

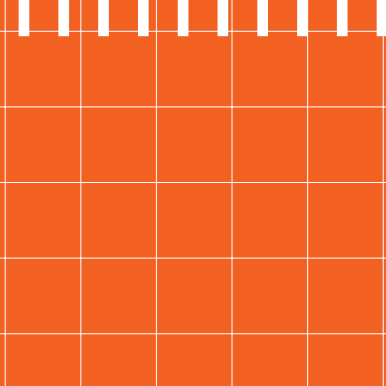
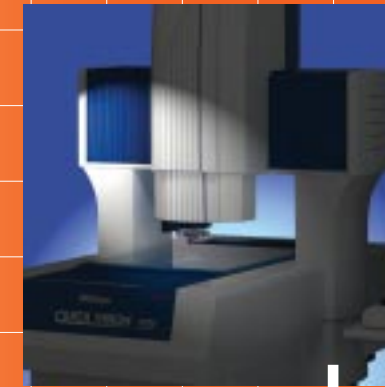
# Mitutoyo

Catalog No. E2003

Mitutoyo

MEASURING INSTRUMENTS CATALOG

No. E2003



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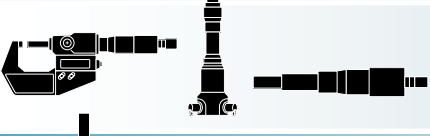



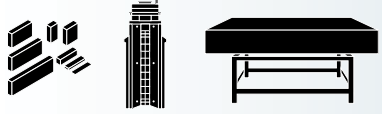



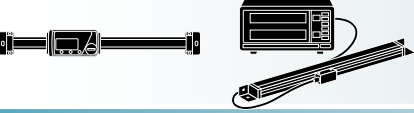

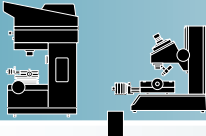







URL: <http://www.mitutoyo.co.jp>

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|   |   | Pages   |   |
|---|---|---|---|
|    | INTRODUCTION MITUTOYO   | 2 — 10  |   |
| ISO 9000  | ISO 9000 CERTIFIED MITUTOYO   | 12 — 20   |    |
| SPC   | SPC (Statistical Process Control)   | 22 — 32   |    |
|    | CALIPERS<br>DEPTH GAGES<br>HEIGHT GAGES   | 34 — 65<br>66 — 69<br>70 — 80                                 |    |
|    | MICROMETERS<br>INSIDE MICROMETERS<br>MICROMETER HEADS   | 82 — 125<br>126 — 141<br>142 — 161                            |    |
|   | DIGIMATIC & DIAL INDICATORS<br>DIAL TEST INDICATORS<br>GAGE HEADS   | 164 — 225<br>226 — 235<br>236 — 260                           |   |
|  | GAUGE BLOCKS<br>REFERENCE GAGES<br>GRANITE SURFACE PLATES   | 262 — 279<br>280 — 289<br>290 — 291                           |  |
|  | MISCELLANEOUS   | 294 — 309   |  |
|  | DIGIMATIC SCALE UNITS<br>LINEAR SCALES  | 312 — 315<br>316 — 330  |  |
|  | PROFILE PROJECTORS<br>MICROSCOPES   | 332 — 353<br>354 — 378  |  |
|  | CONTRACER<br>SURFTEST<br>ROUNDTST   | 382 — 403<br>404 — 425<br>426 — 436                           |  |
|  | HARDNESS TESTING MACHINES   | 438 — 452   |  |
|  | COORDINATE MEASURING MACHINES<br>FLEXIBLE MEASURING GAGE<br>VISION MEASURING SYSTEM<br>LASER SCAN MICROMETERS<br>DO-IT-YOURSELF TOOLS | 454 — 459<br>460 — 461<br>462 — 464<br>465 — 469<br>469 — 471 |  |
|   | INDEX FOR APPLICATIONS<br>ALPHABETICAL INDEX<br>NUMERICAL INDEX   | 474 — 478<br>479 — 483<br>484 — 486                           |   |

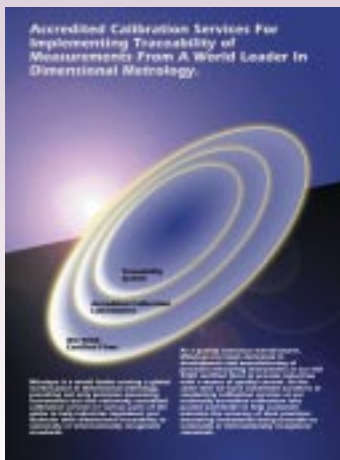
# Index

## INTRODUCTION OF MITUTOYO

|                                 |    |
|---------------------------------|----|
| Mitutoyo Domestic Network ..... | 6  |
| Mitutoyo Overseas Network ..... | 8  |
| Agent/distributors .....        | 10 |

## ISO 9000

|   |    |
|---|----|
| Attaining ISO 9000 Series Registration .....      | 12 |
| Traceability System to National Standard .....    | 14 |
| Worldwide Accredited Calibration Laboratories ... | 16 |
| Products related to ISO 9000 accreditation .....  | 17 |



|                    |    |
|--------------------|----|
| CALIPERS .....     | 34 |
| DEPTH GAGES.....   | 66 |
| HEIGHT GAGES ..... | 70 |



|   |    |
|---|----|
| SPC (STATISTICAL PROCESS CONTROL) ..... | 22 |
|---|----|

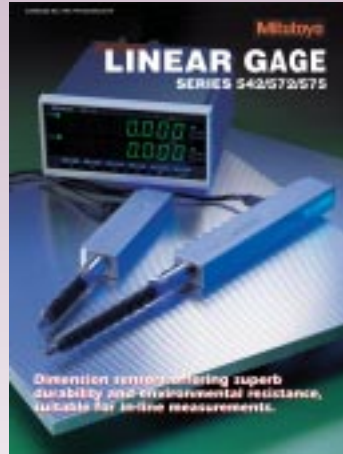


|                         |     |
|-------------------------|-----|
| MICROMETERS             |     |
| Micrometers .....       | 82  |
| Inside Micrometers..... | 126 |
| Micrometer Heads .....  | 142 |



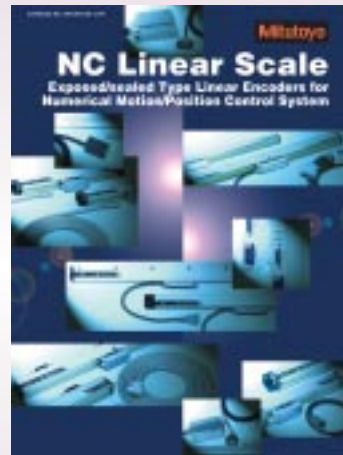
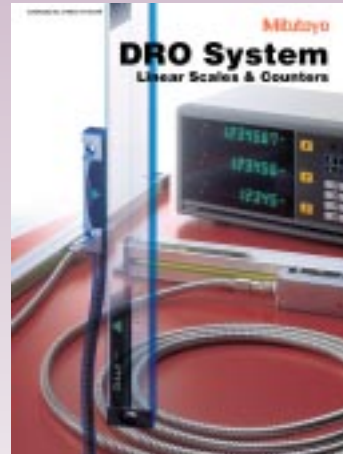
INDICATORS

Digimatic & Dial Indicators ..... 164  
 Dial Test Indicators ..... 226  
 Gage Heads ..... 236



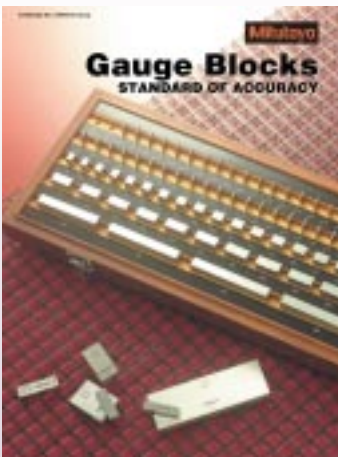
LINEAR ENCODERS

Digimatic Scale Units ..... 312  
 Linear Scales ..... 316

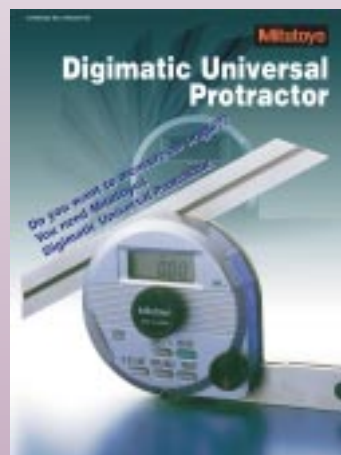


REFERENCE STANDARDS

Gauge Blocks ..... 262  
 Reference Gages ..... 280  
 Granite Surface Plates ..... 290



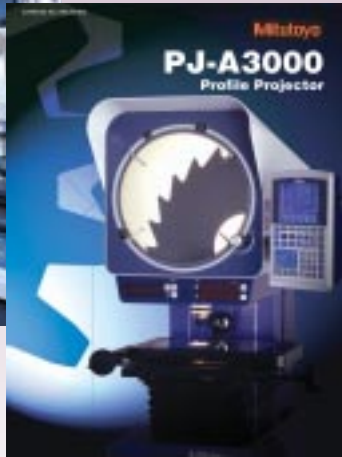
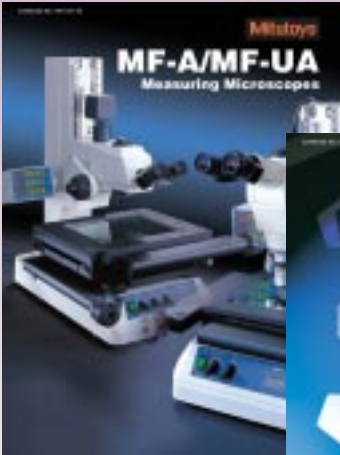
MISCELLANEOUS ..... 294



# Index

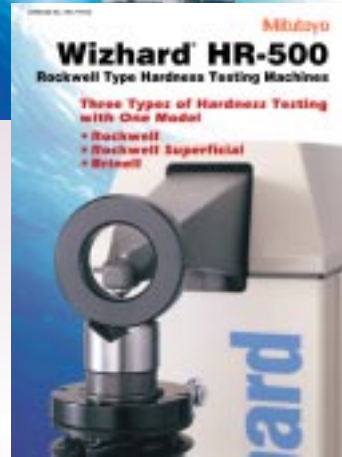
## OPTICAL INSTRUMENTS

Profile Projectors ..... 332  
Microscopes ..... 354



## HARDNESS TESTING MACHINES

..... 438

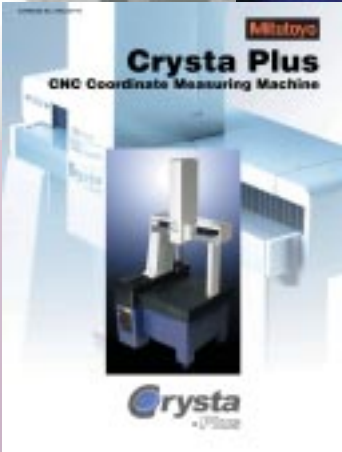
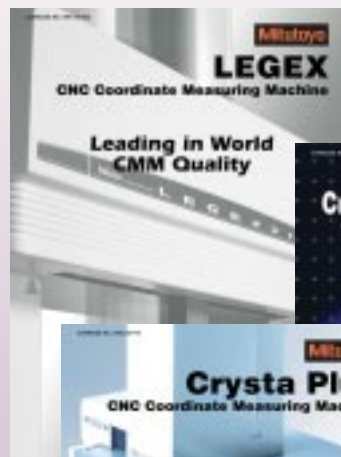


## FORM MEASURING INSTRUMENTS

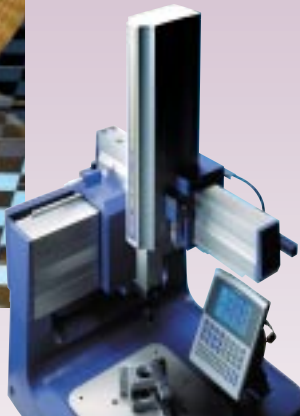
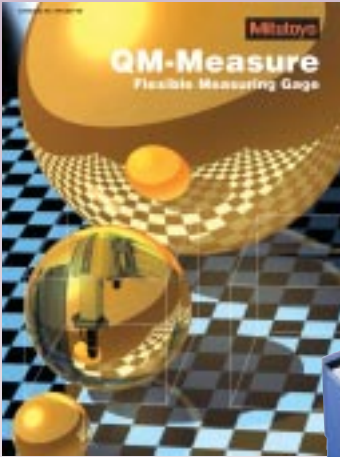
Contracer (contour measurement) ..... 382  
Surftest (surface roughness measurement) ..... 404  
Roundtest (roundness measurement) ..... 426



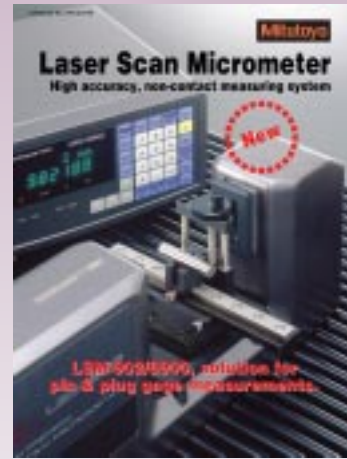
## CMM (Coordinate Measuring Machine) ..... 454



FLEXIBLE GAGES ..... 460



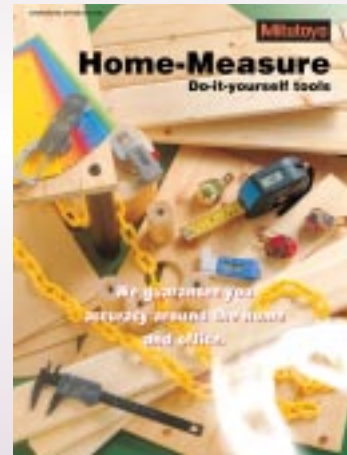
LASER SCAN MICROMETERS ..... 465



VISION MEASURING SYSTEM ..... 462



DO-IT-YOURSELF TOOLS ..... 469



INDEX  
 Index for Applications ..... 474  
 Alphabetical Index ..... 479  
 Numerical Index ..... 484

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Kawasaki Research and Development Center



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Microcord Plant/Machine  
Tool Plant



Nakatsugawa Plant



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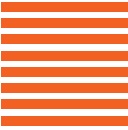
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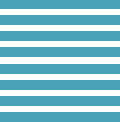
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# ISO 9000

Pages 12 — 20



# Attaining ISO 9000 Series Registration

As a world leading manufacturer of precision measuring instruments, Mitutoyo has implemented ISO 9000 certified quality systems at various sites within the organization all over the globe to better serve customers in dimensional metrology, the basic technology in quality management and quality assurance for all of the manufacturing industries.



- Miyazaki Plant**  
 ISO 9002: Certificate No. JMI-0189  
 Major services: Manufacture and re-calibration of Gauge Blocks and setting rings. Manufacture of micrometer stand bars.
- Kiyohara Plant**  
 ISO 9001: Certificate No. JMI-0241  
 Major services: Design / development and manufacture of Linear Scales
- Tool & Gage Plant**  
 ISO 9001: Certificate No. JQA-0304  
 Major services: Design/development and manufacture of vernier, dial and digital calipers excluding calipers with special measuring faces (jaws), height gauges, depth gauges, digimatic scale unit and linear height.
- Shiwa Plant**  
 ISO 9001: Certificate No. JQA-0319  
 Major services: Design/development/manufacture and servicing of Micrometers
- Microcord Plant**  
 ISO 9001: Certificate No. JQA-0542  
 Major services: Design/development/manufacture and servicing of CMMs and granite surface plates
- Kure Plant**  
 ISO 9001: Certificate No. JSAQ052  
 Major services: Design, manufacture, and servicing of Surface Roughness Measuring Machines, Contour Measuring Machines, Roundness Measuring Machines, and Optical Instruments, Vision Measuring Machines and Working Standards
- Technical Service Business Division**  
 ISO 9002: Certificate No. JSAQ054  
 Major services: Installation, maintenance, inspection and calibration of CMM, Form Measuring Instruments, Optical Instruments and small measuring tools
- Nakatsugawa Plant**  
 ISO 9001: Certificate No. JQA-QM3695  
 Major services: Design/development and manufacture of dial indicators, lever type dial indicators and digital dial indicators (digimatic indicators). The repair of field returns of digital indicators (digimatic indicators)
- Gohara Material Plant**  
 ISO 9002: Certificate No. JQA-QM7729  
 Major services: Manufacturing of cast iron, cast steel, nonferrous alloy, raw materials and ceramic slip cast and parts for measuring tools and instruments, those machining and painting
- Akashi Plant**  
 ISO 9001: Certificate No. JQA-0323  
 Major services: Design/development and manufacture of hardness testing machines, vibrometers, seismological instruments, vibration testing machines and balanching machines
- Calibration Laboratory (U.S.A. Illinois)**  
 ISO 9002: Certificate No. A3203 (UL)  
 Major services: Calibration services of new Mitutoyo or customer owned, dimensional measurement gages to manufactures and/or government specifications.
- Calibration Laboratory (U.S.A. California)**  
 ISO 9001: Certificate No. A7715(UL)  
 Major services: Calibration services of new mitutoyo or customer owned, dimensional measurement gages to manufacturers and/or government specifications
- Los Angeles Plant (U.S.A.)**  
 ISO 9001: Certificate No. 0365 (KPMG)  
 Major services: Design and manufacture of system for the machine tool industry
- Telford Plant (UK)**  
 ISO 9002: Certificate No. FM24221 (BSI)  
 Major services: Manufacture of precision instruments
- Suzano Plant (Brazil)**  
 ISO 9002: Certificate No. 30697 (ABS OE)  
 Major services: Manufacture of coordinate measuring machines, calipers, micrometers etc
- Mitutoyo Germany**  
 ISO 9002: Certificate No. 200015 (LRQA)  
 Major services: Purchase and sales of measuring and test equipment including associated software for production measurement technology and customer service in-house and on site
- Mitutoyo Italiana**  
 ISO 9002: Certificate No. 170323 (LRQA)  
 Major services: Sales and distribution of Mitutoyo precision measuring equipment. Customer support services including technical support, repair and training for measurement equipment
- Mitutoyo France**  
 ISO 9002: Certificate No. 353124 (LRQA)  
 Major services: Servicing for Mitutoyo high accuracy dimensional metrology instruments, including installation, maintenance, repair and internal calibration
- Mitutoyo Scandinavia AB**  
 ISO 9002: Certificate No. 2000-SKM-AQ-1578 (DNV)  
 Major services: Sales and service of precision measuring equipment.
- Mitutoyo Nederland B.V. Veenendaal plant (Mitutoyo Nederland B.V. (Nederland))**  
 ISO 9002: Accreditation No. 654274  
 Major services: Manufacture of CMM



Tool and Gage Plant / Microcord Plant



Miyazaki Plant



Calibration Laboratory (Los Angeles)



Kiyohara Plant



Technical Service Division



Telford Plant (UK)



Kure Plant



Akashi Plant



Suzano Plant (Brazil)



Shiwa Plant



Calibration Laboratory (Chicago)



Mitutoyo Germany



## Attaining ISO 14000 Series Registration

|       | Registered supplier   | Registered Standard | Registration scope   | Registration bodies | Registration number | Date of Original issue |
|-------|---|---------------------|--|---------------------|---------------------|------------------------|
| Japan | Utsunomiya operations/<br>Utsunomiya operations<br>Kiyohara plant | ISO14001: 1996      | Development and manufacture of caliper, height gage, coordinate measuring machine, gage plate, linear scales, counter, and electronic module for digimatic instrument.<br>• Kiyohara plant: development and manufacture of linear scales, counter, and electronic module for digimatic instrument.   | JQA                 | JQA-EM0359          | 1999-03-05             |
|       | Hiroshima operations<br><br>(related organization)                | ISO14001: 1996      | The design and manufacture of measuring instruments (micrometers, from measuring instruments, profile projectors) and standard gauges (gauge blocks)<br><br>• Kure area (Kure plant, machine tool engineering dep, general affairs dep) the design and manufacture of from measuring machines and profile projectors.<br>• Gohara material plant: the production of raw materials and parts for measuring tools and instrument.<br>• Yasuura plant: the production of part for measuring instrument.<br>• Shiwa plant: the design and manufacture of micrometers.<br>• Miyazaki plant: the design and manufacture of gauge blocks.   | JQA                 | JQA-EM0589          | 1999-11-19             |
|       | Kawasaki compound<br><br>(related organization)                   | ISO14001: 1996      | Development, design, manufacture and service (installation, inspection and repair) of precision measuring instruments.<br><br>• Mitutoyo Keihin Service: maintenance of buildings owned by Mitutoyo corp., and transportation of Mitutoyo products.  | JQA                 | JQA-EM0628          | 1999-12-10             |
|       | Nakatsugawa plant   | ISO14001: 1996      | Design, development and manufacture of precision measuring instruments.  | JQA                 | JQA-EM1957          | 2001-12-07             |
|       | Akashi corporation<br><br>(related organization)                  | ISO14001: 1996      | R&D, manufacture, sale and service (installation, examining, repair) for following items.<br>1.Hardness testing machines. 2.Vibrometer, vibration sensors. 3.Vibration testing machines. 4.Balancing machines. 5.Seismographes.<br><br>• Sagami plant: R&D, manufacture, and service(installation, examining, repair) for following items.<br>1.Hardness testing machines. 2.Vibrometer, vibration sensors. 3.Vibration testing machines. 4.Balancing machines. 5.Seismographes.<br>• Meihogiken corporation: repair, examining include calibration for balancing machines, vibrometers. Trusted measuring and correction of unbalance.<br>• Meiho engineering corporation: repair, examining include calibration for seismographs, vibration testing machines. Trusted vibration measuring, testing and analysis. | JQA                 | JQA-EM2073          | 2002-01-11             |
|       | Mitutoyo Sul America Ltda.  | ISO14001: 1996      | Manufacture of coordinate measuring machines; calipers; micrometers; magnetic stands; coating thickness testers; comparator and dial gauge stands; granite and cast iron plates; granite and cast iron blocks and angle plates; bench centers; granite and steel straight parallels; magnetic "v" blocks; bar and ring gauges; steel and granite precision squares; precision sine bars; steel and granite "v" blocks; knife edges; cylindrical squares and precision levels; hardness testing machines  | ABS-OE              | 68991               | 2002-04-12             |

## Conformance to CE Marking

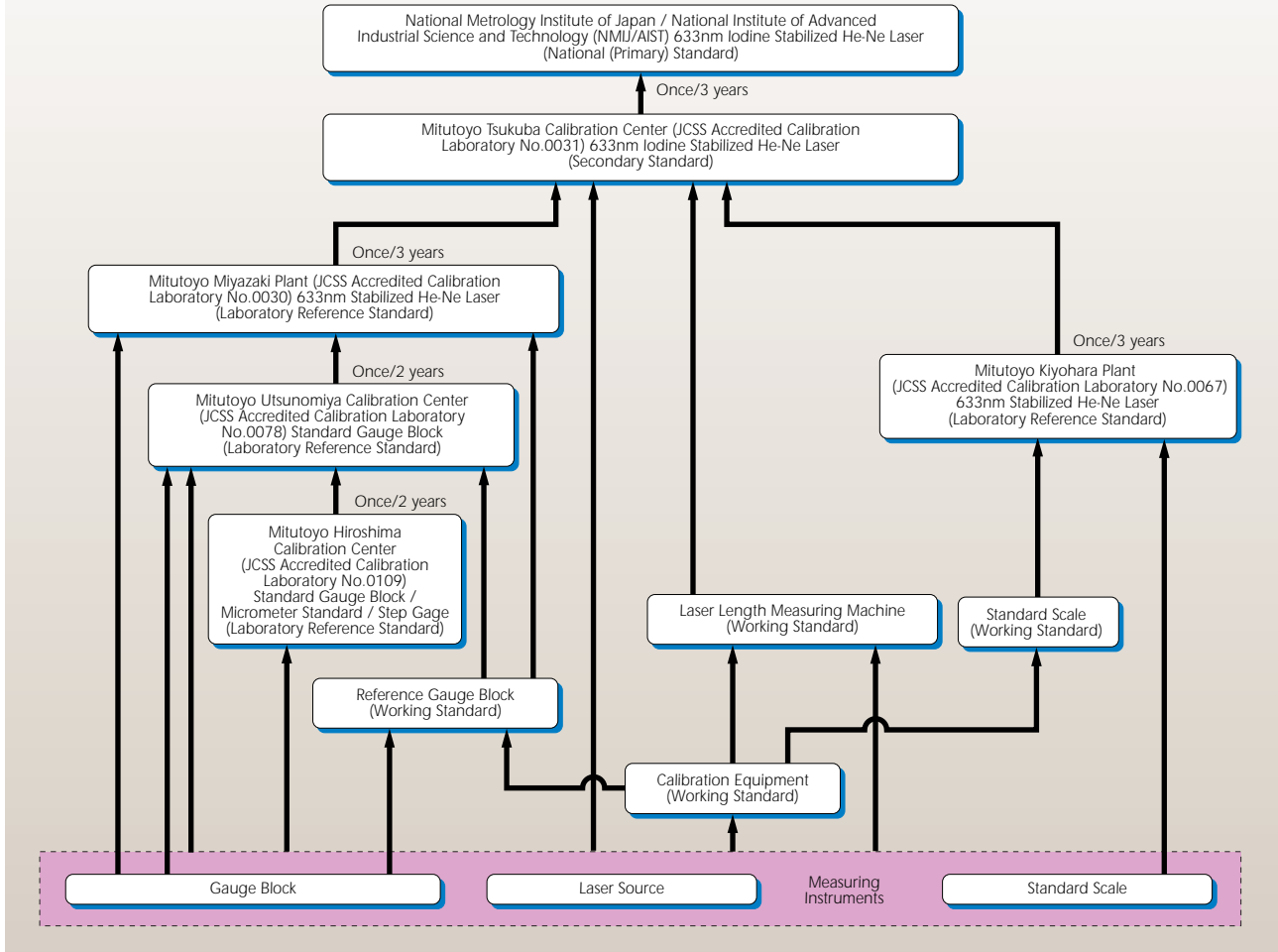
In order to improve the safety, each plant has programs to comply with the Machinery Directives, the EMC Directives, and the Low Voltage Directives. Compliance to CE marking is also satisfactory. CE stands for "Conformité Européenne". The CE marking displayed on the products indicates that the product complies with the requirements drawn up by the European Community for safety, health, environment and customer protection.



# Traceability System to National Standard

## Traceability System of Length Standard

Traceability: Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties.  
 Traceability of the accuracy of measuring instruments: A documented chain of comparison connecting the accuracy of a measuring instrument to other measuring instruments of higher accuracy and ultimately to a primary standard.

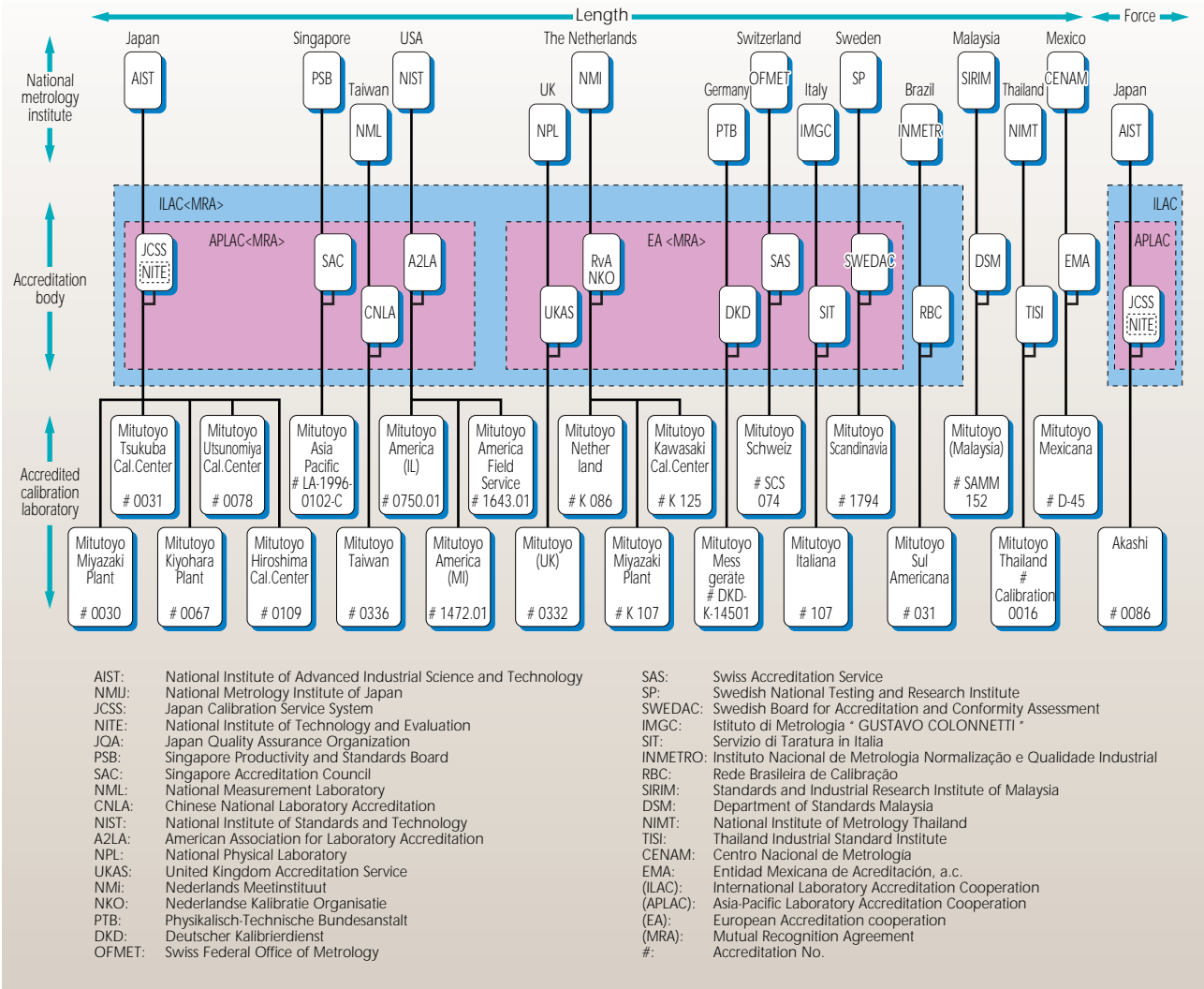


**Iodine Absorption Stabilized He-Ne Laser as the standard for length measurement (At Tsukuba Calibration Center)**



**Interferometer as the standard for Gauge Block calibration (At Miyazaki Plant)**

## Mitutoyo Group Accredited Calibration Laboratories



**Interferometer as the standard for Linear Scale calibration (At Kiyohara Plant)**

Mitutoyo comprises 16 accredited calibration laboratories posted worldwide as illustrated schematically above, where each of the labs has established and implemented traceability of their reference 1standards through calibration to nationally or internationally recognized standards. It is with such a traceability system implemented within Mitutoyo that it can contribute to industries worldwide in helping customers implement the base for their quality management and quality assurance program.



## Worldwide Accredited Calibration Laboratories

Being nationally accredited calibration laboratories, Mitutoyo conducts calibration services at various parts of the globe to help customers implement and maintain the traceability of accuracy of their precision measuring tools and instruments. Scope of calibration service at each of our 16 accredited calibration laboratories is shown below, where we issue the certificate of calibration that carries the national accreditation mark in conformance with the relevant accreditation scheme.

Calibration: A set of operations which establishes, under specified conditions, the relationship between values indicated by measuring instrument or system, or values represented by a material measure, and the corresponding known values of a measure.

| Department                     |  | Category                        |  | Accreditation  |                    |                   |                 |
|--------------------------------|--|---------------------------------|--|--|--------------------|-------------------|-----------------|
|                                |  |                                 |  | Scope of calibration service   | Accreditation body | Accreditation No. | Accredited date |
| Mitutoyo                       | Japan  | Mitutoyo Corporation            | Miyazaki Plant                                 | Gauge Block  | NITE (JCSS)        | 0030              | 1994-05-02      |
|                                |  |                                 |  | Gauge Block  | RvA NKO            | K 107             | 1997-02-20      |
|                                |  |                                 | Kiyohara Plant                                 | Line-Standard (Standard Scale)   | NITE (JCSS)        | 0067              | 1996-08-07      |
|                                |  |                                 | Tsukuba Calibration Center.                    | Wave length (633nm range) of laser light source for length measurement | NITE (JCSS)        | 0031              | 1994-05-02      |
|                                |  |                                 | Utsunomiya Calibration Center.                 | Standard, Measuring Tool   | NITE (JCSS)        | 0078              | 1998-05-06      |
|                                |  |                                 | Kawasaki Calibration Center.                   | Measuring Tool, Measuring Instrument                                   | RvA NKO            | K 125             | 2001-01-24      |
|                                |  |                                 | Hiroshima Calibration Center.                  | Measuring Tool   | NITE (JCSS)        | 0109              | 2001-04-11      |
|                                | Overseas                                       | Mitutoyo (UK) Ltd.              | Standard, Measuring Tool, Measuring Instrument | UKAS   | 0332               | 1991-07-30        |                 |
|                                |  | Mitutoyo Sul Americana Ltda.    | Standard, Measuring Tool, Measuring Instrument | RBC  | 031                | 1992-09-15        |                 |
|                                |  | Mitutoyo Nederland B.V.         | Standard, Measuring Instrument                 | RvA NKO  | K 086              | 1994-10-14        |                 |
|                                |  | Mitutoyo Meßgeräte GmbH         | Gauge Block                                    | DKD  | DKD-K-14501        | 1995-01-10        |                 |
|                                |  | Mitutoyo Asia Pacific Pte. Ltd. | Standard, Measuring Tool, Measuring Instrument | SAC (SAC-SINGLAS)  | LA-1996-0102-C     | 1996-11-08        |                 |
|                                |  | Mitutoyo Schweiz AG             | CMM  | SAS  | SCS 074            | 1996-12-18        |                 |
|                                |  | Mitutoyo America Corporation    | IL Cal.Lab.                                    | Standard, Measuring Tool, Measuring Instrument                         | A2LA               | 0750.01           | 1998-04-20      |
|                                |  |                                 | MI Cal.Lab.                                    | Standard, Measuring Tools  | A2LA               | 1472.01           | 2000-02-03      |
|                                |  |                                 | Field Service                                  | CMM, Hardness Testing Instrument                                       | A2LA               | 1643.01           | 2002-01-15      |
|                                |  | Mitutoyo Italiana S.R.L.        | Standard, CMM                                  | SIT  | 107                | 1998-05-01        |                 |
|                                |  | Mitutoyo Taiwan Co., Ltd.       | Measuring Instrument                           | CNLA   | 0336               | 1998-06-15        |                 |
|                                |  | Mitutoyo (Malaysia) Sdn, Bhd.   | Measuring Tool                                 | DSM (SAMM)   | SAMM 152           | 1998-10-15        |                 |
|                                |  | Mitutoyo (Thailand) Co., Ltd.   | Standard, Measuring Tool                       | TISI   | Calibration 0016   | 2000-09-21        |                 |
| Mitutoyo Mexicana S.A. de C.V. | Standard, Measuring Tool, Measuring Instrument | EMA                             | D-45   | 2000-11-21   |                    |                   |                 |
| Mitutoyo Scandinavia AB        | Gauge Block, CMM                               | SWEDAC                          | 1794   | 2002-03-04   |                    |                   |                 |
| Akashi Corporation.            |  |                                 |  | Force-Proving Instrument: Compressive Force                            | NITE (JCSS)        | 0086              | 2000-05-30      |

NITE: National Institute of Technology and Evaluation  
 JCSS: Japan Calibration Service System  
 RvA NKO: Nederlandse Kalibratie Organisatie  
 UKAS: United Kingdom Accreditation Service  
 RBC: Rede Brasileira de Calibração  
 DKD: Deutscher Kalibrierdienst  
 SAC: Singapore Accreditation Council  
 SACSINGLAS: Singapore Accreditation Council-Singapore Laboratory  
 SINGLAS: Accreditation Scheme  
 SAS: Swiss Accreditation Service

A2LA: American Association for Laboratory Accreditation  
 SIT: Servizio di Taratura in Italia  
 CNLA: Chinese National Laboratory Accreditation  
 DSM: Department of Standards Malaysia  
 SAMM: Skim Akreditasi Makmal Malaysia  
 TISI: Thai Industrial Standard Institute  
 EMA: Entidad Mexicana de Acreditación, a.c.  
 SINGLAS: Accreditation Scheme  
 SWEDAC: Swedish Board for Accreditation and Conformity Assessment

### Scope of end standard calibration

#### At Miyazaki Plant

Type Interferometry and Comparison  
 Range 0.1mm up to 600mm  
 Measurement uncertainty (coverage factor k=2)  
 0.1mm up to 100mm  $0.03\mu\text{m}+0.2\times 10^{-6}L^*$  (at interferometry)  
 $0.5\mu\text{m}+0.35\times 10^{-6}L^*$  (at comparison)  
 Over 100mm up to 600mm  $(0.02+L/6000)\mu\text{m}^{**}$  (at interferometry)  
 $(0.04+L/5000)\mu\text{m}^{**}$  (at comparison)

#### At Utsunomiya Calibration Center

Type Comparison  
 Range 0.5mm up to 250mm  
 Measurement uncertainty (coverage factor k=2)  
 0.5mm up to 100mm  $0.06\mu\text{m}$   
 Over 100mm up to 250mm  $(0.04+L/2500)\mu\text{m}^{**}$

### Scope of laser wavelength calibration for length measurement

Range 633nm  
 Measurement uncertainty (coverage factor k=2)  $(1\times 10^{-8})$

### Scope of line standard calibration

Range Up to 500mm  
 Measurement uncertainty (coverage factor k=2)  
 Up to 300mm  $0.6\mu\text{m}$   
 Over 300mm up to 500mm  $0.7\mu\text{m}$

\* L=nominal length ( $\mu\text{m}$ )  
 \*\* L=nominal length (mm)



**Reference Gage**

Rectangular Gauge Block Sets

SERIES 516



See pages 263 through 271 for details.

**FEATURES**

- Mitutoyo offers a selection of rectangular gauge blocks available in choice of metric or inch, steel or ceramic (CERA) types and ISO/JIS/DIN or Federal Specification or British Standard.
- All types are prepared by highly advanced techniques in the most modern facilities to produce the fine characteristics required of gauge blocks.
- Provided with inspection certificate.
- Mitutoyo CERA Blocks are some of the finest gauge blocks available anywhere in the world. CERA Blocks are made of zirconia ceramic.
- Steel gauge blocks are made of a special steel alloy.

Square Gauge Block Sets

SERIES 516



See pages 272 and 276 for details.

**FEATURES**

- Mitutoyo offers a selection of square gauge blocks available in choice of metric or inch, steel or ceramic (CERA) types and ISO/JIS/DIN or Federal Specification.
- All types are prepared by highly advanced techniques in the most modern facilities to produce the fine characteristics required of gauge blocks.
- Provided with inspection certificate.

Gauge Blocks



See pages 262 through 279 for details.

**FEATURES**

- Mitutoyo offers individual Gauge Blocks as follows.  
 Rectangular Gauge Blocks (0.1-1000mm/.004"-20")  
 CERA Rectangular Gauge Blocks (0.5-500mm/.03125"-20")  
 Square Gauge Blocks (0.5-500mm/.01"-20")  
 CERA Square Gauge Blocks (.05"-4")

Black Granite Surface Plates

SERIES 517



Note: Steel Stands are optional.

See pages 290 and 291 for details.

**FEATURES**

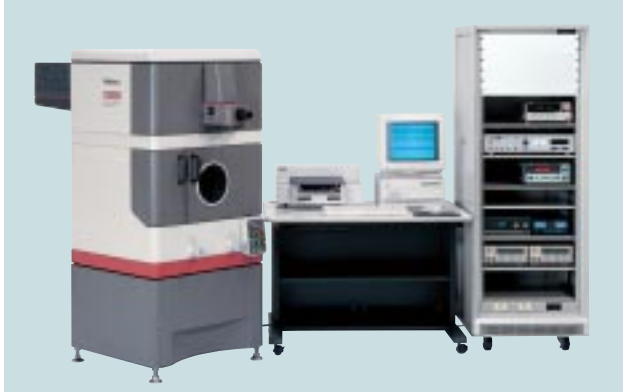
- Provided with a reference surface for precision height and squareness measurements and layout.
- Sizes are available from 300 x 300mm and up to 2000 x 1500mm.
- Various granite accessories are also available.

## Gauge Block

### Gauge Block Calibration Equipment

Following equipment are available for calibrating gauge blocks.

#### Automatic Gauge Block Interferometer



See page 278 for details.

#### FEATURES

- Interferometer for automatic calibration of gauge blocks of sizes from 0.1mm to 250 mm.
- He-Ne laser with high wavelength stability is used as a light source.
- As distribution of the light intensity of interference fringes is automatically detected and analyzed no human error is involved in measurement.

### Gauge Block Comparators



See page 278 for details.

#### FEATURES (GBCD-100A)

- Automatically compares gauge blocks with a standard gauge block and determines accuracies.
- The dual-probe head type differential Mu-Checker is adopted to minimize the measurement error due to the warp of gauge blocks.



See page 279 for details.

#### FEATURES (GBCD-250)

- Dual head feature eliminates the error due to warp of thin gauge blocks.
- A 103 gauge block set of grade 1 or 2 can be calibrated with only 8 reference gauge blocks thanks to the  $\pm 3$ mm measuring range of the Laser Hologage.

## Ring Gage

### Ring Gage Calibration Equipment

#### Ring Gage Master



See page 287 for details.

#### FEATURES

- The laser holoscale eliminates the need for a reference gauge block set and reference ring gages.
- The line of measurement of the ring gage is on the axis of standard, meeting the Abbe's principle and ensuring higher measuring accuracy.
- Stylus change is not required for the entire measuring range.
- Enhanced repeatability and lower measuring force achieved with the air bearing on the stylus carriage guide.
- Workpiece alignment is easy to perform with the specially designed table which is capable of translation, tilting, elevation, and 90 deg rotation. The model with analog meter will further facilitate workpiece translation and tilting.

**Outside Micrometer**

Rectangular Gauge Block Sets for Outside Micrometer Inspection

SERIES 516



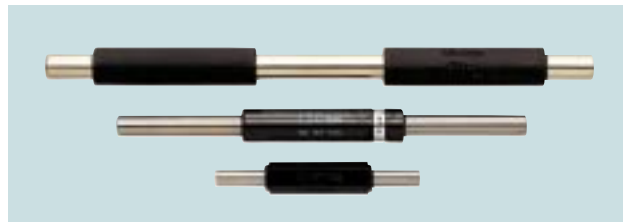
See page 267 for details.

**FEATURES**

- Gauge block sets specially assorted for inspection of instrumental error of outside micrometer, flatness and parallelism of measuring faces.
- Mitutoyo offers a selection of gauge block sets available in choice of metric or inch, steel or ceramic (CERA) types.

Micrometer Standards

SERIES 167



See page 120 for details.

**FEATURES**

- Used for zero point adjustment of outside micrometers.
- Sizes available from 25 mm up to 100mm.
- Standards for screw thread micrometers and V-anvils micrometers are also available.



**Depth Micrometer**

Depth Micro Checker

SERIES 515



See page 287 for details.

**FEATURES**

- The Depth Micro Checker is designed to efficiently check the zero point of a depth micrometer.

**Inside Micrometer**

Inside Micro Checker

SERIES 515



See page 286 for details.

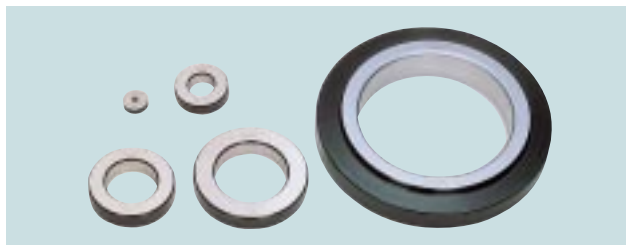
**FEATURES**

- The Inside Micro Checker is designed to efficiently check the zero point of a tubular inside micrometer.
- Each measuring block is made of zirconia-based ceramic and is free from deterioration and dimensional changes over time.

**Inside Micrometer and Bore Gage**

Setting Rings

SERIES 177



**FEATURES**

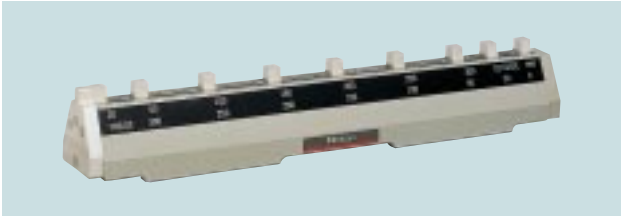
- Used for quick zero adjustment of Holtest, bore gages and inside micrometers.
- Ceramic Setting Rings are also available.
- Sizes are available between 1-300mm (.04"-12")

See page 141 for details.

## Caliper and Height Gage

### Caliper Checker

SERIES 515



See page 286 for details.

#### FEATURES

- The Caliper Checker is designed to calibrate vernier, dial and Digimatic calipers of various types. It is composed of permanently wrung, high-grade gauge blocks in a protective casting.

## Coordinate Measuring Machine

### Check Master

SERIES 515



See pages 284 and 285 for details.

#### FEATURES

- A stack of 10mm (.5") gauge blocks is fixed in a rigid cast iron frame to form a reference gage, providing a means of calibrating coordinate measuring machines and inspecting the feed accuracy of machine tool tables.

### CERA Straight Master

SERIES 311



See page 295 for details.

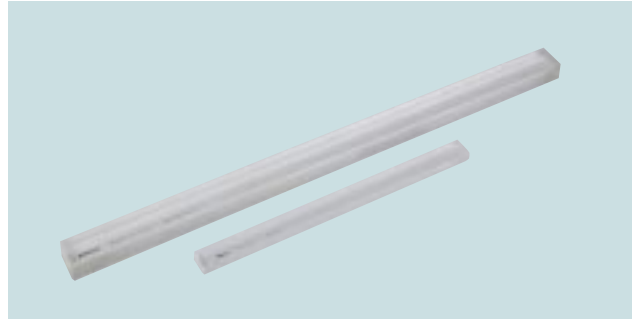
#### FEATURES

- Alminaceramic made
- 50mm / 100" pitch gradation scales
- Precision lapped measuring surface
- Little secular change
- Lightweight

## Length Standard

### Standard Scale

SERIES 182



See page 289 for details.

#### FEATURES

- Made of optical glass. Used as a line standards for calibrating various scales.
- Accuracy:  $(0.5+L/1000)\mu\text{m}$  (at 20°C)
- Provided with calibration certificate.

### Working Standard Scale

SERIES 182



See page 289 for details.

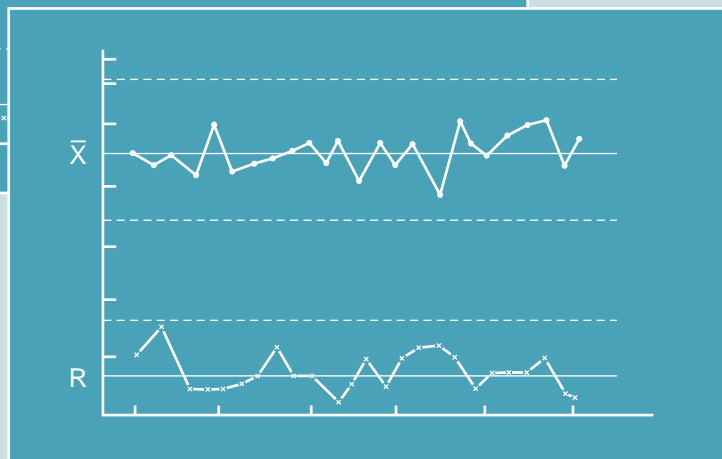
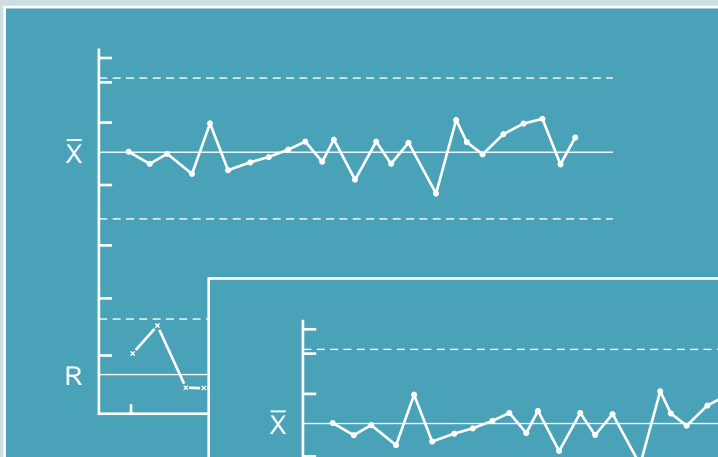
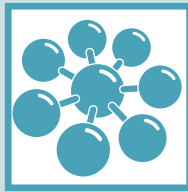
#### FEATURES

- Made of soda-lime glass. Used as a reference for calibrating feeding accuracy of tables of various equipment.
- Accuracy:  $(1.5+2L/1000)\mu\text{m}$  (at 20°C)
- Available in various sizes: 50mm, 100mm, 150mm, 250mm, 300mm, 400mm, 500mm, 750mm, and 1000mm in 13 types depending on the line thickness and scale pitch.

# SPC

Pages 22 — 32

# (Statistical Process Control)



# Multiplexer-10F

SERIES 264

Digimatic/RS-232C Interface Unit



264-002

## FEATURES

- Measurement data entry, through four independently controlled channels, can be executed by either the LOAD switch (MUX-10F), the optional foot switch (937179T), the DATA button (gage) or exe command (PC).

## SPECIFICATIONS

|                 |   |
|-----------------|---|
| Order No.       | 264-002 (w/100V AC adaptor)             |
|                 | 264-002A (w/120V AC adaptor)            |
|                 | 264-002D (w/220V AC adaptor)            |
|                 | 264-002E (w/240-220V AC adaptor)        |
| Data input port | 4 channels for Mitutoyo Digimatic gages |
| Data output     | Via RS-232C interface                   |
| Power supply    | 9V DC, 500mA (via AC adaptor)           |
| Dimensions      | 91.4(W) X 92.8(D) X 50.4(H) mm          |
| Mass            | 220g                                    |

### Technical Data

**Data output format:** RS-232C (D-SUB 9P in connector)  
**Data transmission method:** Half-duplex transmission  
**Data transmission code:** ASCII/JIS  
**Data length:** 8 bits  
**Start bit:** 1 bit  
**Stop bit:** 1 bit  
**Parity check:** Non  
**Synchronizing method:** Start-stop system  
**Data transmission speed:** 300bps, 600bps, 1200bps, 2400bps, 9600bps, 19200bps

## OPTIONAL ACCESSORIES

| Order No. | Description |
|-----------|-------------|
| 937179T   | Foot switch |

# Input Tools

SERIES 264

Digimatic Gage/PC Data Input Device



264-007 for serial/RS-232C port

264-005 for serial/keyboard port

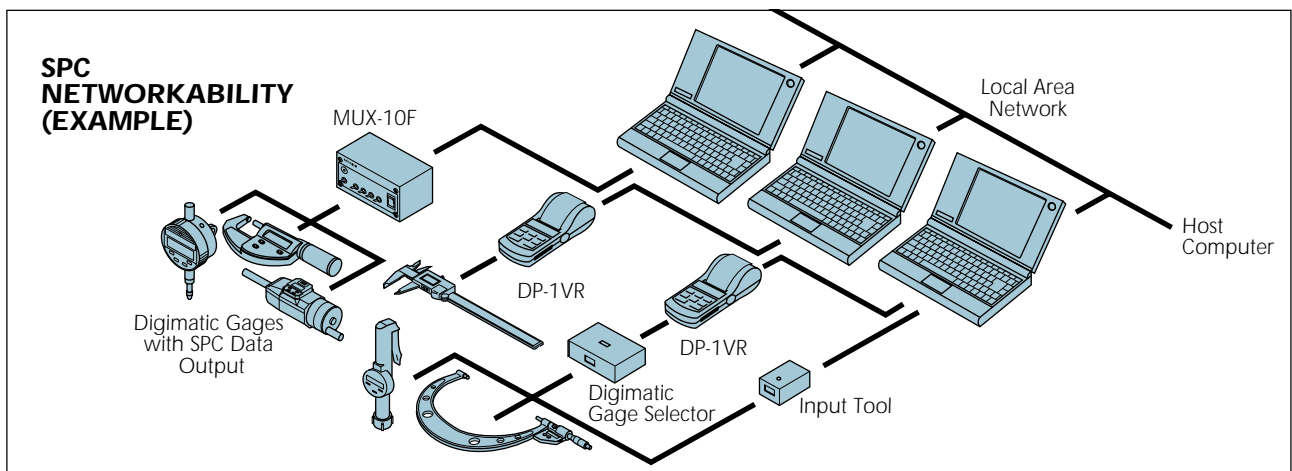


## FEATURES

- This is a interface unit to directly enter the measurement data of Mitutoyo Digimatic Gage to PC.
- The data entered is available for a spreadsheet software.
- Two choice of data communication method.

## SPECIFICATIONS

| Order No.        | 264-005                               | 264-007             |
|------------------|---------------------------------------|---------------------|
| Data input port  | 1 channel for Mitutoyo Digimatic gage |                     |
| Data output port | Serial/keyboard port                  | Serial/RS-232C port |
| Power supply     | Supplied from PC                      |                     |
| Dimensions       | 60 (W) X 34 (D) X 22 (H) mm           |                     |
| Mass             | 78g                                   |                     |



## DP-1VR

### SERIES 264

#### Digimatic Mini-Processor



264-504

#### FEATURES

- One touch setting the printing paper.
- Large character.
- Clock function.
- 9999 pieces of processing data.

#### OPTIONAL ACCESSORIES

| Order No. | Description                       |
|-----------|-----------------------------------|
| 09EAA084* | RS-232C changing cable (1m, 9pin) |
| 965516*   | GO/±NG judgment cable             |
| 937179T   | Foot switch                       |

\*It is impossible to use the both RS-232C cable and GO/±NG judgment cable at the same time.

#### SPECIFICATIONS

| Order No.             | 264-504  | 264-504A | 264-504D | 264-504E |
|-----------------------|--|----------|----------|----------|
| Voltage               | 100V   | 120V     | 220V     | 240/230V |
| Printing method       | Thermal line printer   |          |          |          |
| Printing dot          | 384dot (8dot/mm)   |          |          |          |
| Printing speed        | 6.5mm/s (using AC adapter)   |          |          |          |
| Printing paper        | 48m  |          |          |          |
| Printing line         | Approx. 6500 lines for large characters<br>Approx. 12000 lines for normal characters   |          |          |          |
| Processing capacity   | mode 1/2/3: 9999 data<br>mode 0: 100000 data   |          |          |          |
| Printing data         | Measurement data, GO/±NG judgment, number of data, maximum/minimum value, range, average, standard deviation, number of defective, fraction defective, process capability index, histogram, D-chart, control chart generation for Xd-bar and control limit data, date and time |          |          |          |
| Output function       | Output the measuring data (RS232C) or GO/±NG judgment  |          |          |          |
| Input timer           | 0.25s, 1s, 5s, 30s, 1min, 30min, 60min   |          |          |          |
| Power                 | AC adapter 6V (No interchangeable to DP-1HS) Electric battery: LR6 (alkaline), Ni-Mh (AA size)   |          |          |          |
| Battery life          | 10 years (clock battery), 10000 lines (1600mA 1time/5 sec. using the nickel hydrofluoric battery)  |          |          |          |
| Operating temperature | 0°C to 45°C (using AC adapter), 10°C to 45°C (using battery)   |          |          |          |
| Storage temperature   | -10°C to 50°C  |          |          |          |
| Dimensions            | 94(W)x201(D)x75.2(H) mm  |          |          |          |
| Mass                  | 390g   |          |          |          |

**Mode 0:**  
Record the measurement data and tolerance judgment.

**Mode 1:**  
Record the measurement data, statistical analysis and histogram.

**Mode 2:**  
A "D-chart" can be used to describe measurement data displacement visually. It's also possible to record the measurement data, statistical analysis and histogram at the same time.

**Mode 3:**  
Automatically record the various calculation results to make a  $\bar{X}$ -R control chart.



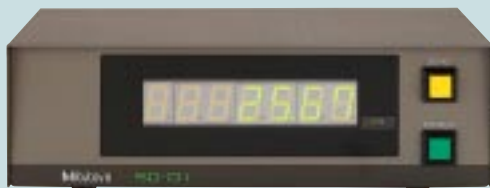
# Digimatic Display Units

## SERIES 572

With Large, Bright LED for Easy Reading



**SD-D1 Single-function Type Digimatic Display Unit**



572-001



Rear view

**SD-D2 Multi-function Type Digimatic Display Unit**



572-021



Rear view

The Digimatic Display Units offer a large LED display for Mitutoyo Digimatic gages with output. The bright LED readout is ideal for low-light situations or when the gage must be inserted into an area where its own LCD cannot be viewed directly.

### FEATURES

- Provide real-time readings and display measurements in inch or metric.
- The multi-function type Display Unit (SD-D2) comes with functions including zero-setting, presetting, GO/±NG judgment, GO/±NG analog signal output, and counting direction switching.
- Can be zero-set independently of the gage.
- Digimatic output function for connection with data processing units in the SPC system.

### SPECIFICATIONS

#### Metric

| Model No.        | SD-D1  | SD-D2  |
|------------------|--|--|
| Order No.        | 572-001 (100V AC)<br>572-001A (120V AC)<br>572-001D (220V AC)<br>572-001E (240-220V AC)                            | 572-021 (100V AC)<br>572-021A (120V AC)<br>572-021D (220V AC)<br>572-021E (240-220V AC)  |
| Data input port  | 1  |  |
| Display          | 7-digit green LED  |  |
| Quantizing error | ±1 count   |  |
| Resolution*      | 0.001mm, 0.01mm  |  |
| Functions        | <ul style="list-style-type: none"> <li>• Zero-Setting</li> <li>• SPC data output</li> <li>• Error alarm</li> </ul> | <ul style="list-style-type: none"> <li>• Zero-Setting</li> <li>• Presetting</li> <li>• GO/±NG judgment</li> <li>• GO/±NG output</li> <li>• Counting direction switching</li> <li>• SPC data output</li> <li>• Error alarm</li> </ul> |
| Power supply     | 9V DC, 200mA<br>(via AC adaptor)   | 9V DC, 200mA<br>(via AC adaptor)   |
| Dimensions       | 200(W)X120(D)X66(H)mm  | 236(W)X120(D)X66(H)mm  |
| Mass             | 1.1kg  | 1.3kg  |

\*Depending on the gage caonnected

#### Inch / Metric

| Model No.   | SD-D1   | SD-D2   |
|-------------|---|---|
| Order No.   | 572-011 (100V AC)<br>572-011A (120V AC)<br>572-011D (220V AC)<br>572-011E (240-220V AC) | 572-031 (100V AC)<br>572-031A (120V AC)<br>572-031D (220V AC)<br>572-031E (240-220V AC) |
| Resolution* | .00005", .0005",<br>0.001mm, 0.01mm   | .00005", .0001",<br>.0005", .001",<br>0.001mm, 0.01mm                                   |

\*Depending on the gage connected.

Note: The SD-D1 Display Unit can only be used with Digimatic gages which have .00005"/0.001mm or .0005"/0.01mm readout.



### OPTIONAL ACCESSORIES

| Order No. | Description                     |
|-----------|---------------------------------|
| 936937    | SPC cable for data output (1m)  |
| 965014    | SPC cable for data output (2m)  |
| 907020    | GO/±NG signal output cable (2m) |

# Digimatic Multi-Unit

## SERIES 572

6-channel Multi-point Measuring Unit



572-052

Rear view

### FEATURES

- The Digimatic Multi-Unit receives measurement data from multiple (up to six) Digimatic gages.
- By connecting a multi-function type Digimatic Display Unit (SD-D2) to the Multi-Unit, measurement from each gage can be displayed, and max, min, and range measurements can be made for the connected gages. Also possible are GO/±NG judgments on the measurement data individually or collectively.
- Tolerance judgment and zero-setting can be triggered using a foot switch (937179T).
- The back up memory stores the tolerance entered, after the power to the Multi-Unit is turned off.
- Two connecting cables are provided for the communication with a Digimatic Display Unit.

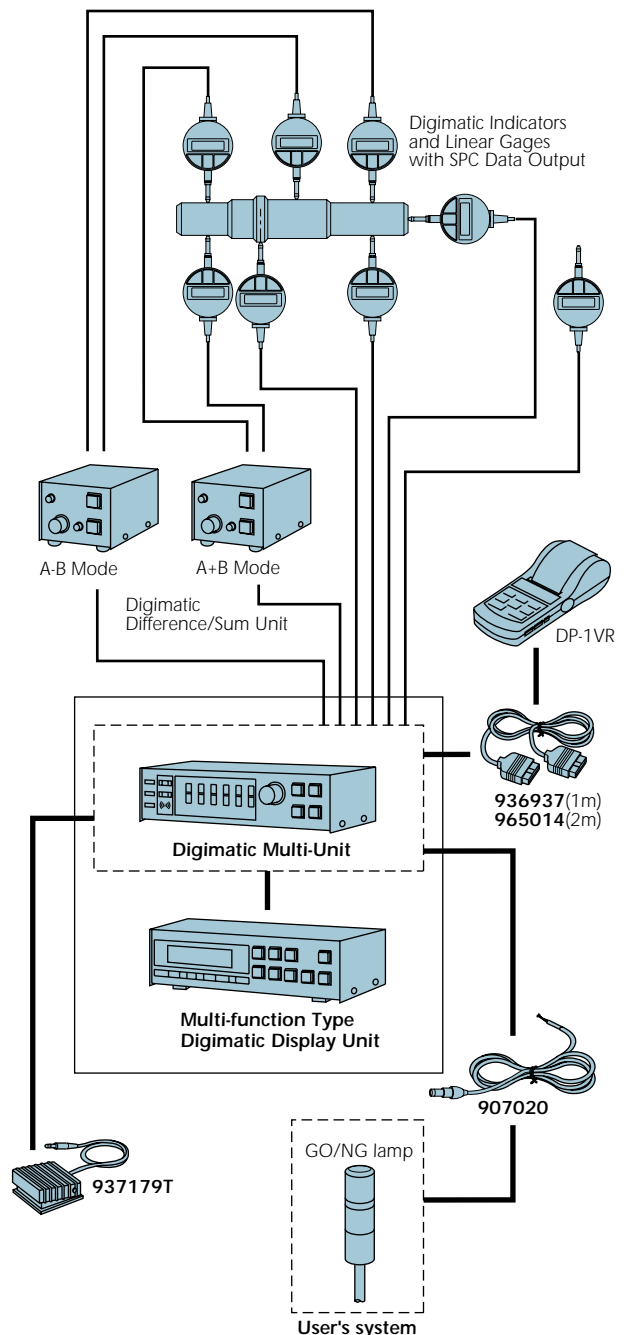
### SPECIFICATIONS

|                 |  |                         |
|-----------------|--|-------------------------|
| Order No.       | 572-052  | (w/100V AC adaptor)     |
|                 | 572-052A   | (w/120V AC adaptor)     |
|                 | 572-052D   | (w/220V AC adaptor)     |
|                 | 572-052E   | (w/240-220V AC adaptor) |
| Data input port | 6  |                         |
| Functions       | <ul style="list-style-type: none"> <li>• MAX/MIN measurement</li> <li>• Range (MAX-MIN) measurement</li> <li>• Zero-Setting</li> <li>• Presetting</li> <li>• GO/±NG judgment (Buzzer and LED)</li> <li>• GO/±NG signal output</li> <li>• Error alarm</li> <li>• SPC data output</li> </ul> |                         |
| Power supply    | 9V DC, 500mA (via AC adaptor)  |                         |
| Dimensions      | 236(W) X 120(D) X 66(H) mm   |                         |
| Mass            | 1.3kg  |                         |

### OPTIONAL ACCESSORIES

| Order No. | Description                     |
|-----------|---------------------------------|
| 936937    | SPC cable for data output (1m)  |
| 965014    | SPC cable for data output (2m)  |
| 907020    | GO/±NG signal output cable (2m) |
| 937179T   | Foot switch                     |

### Examples of Connections



# Digimatic Difference/Sum Unit

SERIES 572

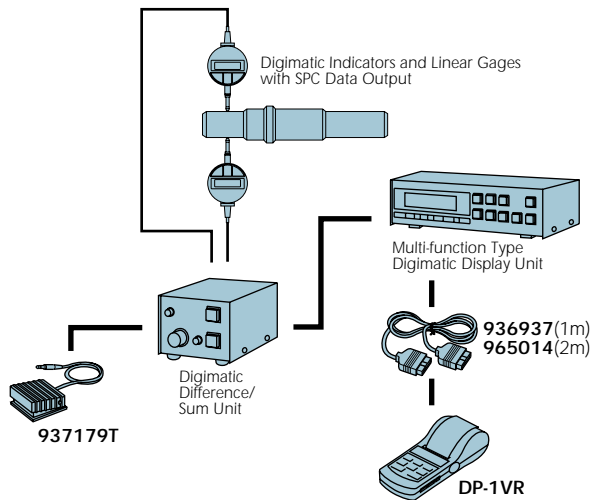
For Multiple-gage Measurements



572-041

Rear view

## Examples of Connections



Note: Data output can be sent to a Mitutoyo Data Processor directly or indirectly through the Digimatic Display Unit.

## FEATURES

- The Digimatic Difference/Sum Unit will add or subtract the measurements from two Digimatic gages and output results to a remote Display Unit or SPC data processor.
- Zero-setting can be done at the Difference/Sum Unit or by external foot switch (937179T) and direct measurements from a single connected gage can also be passed on without alterations.
- One connecting cable is provided for SPC data output.

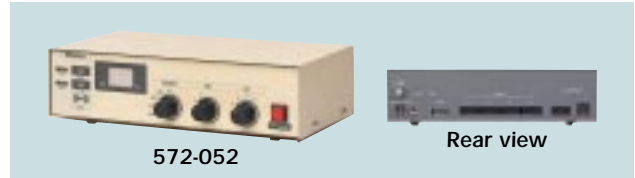
## SPECIFICATIONS

|                  |   |
|------------------|---|
| Order No.        | 572-041 (w/100V AC adaptor)<br>572-041A (w/120V AC adaptor)<br>572-041D (w/220V AC adaptor)<br>572-041E (w/240-220V AC adaptor) |
| Data input port  | 2   |
| Calculation mode | A+B, A-B, A, B  |
| Functions        | <ul style="list-style-type: none"> <li>• Zero-Setting</li> <li>• SPC data output</li> </ul>                                     |
| Power supply     | 9V DC, 500mA (via AC adaptor)   |
| Dimensions       | 76(W) X 120(D) X 66(H) mm   |
| Mass             | 0.55kg  |

# Digimatic Extension Unit

SERIES 572

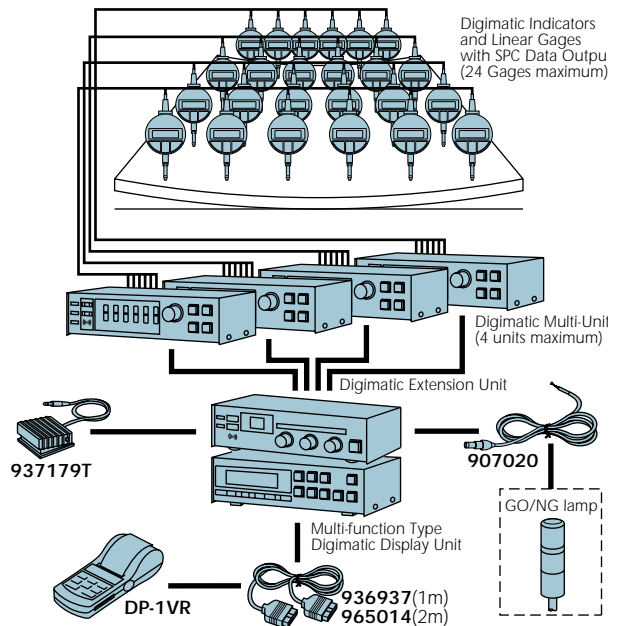
For Multiple-gage Measurements



572-052

Rear view

## Examples of Connections



## FEATURES

- Up to four Multi-Units (shown on previous page) can be connected through the Extension Unit to configure a GO/±NG judgment system for multiple Digimatic gages (up to 24 gages).
- Max, min, and range measurements can be made for the connected gages.
- Tolerance judgment can be triggered using a foot switch (937179T).
- One connecting cable is provided for the connection with a Digimatic Display Unit.

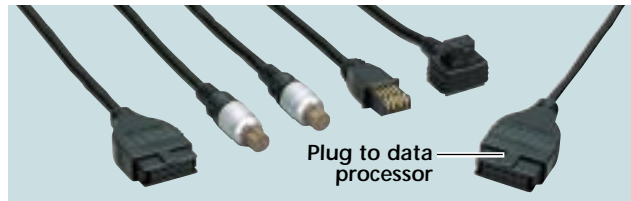
## SPECIFICATIONS



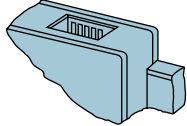


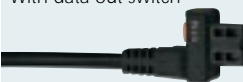





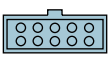
|                 |  |
|-----------------|--|
| Order No.       | 572-061 (w/100V AC adaptor)<br>572-061A (w/120V AC adaptor)<br>572-061D (w/220V AC adaptor)<br>572-061E (w/240-220V AC adaptor)  |
| Data input port | 4  |
| Functions       | <ul style="list-style-type: none"> <li>• MAX/MIN measurement</li> <li>• Range (MAX-MIN) measurement</li> <li>• GO/±NG judgment (Buzzer or LED)</li> <li>• GO/±NG analog signal output</li> <li>• SPC data output</li> <li>• Error alarm</li> </ul> |
| Power supply    | 9V DC, 500mA (via AC adaptor)  |
| Dimensions      | 76(W) X 120(D) X 66(H) mm  |
| Mass            | 0.55kg   |

## SPC Connecting Cables

### FEATURES

- Via these connecting cables, Mitutoyo's electronic gages and instruments can output data in the form of Digimatic codes.
- The plug differs depending on the output port of the connected gage.



| Gage output pulgs  | Order No.     |               | Gage output ports   | Appropriate gages  |
|--|---------------|---------------|---|--|
|  | 1m (40")      | 2m (80")      |   |  |
| <br>Straight  | <b>905338</b> | <b>905409</b> |   | IDS Series Digimatic Indicator (Series 543)<br>IDC Series Digimatic Indicator (Series 543)<br>IDU Series Digimatic Indicator (Series 575)<br>Digimatic Thickness Gage (Series 547)<br>Digimatic Caliper (Series 550, 551)*<br>Digimatic Carbon Fiber Caliper (Series 522)<br>Digimatic Height Gage (Series 192, 570)<br>Heightmatic (Series 574)<br>Digimatic Depth Gage (Series 547)<br>Digimatic Scale Unit (Series 572)*<br>Digital Durometer (Series 811)**  |
| <br>Back  | <b>905689</b> | <b>905690</b> |    | *Use <b>959149</b> or <b>959150</b> for the ABSOLUTE reading type gage.<br>**Only available with <b>905693</b> or <b>905694</b> cable.   |
| <br>Right   | <b>905691</b> | <b>905692</b> |   |  |
| <br>Left   | <b>905693</b> | <b>905694</b> |   |  |
| <br>With data out switch                            | <b>959149</b> | <b>959150</b> |   |  |
| <br>6 pins  | <b>937387</b> | <b>965013</b> |  | Quickmike (Series 293)<br>Digimatic Micrometer (Series 293, 314, 317, 323, 324, 326, 331, 340, 342, 343, 369, 389, 395, 406, 422)<br>Digimatic Micrometer Head (Series 164, 350)<br>Digimatic Bench Micrometer (Series 121)<br>Digimatic Depth Micrometer (Series 329)<br>Digimatic Inside Micrometer (Series 345)<br>Digimatic Tubular Inside Micrometer (Series 337, 339)<br>Digimatic Holtest (Series 468)<br>Borematic (Series 568)<br>Digimatic E-Type Height Master (Series 515)   |
| <br>10 pins   | <b>937386</b> | <b>965012</b> |  | HH-120/140 Hardmatic Hardness Tester (Series 810)<br>ARK-F/ATK-F Hardness Testing Machine (Series 810)<br>ARK/ASK/ATK Hardness Testing Machine (Series 810)  |
| Cable has the same connector pulg at both ends.<br> | <b>936937</b> | <b>965014</b> |  | IDF Series Digimatic Indicator (Series 543)<br>Surftest SJ-201 (Series 178)<br>Surftest SJ-301 (Series 178)<br>Toolmaker's Microscope (Series 176)<br>Digi-Derm Coating Thickness Gage (Series 179)<br>PJ Series Profile Projector (Series 301, 302, 303)<br>Litematic (Series 318)<br>Digital Height Master (Series 515)<br>CERA Height Master (Series 515)<br>Linear Height (Series 518)<br>Digital Mu-Checker (Series 519)<br>Linear Gage Counter (Series 542)<br>Bore Gage Counter (Series 542)<br>LSM-6000 Series Display Unit (Series 544)<br>Digimatic Display Unit (Series 572)<br>MVK-H Series Hardness Testing Machine (Series 810)<br>Digimatic Converter for Hardness Testing Machine<br>Digimatic (SPC) Codeout Unit for DRO Counter<br>Digimatic (SPC) Codeout Unit for Mu-Checker |



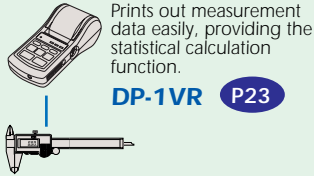
# Examples of Measuring System Construction

The following introduces system construction examples in which the measurement results from various Mitutoyo measuring instruments are recorded and integrated as quality information.

**Construction Step 1**

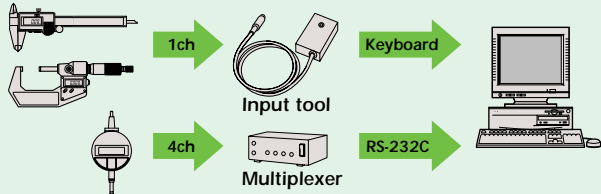
**When recording measurement results:**

**To avoid handwriting**



**To input data to a PC**

A keyboard signal conversion type Input tool can input measurement data directly in spreadsheet software such as Excel.



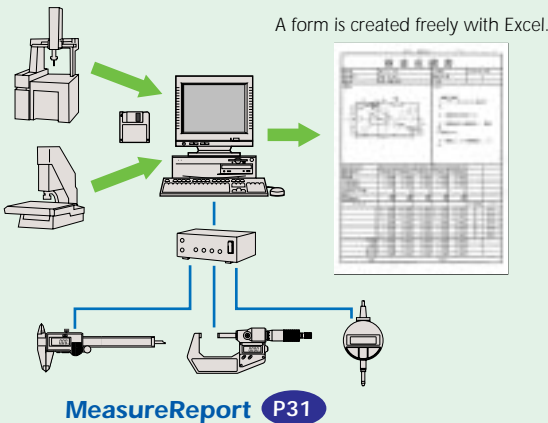
RS-232C conversion type unit requires separate communication software.

**Input tool series P22      Multiplexer MUX-10F P22**

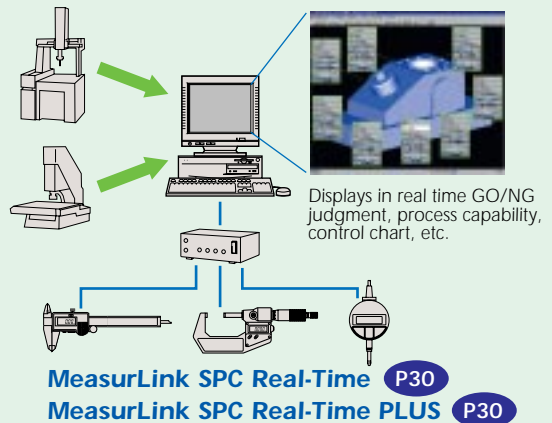
**Construction Step 2**

**When requiring the packaged software dedicated to inspection and quality control:**

**To perform statistical process control**



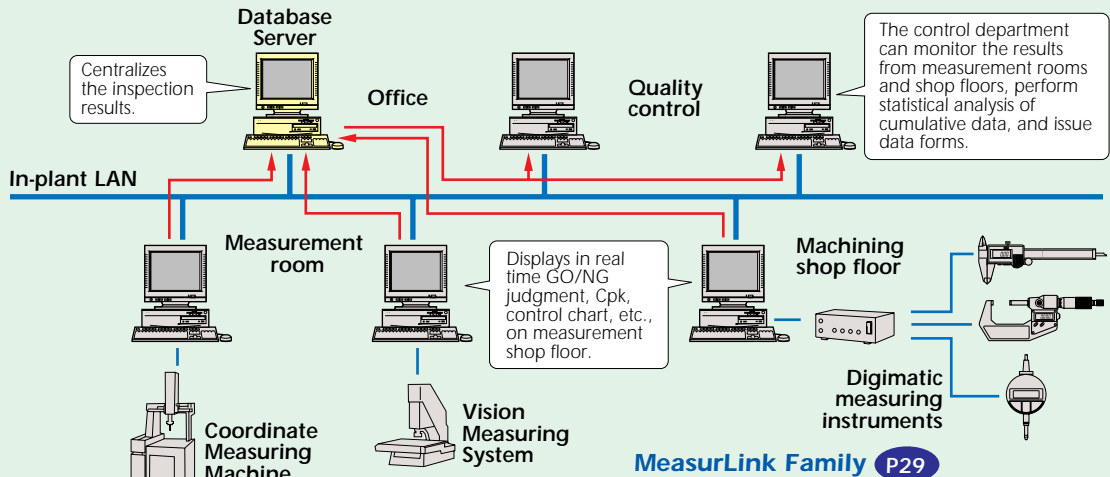
**To perform statistical process control**



**Construction Step 3**

**When networking quality information dispersed in factories:**

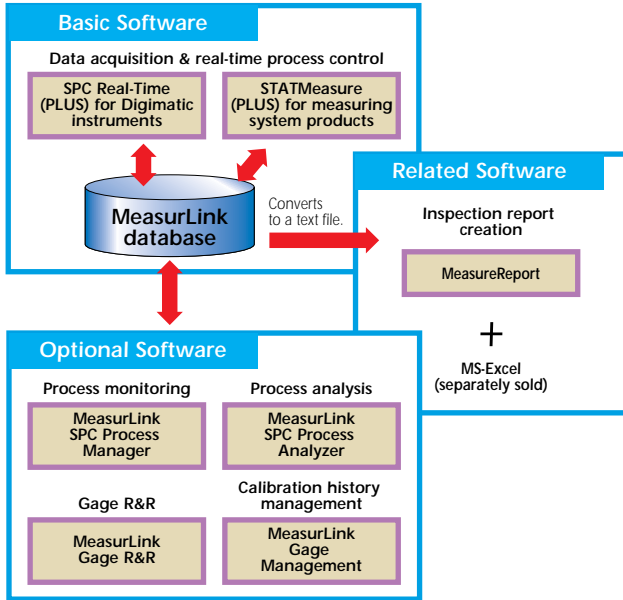
**To centralize and share the quality information of measurement results**



# MeasurLink Family

## Measurement Data Network System

### • MeasurLink Package Configuration



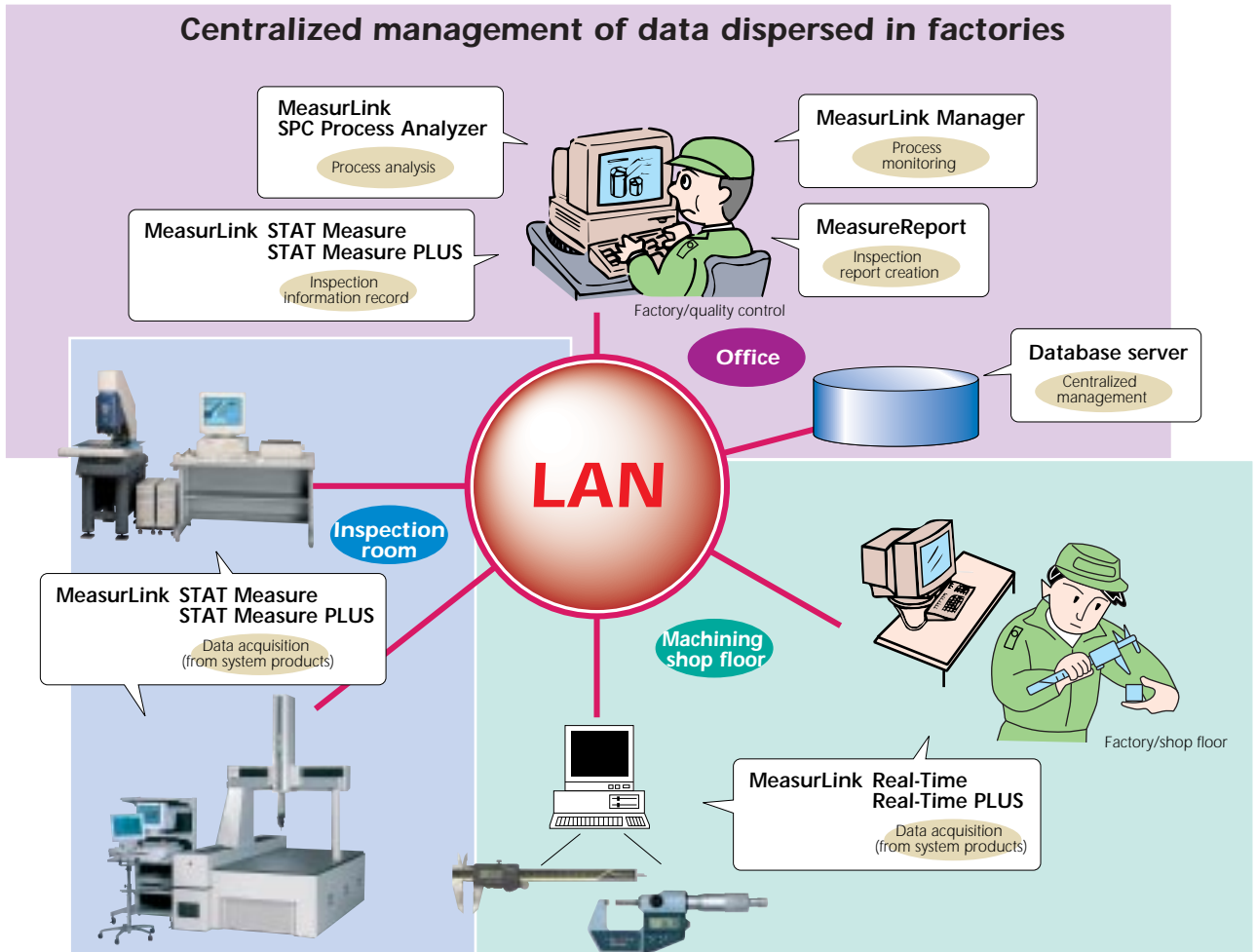
The MeasurLink Quality Management Software combines real-time data acquisition, on-line SPC analysis, integrated networking, and quality information sharing into a comprehensive solution for your company. The MeasurLink family consists of a number of different software modules that allow users to determine the level of depth they want in a quality management system.

Starting with a Real-Time package, users can acquire and analyse data in real-time and check variable, attribute and short-run inspection to maximise production and minimise defects. Other MeasurLink packages allow for management of the manufacturing process, process analysis, gauge management, gauge repeatability and reproducibility, gauge tracking and statistical analysis.

|                   | Package name  |
|-------------------|---|
| Basic software    | MeasurLink SPC Real-Time (PLUS) (for Digimatic instruments)     |
|                   | MeasurLink STATMeasure (PLUS) (for measuring system products)   |
| Optional software | MeasurLink SPC Process Manager (for process monitoring)         |
|                   | MeasurLink SPC Process Analyzer (for process analysis)          |
|                   | MeasurLink Gage R&R (for gage R&R calculation)                  |
|                   | MeasurLink Gage Management (for calibration history management) |
| Related software  | MeasureReport (for inspection report creation)                  |

Note: Database software is separately required for network construction.

### • Data Centralized Management by Measurement Networking



## • Basic Software

### MeasurLink SPC Real-Time (PLUS)

Real-time Process Control Program (for Digimatic Instruments)

### MeasurLink STATMeasure (PLUS)

Real-time Process Control Program (for Measuring Instrument Products)

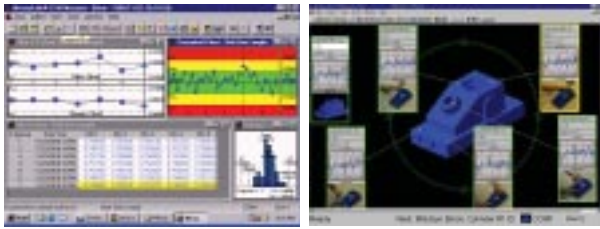
### Recommended Operating Environments

\*The specification in parentheses ( ) indicates that of servers.

|           |                                 |
|-----------|---------------------------------|
| OS        | Windows95/98/NT4.0/2000         |
| Database  | Sybase SQL Anywhere*            |
| CPU       | Pentium II 266MHz (333MHz)      |
| Memory    | 128MB or more                   |
| Hard disk | 500MB or more (1GB or more)     |
| Display   | SVGA                            |
| Others    | CD-ROM drive, keyboard, mouse** |

\* If used in a network, it is necessary to purchase the database license according to the number of servers and clients.

\*\* If used in a network, the parts comprising the network environments such as LAN card, LAN cables and hub are required.



Visceral and user-friendly measurement screen

- This software performs data acquisition, registration, and real-time statistical processing.

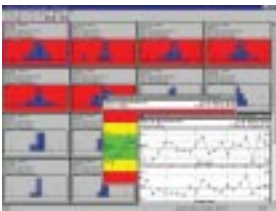
### Major specifications

|  |  |   |
|--|--|---|
| Control chart by indiscrete value                    | X-R, X-S, X-Rs, pre-control chart, histogram, dia-chart, run chart, short-run X-R, short-run X-Rs  |   |
| Control chart by discrete value                      | p, pn, c, u, Pareto diagram  |   |
| Statistical calculation item                         | Mean, maximum value, minimum value, percent defective, standard deviation, Cp, Cpk, CR, CPL, CPU, Pp, Ppk, PR, X, Rbar, mean±3s/4s/6s, PPM   |   |
| Alarm function                                       | Check item   | Out-of-tolerance, out-of-control limit, luck, trend, vibration trend, various checks based on sigma, others   |
|  | Alarm level setting  | Select one from among four levels, (1): none, (2): status bar display, (3): beep sound + (2), and (4): pop-up window + (3).   |
| Item window display (for PLUS only)                  | Item information data  | Part name, item name, measurement value, design value, upper limit value, lower limit value, sub-group No., sample No., revision No., process ID  |
|  | Result   | Cp, Cpk, Pp, Ppk, standard deviation, X, R, MAX, MIN  |
| Addition of part history/process history information | Chart  | Select optionally from various control charts and meter charts, histogram, box whisker, indicator bar, and control indicator light.   |
|  | Statistics report  | Historical information about operator, machine tool, delivery destination, purchase destination, etc., can be registered and printed. This information can be used for analysis with "ML Analyzer". |
| Security function                                    | • Report print function that can optionally mix charts and statistical values.<br>• Integrated report print based on part in a fixed format.   |   |
| File input/output                                    | The administrator can set the restrictions on operation range and read/write according to the content of user task.  |   |
| Applicable measuring instrument                      | Input/output of text data  |   |
|  | • MeasurLink STATMeasure/STATMeasure PLUS compatible instruments (Digimatic measuring instruments and measuring system products) (1) Measuring instruments with Digimatic output (e.g. MUX-10F, IT-007R) (2) Measuring instruments with RS-232C output (e.g. linear gage, laser scan micrometer, other companies' counters)* (3) Coordinate measuring machines (MICROPAK5000L, 2900/2, 11000, MCOSMOS) (4) Vision measuring systems (QVPAK 4.2 or newer, QSPAK 4.0 or newer) (5) Contour measuring instruments (FORMPAK1000, ROUNDPAK, SURFPAK) (6) Optical measuring instruments (MICROPAK9, OM-DATA 200) |   |
|  | • MeasurLink SPC Real-Time/SPC Real-Time PLUS compatible instruments (Digimatic measuring instruments) (1) and (2) above are only applicable.  |   |
|  | * To connect these instruments, the communication specification must meet certain conditions.  |   |

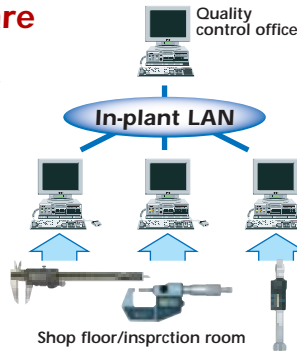
## • Optional Software

### MeasurLink SPC Process Manager

Process Monitoring Program



Displays the list of entire process states to check process in detail.



- This program can monitor each inspection process state on the network even in the QC office.
- This program quickly notifies the administrator of a problem that occurs in a process with the alarm function.

### MeasurLink Gage R&R

Gage R&R Assessment Program

- (1) Selection of an assessment method  
Select one from among seven assessment methods.
- (2) Selection of trial conditions  
Select the number of assessors, number of parts, and number of trial times.
- (3) Measured data input

- Display of evaluation results
- (1) Gage R&R
  - (2) EV (Equipment Variable)
  - (3) AV (Assessor Variable)
  - (4) PV (Part Variable)
  - Analysis charts (5 types)

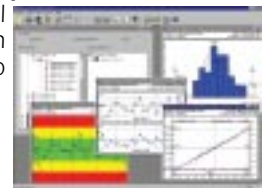


- This program can perform gage R&R assessment required by QS-9000 in simple operation.

### MeasurLink SPC Process Analyzer

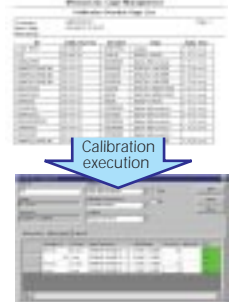
Process Analysis Program

- This program supports verification of problems through various analyses according to historical information (such as environment, time, machine tool, and operator) about parts and processes using the database in which data has been acquired and accumulated by MeasurLink SPC.
- This program allows differential analysis under a specific condition with the filter function and grasp of long-term trend with the combination function.



### MeasurLink Gage Management

Calibration History Management Program



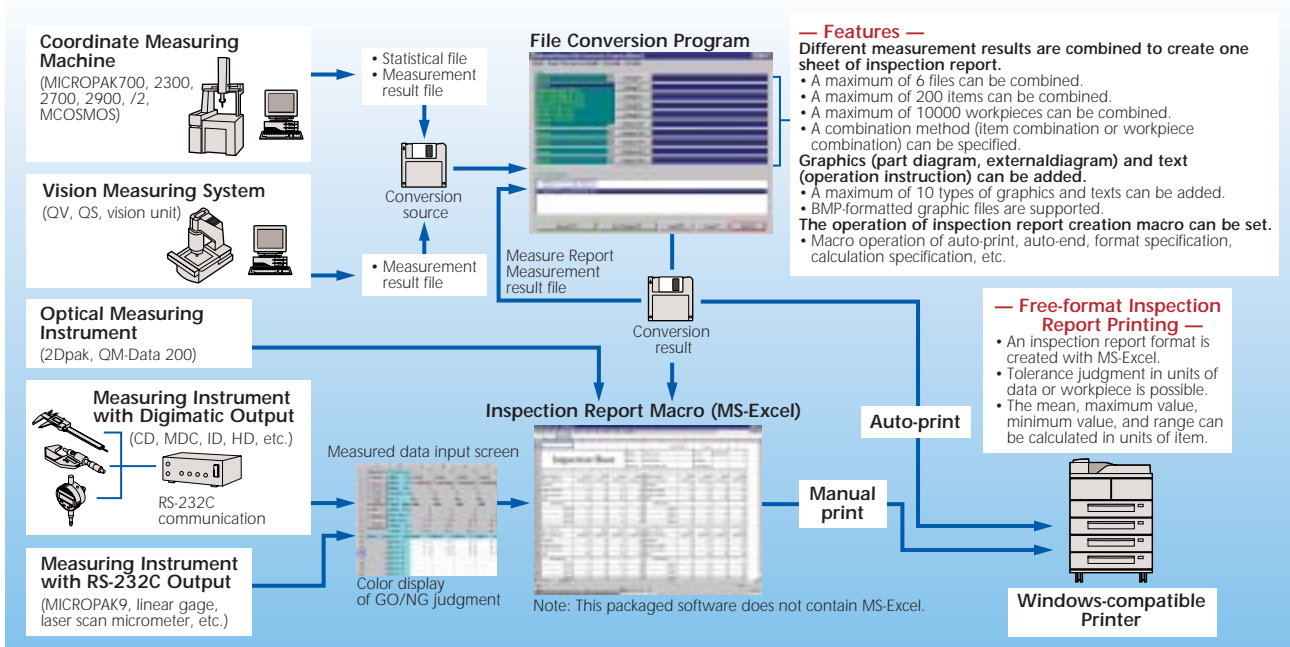
Powerful search function using an optional item (e.g. next calibration date) as a keyword

- This program allows historical record of each measuring instrument operating states to support proper management of calibrations without omission with the powerful search function.

# MeasureReport

## Excel Inspection Report Creation Program

### • Outline of MeasureReport Program



- This program can easily create an inspection report by linking measurement results acquired from Mitutoyo coordinate measuring machine, vision measuring system, caliper, micrometer, etc., to a free format created with MS-Excel.
- Users who are familiarized with MS-Excel can newly create or edit an inspection report format.
- The use of commercial software MS-Excel makes this program price lower than that of the conventional application that has been specifically developed.
- The user can create an inspection report immediately after purchase of this program using one of the supplied sample formats.
- This program provides the automation function that performs automatic processing until printing an inspection report after converting a measurement result file, if the report is printed in the fixed format and calculation for each time.
- This program can be linked to the real-time process control program "MeasurLink". MeasureReport can create an inspection report using data acquired with MeasurLink.

### • Part No.

| Part No. | Applicable measuring system                              |
|----------|--|
| 02ARA050 | Coordinate measuring machine (MeasureReport/MC)          |
| 02ARA140 | Vision measuring system QV • EQS (MeasureReport/QV • QS) |
| 02ARA142 | Vision measuring system QS-L (MeasureReport/QS-L)        |

- \* The MeasureReport program for each model supports the function of data input from Digimatic measuring instruments.
- \* Use MeasureReport/QS-L (No.02ARA143) for QS-L/AF, QS-E, and vision units.
- \* This packaged software does not contain MS-Excel. Prepare it separately.
- \* Mitutoyo does not provide the setup and training service for this program at delivery.

### • Major Specifications of MeasureReport Program

| Inspection report format | A free format can be created using the function of MS-Excel   |                |   |                  |   |       |  |
|--------------------------|---|----------------|---|------------------|---|-------|--|
| Macro processing         | <table border="1"> <tr> <td>GO/NG judgment</td> <td>Tolerance judgment in units of data or workpiece is possible.</td> </tr> <tr> <td>Calculation item</td> <td>The mean, maximum value, minimum value, range, and other calculation in units of item is possible</td> </tr> <tr> <td>Other</td> <td> <ul style="list-style-type: none"> <li>• A maximum of 200 items and 10000 workpieces can be processed.</li> <li>• Processing of aligning decimal places</li> </ul> </td> </tr> </table> | GO/NG judgment | Tolerance judgment in units of data or workpiece is possible. | Calculation item | The mean, maximum value, minimum value, range, and other calculation in units of item is possible | Other | <ul style="list-style-type: none"> <li>• A maximum of 200 items and 10000 workpieces can be processed.</li> <li>• Processing of aligning decimal places</li> </ul> |
| GO/NG judgment           | Tolerance judgment in units of data or workpiece is possible.   |                |   |                  |   |       |  |
| Calculation item         | The mean, maximum value, minimum value, range, and other calculation in units of item is possible   |                |   |                  |   |       |  |
| Other                    | <ul style="list-style-type: none"> <li>• A maximum of 200 items and 10000 workpieces can be processed.</li> <li>• Processing of aligning decimal places</li> </ul>  |                |   |                  |   |       |  |
| Print processing         | Optionally selected and sorted measurement items can be printed.  |                |   |                  |   |       |  |
| Sample format            | A4-size inspection report formats are supplied.   |                |   |                  |   |       |  |

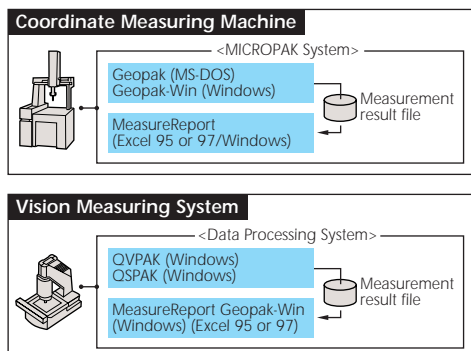
### • MeasureReport Operating Environments

|                      |                               |
|----------------------|-------------------------------|
| OS                   | Windows95/98/NT4.0/2000       |
| Spreadsheet software | MS-Excel95/97/2000*           |
| CPU                  | Pentium 90MHz or higher       |
| Memory               | 20MB or more                  |
| Hard disk            | 256MB or more                 |
| Display              | 640 x 480 or more             |
| Others               | 3.5-inch FDD, keyboard, mouse |

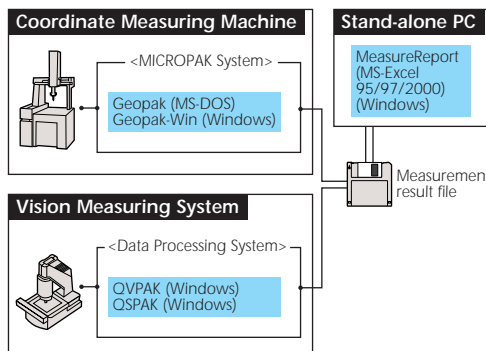
- \* This packaged software does not contain MS-Excel. Prepare it separately.

### • Examples of System Configuration with Various Measuring Instruments

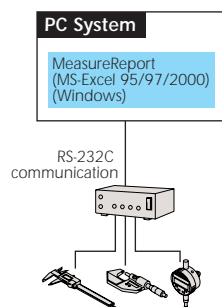
#### 1. When making this program coexistent with a measuring machine data processing system:



#### 2. When using a stand-alone PC:



#### 3. When connecting measuring instruments with Digimatic output:





# QUICK GUIDE TO PRECISION MEASUREMENT

## SPC Terminology

### Quality Control (QC)

Inspection, analysis, and action applied to a manufacturing operation to achieve and maintain the required level of quality of the product and service economically. Statistical quality control (abbreviated SQC) applies statistical techniques to quality control.

### Subgroup

To investigate whether or not measurements are stable, samples are taken from the entire set of measurements and classified according to time, raw material, and other factors. Each set of samples is called a subgroup.

### Bias

The difference between the mean (or estimated mean) of measurements and the expected value.

### Dispersion

A measure of the variation of measurements. The degree of dispersion is usually quantified in terms of the standard deviation.

### Sample

A collection of objects that are taken from a population in order to investigate segregated characteristics.

### Sample size

The number of objects in a sample.

### Population

The entire group of objects to which statistical analysis is applied.

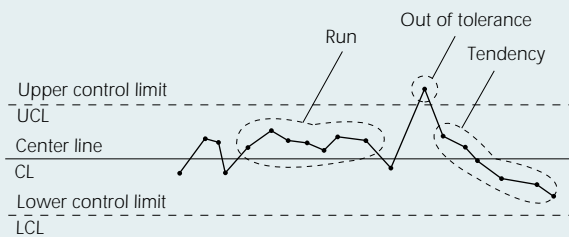
| Purpose   | Population                     | Sample   |
|---|--------------------------------|--|
| a) Action applied to process<br>Process control<br>Process analysis | Infinite population<br>Process | Sampling → Lot → Sample → Measurement → Data<br>Action |
| b) Action applied to lots<br>Inspection<br>Quality estimation       | Finite population<br>Lot       | Sampling → Sample → Measurement → Data<br>Action       |

### Process Capability

Process capability is the reproducibility of the product when the process is under control and any assignable causes of error have been removed.

### Control Charts

The control chart shows the central tendency and dispersion of the quality characteristic. It is used for effectively implementing process control by determining whether a variation in quality is assignable to a change in process conditions or to random causes. A control chart consists of a center line (CL), and upper and lower control limit lines (UCL and LCL) which are determined based on the past performance of the manufacturing process. If the characteristic values plotted on the chart are between the upper and lower control limits, and are free from abnormal tendencies, the process is considered to be under control.

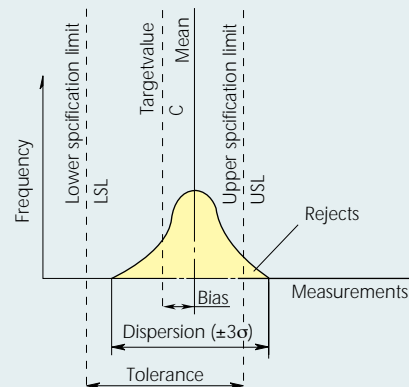


### $\bar{x}$ -R Chart

The  $\bar{x}$ -R chart is a combination of an  $\bar{x}$  chart (which indicates the mean of each subgroup) and an R chart (which indicates the range of dispersions). It provides useful information for checking abnormal condition based on the tendency of the mean and range of subgroups. It is often used for controlling the process in terms of dimensions, yield, tensile strength, and other quality characteristics of product.

### Histogram

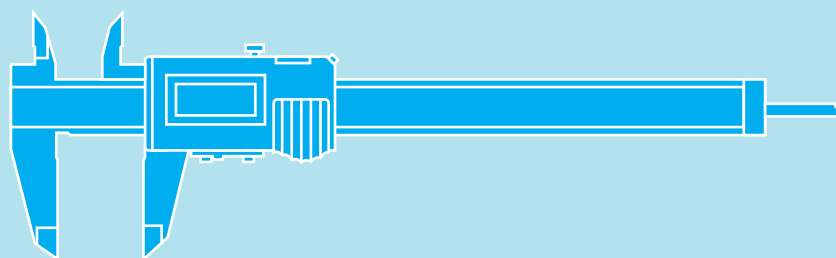
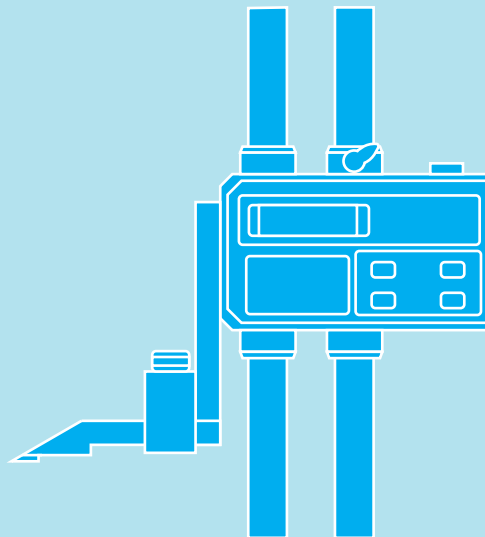
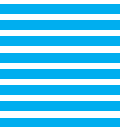
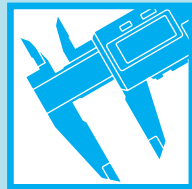
A graphical representation of the distribution of measurements by means of rectangles whose widths represent intervals into which the range (maximum - minimum) of observed values is divided and whose heights represent the number of observations occurring on each interval (frequency). It provides an overview of the mean and the degree of dispersion. When the plotted points are distributed in a symmetrical, bell-shaped form, it is called the normal distribution.



Calipers Pages 34 — 65

Depth Gages Pages 66 — 69

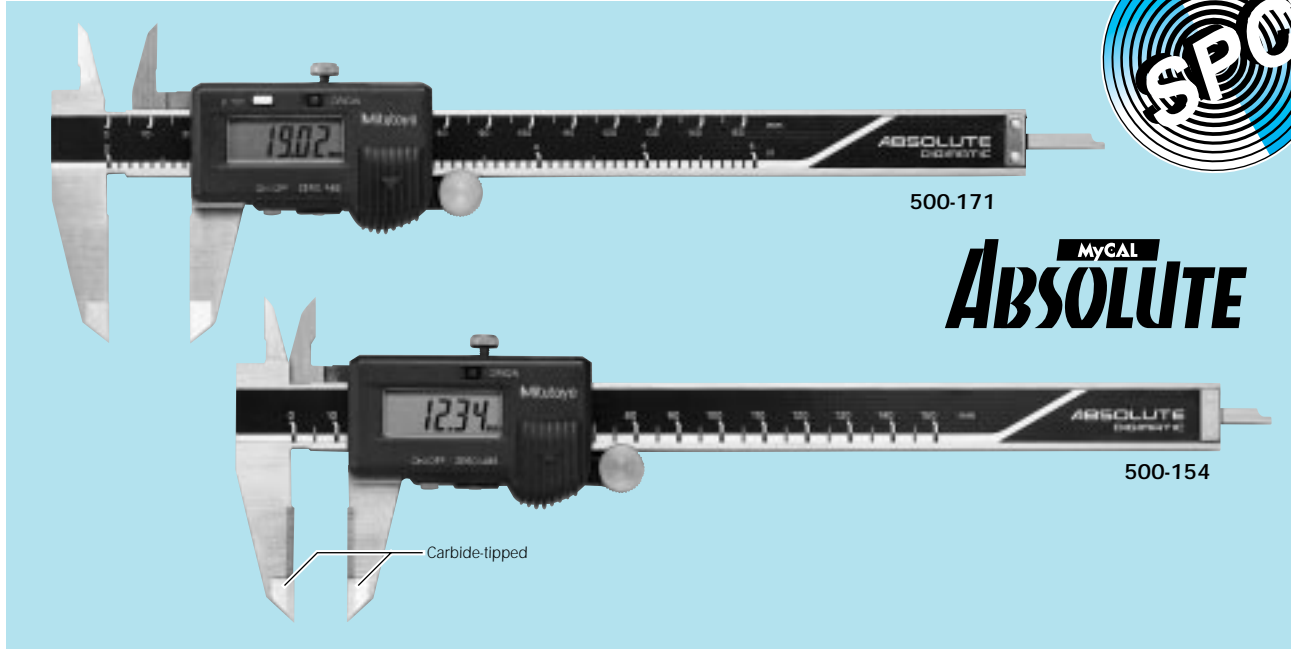
Height Gages Pages 70 — 80



# Digimatic Calipers "MyCAL ABSOLUTE"

## SERIES 500

with Exclusive Absolute Encoder Technology



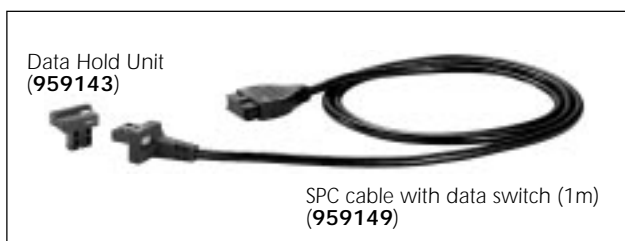
Mitutoyo's new absolute-reading Digimatic Caliper "MyCAL ABSOLUTE" is the next generation of electronic calipers. It keeps track of its origin point once set. Whenever turned on, the large LCD screen displays the actual slider position ready to start measurement. No more repeated zero setting is necessary with the "MyCAL ABSOLUTE" as well as no more care for overspeed errors.

### FEATURES

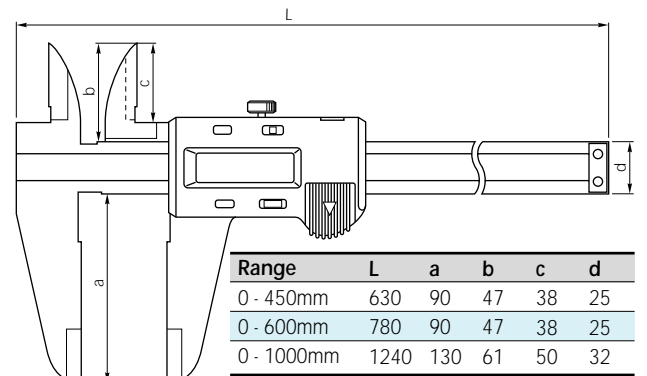
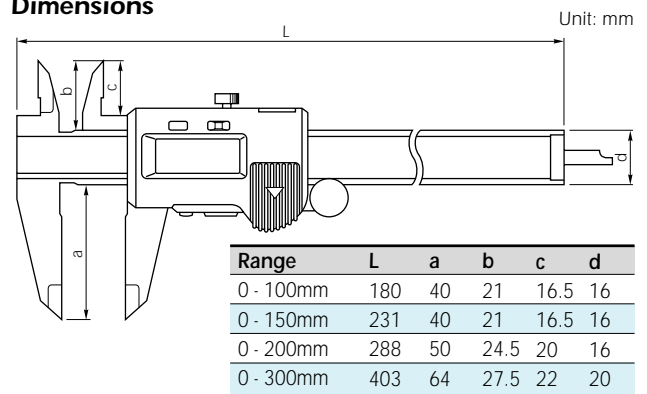
- Large and clear LCD readout.
- The ZERO/ABS key allows the display to be Zero-Set at any slider position along the scale for incremental comparison measurements. This switch will also allow return to the absolute (ABS) coordinate and display of the true position from the origin point (usually jaws-closed point).
- Data Hold Unit (**959143**) is optional.
- Carbide-tipped jaw type calipers are also available.

### Technical Data

**Display:** LCD  
**Functions:** Origin-Set, Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, data hold (optional)  
**Battery:** SR44 (1 pc.) (**938882**)  
**Battery life:** Approx. 3.5 years under normal use  
**Maximum response speed:** Unlimited  
**Alarm:** Low battery voltage, scale contamination, counting value composition error  
**Operating temperature:** 0°C to 40°C

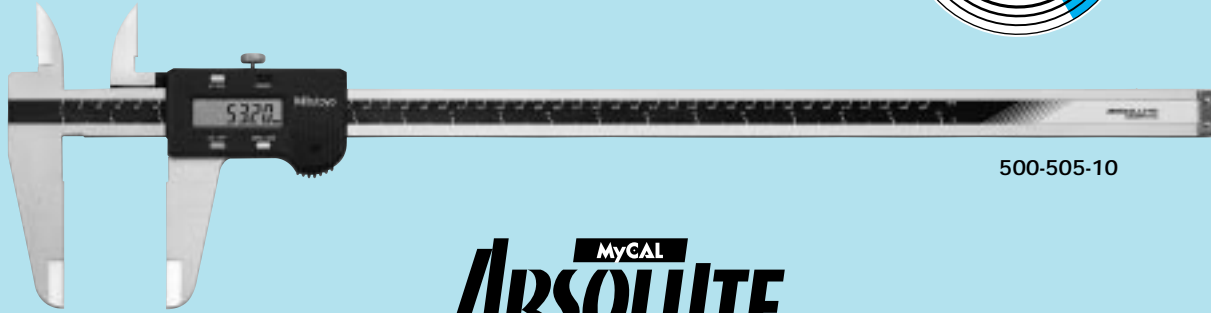


### Dimensions



### OPTIONAL ACCESSORIES

| Order No.     | Description                     |
|---------------|---------------------------------|
| <b>959143</b> | Data Hold Unit                  |
| <b>959149</b> | SPC cable with data switch (1m) |
| <b>959150</b> | SPC cable with data switch (2m) |



500-505-10

## MyCAL ABSOLUTE



### SPECIFICATIONS

#### Metric

| Range      | Order No.  | Resolution | Accuracy | Mass  | Remarks                           |
|------------|------------|------------|----------|-------|-----------------------------------|
| 0 - 100mm  | 500-150    | 0.01mm     | ±0.02mm  | 137g  | With depth measuring rod (Ø1.9mm) |
| 0 - 150mm  | 500-151    | 0.01mm     | ±0.02mm  | 162g  | With depth measuring bar (blade)  |
|            | 500-154*   | 0.01mm     | ±0.02mm  | 162g  | With depth measuring bar (blade)  |
|            | 500-155**  | 0.01mm     | ±0.02mm  | 162g  | With depth measuring bar (blade)  |
|            | 500-158    | 0.01mm     | ±0.02mm  | 162g  | With depth measuring rod (Ø1.9mm) |
| 0 - 200mm  | 500-152    | 0.01mm     | ±0.02mm  | 192g  | With depth measuring bar (blade)  |
|            | 500-156*   | 0.01mm     | ±0.02mm  | 192g  | With depth measuring bar (blade)  |
|            | 500-157**  | 0.01mm     | ±0.02mm  | 192g  | With depth measuring bar (blade)  |
| 0 - 300mm  | 500-153    | 0.01mm     | ±0.03mm  | 350g  | With depth measuring bar (blade)  |
| 0 - 450mm  | 500-500-10 | 0.01mm     | ±0.05mm  | 1170g | —                                 |
| 0 - 600mm  | 500-501-10 | 0.01mm     | ±0.05mm  | 1350g | —                                 |
| 0 - 1000mm | 500-502-10 | 0.01mm     | ±0.07mm  | 3300g | —                                 |

\*Provided with carbide-tipped jaws for OD measurement.

\*\*Provided with carbide-tipped jaws for OD & ID measurements.

#### Inch/Metric

| Range                | Order No.  | Resolution    | Accuracy | Mass      | Remarks                           |
|----------------------|------------|---------------|----------|-----------|-----------------------------------|
| 0 - 4" (0 - 100mm)   | 500-170    | .0005"/0.01mm | ±.0010"  | .30 lbs.  | With depth measuring rod (Ø3/40") |
| 0 - 6" (0 - 150mm)   | 500-171    | .0005"/0.01mm | ±.0010"  | .36 lbs.  | With depth measuring bar (blade)  |
|                      | 500-174*   | .0005"/0.01mm | ±.0010"  | .36 lbs.  | With depth measuring bar (blade)  |
|                      | 500-175**  | .0005"/0.01mm | ±.0010"  | .36 lbs.  | With depth measuring bar (blade)  |
|                      | 500-178    | .0005"/0.01mm | ±.0010"  | .36 lbs.  | With depth measuring rod (Ø3/40") |
| 0 - 8" (0 - 200mm)   | 500-172    | .0005"/0.01mm | ±.0010"  | .42 lbs.  | With depth measuring bar (blade)  |
|                      | 500-176*   | .0005"/0.01mm | ±.0010"  | .42 lbs.  | With depth measuring bar (blade)  |
|                      | 500-177**  | .0005"/0.01mm | ±.0010"  | .42 lbs.  | With depth measuring bar (blade)  |
| 0 - 12" (0 - 300mm)  | 500-173    | .0005"/0.01mm | ±.0015"  | .77 lbs.  | With depth measuring bar (blade)  |
|                      | 500-167*   | .0005"/0.01mm | ±.0015"  | .77 lbs.  | With depth measuring bar (blade)  |
|                      | 500-168**  | .0005"/0.01mm | ±.0015"  | .77 lbs.  | With depth measuring bar (blade)  |
| 0 - 18" (0 - 450mm)  | 500-505-10 | .0005"/0.01mm | ±.0020"  | 2.57 lbs. | —                                 |
| 0 - 24" (0 - 600mm)  | 500-506-10 | .0005"/0.01mm | ±.0020"  | 2.97 lbs. | —                                 |
| 0 - 40" (0 - 1000mm) | 500-507-10 | .0005"/0.01mm | ±.0030"  | 7.26 lbs. | —                                 |

\*Provided with carbide-tipped jaws for OD measurement.

\*\*Provided with carbide-tipped jaws for OD & ID measurements.

# Digimatic Caliper "MyCAL E•Z"

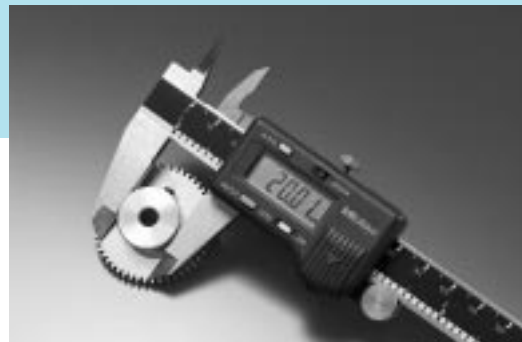
## SERIES 500

with Economical Design



### FEATURES

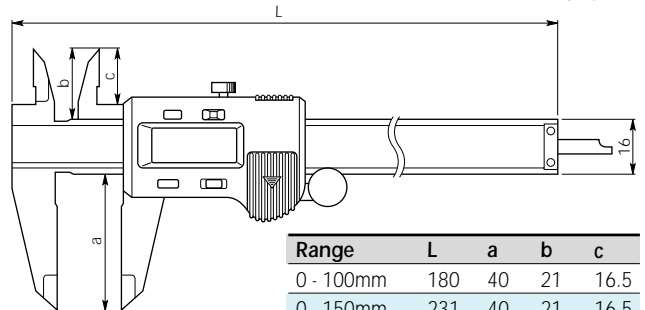
- Large and clear LCD readout.
- Low price due to the design featuring only essential functions.
- ZERO/ABS key: Allows the display to be Zero-Set at any slider position along the scale for incremental comparison measurements. This switch will also allow return to the absolute mode and display of the true position from the origin point.



### Technical Data

**Display:** LCD  
**Functions:** Origin-Set, Zero-Set, power on/off, inch/mm conversion (inch/mm type only)  
**Battery:** SR44 (1 pc.) (938882)  
**Battery life:** Approx. 3.5 years under normal use  
**Maximum response speed:** Unlimited  
**Alarm:** Low voltage, scale contamination, counting value composition error  
**Operating temperature:** 0°C to 40°C

### Dimensions



| Range     | L   | a  | b    | c    |
|-----------|-----|----|------|------|
| 0 - 100mm | 180 | 40 | 21   | 16.5 |
| 0 - 150mm | 231 | 40 | 21   | 16.5 |
| 0 - 200mm | 288 | 50 | 24.5 | 20   |

### SPECIFICATIONS

#### Metric

| Range     | Order No. | Resolution | Accuracy | Mass | Remarks                           |
|-----------|-----------|------------|----------|------|-----------------------------------|
| 0 - 100mm | 500-180   | 0.01mm     | ±0.02mm  | 137g | With depth measuring rod (Ø1.9mm) |
| 0 - 150mm | 500-181   | 0.01mm     | ±0.02mm  | 162g | With depth measuring bar (blade)  |
| 0 - 200mm | 500-182   | 0.01mm     | ±0.02mm  | 192g | With depth measuring bar (blade)  |

#### Inch/Metric

| Range               | Order No. | Resolution    | Accuracy | Mass     | Remarks                           |
|---------------------|-----------|---------------|----------|----------|-----------------------------------|
| 0 - 4" (0 - 100mm)  | 500-195   | .0005"/0.01mm | ±.0010"  | .30 lbs. | With depth measuring rod (Ø3/40") |
| 0 - 6" (0 - 150mm)  | 500-196   | .0005"/0.01mm | ±.0010"  | .36 lbs. | With depth measuring bar (blade)  |
|                     | 500-159*  | .0005"/0.01mm | ±.0010"  | .36 lbs. | With depth measuring bar (blade)  |
|                     | 500-160** | .0005"/0.01mm | ±.0010"  | .36 lbs. | With depth measuring bar (blade)  |
| 0 - 8" (0 - 200mm)  | 500-197   | .0005"/0.01mm | ±.0010"  | .42 lbs. | With depth measuring bar (blade)  |
|                     | 500-163*  | .0005"/0.01mm | ±.0010"  | .42 lbs. | With depth measuring bar (blade)  |
|                     | 500-164** | .0005"/0.01mm | ±.0010"  | .42 lbs. | With depth measuring bar (blade)  |
| 0 - 12" (0 - 300mm) | 500-193   | .0005"/0.01mm | ±.0015"  | .77 lbs. | With depth measuring bar (blade)  |
|                     | 500-165*  | .0005"/0.01mm | ±.0015"  | .77 lbs. | With depth measuring bar (blade)  |
|                     | 500-166** | .0005"/0.01mm | ±.0015"  | .77 lbs. | With depth measuring bar (blade)  |

\*Provided with carbide-tipped jaws for OD measurement.  
 \*\*Provided with carbide-tipped jaws for OD & ID measurements.

## Absolute Coolant Proof Caliper

### SERIES 500

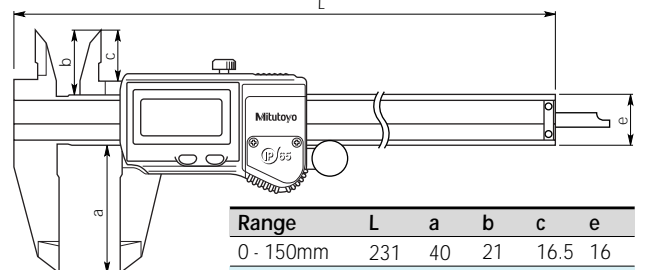
with Dust/Water Protection Conforming to IP65 Level



#### FEATURES

- Can be used in workshop conditions exposed to coolant, water, dust or oil.
- Easy to use - no need to wipe or clean the scale.
- Advanced design styling.
- Incorporates absolute measurement system.
- Automatic power-on/off.
- Data output function.

#### Dimensions



| Range     | L   | a  | b    | c    | e  |
|-----------|-----|----|------|------|----|
| 0 - 150mm | 231 | 40 | 21   | 16.5 | 16 |
| 0 - 200mm | 288 | 50 | 24.5 | 20   | 16 |
| 0 - 300mm | 408 | 64 | 28   | 21.8 | 20 |

#### Technical Data

**Display:** LCD

**Functions:** Origin-Set, Automatic power on/off, inch/mm conversion (inch/mm type only)/Data output

**Battery:** SR44 (2 pc.) (938882)

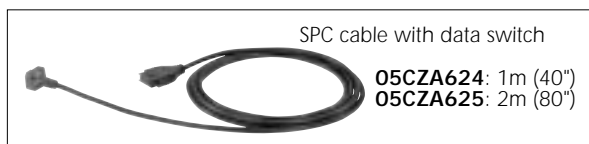
**Battery life:** Approx. 1.5 years under normal use

**Maximum response speed:** Unlimited

**Dust/Water protection level:** Conforming to IP65

**Alarm:** Low voltage, counting value composition error

**Operating temperature:** 0°C to 40°C



#### SPECIFICATIONS

##### Metric

| Range     | Order No. | Resolution | Accuracy | Mass | Remarks                           |
|-----------|-----------|------------|----------|------|-----------------------------------|
| 0 - 150mm | 500-602   | 0.01mm     |          | 168g | With thumb roller                 |
|           | 500-612   | 0.01mm     |          | 168g | With data output and thumb roller |
|           | 500-606   | 0.01mm     |          | 164g | —                                 |
| 0 - 200mm | 500-603   | 0.01mm     | ±0.02mm  | 198g | With thumb roller                 |
|           | 500-613   | 0.01mm     | (≤200mm) | 198g | With data output and thumb roller |
|           | 500-607   | 0.01mm     | ±0.03mm  | 194g | —                                 |
| 0 - 300mm | 500-604   | 0.01mm     | (>200mm) | 350g | With thumb roller                 |
|           | 500-608   | 0.01mm     |          | 345g | —                                 |
|           | 500-614   | 0.01mm     |          | 350g | With data output and thumb roller |
|           | 500-619   | 0.01mm     |          | 345g | With data output                  |

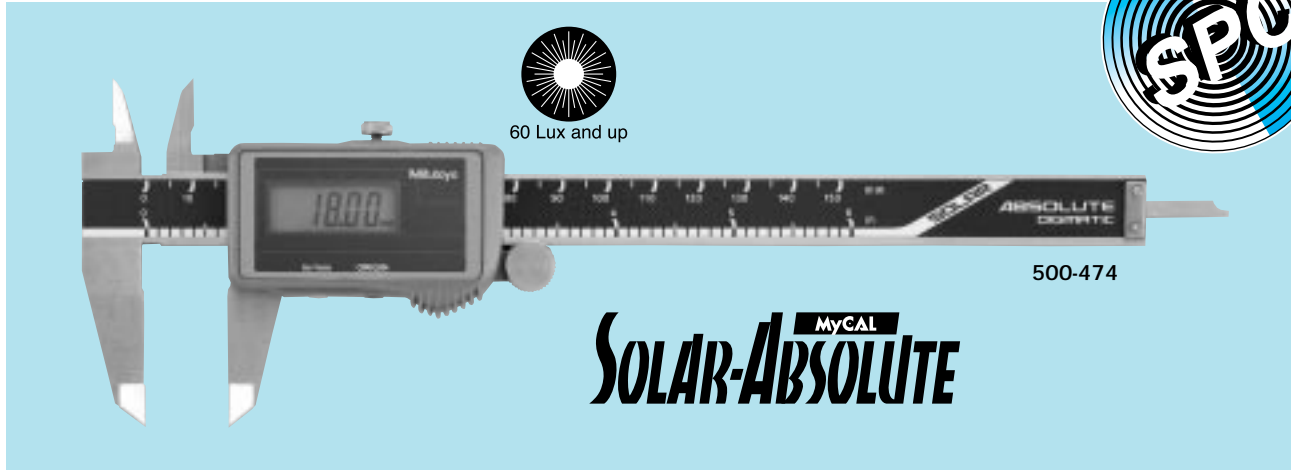
##### Inch/Metric

| Range               | Order No. | Resolution    | Accuracy      | Mass     | Remarks                           |
|---------------------|-----------|---------------|---------------|----------|-----------------------------------|
| 0 - 6" (0 - 150mm)  | 500-652   | .0005"/0.01mm |               | .37 lbs. | With thumb roller                 |
|                     | 500-662   | .0005"/0.01mm |               | .37 lbs. | With data output and thumb roller |
| 0 - 8" (0 - 200mm)  | 500-653   | .0005"/0.01mm | ±.001" (≤8")  | .43 lbs. | With thumb roller                 |
|                     | 500-663   | .0005"/0.01mm | ±.0015" (>8") | .43 lbs. | With data output and thumb roller |
| 0 - 10" (0 - 300mm) | 500-654   | .0005"/0.01mm |               | .77 lbs. | With thumb roller                 |
|                     | 500-664   | .0005"/0.01mm |               | .77 lbs. | With data output and thumb roller |

# Solar-Powered Digimatic Caliper

## SERIES 500

Allowing No Need for Battery Replacement



Mitutoyo's Digimatic Caliper "MyCAL SOLAR-ABSOLUTE" retains its origin point even the display turns off for the entire life of the caliper. At 60 Lux and up the "MyCAL SOLAR-ABSOLUTE" is turned on ready to start measurement.

### FEATURES

- No more repeated zero setting caused by the shortage of light intensity.
- Hard-coated solar panel for safe operation.
- No fear for overspeed errors.

### Technical Data

**Display:** LCD

**Functions:** Origin-Set, inch/mm conversion (inch/mm type only)

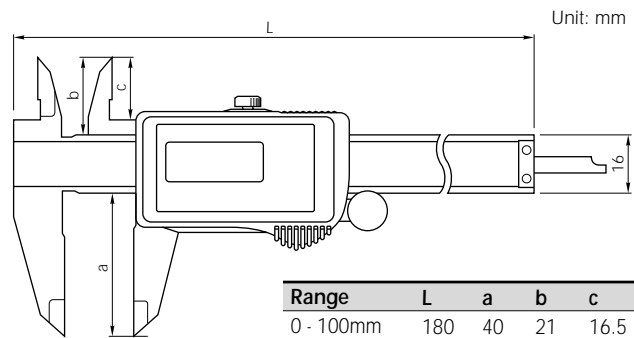
**Light intensity:** 60Lux and up for operation (300Lux and up for origin setting)

**Maximum response speed:** Unlimited

**Alarm:** Scale contamination, counting value composition error

**Operating temperature:** 0°C to 40°C

### Dimensions



| Range     | L   | a  | b    | c    |
|-----------|-----|----|------|------|
| 0 - 100mm | 180 | 40 | 21   | 16.5 |
| 0 - 150mm | 231 | 40 | 21   | 16.5 |
| 0 - 200mm | 288 | 50 | 24.5 | 20   |

### OPTIONAL ACCESSORIES

| Order No. | Description                     |
|-----------|---------------------------------|
| 959143    | Data Hold Unit                  |
| 959149    | SPC cable with data switch (1m) |
| 959150    | SPC cable with data switch (2m) |

Available for SPC data output model only.

### SPECIFICATIONS

#### Metric

| Range     | Order No. | Resolution | Accuracy | Mass | Remarks                           |
|-----------|-----------|------------|----------|------|-----------------------------------|
| 0 - 100mm | 500-443   | 0.01mm     | ±0.02mm  | 145g | With depth measuring rod (Ø1.9mm) |
|           | 500-453*  | 0.01mm     | ±0.02mm  | 125g | With depth measuring rod (Ø1.9mm) |
| 0 - 150mm | 500-444   | 0.01mm     | ±0.02mm  | 170g | With depth measuring bar (blade)  |
|           | 500-454*  | 0.01mm     | ±0.02mm  | 150g | With depth measuring bar (blade)  |
| 0 - 200mm | 500-445   | 0.01mm     | ±0.02mm  | 200g | With depth measuring bar (blade)  |
|           | 500-455*  | 0.01mm     | ±0.02mm  | 180g | With depth measuring bar (blade)  |

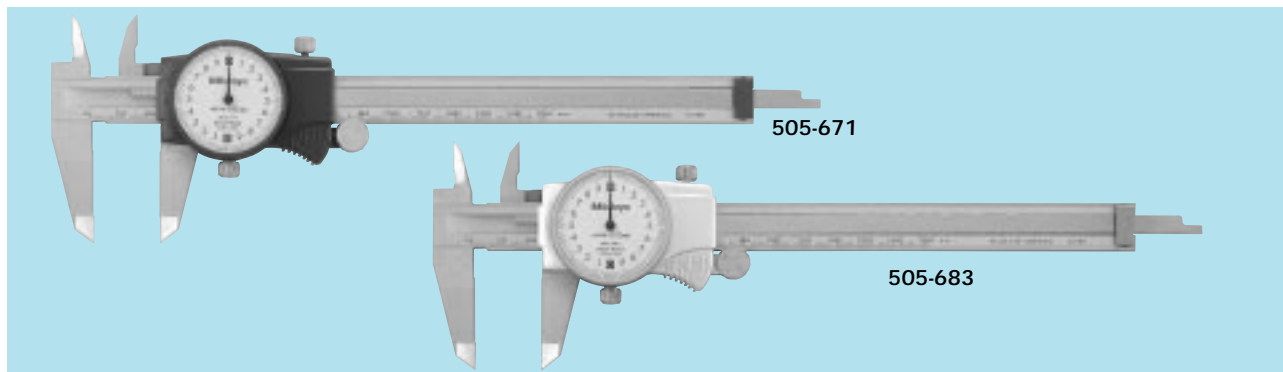
#### Inch/Metric

| Range              | Order No. | Resolution    | Accuracy | Mass     | Remarks                           |
|--------------------|-----------|---------------|----------|----------|-----------------------------------|
| 0 - 4" (0 - 100mm) | 500-463   | .0005"/0.01mm | ±.001"   | .32 lbs. | With depth measuring rod (Ø3/40") |
|                    | 500-473*  | .0005"/0.01mm | ±.001"   | .28 lbs. | With depth measuring rod (Ø3/40") |
| 0 - 6" (0 - 150mm) | 500-464   | .0005"/0.01mm | ±.001"   | .37 lbs. | With depth measuring bar (blade)  |
|                    | 500-474*  | .0005"/0.01mm | ±.001"   | .33 lbs. | With depth measuring bar (blade)  |
| 0 - 8" (0 - 200mm) | 500-465   | .0005"/0.01mm | ±.001"   | .44 lbs. | With depth measuring bar (blade)  |
|                    | 500-475*  | .0005"/0.01mm | ±.001"   | .40 lbs. | With depth measuring bar (blade)  |

\*Without SPC data output

## Dial Calipers

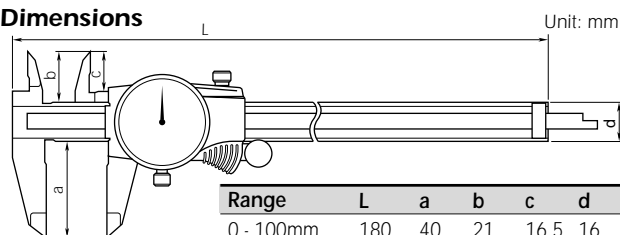
### SERIES 505



#### FEATURES

- New designed dial movement for ultra smooth sliding and high shock protection.
- Titanium coating is applied to the sliding surface to strengthen the durability. No wearing by 100,000-time sliding test.
- Can measure OD, ID, depth, and steps.
- Clamping screw atop the slider.
- Special models available with carbide-tipped OD and ID jaws.

#### Dimensions



| Range     | L   | a  | b    | c    | d  |
|-----------|-----|----|------|------|----|
| 0 - 100mm | 180 | 40 | 21   | 16.5 | 16 |
| 0 - 150mm | 231 | 40 | 21   | 16.5 | 16 |
| 0 - 200mm | 288 | 50 | 24.5 | 20   | 16 |
| 0 - 300mm | 403 | 64 | 27.5 | 22   | 20 |

#### SPECIFICATIONS

##### Metric

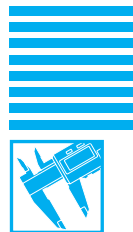
| Range     | Order No. | Dial reading |            | Accuracy | Remarks                      |
|-----------|-----------|--------------|------------|----------|------------------------------|
|           |           | Graduation   | Range/rev. |          |                              |
| 0 - 100mm | 505-680   | 0.01mm       | 1mm        | ±0.015mm | with Depth bar, gray cover   |
| 0 - 150mm | 505-683   | 0.02mm       | 2mm        | ±0.03mm  | with Depth bar, silver cover |
|           | 505-671   | 0.02mm       | 2mm        | ±0.03mm  | with Depth bar, gray cover   |
|           | 505-707*  | 0.02mm       | 2mm        | ±0.03mm  | with Depth bar, gray cover   |
|           | 505-711** | 0.02mm       | 2mm        | ±0.03mm  | with Depth bar, silver cover |
|           | 505-685   | 0.01mm       | 1mm        | ±0.02mm  | with Depth bar, silver cover |
| 0 - 200mm | 505-681   | 0.01mm       | 1mm        | ±0.02mm  | with Depth bar, gray cover   |
|           | 505-684   | 0.02mm       | 2mm        | ±0.03mm  | with Depth bar, silver cover |
|           | 505-672   | 0.02mm       | 2mm        | ±0.03mm  | with Depth bar, gray cover   |
|           | 505-686   | 0.01mm       | 1mm        | ±0.03mm  | with Depth bar, silver cover |
| 0 - 300mm | 505-682   | 0.01mm       | 1mm        | ±0.03mm  | with Depth bar, gray cover   |
|           | 505-673   | 0.02mm       | 2mm        | ±0.04mm  | with Depth bar, gray cover   |

##### Inch

| Range   | Order No. | Dial reading |            | Accuracy | Remarks                      |
|---------|-----------|--------------|------------|----------|------------------------------|
|         |           | Graduation   | Range/rev. |          |                              |
| 0 - 4"  | 505-674   | .001"        | .1"        | ±.001"   | with Depth bar, gray cover   |
| 0 - 6"  | 505-689   | .001"        | .1"        | ±.001"   | with Depth bar, silver cover |
|         | 505-675   | .001"        | .1"        | ±.001"   | with Depth bar, gray cover   |
|         | 505-708*  | .001"        | .1"        | ±.001"   | with Depth bar, gray cover   |
|         | 505-712** | .001"        | .1"        | ±.001"   | with Depth bar, gray cover   |
| 0 - 8"  | 505-690   | .001"        | .1"        | ±.002"   | with Depth bar, silver cover |
|         | 505-676   | .001"        | .1"        | ±.002"   | with Depth bar, gray cover   |
|         | 505-709*  | .001"        | .1"        | ±.002"   | with Depth bar, gray cover   |
|         | 505-713** | .001"        | .1"        | ±.002"   | with Depth bar, gray cover   |
| 0 - 12" | 505-720   | .001"        | .2"        | ±.002"   | with Depth bar, gray cover   |
|         | 505-677   | .001"        | .1"        | ±.002"   | with Depth bar, silver cover |
|         | 505-721*  | .001"        | .2"        | ±.002"   | with Depth bar, gray cover   |
|         | 505-710*  | .001"        | .1"        | ±.002"   | with Depth bar, silver cover |
|         | 505-714** | .001"        | .1"        | ±.002"   | with Depth bar, silver cover |

\*Provided with carbide-tipped jaws for OD measurement.

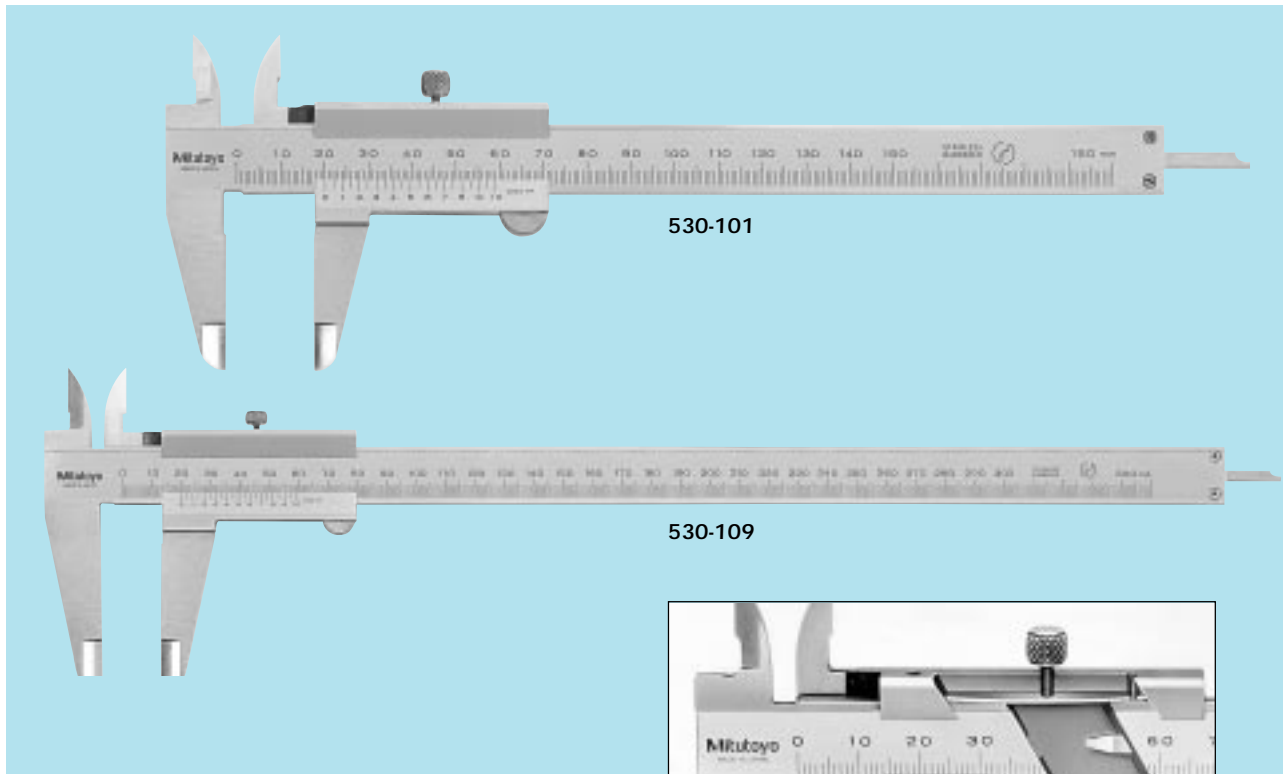
\*\*Provided with carbide-tipped jaws for OD & ID measurements.





# Vernier Calipers

## SERIES 530



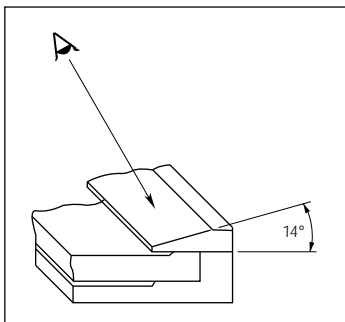
530-101

530-109



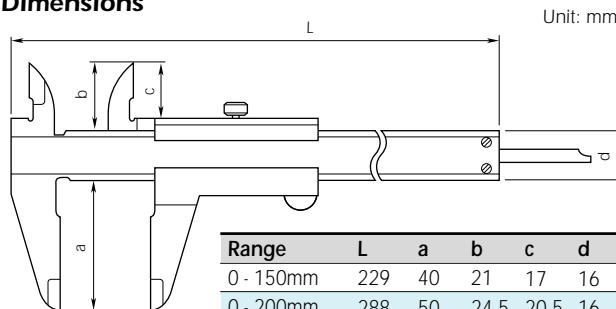
### FEATURES

- Plain and basic design.
- Can measure OD (outside diameter), ID (inside diameter), depth, and steps.
- The small vernier face angle (14°) provides easy reading.



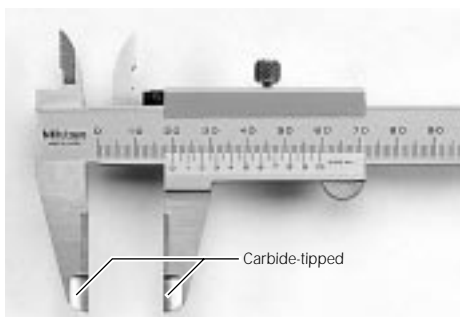
- Clamping screw atop the slider.
- Carbide-tipped jaw type calipers are also available.

### Dimensions



Unit: mm

| Range      | L    | a   | b    | c    | d  |
|------------|------|-----|------|------|----|
| 0 - 150mm  | 229  | 40  | 21   | 17   | 16 |
| 0 - 200mm  | 288  | 50  | 24.5 | 20.5 | 16 |
| 0 - 300mm  | 403  | 64  | 27.5 | 22   | 20 |
| 0 - 600mm  | 780  | 90  | 47   | 38   | 25 |
| 0 - 1000mm | 1240 | 130 | 60   | 50   | 32 |



Carbide-tipped jaw type

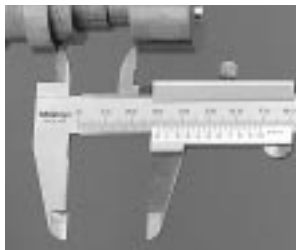


Round depth bar type

## • Measurement applications



OD measurement



ID measurement



Step measurement



Depth measurement

## SPECIFICATIONS

### Metric

| Range       |             | Order No.            | Vernier reading |             | Accuracy | Mass  | Remarks                           |
|-------------|-------------|----------------------|-----------------|-------------|----------|-------|-----------------------------------|
| Lower scale | Upper scale |                      | Lower scale     | Upper scale |          |       |                                   |
| 0 - 150mm   | —           | 530-102              | 0.05mm          | —           | ±0.05mm  | 145g  | With depth measuring rod (Ø1.9mm) |
|             |             | 530-101              | 0.05mm          | —           | ±0.05mm  | 145g  | With depth measuring bar (blade)  |
|             |             | 530-320*             | 0.05mm          | —           | ±0.05mm  | 145g  | With depth measuring bar (blade)  |
|             |             | 530-335**            | 0.05mm          | —           | ±0.05mm  | 145g  | With depth measuring bar (blade)  |
|             |             | 530-319 <sup>†</sup> | 0.05mm          | —           | ±0.05mm  | 145g  | With depth measuring bar (blade)  |
|             |             | 530-122              | 0.02mm          | —           | ±0.03mm  | 145g  | With depth measuring bar (blade)  |
| 0 - 200mm   | —           | 530-108              | 0.05mm          | —           | ±0.05mm  | 180g  | With depth measuring bar (blade)  |
|             |             | 530-321*             | 0.05mm          | —           | ±0.05mm  | 180g  | With depth measuring bar (blade)  |
|             |             | 530-123              | 0.02mm          | —           | ±0.03mm  | 180g  | With depth measuring bar (blade)  |
| 0 - 300mm   | —           | 530-109              | 0.05mm          | —           | ±0.08mm  | 355g  | With depth measuring bar (blade)  |
|             |             | 530-322*             | 0.05mm          | —           | ±0.08mm  | 355g  | With depth measuring bar (blade)  |
|             | —           | 530-124              | 0.02mm          | —           | ±0.04mm  | 355g  | With depth measuring bar (blade)  |
| 0 - 600mm   | —           | 530-501              | 0.05mm          | —           | ±0.10mm  | 1300g | —                                 |
| 0 - 1000mm  | —           | 530-502              | 0.05mm          | —           | ±0.15mm  | 3300g | —                                 |

\*Provided with carbide-tipped jaws for OD measurement. \*\*Provided with carbide-tipped jaws for OD & ID measurements.

<sup>†</sup>Clamping screw below the slider.

### Metric / Inch

| Range       |             | Order No.             | Vernier reading |             | Accuracy | Mass | Remarks                          |
|-------------|-------------|-----------------------|-----------------|-------------|----------|------|----------------------------------|
| Lower scale | Upper scale |                       | Lower scale     | Upper scale |          |      |                                  |
| 0 - 150mm   | 0 - 6"      | 530-104               | 0.05mm          | 1/128"      | ±0.05mm  | 145g | With depth measuring bar (blade) |
|             |             | 530-316 <sup>†</sup>  | 0.05mm          | 1/128"      | ±0.05mm  | 145g | With depth measuring bar (blade) |
|             |             | 530-125 <sup>††</sup> | 0.05mm          | 1/128"      | ±0.05mm  | 145g | With depth measuring bar (blade) |
|             |             | 530-312               | 0.02mm          | .001"       | ±0.03mm  | 145g | With depth measuring bar (blade) |
| 0 - 200mm   | 0 - 8"      | 530-114               | 0.05mm          | 1/128"      | ±0.05mm  | 180g | With depth measuring bar (blade) |
|             |             | 530-118               | 0.02mm          | .001"       | ±0.03mm  | 180g | With depth measuring bar (blade) |
| 0 - 300mm   | 0 - 12"     | 530-115               | 0.05mm          | 1/128"      | ±0.08mm  | 355g | With depth measuring bar (blade) |
|             |             | 530-119               | 0.02mm          | .001"       | ±0.04mm  | 355g | With depth measuring bar (blade) |

<sup>†</sup>Clamping screw below the slider. <sup>††</sup>Inch/mm conversion table is labeled on the back of the slider.

### Inch

| Range       |             | Order No. | Vernier reading |             | Accuracy | Mass     | Remarks                          |
|-------------|-------------|-----------|-----------------|-------------|----------|----------|----------------------------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |          |                                  |
| 0 - 6"      | —           | 530-105   | .001"           | 1/128"      | ±.0015"  | .32 lbs. | With depth measuring bar (blade) |
|             |             | 530-314*  | .001"           | 1/128"      | ±.0015"  | .32 lbs. | With depth measuring bar (blade) |
| 0 - 8"      | —           | 530-116   | .001"           | 1/128"      | ±.0015"  | .40 lbs. | With depth measuring bar (blade) |

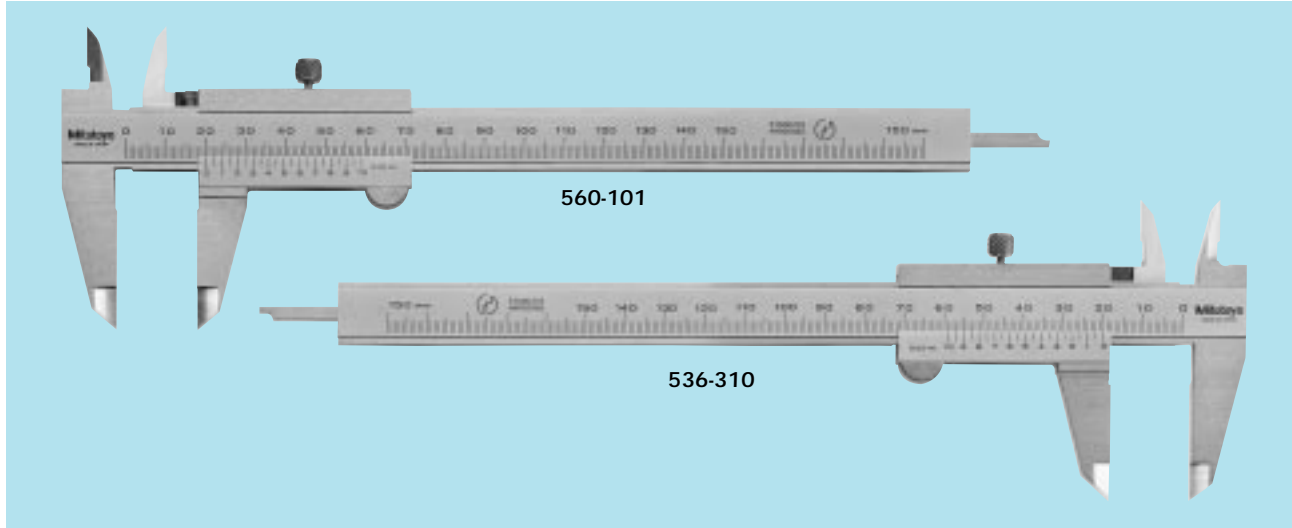
\*Provided with carbide-tipped jaws for OD measurement.



# Vernier Calipers

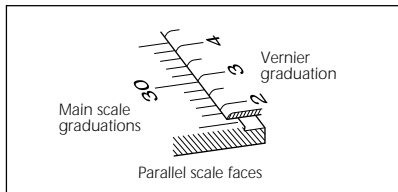
SERIES 560, 536

Parallax-Free Type



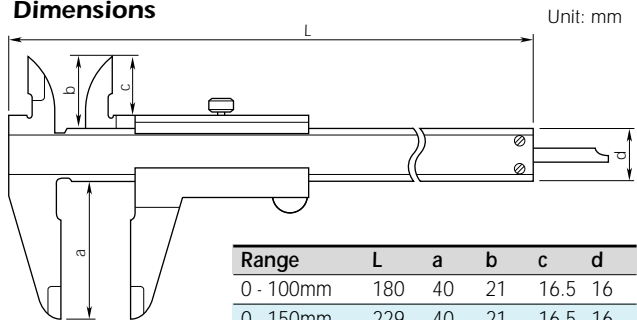
## FEATURES

- Parallax-free vernier scales for easy and positive measurement.



- Can measure OD, ID, depth, and steps.
- With clamping screw atop the slider.
- Special model (Series 536) is also available designed for left-handers.

## Dimensions



| Range     | L   | a  | b    | c    | d  |
|-----------|-----|----|------|------|----|
| 0 - 100mm | 180 | 40 | 21   | 16.5 | 16 |
| 0 - 150mm | 229 | 40 | 21   | 16.5 | 16 |
| 0 - 200mm | 288 | 50 | 24.5 | 20   | 16 |
| 0 - 300mm | 403 | 64 | 27.5 | 22   | 20 |

## SPECIFICATIONS

### Metric

| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks                           |
|-------------|-------------|-----------|-----------------|-------------|----------|-----------------------------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                                   |
| 0 - 100mm   | —           | 560-110   | 0.05mm          | —           | ±0.05mm  | with Depth measuring rod (Ø1.9mm) |
| 0 - 150mm   | —           | 560-101   | 0.05mm          | —           | ±0.05mm  | with Depth bar                    |
|             |             | 536-310*  | 0.05mm          | —           | ±0.05mm  | with Depth bar                    |
|             |             | 560-122   | 0.02mm          | —           | ±0.03mm  | with Depth bar                    |
| 0 - 200mm   | —           | 560-108   | 0.05mm          | —           | ±0.05mm  | with Depth bar                    |
| 0 - 300mm   | —           | 560-109   | 0.05mm          | —           | ±0.08mm  | with Depth bar                    |

\*Left-handed type (Series 536)

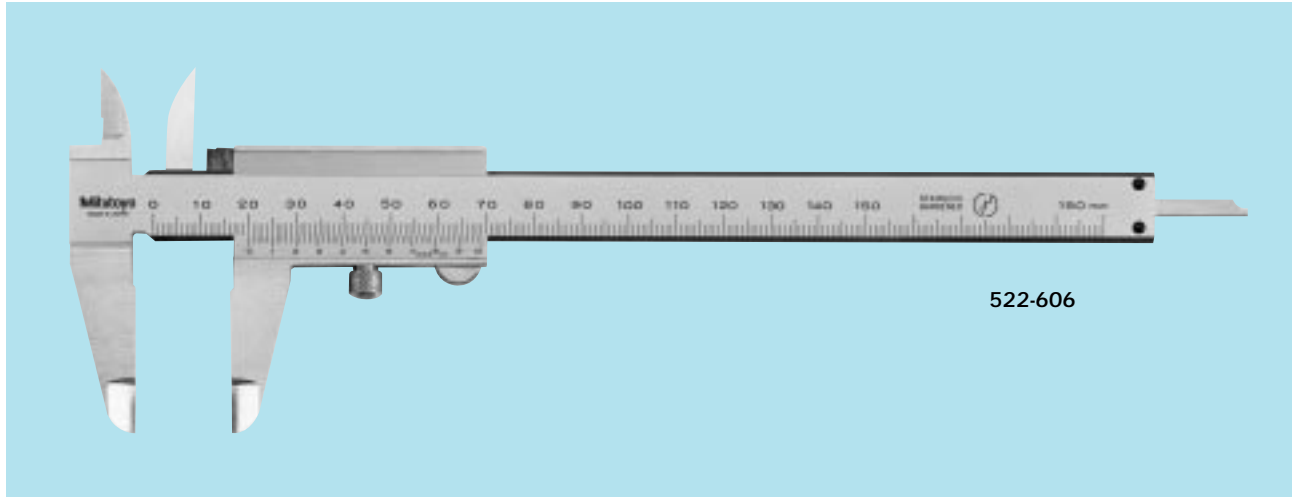
### Metric / Inch

| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks        |
|-------------|-------------|-----------|-----------------|-------------|----------|----------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                |
| 0 - 150mm   | 0 - 6"      | 560-104   | 0.05mm          | 1/128"      | ±0.05mm  | with Depth bar |
| 0 - 200mm   | 0 - 8"      | 560-118   | 0.02mm          | .001"       | ±0.03mm  | with Depth bar |

## Diamond Master Vernier Calipers

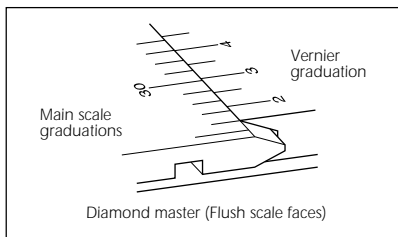
### SERIES 522

Parallax-Free Type

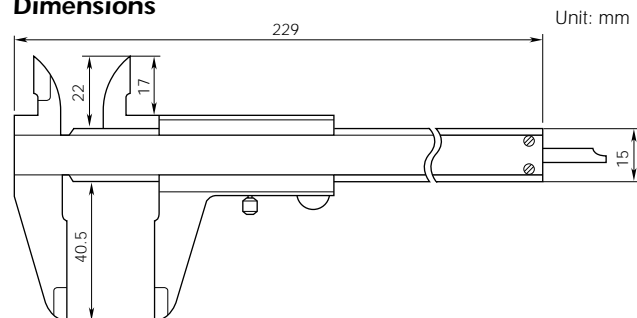


### FEATURES

- The main and vernier scales are flush-fitted to eliminate parallax errors because of the diamond-shaped (octagonal) cross section of the main scale.



### Dimensions



- Can measure OD, ID, depth, and steps.
- With clamping screw below the slider.

### SPECIFICATIONS

#### Metric

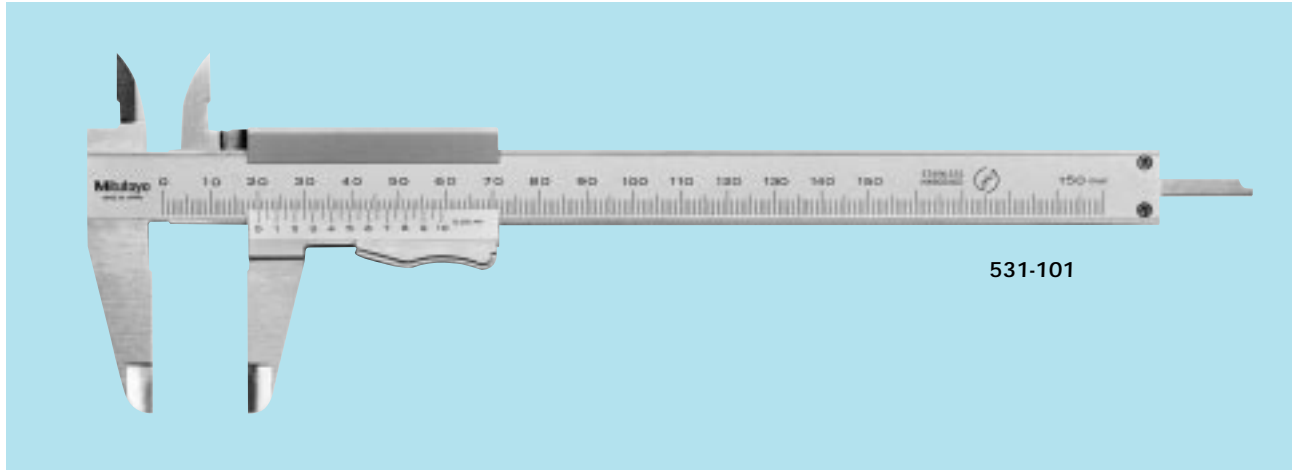
| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks        |
|-------------|-------------|-----------|-----------------|-------------|----------|----------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                |
| 0 - 150mm   | —           | 522-600   | 0.05mm          | —           | ±0.05mm  | with Depth bar |
|             |             | 522-606   | 0.02mm          | —           | ±0.03mm  | with Depth bar |

#### Metric/Inch

| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks        |
|-------------|-------------|-----------|-----------------|-------------|----------|----------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                |
| 0 - 150mm   | 0 - 6"      | 522-601   | 0.05mm          | 1/128"      | ±0.05mm  | with Depth bar |
|             |             | 522-602   | 0.02mm          | .001"       | ±0.03mm  | with Depth bar |

# Vernier Calipers

SERIES 531  
with Thumb Clamp

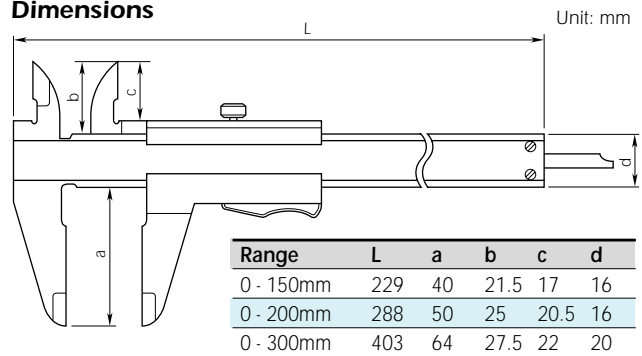


## FEATURES

- The slider moves only when the spring loaded thumb clamp is depressed.
- Can measure OD, ID, depth, and steps.



## Dimensions



## SPECIFICATIONS

### Metric

| Range     | Order No.   |             | Vernier reading |             | Accuracy | Remarks        |
|-----------|-------------|-------------|-----------------|-------------|----------|----------------|
|           | Lower scale | Upper scale | Lower scale     | Upper scale |          |                |
| 0 - 150mm | —           | 531-101     | 0.05mm          | —           | ±0.05mm  | with Depth bar |
|           |             | 531-140     | 0.02mm          | —           | ±0.03mm  | with Depth bar |
| 0 - 200mm | —           | 531-102     | 0.05mm          | —           | ±0.05mm  | with Depth bar |
|           |             | 531-141     | 0.02mm          | —           | ±0.03mm  | with Depth bar |
| 0 - 300mm | —           | 531-103     | 0.05mm          | —           | ±0.08mm  | with Depth bar |
|           |             | 531-142     | 0.02mm          | —           | ±0.04mm  | with Depth bar |

### Inch

| Range  | Order No.   |             | Vernier reading |             | Accuracy | Remarks        |
|--------|-------------|-------------|-----------------|-------------|----------|----------------|
|        | Lower scale | Upper scale | Lower scale     | Upper scale |          |                |
| 0 - 6" | 0 - 6"      | 531-113     | .001"           | 1/128"      | ±.0015"  | with Depth bar |
| 0 - 8" | 0 - 8"      | 531-114     | .001"           | 1/128"      | ±.0015"  | with Depth bar |

### Metric / Inch

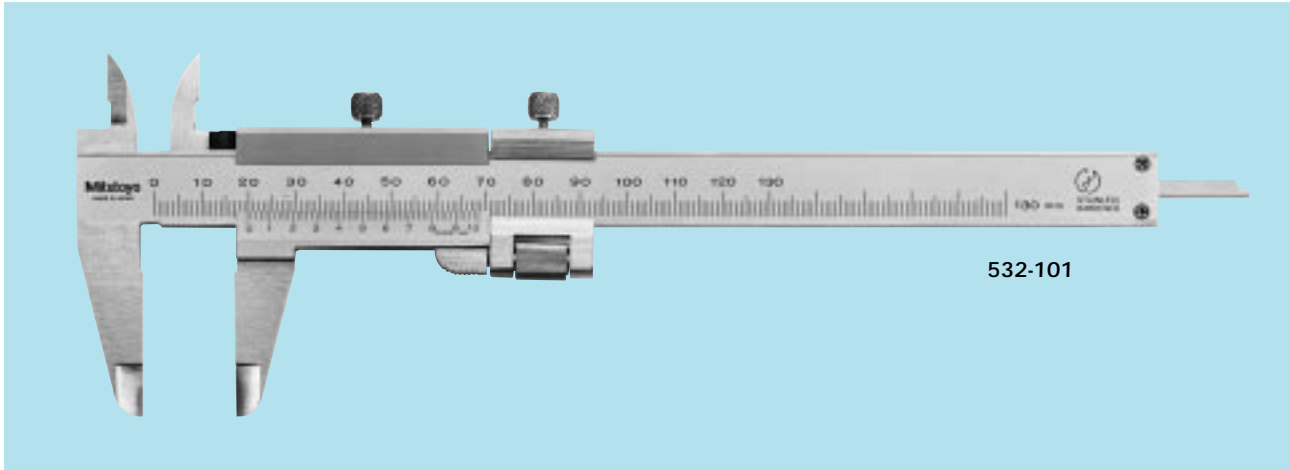
| Range     | Order No.   |             | Vernier reading |             | Accuracy | Remarks        |
|-----------|-------------|-------------|-----------------|-------------|----------|----------------|
|           | Lower scale | Upper scale | Lower scale     | Upper scale |          |                |
| 0 - 150mm | 0 - 6"      | 531-107     | 0.05mm          | 1/128"      | ±0.05mm  | with Depth bar |
|           |             | 531-122*    | 0.05mm          | 1/128"      | ±0.05mm  | with Depth bar |
|           |             | 531-128     | 0.02mm          | .001"       | ±0.03mm  | with Depth bar |
| 0 - 200mm | 0 - 8"      | 531-108     | 0.05mm          | 1/128"      | ±0.05mm  | with Depth bar |
|           |             | 531-129     | 0.02mm          | .001"       | ±0.03mm  | with Depth bar |
| 0 - 300mm | 0 - 12"     | 531-109     | 0.05mm          | 1/128"      | ±0.08mm  | with Depth bar |
|           |             | 531-112     | 0.02mm          | .001"       | ±0.04mm  | with Depth bar |

\*mm/inch conversion table is labeled on the underside of slider.

## Vernier Calipers

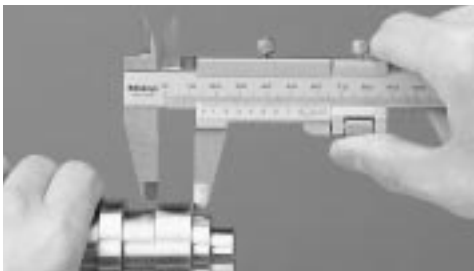
### SERIES 532

with Fine Adjustment

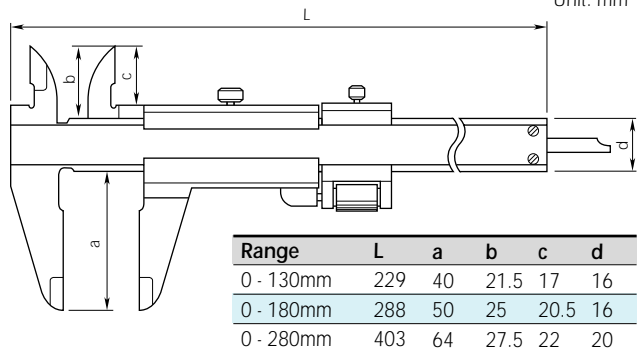


### FEATURES

- Provided with a fine-adjustment carriage to feed the slider finely.
- Can measure OD, ID, depth, and steps.



### Dimensions



### SPECIFICATIONS

#### Metric

| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks        |
|-------------|-------------|-----------|-----------------|-------------|----------|----------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                |
| 0 - 130mm   | —           | 532-101   | 0.02mm          | —           | ±0.03mm  | with Depth bar |
| 0 - 180mm   | —           | 532-102   | 0.02mm          | —           | ±0.03mm  | with Depth bar |
| 0 - 280mm   | —           | 532-103   | 0.02mm          | —           | ±0.04mm  | with Depth bar |

#### Inch

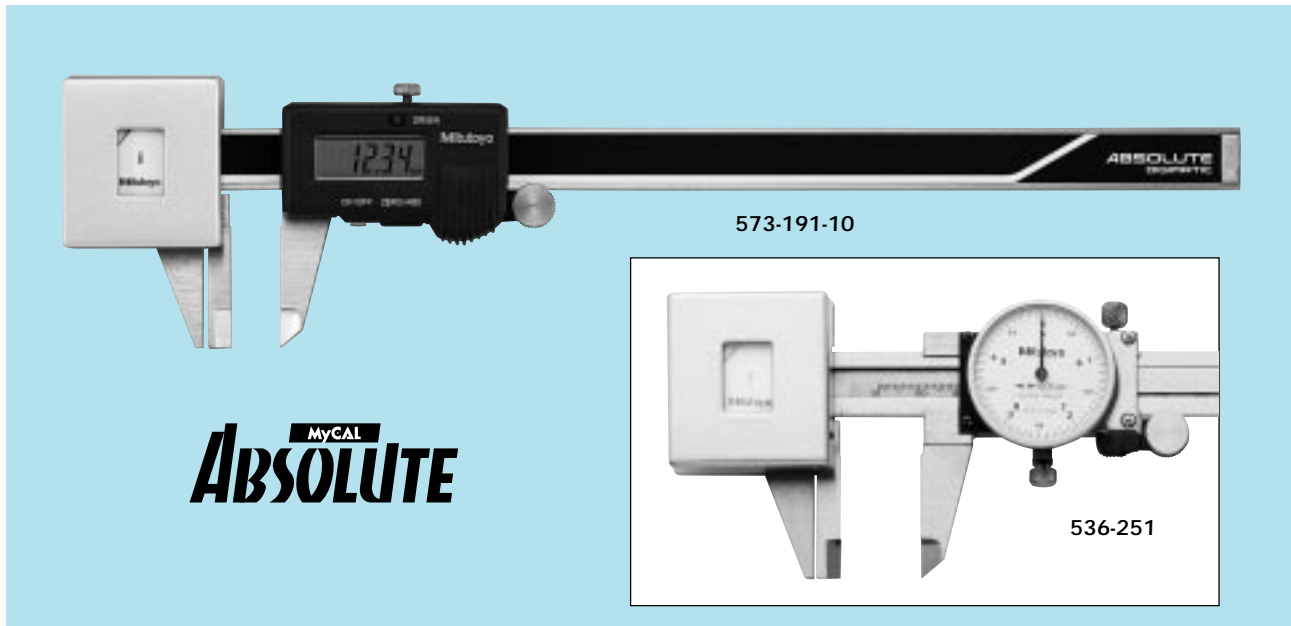
| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks        |
|-------------|-------------|-----------|-----------------|-------------|----------|----------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                |
| 0 - 5"      | 0 - 5"      | 532-104   | .001"           | 1/128"      | ±.0015"  | with Depth bar |
| 0 - 7"      | 0 - 7"      | 532-105   | .001"           | 1/128"      | ±.0015"  | with Depth bar |
| 0 - 11"     | 0 - 11"     | 532-106   | .001"           | 1/128"      | ±.0015"  | with Depth bar |

#### Metric / Inch

| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks        |
|-------------|-------------|-----------|-----------------|-------------|----------|----------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                |
| 0 - 130mm   | 0 - 5"      | 532-119   | 0.02mm          | .001"       | ±0.03mm  | with Depth bar |
| 0 - 180mm   | 0 - 7"      | 532-120   | 0.02mm          | .001"       | ±0.03mm  | with Depth bar |
| 0 - 280mm   | 0 - 11"     | 532-121   | 0.02mm          | .001"       | ±0.04mm  | with Depth bar |

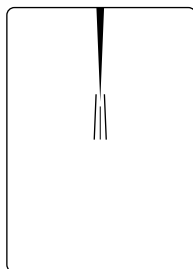
# Low Force Caliper

SERIES 573, 536



## FEATURES

- Due to the low measuring force these calipers are ideal for elastic or resilient workpieces such as plastic parts and rubber parts that standard calipers cannot measure.



(To measure resilient workpieces take the measurement when the pointer is between the two index lines.)

- Constant force: 0.49N to 0.98N (50 to 100gf)
- The jaw on the beam travels 0.3mm.
- The 573 series (LCD readout type) is provided with SPC output.

## SPECIFICATIONS

### Low Force Digimatic Caliper

#### Metric

| Range     | Order No.  | Resolution | Accuracy | Mass |
|-----------|------------|------------|----------|------|
| 0 - 180mm | 573-191-10 | 0.01mm     | ±0.05mm  | 247g |

#### Inch/Metric

| Range              | Order No.  | Resolution    | Accuracy | Mass     |
|--------------------|------------|---------------|----------|----------|
| 0 - 7" (0 - 180mm) | 573-291-10 | .0005"/0.01mm | ±.002"   | .54 lbs. |

### Low Force Dial Caliper

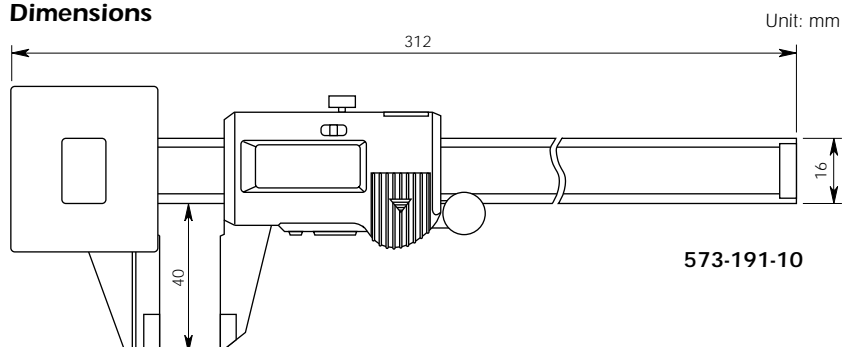
#### Metric

| Range     | Order No. | Graduation | Accuracy | Range per revolution | Mass |
|-----------|-----------|------------|----------|----------------------|------|
| 0 - 180mm | 536-251   | 0.05mm     | ±0.05mm  | 5mm                  | 280g |

#### Inch

| Range  | Order No. | Graduation | Accuracy | Range per revolution | Mass     |
|--------|-----------|------------|----------|----------------------|----------|
| 0 - 7" | 536-252   | .001"      | ±.002"   | .2"                  | .62 lbs. |

## Dimensions



## Digimatic Calipers

SERIES 550  
with Nib Style Jaws



550-201-10

# ABSOLUTE

Mitutoyo's Digimatic Caliper keeps track of its origin point (jaws-closed point) once set. Whenever turned on, the large LCD screen displays the actual slider position to start measurement. No more repeated zero-setting is necessary.

### FEATURES

- The rounded faces of the jaws are ideal for accurate ID (inside diameter) measurement.
- Depth measuring bar is not provided.
- Data Hold Unit (959143) is optional.

### Technical Data

**Display:** LCD

**Functions:** Origin-Set, Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, data hold (optional), offset, preset

**Battery:** SR44 (1 pc.) (938882)

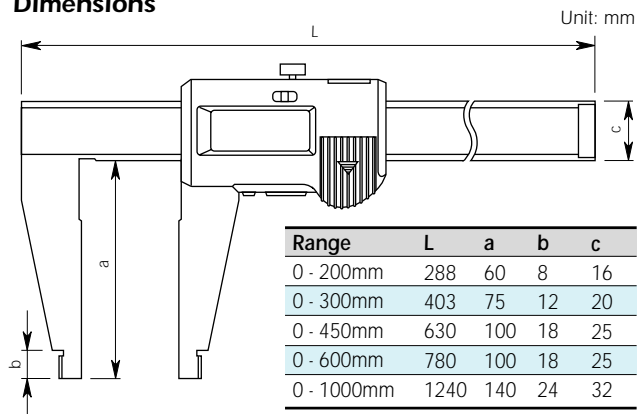
**Battery life:** Approx. 3.5 years under normal use

**Maximum response speed:** Unlimited

**Alarm:** Low battery voltage, scale contamination, counting value composition error

**Operating temperature:** 0°C to 40°C

### Dimensions



### OPTIONAL ACCESSORIES

| Order No. | Description                     |
|-----------|---------------------------------|
| 959143    | Data Hold Unit                  |
| 959149    | SPC cable with data switch (1m) |
| 959150    | SPC cable with data switch (2m) |

### SPECIFICATIONS

#### Metric

| Range      | Order No.   | Resolution | Accuracy | Mass  | Remarks                         |
|------------|-------------|------------|----------|-------|---------------------------------|
| 0 - 200mm  | 550-201-10  | 0.01mm     | ±0.03mm  | 180g  | ID measuring range: 10 - 200mm  |
| 0 - 300mm  | 550-231-10* | 0.01mm     | ±0.03mm  | 380g  | ID measuring range: 10 - 300mm  |
| 0 - 450mm  | 550-203-10  | 0.01mm     | ±0.05mm  | 1110g | ID measuring range: 20 - 450mm  |
| 0 - 600mm  | 550-205-10  | 0.01mm     | ±0.05mm  | 1290g | ID measuring range: 20 - 600mm  |
| 0 - 1000mm | 550-207-10  | 0.01mm     | ±0.07mm  | 3350g | ID measuring range: 20 - 1000mm |

\*Provided with offset-value setting and preset functions for easy ID measurement.

#### Inch/Metric

| Range                | Order No.   | Resolution    | Accuracy | Mass      | Remarks                       |
|----------------------|-------------|---------------|----------|-----------|-------------------------------|
| 0 - 8" (0 - 200mm)   | 550-221-10  | .0005"/0.01mm | ±.001"   | .40 lbs.  | ID measuring range: .4" - 8"  |
| 0 - 12" (0 - 300mm)  | 550-241-10* | .0005"/0.01mm | ±.0015"  | .84 lbs.  | ID measuring range: .4" - 12" |
| 0 - 18" (0 - 450mm)  | 550-223-10  | .0005"/0.01mm | ±.002"   | 2.44 lbs. | ID measuring range: .5" - 18" |
| 0 - 24" (0 - 600mm)  | 550-225-10  | .0005"/0.01mm | ±.002"   | 2.84 lbs. | ID measuring range: .5" - 24" |
| 0 - 40" (0 - 1000mm) | 550-227-10  | .0005"/0.01mm | ±.003"   | 7.37 lbs. | ID measuring range: 1" - 40"  |

\*Provided with offset-value setting and preset functions for easy ID measurement.

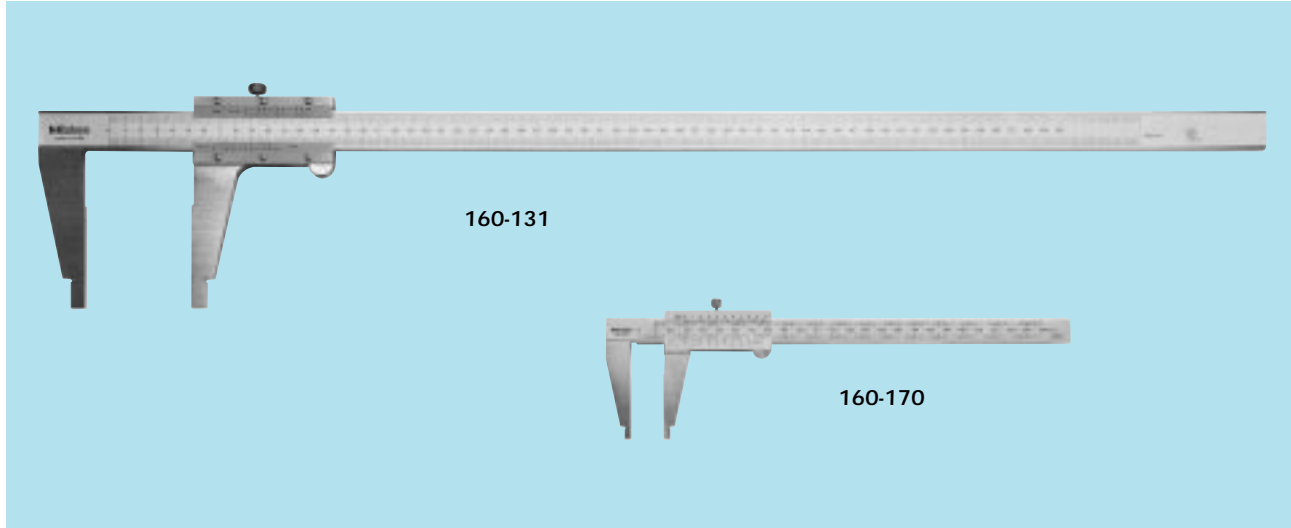




# Vernier Calipers

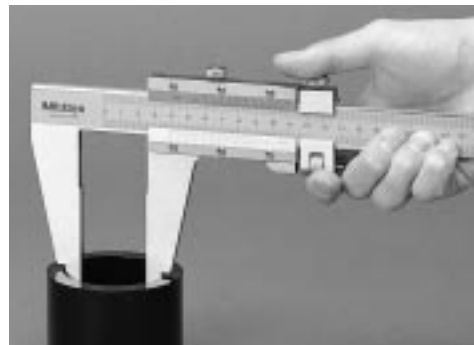
## SERIES 160

with Nib Style Jaws



### FEATURES

- The jaws have round measuring faces for accurate ID measurement.
- With or without a fine-adjustment carriage to feed the slider finely.
- Inside and outside measurements can be directly read from the upper and lower slider graduations, respectively. (Metric model or inch model only).
- No depth measuring bar.



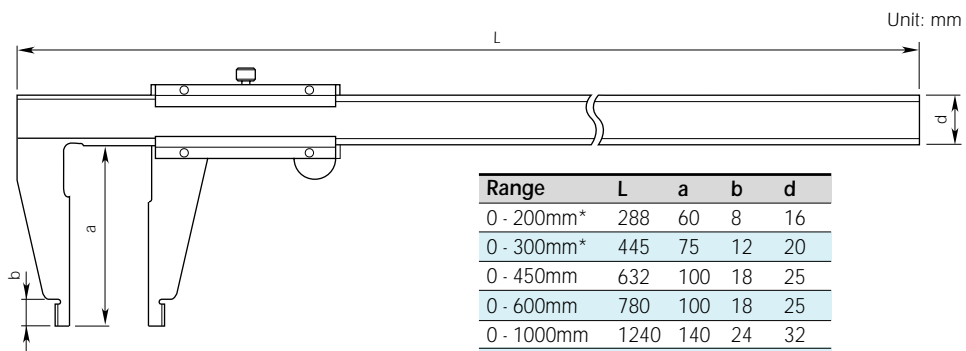
### SPECIFICATIONS

#### Vernier Calipers

##### Metric

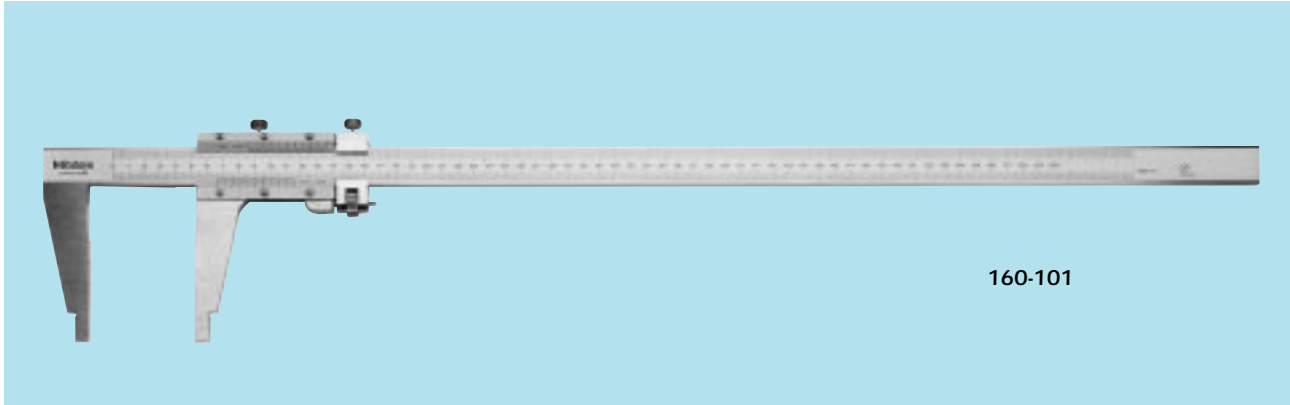
| Range      |             | Order No.      | Vernier reading |        | Accuracy | Remarks            |
|------------|-------------|----------------|-----------------|--------|----------|--------------------|
| OD         | ID          |                | OD              | ID     |          |                    |
| 0 - 200mm  | 10 - 200mm  | <b>160-170</b> | 0.02mm          | 0.02mm | ±0.03mm  | Parallax-free type |
| 0 - 300mm  | 10 - 300mm  | <b>160-180</b> | 0.02mm          | 0.02mm | ±0.04mm  | Parallax-free type |
| 0 - 450mm  | 20 - 450mm  | <b>160-130</b> | 0.05mm          | 0.05mm | ±0.1mm   | —                  |
| 0 - 600mm  | 20 - 600mm  | <b>160-131</b> | 0.05mm          | 0.05mm | ±0.1mm   | —                  |
| 0 - 1000mm | 20 - 1000mm | <b>160-132</b> | 0.05mm          | 0.05mm | ±0.15mm  | —                  |
| 0 - 1500mm | 20 - 1500mm | <b>160-133</b> | 0.05mm          | 0.05mm | ±0.22mm  | —                  |
| 0 - 2000mm | 20 - 2000mm | <b>160-134</b> | 0.05mm          | 0.05mm | ±0.28mm  | —                  |

### Dimensions



| Range      | L    | a   | b  | d  |
|------------|------|-----|----|----|
| 0 - 200mm* | 288  | 60  | 8  | 16 |
| 0 - 300mm* | 445  | 75  | 12 | 20 |
| 0 - 450mm  | 632  | 100 | 18 | 25 |
| 0 - 600mm  | 780  | 100 | 18 | 25 |
| 0 - 1000mm | 1240 | 140 | 24 | 32 |
| 0 - 1500mm | 1800 | 180 | 30 | 32 |
| 0 - 2000mm | 2300 | 180 | 30 | 40 |

\*Parallax-free type



160-101



## Vernier Calipers with Fine Adjustment

### Metric

| Range      |             | Order No. | Vernier reading |        | Accuracy | Remarks |
|------------|-------------|-----------|-----------------|--------|----------|---------|
| OD         | ID          |           | OD              | ID     |          |         |
| 0 - 300mm  | 10 - 300mm  | 160-127   | 0.02mm          | 0.02mm | ±0.04mm  | —       |
| 0 - 450mm  | 20 - 450mm  | 160-128   | 0.02mm          | 0.02mm | ±0.05mm  | —       |
| 0 - 600mm  | 20 - 600mm  | 160-101   | 0.02mm          | 0.02mm | ±0.05mm  | —       |
| 0 - 1000mm | 20 - 1000mm | 160-104   | 0.02mm          | 0.02mm | ±0.07mm  | —       |
| 0 - 1500mm | 20 - 1500mm | 160-110   | 0.02mm          | 0.02mm | ±0.09mm  | —       |
| 0 - 2000mm | 20 - 2000mm | 160-113   | 0.02mm          | 0.02mm | ±0.12mm  | —       |

### Inch

| Range   |           | Order No. | Vernier reading |       | Accuracy | Remarks |
|---------|-----------|-----------|-----------------|-------|----------|---------|
| OD      | ID        |           | OD              | ID    |          |         |
| 0 - 12" | .3" - 12" | 160-124   | .001"           | .001" | ±.0015"  | —       |
| 0 - 18" | .5" - 18" | 160-116   | .001"           | .001" | ±.002"   | —       |
| 0 - 24" | .5" - 24" | 160-102   | .001"           | .001" | ±.002"   | —       |
| 0 - 40" | 1" - 40"  | 160-105   | .001"           | .001" | ±.003"   | —       |
| 0 - 60" | 1" - 60"  | 160-111   | .001"           | .001" | ±.004"   | —       |
| 0 - 80" | 1" - 80"  | 160-114   | .001"           | .001" | ±.005"   | —       |

### Metric/Inch

| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks |
|-------------|-------------|-----------|-----------------|-------------|----------|---------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |         |
| 0 - 300mm   | 0 - 12"     | 160-150   | 0.02mm          | .001"       | ±0.04mm  | —       |
| 0 - 450mm   | 0 - 18"     | 160-151   | 0.02mm          | .001"       | ±0.05mm  | —       |
| 0 - 600mm   | 0 - 24"     | 160-153   | 0.02mm          | .001"       | ±0.05mm  | —       |
| 0 - 1000mm  | 0 - 40"     | 160-155   | 0.02mm          | .001"       | ±0.07mm  | —       |
| 0 - 1500mm  | 0 - 60"     | 160-157   | 0.02mm          | .001"       | ±0.09mm  | —       |
| 0 - 2000mm  | 0 - 80"     | 160-159   | 0.02mm          | .001"       | ±0.12mm  | —       |

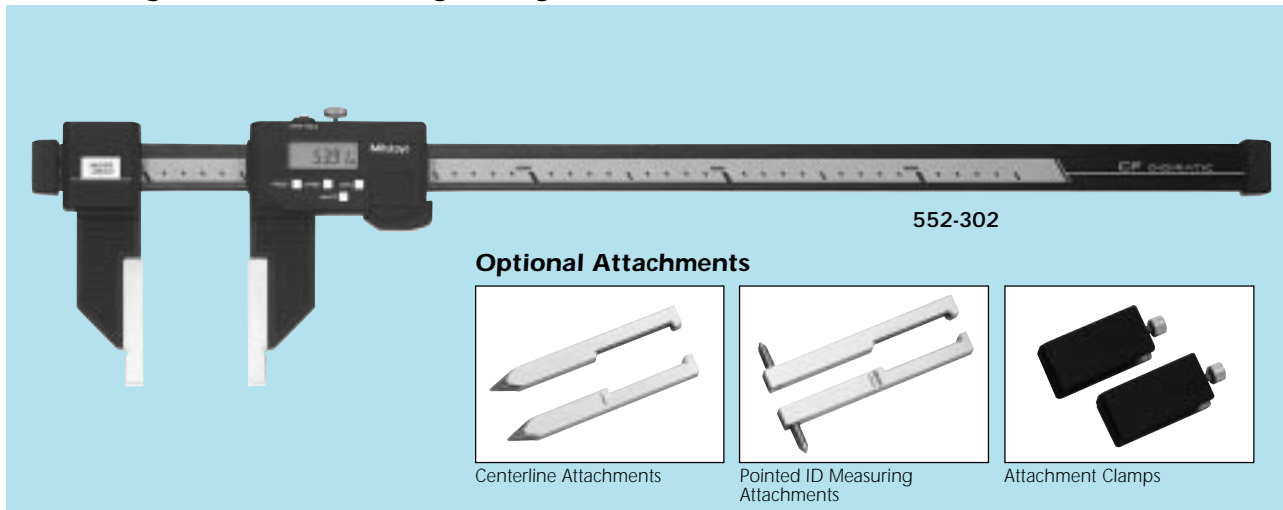
### Inch/Metric

| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks |
|-------------|-------------|-----------|-----------------|-------------|----------|---------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |         |
| 0 - 12"     | 0 - 300mm   | 160-125   | .001"           | 0.02mm      | ±.0015"  | —       |
| 0 - 18"     | 0 - 450mm   | 160-119   | .001"           | 0.02mm      | ±.002"   | —       |
| 0 - 24"     | 0 - 600mm   | 160-103   | .001"           | 0.02mm      | ±.002"   | —       |
| 0 - 40"     | 0 - 1000mm  | 160-106   | .001"           | 0.02mm      | ±.003"   | —       |
| 0 - 60"     | 0 - 1500mm  | 160-112   | .001"           | 0.02mm      | ±.004"   | —       |
| 0 - 80"     | 0 - 2000mm  | 160-115   | .001"           | 0.02mm      | ±.005"   | —       |

# Digimatic Carbon Fiber Calipers

## SERIES 552

Wide Range Models with a Lightweight Beam



### FEATURES

- Lightweight Digimatic Calipers that employ CFRP (Carbon Fiber Reinforced Plastics) in the beam and jaws.
- Highly durable and easy to handle.
- The range of applications can be expanded by using the optional attachments.
- Direct readout of ID measurements from the LCD. (Offset value can be set easily by pressing the Offset key.)
- Preset function for setting a desired starting point.
- Power supply: One SR44 battery (**938882**) offers approx. 2 years of use under normal working conditions.
- With SPC data output.
- Special model available with ceramic jaws which are suitable to measure magnetic products.

### OPTIONAL ACCESSORIES

| Order No. | Description   |
|-----------|---|
| 905338    | SPC cable (1m)  |
| 905409    | SPC cable (2m)  |
| 905689    | SPC cable, L-type (1m)*                                 |
| 905690    | SPC cable, L-type (2m)*                                 |
| 914055    | Centerline Attachments (mm)**                           |
| 914056    | Centerline Attachments (inch)**                         |
| 914057    | Pointed ID Measuring Attachments (mm)**                 |
| 914058    | Pointed ID Measuring Attachments (inch)**               |
| 914053    | Attachment Clamps<br>(for models up to 600mm/24" range) |
| 914054    | Attachment Clamps<br>(for models over 600mm/24" range)  |

\*Connector bent back  
\*\*Attachment Clamps are required.

### SPECIFICATIONS

#### Digimatic Carbon Fiber Calipers

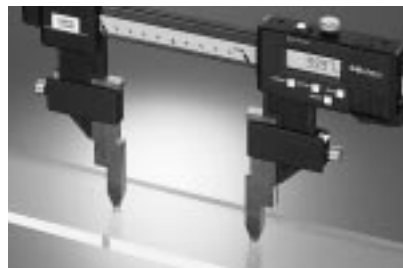
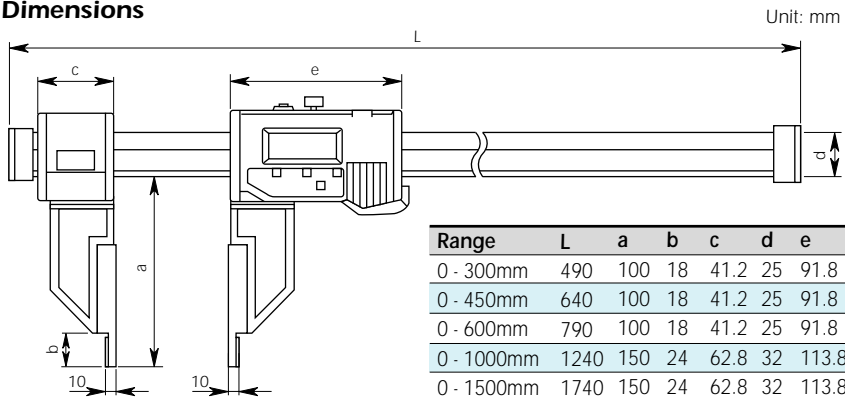
##### Metric

| Range      | Order No.   | Resolution | Accuracy | Mass    | Remarks                |
|------------|-------------|------------|----------|---------|------------------------|
| OD         | ID          |            |          |         |                        |
| 0 - 300mm  | 20 - 320mm  | 552-301    | 0.01mm   | ±0.04mm | 530g —                 |
| 0 - 450mm  | 20 - 470mm  | 552-302    | 0.01mm   | ±0.05mm | 600g —                 |
|            |             | 552-155    | 0.01mm   | ±0.05mm | 600g with Ceramic jaws |
| 0 - 600mm  | 20 - 620mm  | 552-303    | 0.01mm   | ±0.05mm | 670g —                 |
|            |             | 552-156    | 0.01mm   | ±0.05mm | 670g with Ceramic jaws |
| 0 - 1000mm | 20 - 1020mm | 552-304    | 0.01mm   | ±0.07mm | 2100g —                |
| 0 - 1500mm | 20 - 1520mm | 552-305    | 0.01mm   | ±0.09mm | 2400g —                |

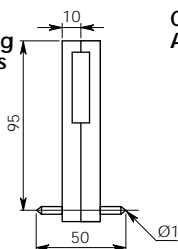
##### Inch/Metric

| Range          | Order No.                | Resolution | Accuracy      | Mass    | Remarks                     |
|----------------|--------------------------|------------|---------------|---------|-----------------------------|
| OD             | ID                       |            |               |         |                             |
| 0 - 12"/300mm  | .5" - 12.5"/12.7 - 312mm | 552-311    | .0005"/0.01mm | ±.0015" | 1.17 lbs. —                 |
| 0 - 18"/450mm  | .5" - 18.5"/12.7 - 462mm | 552-312    | .0005"/0.01mm | ±.002"  | 1.32 lbs. —                 |
|                |                          | 552-165    | .0005"/0.01mm | ±.002"  | 1.32 lbs. with Ceramic jaws |
| 0 - 24"/600mm  | .5" - 24.5"/12.7 - 612mm | 552-313    | .0005"/0.01mm | ±.002"  | 1.48 lbs. —                 |
|                |                          | 552-166    | .0005"/0.01mm | ±.002"  | 1.48 lbs. with Ceramic jaws |
| 0 - 40"/1000mm | 1" - 41"/25.4 - 1025mm   | 552-314    | .0005"/0.01mm | ±.003"  | 4.62 lbs. —                 |
| 0 - 60"/1500mm | 1" - 61"/25.4 - 1525mm   | 552-315    | .0005"/0.01mm | ±.0035" | 5.28 lbs. —                 |

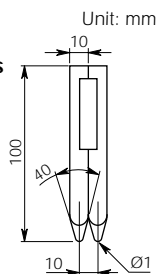
### Dimensions



### Pointed ID Measuring Attachments



### Centerline Attachments



### Digimatic Carbon Fiber Calipers with Long Jaws

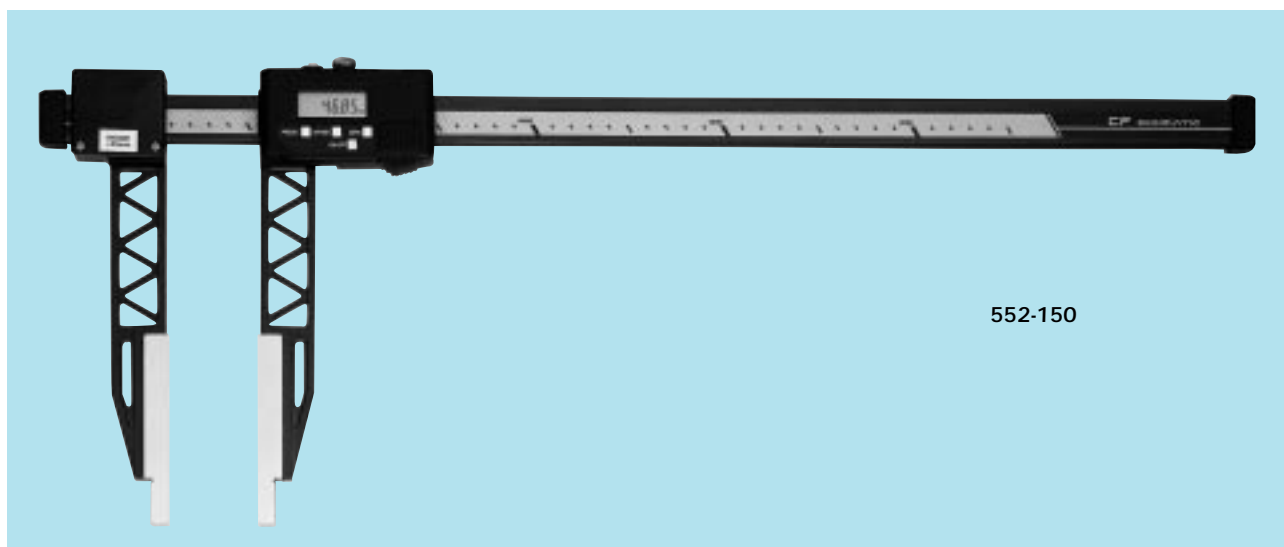
#### Metric

| Range     | Order No. | Resolution | Accuracy | Mass  | Remarks              |
|-----------|-----------|------------|----------|-------|----------------------|
| <b>OD</b> |           |            |          |       |                      |
| 0 - 450mm | 552-150   | 0.01mm     | ±0.07mm  | 1170g | Depth of jaws: 200mm |
| 0 - 600mm | 552-151   | 0.01mm     | ±0.07mm  | 1370g | Depth of jaws: 200mm |

#### Inch/Metric

| Range         | Order No. | Resolution    | Accuracy | Mass      | Remarks             |
|---------------|-----------|---------------|----------|-----------|---------------------|
| <b>OD</b>     |           |               |          |           |                     |
| 0 - 450mm/18" | 552-160   | .0005"/0.01mm | ±.003"   | 2.57 lbs. | Depth of jaws: 7.9" |
| 0 - 600mm/24" | 552-161   | .0005"/0.01mm | ±.003"   | 3.01 lbs. | Depth of jaws: 7.9" |

Note: Centerline Attachments and Pointed ID Measuring Attachments are not available.

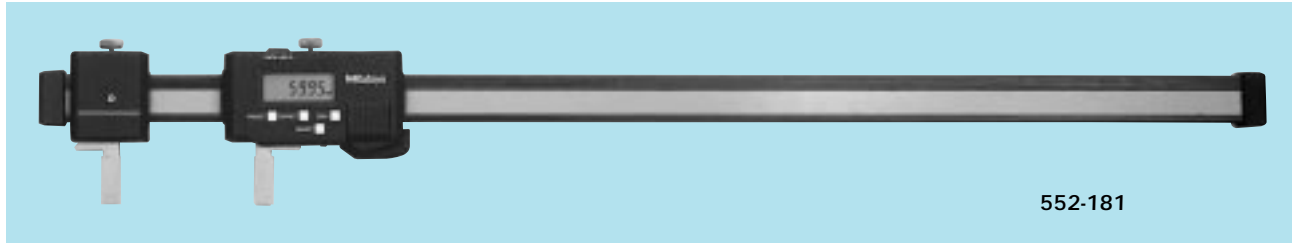


552-150

# Digimatic Carbon Fiber Calipers

## SERIES 552

with Interchangeable Jaws



552-181

### FEATURES

- The range of applications can be expanded by using the interchangeable jaws (optional).
- Quick and easy exchanging of jaws due to the unique clamping mechanism. (A pair of clamping wheels are standard accessories.)
- Provided with preset function for setting a desired starting point, which allows direct readout of offset measurements.
- Power supply: One SR44 battery (**938882**) offers approx. 2 years of use under normal working conditions.
- With SPC data output.

### SPECIFICATIONS

#### Metric

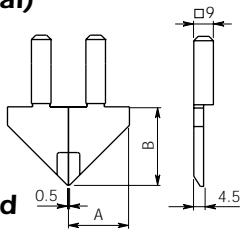
| Range     | Order No.      | Resolution | Accuracy | Mass |
|-----------|----------------|------------|----------|------|
| 0 - 450mm | <b>552-181</b> | 0.01mm     | ±0.04mm  | 730g |
| 0 - 600mm | <b>552-182</b> | 0.01mm     | ±0.04mm  | 770g |

#### Inch / Metric

| Range         | Order No.      | Resolution    | Accuracy | Mass      |
|---------------|----------------|---------------|----------|-----------|
| 0 - 18"/450mm | <b>552-191</b> | .0005"/0.01mm | ±.002"   | 1.6 lbs.  |
| 0 - 24"/600mm | <b>552-192</b> | .0005"/0.01mm | ±.002"   | 1.69 lbs. |

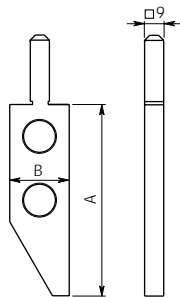
### Interchangeable Jaws (Optional)

#### Standard Type



| Order No. | Components        | Dimensions |        |
|-----------|-------------------|------------|--------|
|           |                   | A          | B      |
| 07CZA056  | Right (07CAA044), | 28mm       | 36mm   |
|           | Left (07CAA045)   | (1.1")     | (1.4") |

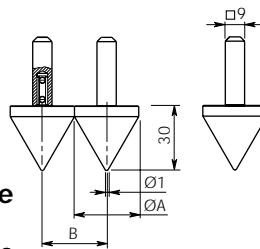
#### Surface Plate Type



| Order No. | Dimensions  |             |
|-----------|-------------|-------------|
|           | A           | B           |
| 07CZA044  | 90mm (3.5") | 28mm (1.1") |

Unit: mm

#### Centerline Type

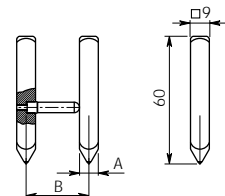


| Order No. | Components       | Dimensions |      |
|-----------|------------------|------------|------|
|           |                  | A          | B    |
| 07CZA057  | 07CZA039 x 2pcs. | 30mm       | 30mm |

#### Inch

| Order No. | Components       | Dimensions |      |
|-----------|------------------|------------|------|
|           |                  | A          | B    |
| 07CZA060  | 07CZA047 x 2pcs. | 1.2"       | 1.2" |

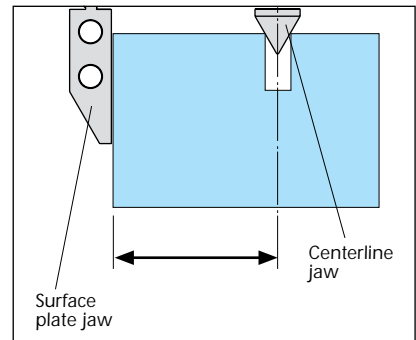
#### Scriber Type



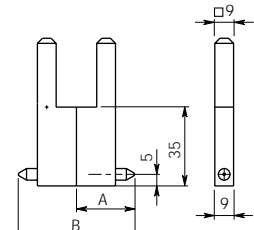
| Order No. | Components                           | Dimensions |      |
|-----------|--------------------------------------|------------|------|
|           |                                      | A          | B    |
| 07CZA055  | Right (07CZA042),<br>Left (07CZA043) | 8mm        | 30mm |

#### Inch

| Order No. | Components                           | Dimensions |      |
|-----------|--------------------------------------|------------|------|
|           |                                      | A          | B    |
| 07CZA061  | Right (07CZA042),<br>Left (07CZA049) | .31"       | 1.2" |



#### Inside Point Type



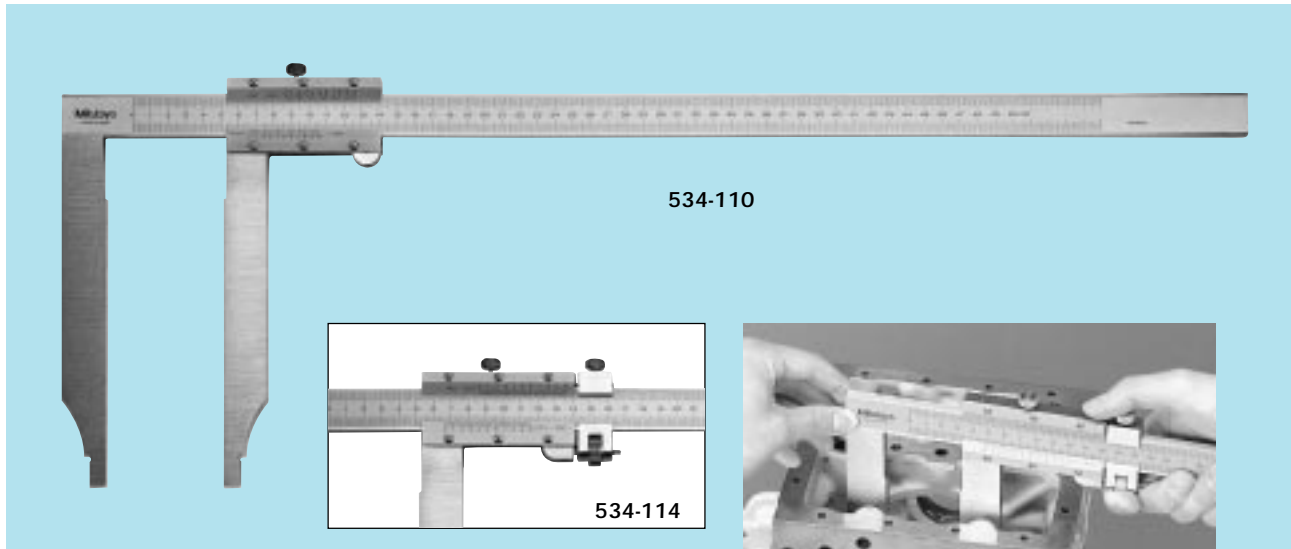
| Order No. | Components       | Dimensions |      |
|-----------|------------------|------------|------|
|           |                  | A          | B    |
| 07CZA058  | 07CZA041 x 2pcs. | 25mm       | 50mm |

#### Inch

| Order No. | Components       | Dimensions |    |
|-----------|------------------|------------|----|
|           |                  | A          | B  |
| 07CZA059  | 07CZA048 x 2pcs. | 1"         | 2" |

## Long Jaw Vernier Calipers

### SERIES 534



#### FEATURES

- Long jaws for measuring hard-to-reach portions.

#### SPECIFICATIONS

##### Long Jaw Vernier Calipers

###### Metric

| Range     |            | Order No. | Vernier reading |        | Accuracy | Remarks              |
|-----------|------------|-----------|-----------------|--------|----------|----------------------|
| OD        | ID         |           | OD              | ID     |          |                      |
| 0 - 300mm | 10 - 300mm | 534-109   | 0.05mm          | 0.05mm | ±0.07mm  | Depth of jaws: 90mm  |
| 0 - 500mm | 20 - 500mm | 534-110   | 0.05mm          | 0.05mm | ±0.13mm  | Depth of jaws: 200mm |

##### Long Jaw Vernier Calipers with Fine Adjustment

###### Metric

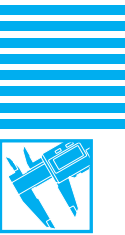
| Range      |             | Order No. | Vernier reading |        | Accuracy | Remarks              |
|------------|-------------|-----------|-----------------|--------|----------|----------------------|
| OD         | ID          |           | OD              | ID     |          |                      |
| 0 - 300mm  | 10 - 300mm  | 534-113   | 0.02mm          | 0.02mm | ±0.04mm  | Depth of jaws: 90mm  |
| 0 - 500mm  | 20 - 500mm  | 534-114   | 0.02mm          | 0.02mm | ±0.06mm  | Depth of jaws: 200mm |
| 0 - 750mm  | 20 - 750mm  | 534-115   | 0.02mm          | 0.02mm | ±0.08mm  | Depth of jaws: 200mm |
| 0 - 1000mm | 20 - 1000mm | 534-116   | 0.02mm          | 0.02mm | ±0.10mm  | Depth of jaws: 200mm |

###### Inch

| Range   |           | Order No. | Vernier reading |       | Accuracy | Remarks             |
|---------|-----------|-----------|-----------------|-------|----------|---------------------|
| OD      | ID        |           | OD              | ID    |          |                     |
| 0 - 12" | .3" - 12" | 534-117   | .001"           | .001" | ±.002"   | Depth of jaws: 3.5" |
| 0 - 20" | .8" - 20" | 534-118   | .001"           | .001" | ±.003"   | Depth of jaws: 7.9" |
| 0 - 30" | .8" - 30" | 534-119   | .001"           | .001" | ±.004"   | Depth of jaws: 7.9" |
| 0 - 40" | .8" - 40" | 534-120   | .001"           | .001" | ±.004"   | Depth of jaws: 7.9" |

###### Metric / Inch

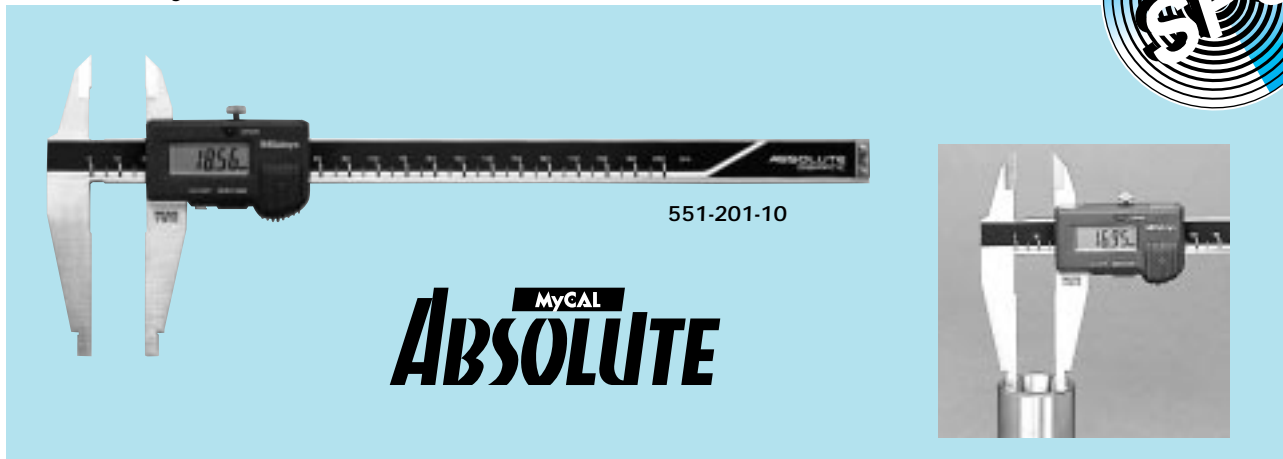
| Range       |             | Order No. | Vernier reading |             | Accuracy | Remarks              |
|-------------|-------------|-----------|-----------------|-------------|----------|----------------------|
| Lower scale | Upper scale |           | Lower scale     | Upper scale |          |                      |
| 0 - 300mm   | 0 - 12"     | 534-101   | 0.05mm          | 1/128"      | ±0.07mm  | Depth of jaws: 90mm  |
|             |             | 534-105   | 0.02mm          | .001"       | ±0.04mm  | Depth of jaws: 90mm  |
| 0 - 500mm   | 0 - 20"     | 534-102   | 0.05mm          | 1/128"      | ±0.13mm  | Depth of jaws: 200mm |
|             |             | 534-106   | 0.02mm          | .001"       | ±0.06mm  | Depth of jaws: 200mm |
| 0 - 750mm   | 0 - 30"     | 534-103   | 0.05mm          | 1/128"      | ±0.16mm  | Depth of jaws: 200mm |
|             |             | 534-107   | 0.02mm          | .001"       | ±0.08mm  | Depth of jaws: 200mm |
| 0 - 1000mm  | 0 - 40"     | 534-104   | 0.05mm          | 1/128"      | ±0.20mm  | Depth of jaws: 200mm |
|             |             | 534-108   | 0.02mm          | .001"       | ±0.10mm  | Depth of jaws: 200mm |



# Digimatic Calipers

## SERIES 551

with Nib Style and Standard Jaws



551-201-10

**MyCAL**  
**ABSOLUTE**

Mitutoyo's Digimatic Caliper keeps track of its origin point (jaws-closed point) once set. Whenever turned on, the large LCD screen displays the actual slider position to start measurement. No more repeated zero-setting is necessary.

### FEATURES

- The rounded faces of the jaws are ideal for accurate ID (inside diameter) measurement.
- Depth measuring bar is not provided.
- Data Hold Unit (959143) is optional.

### Technical Data

**Display:** LCD

**Functions:** Origin-Set, Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, data hold (optional), offset, preset

**Battery:** SR44 (1 pc.) (938882)

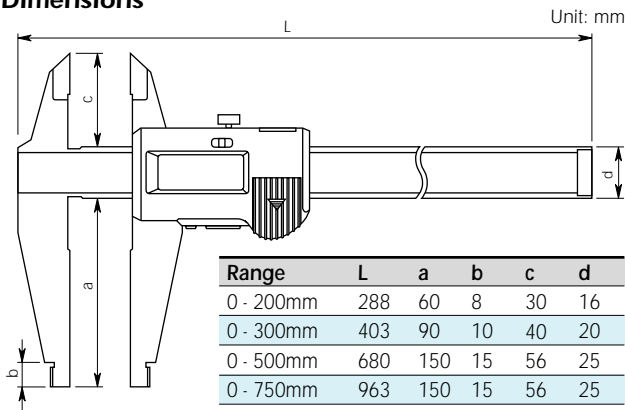
**Battery life:** Approx. 3.5 years under normal use

**Maximum response speed:** Unlimited

**Alarm:** Low battery voltage, scale contamination, counting value composition error

**Operating temperature:** 0°C to 40°C

### Dimensions



| Range      | L    | a   | b  | c  | d  |
|------------|------|-----|----|----|----|
| 0 - 200mm  | 288  | 60  | 8  | 30 | 16 |
| 0 - 300mm  | 403  | 90  | 10 | 40 | 20 |
| 0 - 500mm  | 680  | 150 | 15 | 56 | 25 |
| 0 - 750mm  | 963  | 150 | 15 | 56 | 25 |
| 0 - 1000mm | 1230 | 150 | 20 | 56 | 32 |

### OPTIONAL ACCESSORIES

| Order No. | Description                     |
|-----------|---------------------------------|
| 959143    | Data Hold Unit                  |
| 959149    | SPC cable with data switch (1m) |
| 959150    | SPC cable with data switch (2m) |

### SPECIFICATIONS

#### Metric

| Range      | Order No.   | Resolution | Accuracy | Mass  | Remarks                         |
|------------|-------------|------------|----------|-------|---------------------------------|
| 0 - 200mm  | 551-201-10  | 0.01mm     | ±0.03mm  | 190g  | ID measuring range: 10 - 200mm  |
| 0 - 300mm  | 551-231-10* | 0.01mm     | ±0.04mm  | 420g  | ID measuring range: 10 - 300mm  |
| 0 - 500mm  | 551-204-10  | 0.01mm     | ±0.04mm  | 1060g | ID measuring range: 20 - 500mm  |
| 0 - 750mm  | 551-206-10  | 0.01mm     | ±0.06mm  | 1410g | ID measuring range: 20 - 750mm  |
| 0 - 1000mm | 551-207-10  | 0.01mm     | ±0.07mm  | 3430g | ID measuring range: 20 - 1000mm |

\*Provided with offset-value setting and preset functions for easy ID measurement.

#### Inch/Metric

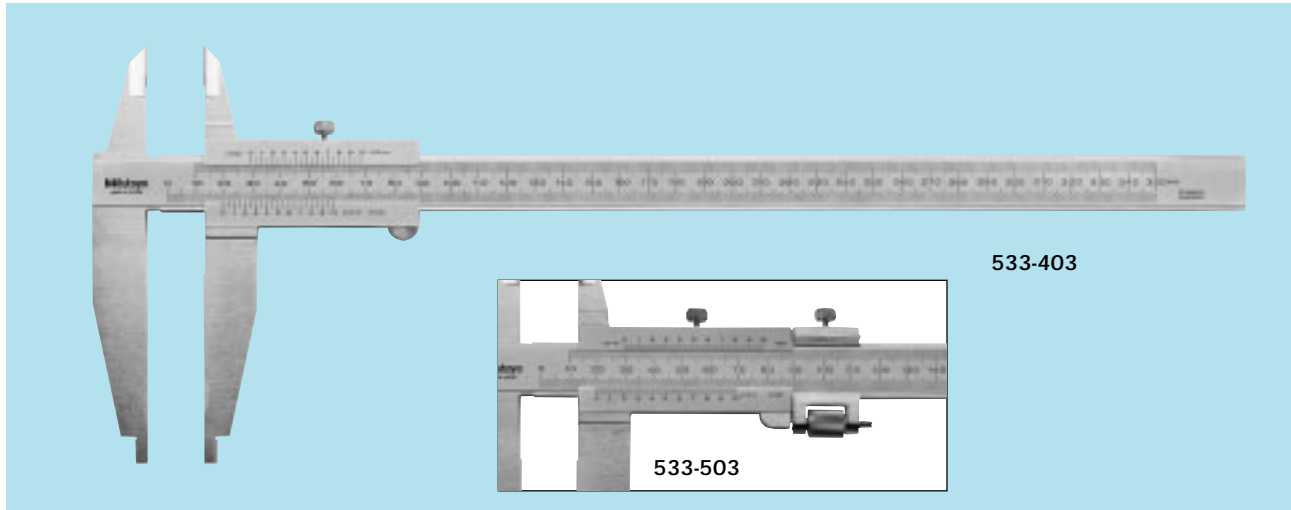
| Range                | Order No.   | Resolution    | Accuracy | Mass      | Remarks                       |
|----------------------|-------------|---------------|----------|-----------|-------------------------------|
| 0 - 8" (0 - 200mm)   | 551-221-10  | .0005"/0.01mm | ±.001"   | .42 lbs.  | ID measuring range: .4" - 8"  |
| 0 - 12" (0 - 300mm)  | 551-241-10* | .0005"/0.01mm | ±.002"   | .92 lbs.  | ID measuring range: .4" - 12" |
| 0 - 20" (0 - 500mm)  | 551-224-10  | .0005"/0.01mm | ±.0025"  | 2.33 lbs. | ID measuring range: .5" - 20" |
| 0 - 30" (0 - 750mm)  | 551-226-10  | .0005"/0.01mm | ±.0025"  | 3.10 lbs. | ID measuring range: .5" - 30" |
| 0 - 40" (0 - 1000mm) | 551-227-10  | .0005"/0.01mm | ±.003"   | 7.55 lbs. | ID measuring range: 1" - 40"  |

\*Provided with offset-value setting and preset functions for easy ID measurement.

## Vernier Calipers

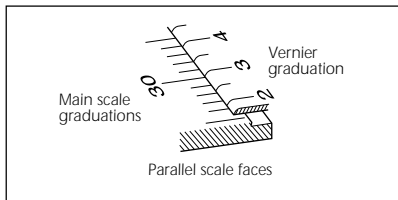
### SERIES 533

with Nib Style and Standard Jaws



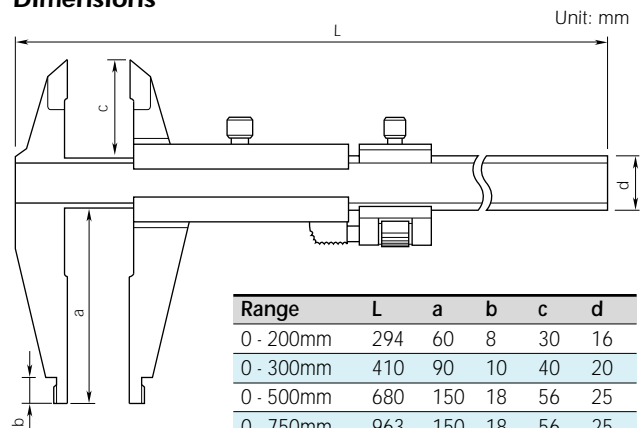
### FEATURES

- The nib style jaws have round measuring faces for accurate ID measurement.
- The standard sharp edged jaws provide easy access to portions that ordinary calipers cannot measure.
- Parallax-free vernier scales for easy and positive measurements.



- No depth bar.

### Dimensions



| Range      | L    | a   | b  | c  | d  |
|------------|------|-----|----|----|----|
| 0 - 200mm  | 294  | 60  | 8  | 30 | 16 |
| 0 - 300mm  | 410  | 90  | 10 | 40 | 20 |
| 0 - 500mm  | 680  | 150 | 18 | 56 | 25 |
| 0 - 750mm  | 963  | 150 | 18 | 56 | 25 |
| 0 - 1000mm | 1230 | 150 | 20 | 56 | 32 |

### SPECIFICATIONS

#### Vernier Calipers

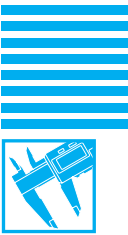
##### Metric

| Range      | Order No. | Vernier reading | Accuracy | Mass  | Remarks                         |
|------------|-----------|-----------------|----------|-------|---------------------------------|
| 0 - 200mm  | 533-401   | 0.05mm          | ±0.05mm  | 220g  | ID measuring range: 10 - 200mm  |
| 0 - 300mm  | 533-403   | 0.05mm          | ±0.08mm  | 370g  | ID measuring range: 10 - 300mm  |
| 0 - 500mm  | 533-404   | 0.05mm          | ±0.10mm  | 1200g | ID measuring range: 20 - 500mm  |
| 0 - 750mm  | 533-405   | 0.05mm          | ±0.12mm  | 1500g | ID measuring range: 20 - 750mm  |
| 0 - 1000mm | 533-406   | 0.05mm          | ±0.15mm  | 3300g | ID measuring range: 20 - 1000mm |

#### Vernier Calipers with Fine Adjustment

##### Metric

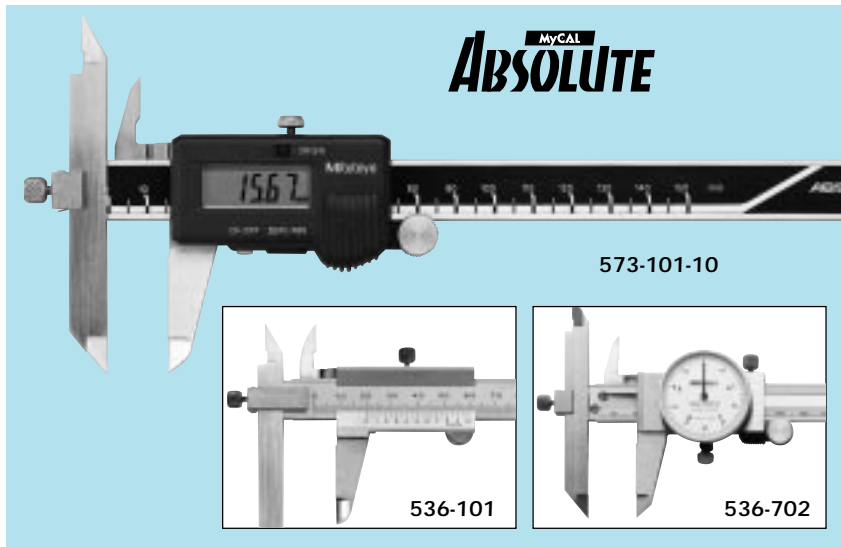
| Range      | Order No. | Vernier reading | Accuracy | Mass  | Remarks                         |
|------------|-----------|-----------------|----------|-------|---------------------------------|
| 0 - 280mm  | 533-503   | 0.02mm          | ±0.04mm  | 405g  | ID measuring range: 10 - 280mm  |
| 0 - 500mm  | 533-504   | 0.02mm          | ±0.05mm  | 1250g | ID measuring range: 20 - 500mm  |
| 0 - 750mm  | 533-505   | 0.02mm          | ±0.06mm  | 1550g | ID measuring range: 20 - 750mm  |
| 0 - 1000mm | 533-506   | 0.02mm          | ±0.07mm  | 3450g | ID measuring range: 20 - 1000mm |





# Offset Calipers

SERIES 573, 536



MYCAL  
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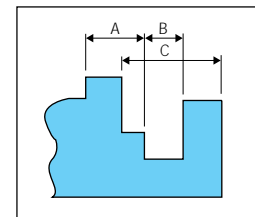
573-101-10

536-101

536-702

## FEATURES

- Main scale jaw can be slid up and down to facilitate measurement of stepped sections.



(Hard-to-get-at dimensions such as A, B, C can be accurately measured with an Offset Caliper.)

- With Depth bar.
- The 573 series (LCD readout type) is provided with SPC output.

## SPECIFICATIONS

### Offset ABS Digimatic Calipers

#### Metric

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 150mm | 573-101-10 | 0.01mm     | ±0.02mm  |
| 0 - 200mm | 573-102-10 | 0.01mm     | ±0.02mm  |
| 0 - 300mm | 573-103-10 | 0.01mm     | ±0.03mm  |

#### Inch/Metric

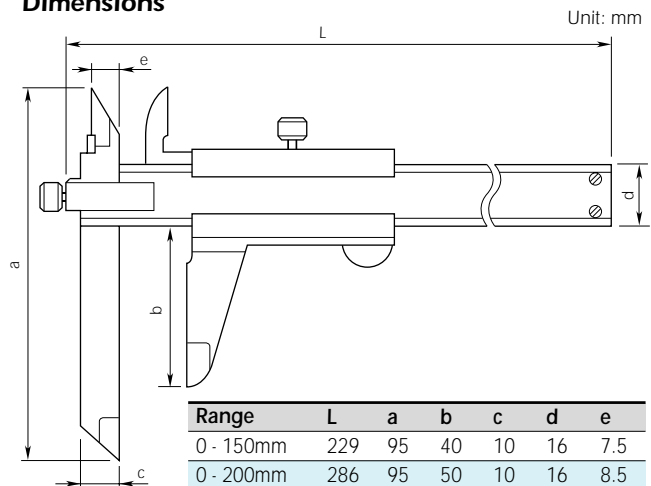
| Range         | Order No.  | Resolution    | Accuracy |
|---------------|------------|---------------|----------|
| 0 - 6"/150mm  | 573-201-10 | .0005"/0.01mm | ±.001"   |
| 0 - 8"/200mm  | 573-202-10 | .0005"/0.01mm | ±.001"   |
| 0 - 12"/300mm | 573-203-10 | .0005"/0.01mm | ±.0015"  |

### Offset Vernier Calipers

#### Metric

| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 536-101   | 0.05mm          | ±0.05mm  |
| 0 - 200mm | 536-102   | 0.05mm          | ±0.05mm  |
| 0 - 300mm | 536-103   | 0.05mm          | ±0.08mm  |

## Dimensions



| Range     | L   | a   | b  | c  | d  | e   |
|-----------|-----|-----|----|----|----|-----|
| 0 - 150mm | 229 | 95  | 40 | 10 | 16 | 7.5 |
| 0 - 200mm | 286 | 95  | 50 | 10 | 16 | 8.5 |
| 0 - 300mm | 403 | 135 | 64 | 15 | 20 | 12  |

Note: L for vernier caliper only

### Offset Dial Calipers

#### Metric

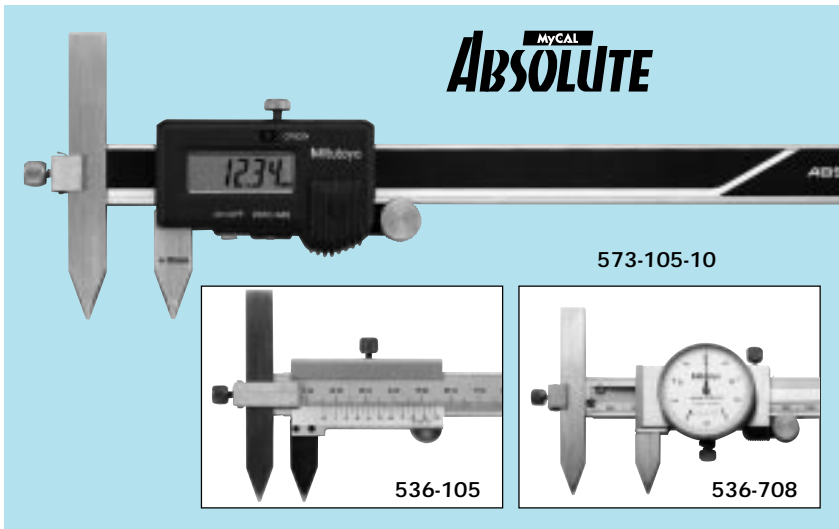
| Range     | Order No. | Dial reading | Accuracy |            |
|-----------|-----------|--------------|----------|------------|
|           |           | Graduation   |          | Range/rev. |
| 0 - 150mm | 536-702   | 0.05mm       | 5mm      | ±0.05mm    |

#### Inch

| Range  | Order No. | Dial reading | Accuracy |            |
|--------|-----------|--------------|----------|------------|
|        |           | Graduation   |          | Range/rev. |
| 0 - 6" | 536-701   | .001"        | .2"      | ±.0015"    |

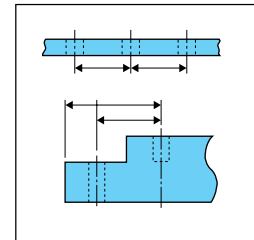
## Offset Centerline Calipers

SERIES 573, 536



### FEATURES

- Specially designed for center to center distance measurements on the same and offset planes.
- Can also measure from edge to center.



### SPECIFICATIONS

#### Offset Centerline ABS Digimatic Calipers

##### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 10 - 150mm | 573-105-10 | 0.01mm     | ±0.03mm  |
| 10 - 200mm | 573-106-10 | 0.01mm     | ±0.03mm  |

##### Inch/Metric

| Range                      | Order No.  | Resolution    | Accuracy |
|----------------------------|------------|---------------|----------|
| .4" - 6"/<br>10.16 - 150mm | 573-205-10 | .0005"/0.01mm | ±.0015"  |
| .4" - 8"/<br>10.16 - 200mm | 573-206-10 | .0005"/0.01mm | ±.0015"  |

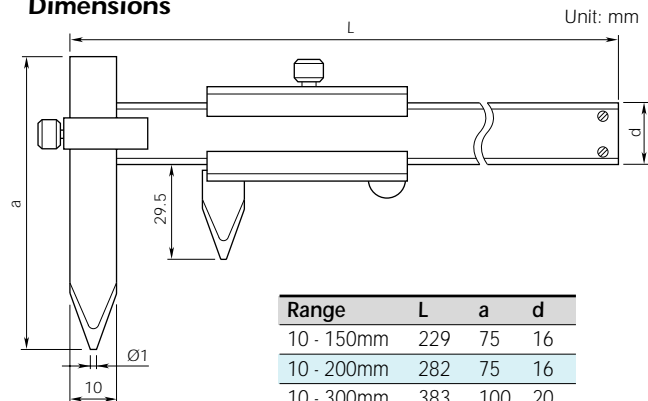
Note: Measurements = Displayed value + 10mm for metric model or displayed value + .4" (10.16mm) for inch/metric model.

#### Offset Centerline Vernier Calipers

##### Metric

| Range      | Order No. | Vernier reading | Accuracy |
|------------|-----------|-----------------|----------|
| 10 - 150mm | 536-105   | 0.05mm          | ±0.05mm  |
| 10 - 200mm | 536-106   | 0.05mm          | ±0.05mm  |
| 10 - 300mm | 536-107   | 0.05mm          | ±0.08mm  |

### Dimensions



| Range      | L   | a   | d  |
|------------|-----|-----|----|
| 10 - 150mm | 229 | 75  | 16 |
| 10 - 200mm | 282 | 75  | 16 |
| 10 - 300mm | 383 | 100 | 20 |

Note: L for vernier caliper only

#### Offset Centerline Dial Calipers

##### Metric

| Range      | Order No. | Dial reading | Accuracy |            |
|------------|-----------|--------------|----------|------------|
|            |           | Graduation   |          | Range/rev. |
| 10 - 300mm | 536-708   | 0.05mm       | 5mm      | ±0.08mm    |

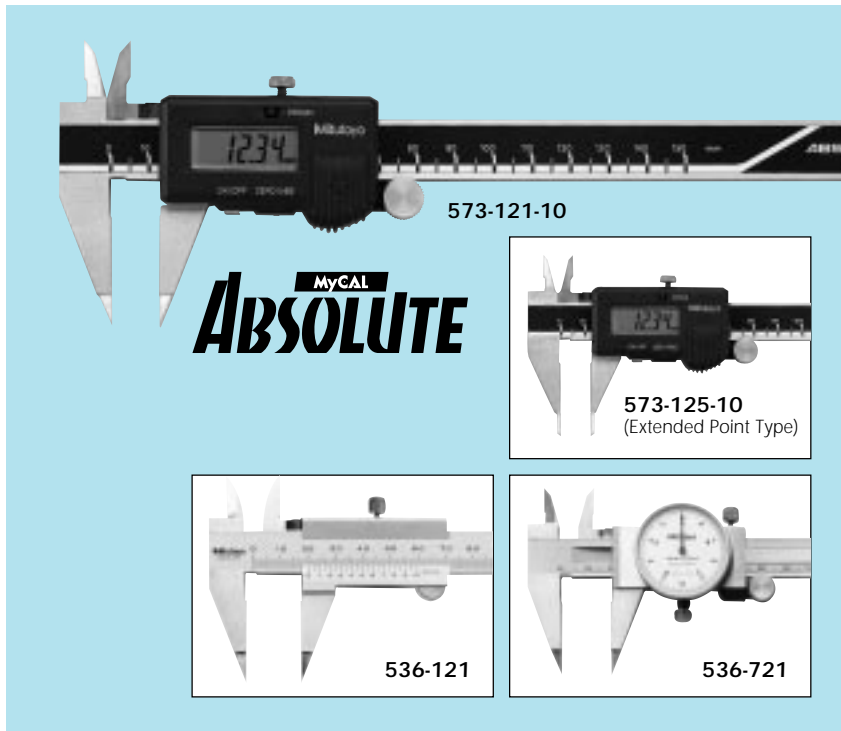
##### Inch

| Range     | Order No. | Dial reading | Accuracy |            |
|-----------|-----------|--------------|----------|------------|
|           |           | Graduation   |          | Range/rev. |
| .4" - 12" | 536-710   | .001"        | .2"      | ±.002"     |



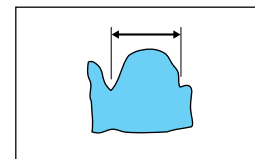
# Point Calipers

SERIES 573, 536



### FEATURES

- The narrow tip jaws fit into very small grooves and tracks, making many previously difficult outside measurements far easier to obtain.



- With Depth bar.
- The 573 series (LCD readout type) is provided with SPC output.

### SPECIFICATIONS

#### Point ABS Digimatic Calipers

##### Metric

| Range     | Order No.   | Resolution | Accuracy |
|-----------|-------------|------------|----------|
| 0 - 150mm | 573-121-10  | 0.01mm     | ±0.02mm  |
|           | 573-125-10* | 0.01mm     | ±0.02mm  |

\*Extended Point Type

##### Inch / Metric

| Range        | Order No.   | Resolution    | Accuracy |
|--------------|-------------|---------------|----------|
| 0 - 6"/150mm | 573-221-10  | .0005"/0.01mm | ±.001"   |
|              | 573-225-10* | .0005"/0.01mm | ±.001"   |

\*Extended Point Type

#### Point Vernier Calipers

##### Metric

| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 536-121   | 0.05mm          | ±0.05mm  |

#### Point Dial Calipers

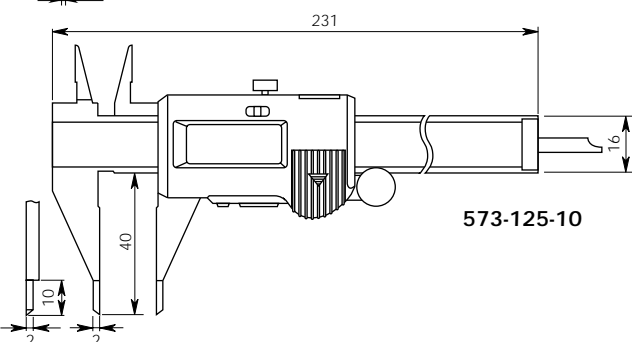
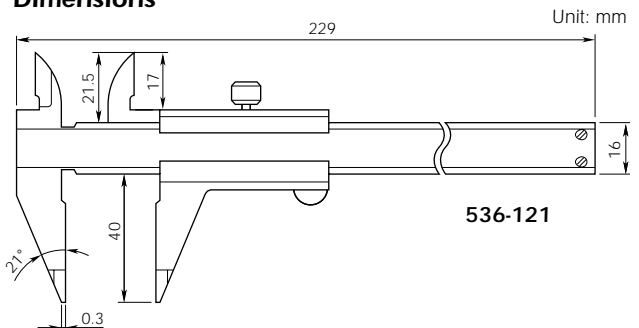
##### Metric

| Range     | Order No. | Dial reading | Accuracy |            |
|-----------|-----------|--------------|----------|------------|
|           |           | Graduation   |          | Range/rev. |
| 0 - 150mm | 536-721   | 0.05mm       | 5mm      | ±0.05mm    |

##### Inch

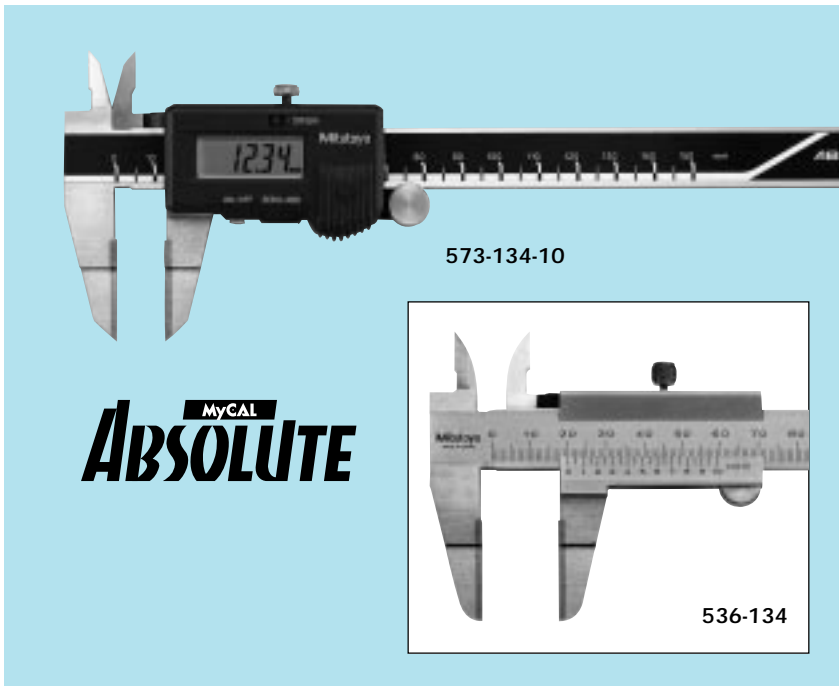
| Range  | Order No. | Dial reading | Accuracy |            |
|--------|-----------|--------------|----------|------------|
|        |           | Graduation   |          | Range/rev. |
| 0 - 6" | 536-724   | .001"        | .2"      | ±.0015"    |

### Dimensions



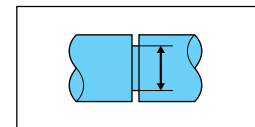
## Blade Type Calipers

SERIES 573, 536



### FEATURES

- The thin blade type jaws fit into very small grooves and tracks, making many previously difficult outside measurements far easier to obtain.



### SPECIFICATIONS

#### Blade Type ABS Digimatic Calipers

##### Metric

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 150mm | 573-134-10 | 0.01mm     | ±0.02mm  |

##### Inch/Metric

| Range        | Order No.  | Resolution    | Accuracy |
|--------------|------------|---------------|----------|
| 0 - 6"/150mm | 573-234-10 | .0005"/0.01mm | ±.001"   |

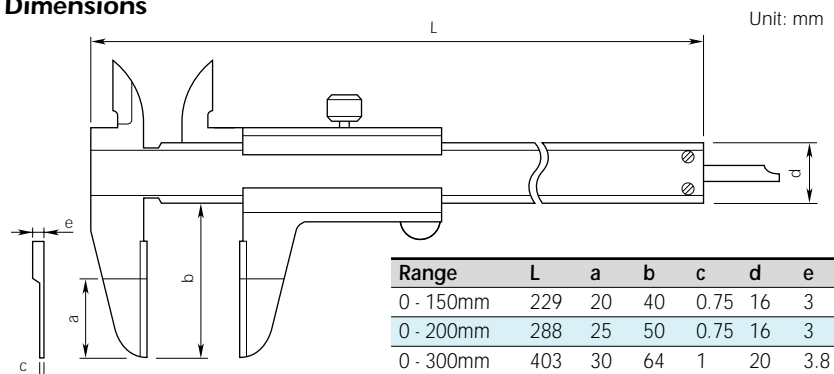
- The OD measuring faces are carbide-tipped.
- With Depth bar.
- The 573 series (LCD readout type) is provided with SPC output.

#### Blade Type Vernier Calipers

##### Metric

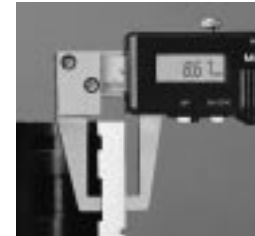
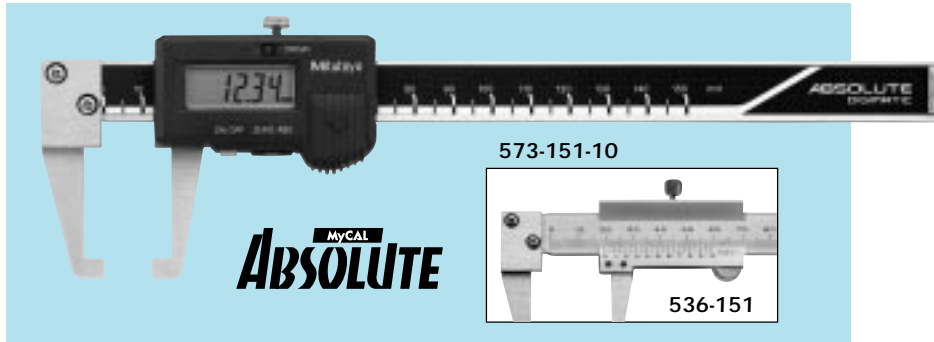
| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 536-134   | 0.05mm          | ±0.05mm  |
| 0 - 200mm | 536-135   | 0.05mm          | ±0.05mm  |
| 0 - 300mm | 536-136   | 0.05mm          | ±0.08mm  |

### Dimensions



# Neck Type Calipers

SERIES 573, 536



## SPECIFICATIONS

### Neck Type ABS Digimatic Caliper

**Metric**

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 150mm | 573-151-10 | 0.01mm     | ±0.03mm  |

### Inch/Metric

| Range        | Order No.  | Resolution    | Accuracy |
|--------------|------------|---------------|----------|
| 0 - 6"/150mm | 573-251-10 | .0005"/0.01mm | ±.0015"  |

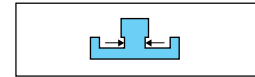
### Neck Type Vernier Caliper

**Metric**

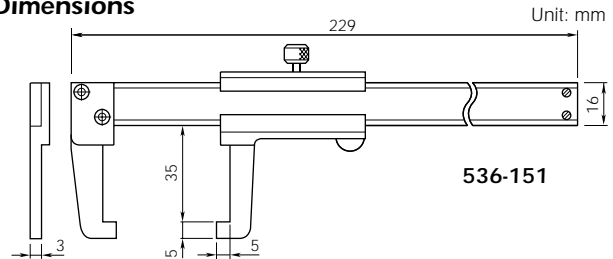
| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 536-151   | 0.05mm          | ±0.05mm  |

## FEATURES

- Can measure wall thickness inside bores and recesses.
- The 573 series (LCD readout type) is provided with SPC output.

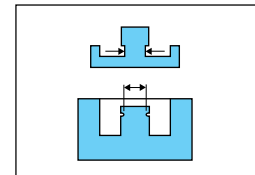
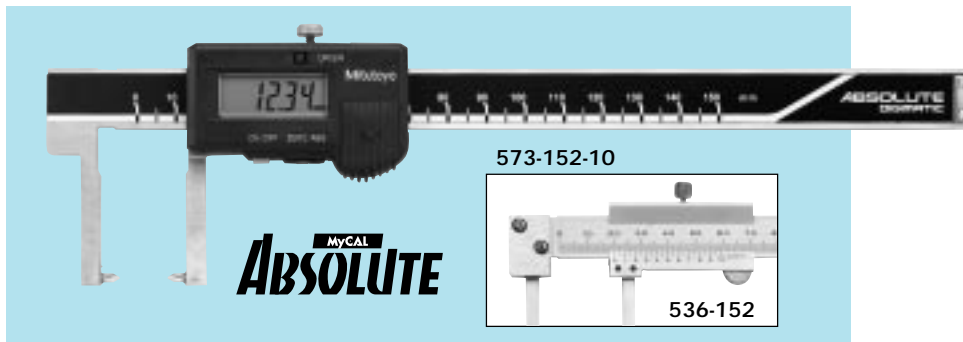


## Dimensions



# Outside Point Type Calipers

SERIES 573, 536



## SPECIFICATIONS

### Outside Point Type ABS Digimatic Caliper

**Metric**

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 150mm | 573-152-10 | 0.01mm     | ±0.03mm  |

### Inch/Metric

| Range        | Order No.  | Resolution    | Accuracy |
|--------------|------------|---------------|----------|
| 0 - 6"/150mm | 573-252-10 | .0005"/0.01mm | ±.0015"  |

### Outside Point Type Vernier Caliper

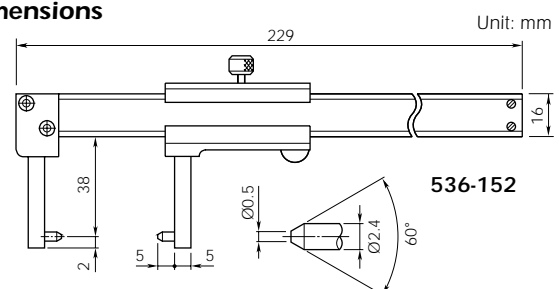
**Metric**

| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 536-152   | 0.05mm          | ±0.05mm  |

## FEATURES

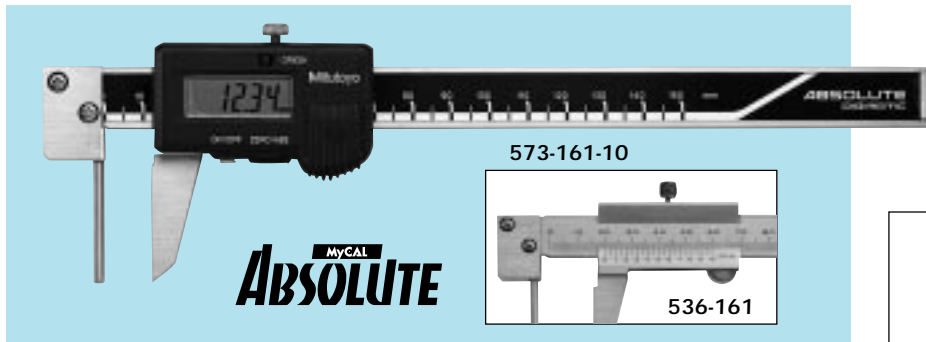
- Can measure wall thickness inside bores and recesses.
- The 573 series (LCD readout type) is provided with SPC output.

## Dimensions



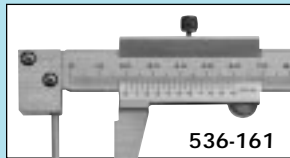
## Tube Thickness Type Calipers

SERIES 573, 536

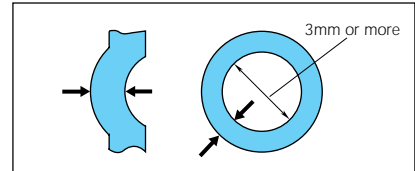


**ABSOLUTE**

573-161-10



536-161



### SPECIFICATIONS

#### Tube Thickness Type ABS Digimatic Caliper

##### Metric

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 150mm | 573-161-10 | 0.01mm     | ±0.05mm  |

##### Inch/Metric

| Range        | Order No.  | Resolution    | Accuracy |
|--------------|------------|---------------|----------|
| 0 - 6"/150mm | 573-261-10 | .0005"/0.01mm | ±.002"   |

#### Tube Thickness Type Vernier Caliper

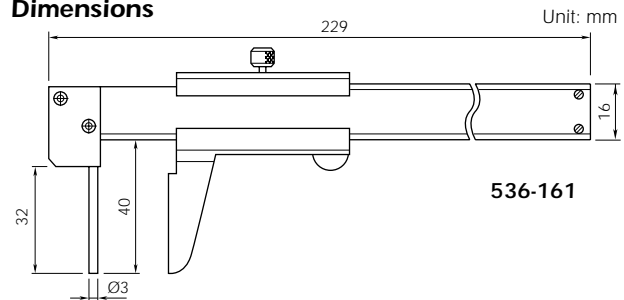
##### Metric

| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 536-161   | 0.05mm          | ±0.05mm  |

### FEATURES

- The main scale jaw is a round bar that facilitates measurements of tube wall thickness.
- The 573 series (LCD readout type) is provided with SPC output.

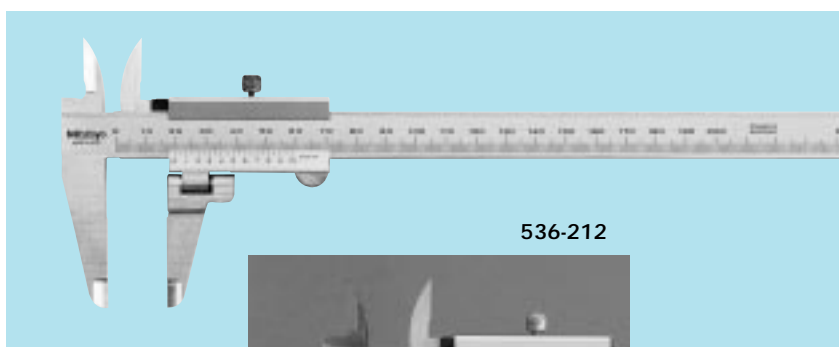
### Dimensions



536-161

## Swivel Type Vernier Caliper

SERIES 536



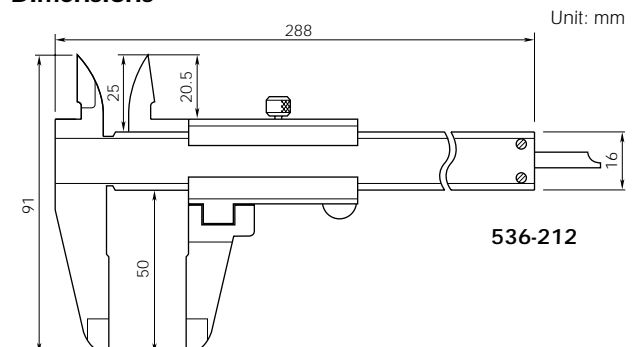
536-212



### FEATURES

- The moving jaw can be rotated to measure sectioned shafts.
- With Depth bar.

### Dimensions



536-212

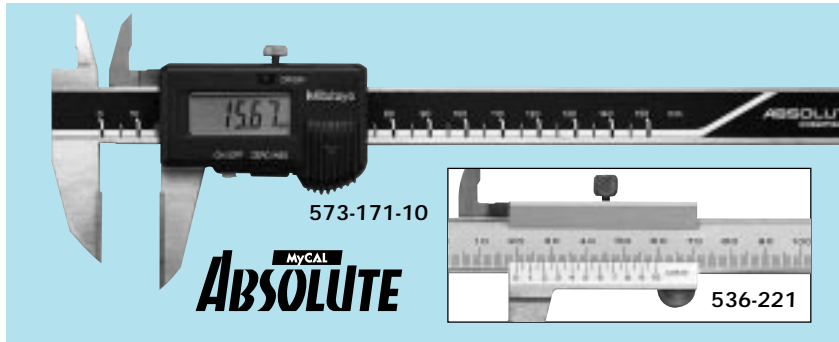
### SPECIFICATIONS

##### Metric

| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 200mm | 536-212   | 0.05mm          | ±0.05mm  |

# Scribing Calipers

SERIES 573, 536



### FEATURES

- The carbide-tipped jaws facilitate fine scribing on workpieces.
- With Depth bar.
- The 573 series (LCD readout type) is provided with SPC output.

### SPECIFICATIONS

#### Scribing ABS Digimatic Calipers

##### Metric

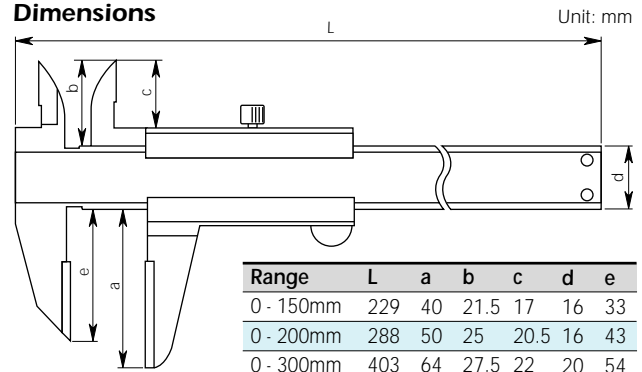
| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 150mm | 573-171-10 | 0.01mm     | ±0.02mm  |
| 0 - 200mm | 573-172-10 | 0.01mm     | ±0.02mm  |
| 0 - 300mm | 573-173-10 | 0.01mm     | ±0.03mm  |

#### Scribing Vernier Calipers

##### Metric

| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 536-221   | 0.05mm          | ±0.05mm  |
| 0 - 200mm | 536-222   | 0.05mm          | ±0.05mm  |
| 0 - 300mm | 536-223   | 0.05mm          | ±0.08mm  |

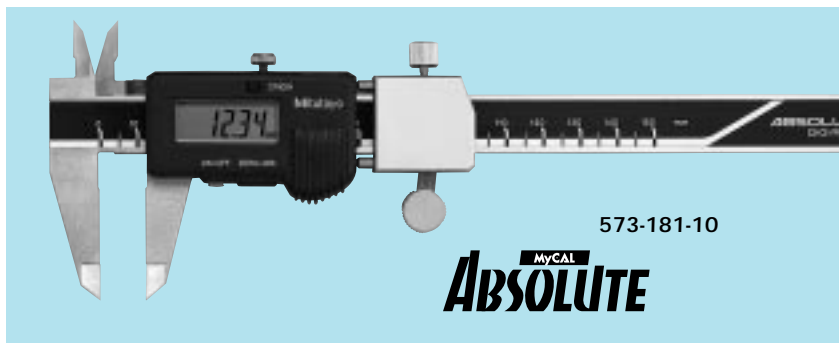
### Dimensions



Note: L for vernier caliper only

# Digimatic Snap Caliper

SERIES 573



### FEATURES

- The Digimatic Snap Caliper features a spring-loaded mechanism to allow quick and efficient GO/NO-GO inspection for mass-produced parts.
- The moving jaw retraction: 2mm
- Repeatability: 0.01mm (.0005")
- With SPC data output.

### SPECIFICATIONS

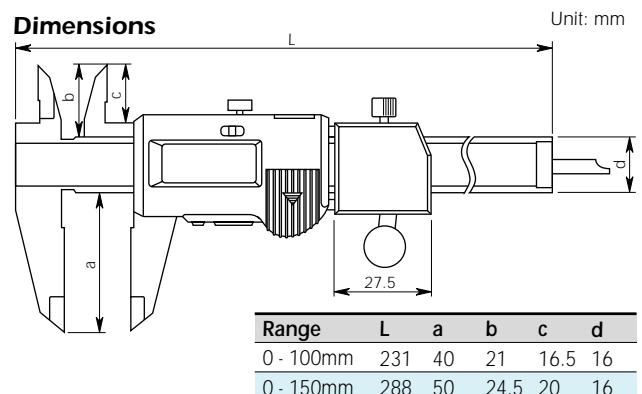
##### Metric

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 100mm | 573-181-10 | 0.01mm     | ±0.02mm  |
| 0 - 150mm | 573-182-10 | 0.01mm     | ±0.02mm  |

##### Inch / Metric

| Range        | Order No.  | Resolution    | Accuracy |
|--------------|------------|---------------|----------|
| 0 - 4"/100mm | 573-281-10 | .0005"/0.01mm | ±.001"   |
| 0 - 6"/150mm | 573-282-10 | .0005"/0.01mm | ±.001"   |

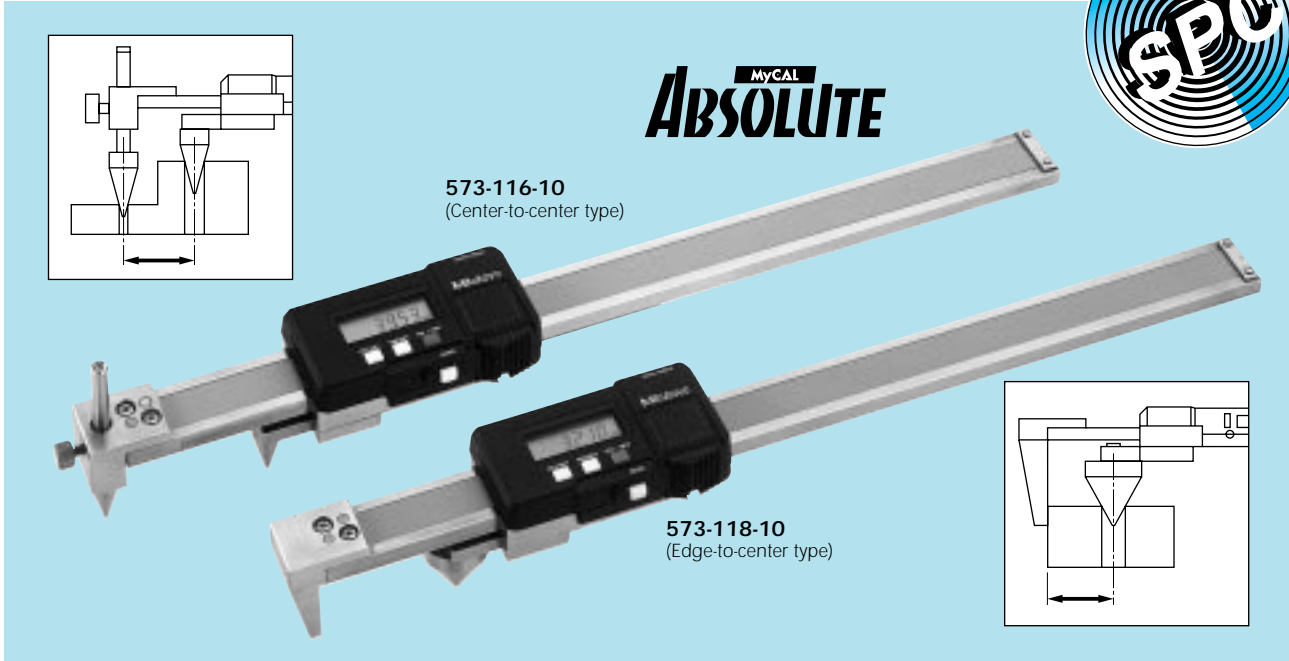
### Dimensions



## Back-Jaw Centerline Calipers

### SERIES 573

Center-to-center & Edge-to-center Types



### FEATURES

- Specially designed to measure the distance between two centers or the distance from an edge to center.
- Provided with jaws on the back of the slider, measurements can be read easily by looking down.
- Direct reading of pitch measurements is available due to the offset value setting function.
- With SPC data output.

### Technical Data

**Display:** LCD

**Functions:** Origin-Set, Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, data hold (optional), offset, preset

**Battery:** SR44 (1 pc.) (938882)

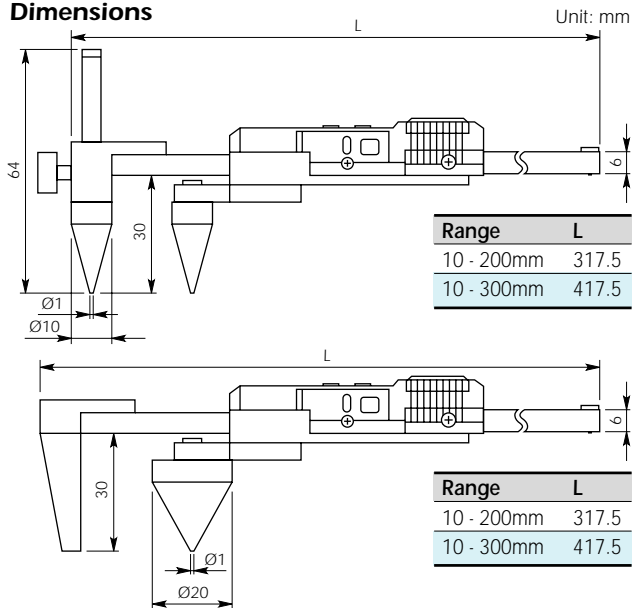
**Battery life:** Approx. 3.5 years under normal use

**Maximum response speed:** Unlimited

**Alarm:** Low battery voltage, scale contamination, counting value composition error

**Operating temperature:** 0°C to 40°C

### Dimensions



### OPTIONAL ACCESSORIES

| Order No. | Description                     |
|-----------|---------------------------------|
| 959143    | Data Hold Unit                  |
| 959149    | SPC cable with data switch (1m) |
| 959150    | SPC cable with data switch (2m) |

### SPECIFICATIONS

#### Metric

| Range      | Order No.  | Resolution | Accuracy | Mass | Remarks                        |
|------------|------------|------------|----------|------|--------------------------------|
| 10 - 200mm | 573-116-10 | 0.01mm     | ±0.10mm  | 482g | Center-to-center distance type |
|            | 573-118-10 | 0.01mm     | ±0.10mm  | 485g | Edge-to-center distance type   |
| 10 - 300mm | 573-117-10 | 0.01mm     | ±0.15mm  | 578g | Center-to-center distance type |
|            | 573-119-10 | 0.01mm     | ±0.15mm  | 581g | Edge-to-center distance type   |



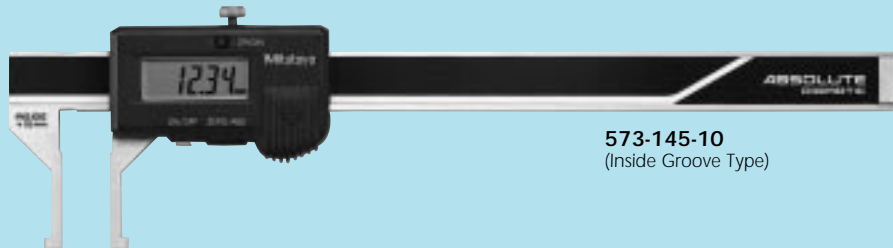
# Inside Calipers

SERIES 573, 536

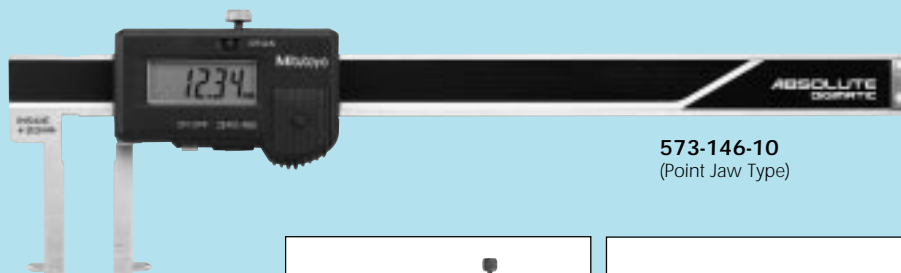
Knife-Edge/Inside Groove/Point Jaw Type



573-142-10  
(Knife-Edge Type)



573-145-10  
(Inside Groove Type)

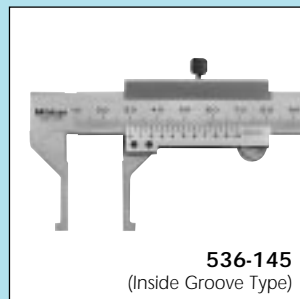


573-146-10  
(Point Jaw Type)

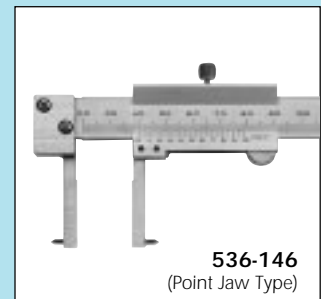
MyCAL  
**ABSOLUTE**



536-142  
(Knife-Edge Type)



536-145  
(Inside Groove Type)



536-146  
(Point Jaw Type)

## FEATURES

- Specially designed for inside measurements in hard to reach places.
- The 573 series (LCD readout type) is provided with SPC output.

## SPECIFICATIONS

### Inside ABS Digimatic Calipers

#### Metric

| Range              | Order No.  | Resolution | Accuracy | Remarks            |
|--------------------|------------|------------|----------|--------------------|
| 10 - 200mm         | 573-142-10 | 0.01mm     | ±0.05mm  | Knife-edge type    |
| 10 - 150mm (+10mm) | 573-145-10 | 0.01mm     | ±0.05mm  | Inside groove type |
| 20 - 150mm (+20mm) | 573-146-10 | 0.01mm     | ±0.03mm  | Point jaw type     |

#### Inch/Metric

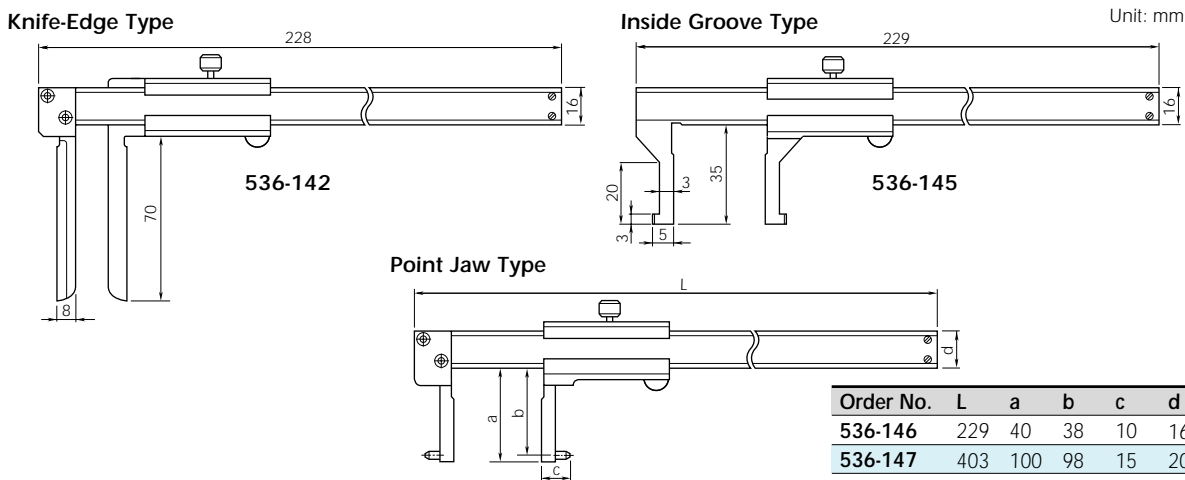
| Range                                   | Order No.  | Resolution    | Accuracy | Remarks            |
|---|------------|---------------|----------|--------------------|
| .4" - 8"/10 - 200mm                     | 573-242-10 | .0005"/0.01mm | ±.002"   | Knife-edge type    |
| .4" - 6" (.4")/10.16 - 150mm (+10.16mm) | 573-245-10 | .0005"/0.01mm | ±.002"   | Inside groove type |
| .8" - 6" (.8")/20.32 - 150mm (+20.32mm) | 573-246-10 | .0005"/0.01mm | ±.0015"  | Point jaw type     |

## Inside Vernier Calipers

### Metric

| Range      | Order No. | Vernier reading | Accuracy | Remarks            |
|------------|-----------|-----------------|----------|--------------------|
| 10 - 200mm | 536-142   | 0.05mm          | ±0.12mm  | Knife-edge type    |
| 10 - 150mm | 536-145   | 0.05mm          | ±0.05mm  | Inside groove type |
| 20 - 150mm | 536-146   | 0.05mm          | ±0.05mm  | Point jaw type     |
| 30 - 300mm | 536-147   | 0.05mm          | ±0.08mm  | Point jaw type     |
| 70 - 450mm | 536-148   | 0.05mm          | ±0.10mm  | Point jaw type     |
| 70 - 600mm | 536-149   | 0.05mm          | ±0.12mm  | Point jaw type     |

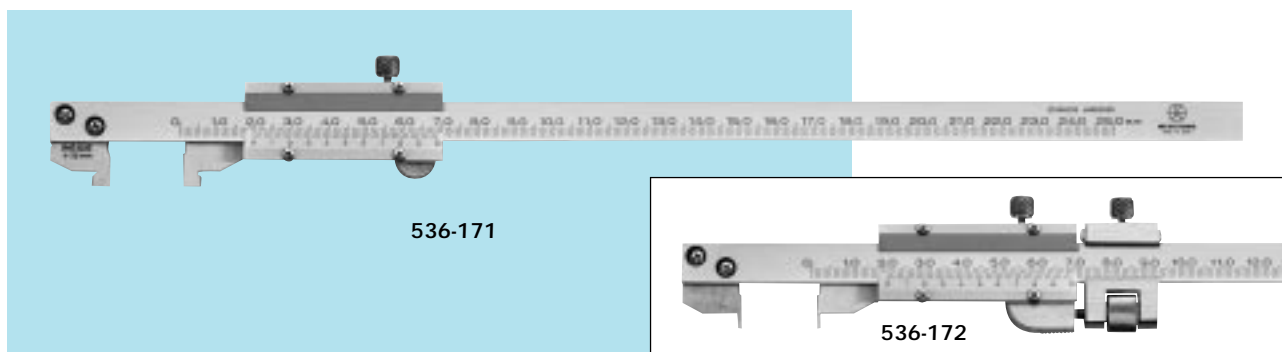
### Dimensions



| Order No. | L   | a   | b   | c  | d  |
|-----------|-----|-----|-----|----|----|
| 536-146   | 229 | 40  | 38  | 10 | 16 |
| 536-147   | 403 | 100 | 98  | 15 | 20 |
| 536-148   | 610 | 150 | 145 | 35 | 25 |
| 536-149   | 750 | 150 | 145 | 35 | 25 |

## Hook Type Vernier Caliper

### SERIES 536



### FEATURES

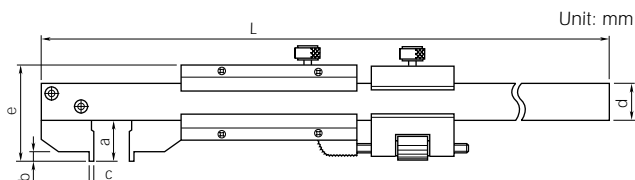
- Can measure width of grooves and lands inside bores and recesses.

### SPECIFICATIONS

#### Metric

| Range                | Order No. | Vernier reading | Accuracy | Remarks              |
|----------------------|-----------|-----------------|----------|----------------------|
| OD ID                |           |                 |          |                      |
| 0 - 200mm 10 - 200mm | 536-171   | 0.02mm          | ±0.03mm  | —                    |
| 0 - 200mm 2 - 200mm  | 536-172   | 0.02mm          | ±0.03mm  | with Fine adjustment |

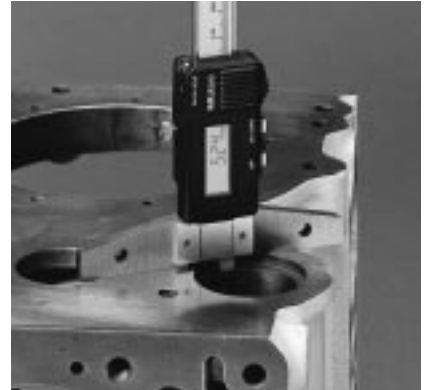
### Dimensions



| Order No. | L   | a  | b | c | d  | e  |
|-----------|-----|----|---|---|----|----|
| 536-171   | 310 | 12 | 4 | 5 | 11 | 28 |
| 536-172   | 310 | 12 | 4 | 1 | 11 | 28 |

# Digimatic Depth Gages

SERIES 571  
with SPC Output



571-201-10

## FEATURES

- Models up to 300mm (8") range are ABS Digimatic Depth Gages, so that they keep track of the origin point once set for the entire life of the battery.
- Base and measuring faces are hardened and micro-lapped.
- Functions available: Zero-setting, Data hold, SPC data output, inch/mm conversion (on Inch/Metric model only).
- Power supply: One SR44 battery (938882).
- Wider extension bases are available as optional accessory.

## SPECIFICATIONS

### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 0 - 150mm  | 571-201-10 | 0.01mm     | ±0.02mm  |
| 0 - 200mm  | 571-202-10 | 0.01mm     | ±0.02mm  |
| 0 - 300mm  | 571-203-10 | 0.01mm     | ±0.03mm  |
| 0 - 450mm  | 571-204-10 | 0.01mm     | ±0.05mm  |
| 0 - 600mm  | 571-205-10 | 0.01mm     | ±0.05mm  |
| 0 - 750mm  | 571-206-10 | 0.01mm     | ±0.06mm  |
| 0 - 1000mm | 571-207-10 | 0.01mm     | ±0.07mm  |

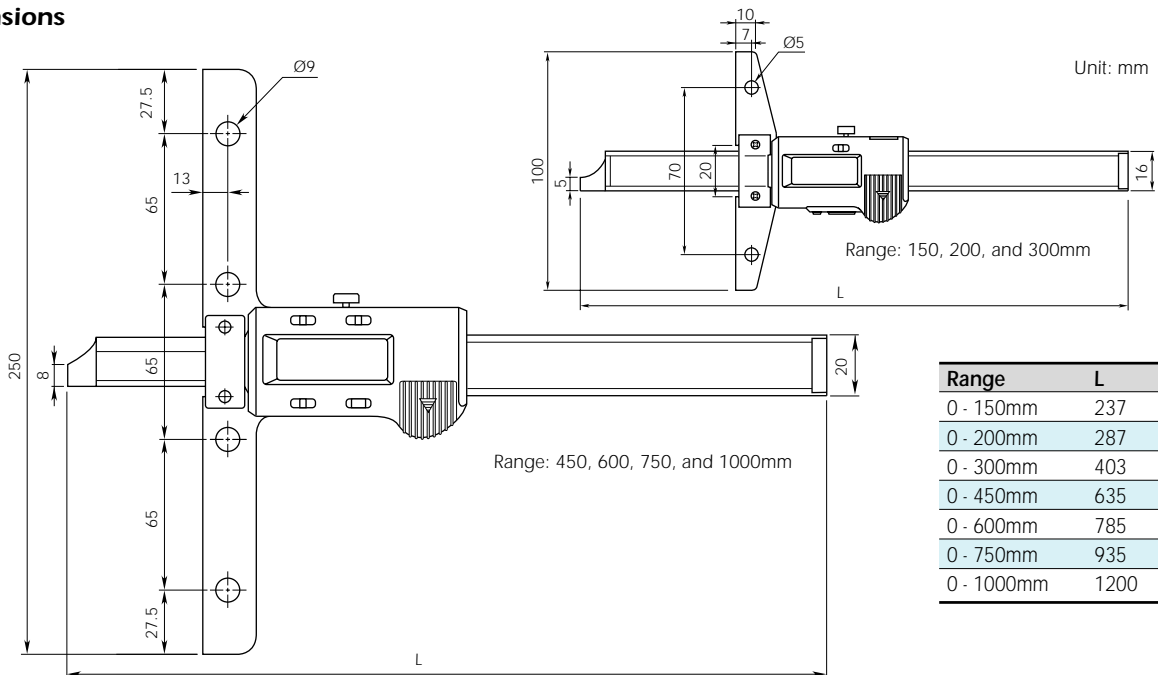
### Inch / Metric

| Range          | Order No.  | Resolution    | Accuracy |
|----------------|------------|---------------|----------|
| 0 - 6"/150mm   | 571-211-10 | .0005"/0.01mm | ±.001"   |
| 0 - 8"/200mm   | 571-212-10 | .0005"/0.01mm | ±.001"   |
| 0 - 12"/300mm  | 571-213-10 | .0005"/0.01mm | ±.0015"  |
| 0 - 18"/450mm  | 571-214-10 | .0005"/0.01mm | ±.002"   |
| 0 - 24"/600mm  | 571-215-10 | .0005"/0.01mm | ±.002"   |
| 0 - 30"/750mm  | 571-216-10 | .0005"/0.01mm | ±.0025"  |
| 0 - 40"/1000mm | 571-217-10 | .0005"/0.01mm | ±.003"   |

## OPTIONAL ACCESSORIES

| Order No.      | Description                                 |
|----------------|---|
| 959143         | Data Hold Unit for ABS Digimatic Depth Gage |
| 959149         | SPC cable with data switch (1m)             |
| 959150         | SPC cable with data switch (2m)             |
| (See page 69.) | Extension Bases                             |

## Dimensions

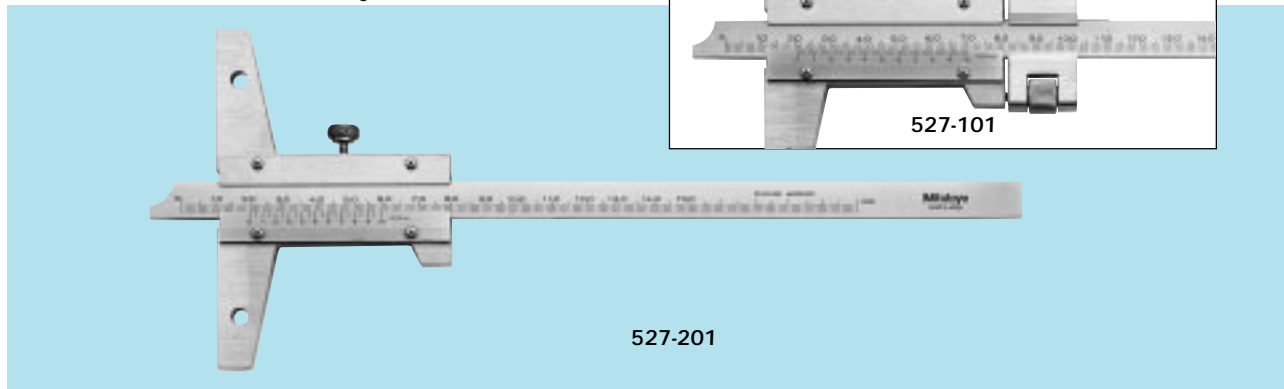


| Range      | L    |
|------------|------|
| 0 - 150mm  | 237  |
| 0 - 200mm  | 287  |
| 0 - 300mm  | 403  |
| 0 - 450mm  | 635  |
| 0 - 600mm  | 785  |
| 0 - 750mm  | 935  |
| 0 - 1000mm | 1200 |

## Vernier Depth Gages

### SERIES 527

with or without Fine Adjustment



### FEATURES

- Made of hardened stainless steel.
- Base and measuring faces are hardened and micro-lapped.
- Wider extension bases are available. (See page 69.)

### SPECIFICATIONS

#### Vernier Depth Gages

| Metric     |           |                 |          |
|------------|-----------|-----------------|----------|
| Range      | Order No. | Vernier reading | Accuracy |
| 0 - 150mm  | 527-201   | 0.05mm          | ±0.05mm  |
|            | 527-121   | 0.02mm          | ±0.03mm  |
| 0 - 200mm  | 527-202   | 0.05mm          | ±0.05mm  |
|            | 527-122   | 0.02mm          | ±0.03mm  |
| 0 - 300mm  | 527-203   | 0.05mm          | ±0.08mm  |
|            | 527-123   | 0.02mm          | ±0.04mm  |
| 0 - 600mm  | 527-204   | 0.05mm          | ±0.10mm  |
| 0 - 1000mm | 527-205   | 0.05mm          | ±0.15mm  |

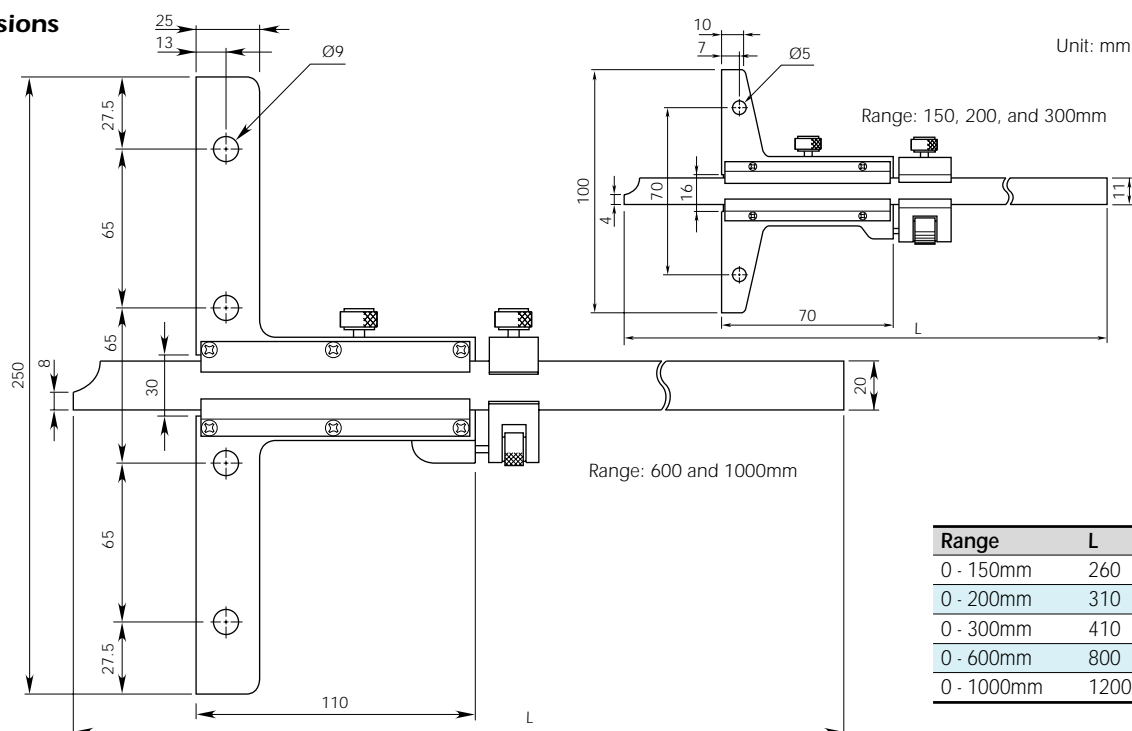
#### Vernier Depth Gages with Fine Adjustment

| Metric     |           |                 |          |
|------------|-----------|-----------------|----------|
| Range      | Order No. | Vernier reading | Accuracy |
| 0 - 150mm  | 527-101   | 0.02mm          | ±0.03mm  |
| 0 - 200mm  | 527-102   | 0.02mm          | ±0.03mm  |
| 0 - 300mm  | 527-103   | 0.02mm          | ±0.04mm  |
| 0 - 600mm  | 527-104   | 0.02mm          | ±0.05mm  |
| 0 - 1000mm | 527-105   | 0.02mm          | ±0.07mm  |

| Inch    |           |                 |          |
|---------|-----------|-----------------|----------|
| Range   | Order No. | Vernier reading | Accuracy |
| 0 - 6"  | 527-111   | .001"           | ±.001"   |
| 0 - 8"  | 527-112   | .001"           | ±.001"   |
| 0 - 12" | 527-113   | .001"           | ±.0015"  |
| 0 - 24" | 527-114   | .001"           | ±.002"   |
| 0 - 40" | 527-115   | .001"           | ±.003"   |

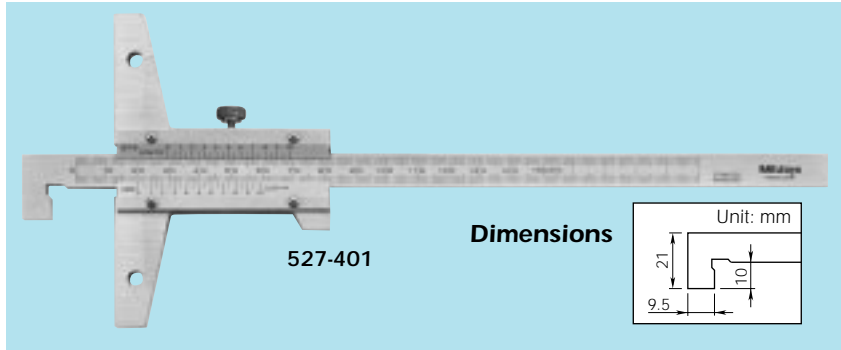
### Dimensions



# Vernier Depth Gages

## SERIES 527

Hook Type



### FEATURES

- The end of the main scale is hook-shaped to allow depth and thickness measurements of a projected portion or lip in a hole, in addition to standard depth measurement.
- With or without a fine-adjustment carriage.
- Extension Bases are available.

### SPECIFICATIONS

#### Vernier Depth Gages

##### Metric

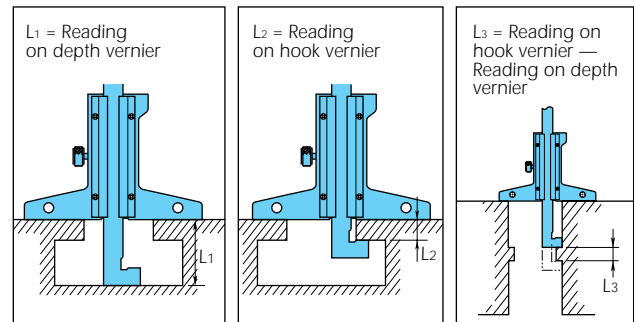
| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 527-401   | 0.05mm          | ±0.05mm  |
| 0 - 200mm | 527-402   | 0.05mm          | ±0.05mm  |
| 0 - 300mm | 527-403   | 0.05mm          | ±0.08mm  |

#### Vernier Depth Gages with Fine Adjustment

##### Metric

| Range     | Order No. | Vernier reading | Accuracy |
|-----------|-----------|-----------------|----------|
| 0 - 150mm | 527-411   | 0.02mm          | ±0.03mm  |
| 0 - 200mm | 527-412   | 0.02mm          | ±0.03mm  |
| 0 - 300mm | 527-413   | 0.02mm          | ±0.04mm  |

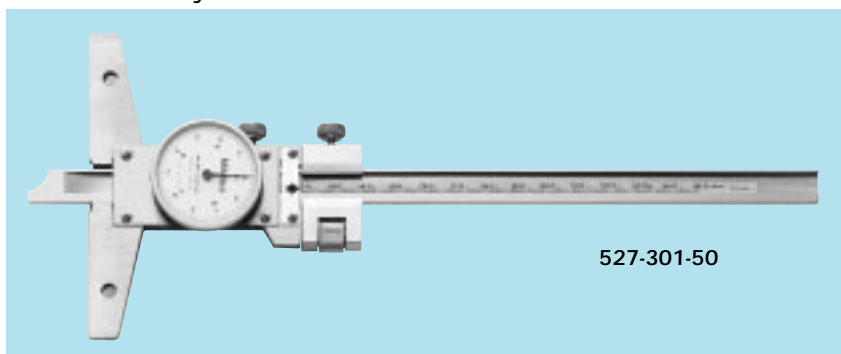
### Applications



# Dial Depth Gages

## SERIES 527

with Fine Adjustment



### FEATURES

- Easier and faster reading Depth Gage.
- Made of hardened stainless steel.
- Base and measuring faces are hardened and micro-lapped.
- Extension Bases are available.

### SPECIFICATIONS

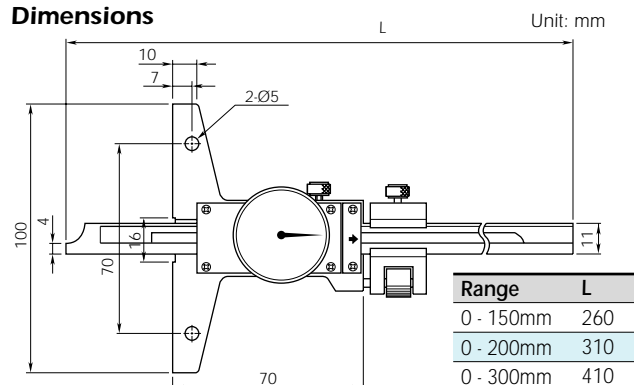
##### Metric

| Range     | Order No.  | Dial reading | Accuracy |
|-----------|------------|--------------|----------|
| 0 - 150mm | 527-301-50 | 0.05mm       | ±0.05mm  |
| 0 - 200mm | 527-302-50 | 0.05mm       | ±0.05mm  |
| 0 - 300mm | 527-303-50 | 0.05mm       | ±0.08mm  |

##### Inch

| Range   | Order No.  | Dial reading | Accuracy |
|---------|------------|--------------|----------|
| 0 - 6"  | 527-311-50 | .001"        | ±.001"   |
| 0 - 8"  | 527-312-50 | .001"        | ±.001"   |
| 0 - 12" | 527-313-50 | .001"        | ±.0015"  |

### Dimensions



## Extension Bases



### FEATURES

- Attached to the base (reference face) plate of a Depth Gage to extend its span.
- Note: These extension bases cannot be attached to 600mm (24") and 1000mm (40") range Depth Gages.

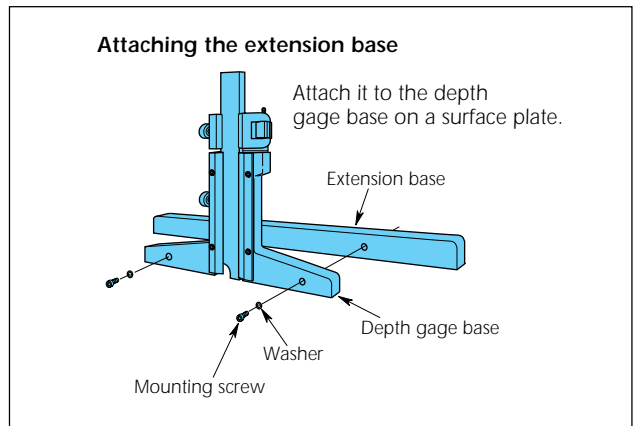
### SPECIFICATIONS

#### Metric

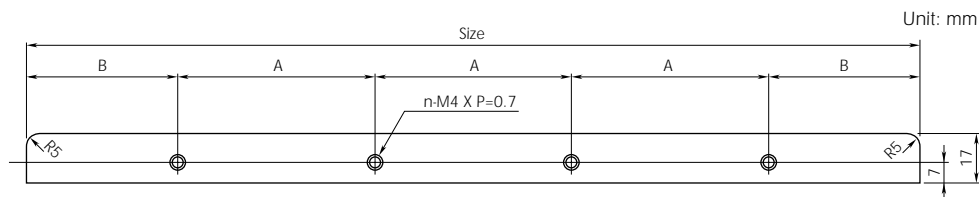
| Size  | Order No. | Dimension A | Dimension B | n |
|-------|-----------|-------------|-------------|---|
| 180mm | 900370    | 70mm        | 55mm        | 2 |
| 260mm | 900371    | 35mm        | 60mm        | 5 |
| 320mm | 900372    | 70mm        | 55mm        | 4 |

#### Inch

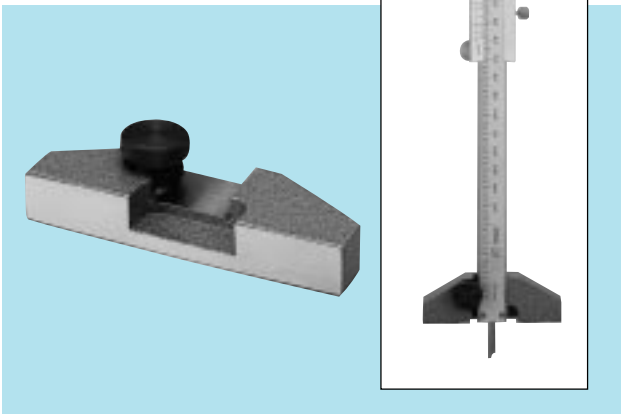
| Size | Order No. | Dimension A | Dimension B | n |
|------|-----------|-------------|-------------|---|
| 7"   | 900367    | 2.76"       | 2.17"       | 2 |
| 10"  | 900368    | 1.38"       | 2.36"       | 5 |
| 12"  | 900369    | 2.76"       | 2.17"       | 4 |



### Dimensions



## Depth Base Attachment



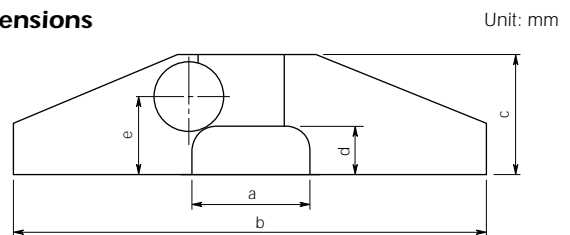
### FEATURES

- For 100mm (4"), 150mm (6"), 200mm (8"), and 300mm (12") Mitutoyo Vernier and Dial Calipers which have a depth measuring bar.
- Finely ground base surface and secure locking clamp.

### SPECIFICATIONS

| Size  | Order No. | Description                        |
|-------|-----------|------------------------------------|
| 75mm  | 050083    | For 100mm, 150mm, and 200mm models |
| 100mm | 050084    | For 100mm, 150mm, and 200mm models |
| 125mm | 050085    | For 300mm models only              |

### Dimensions

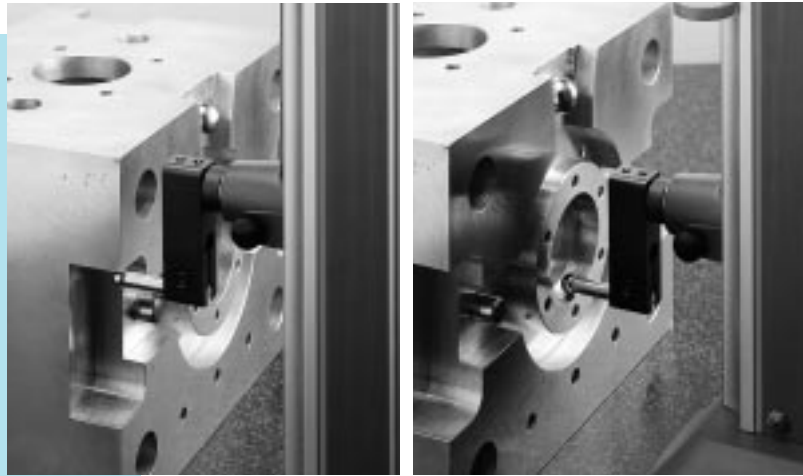


| Size  | a  | b   | c    | d    | e  |
|-------|----|-----|------|------|----|
| 75mm  | 25 | 75  | 24.5 | 9    | 16 |
| 100mm | 25 | 100 | 24.5 | 9    | 16 |
| 125mm | 30 | 125 | 28.5 | 11.5 | 20 |

# Linear Height

## SERIES 518

### 2D Measurement System



### SPECIFICATIONS

#### Metric / Inch

|                      |  |
|----------------------|--|
| Order No.*           | 518-321A-21 (120V with English manual)                             |
|                      | 518-321A-22 (120V with Spanish manual)                             |
|                      | 518-321D-21 (220V with English manual)                             |
|                      | 518-321D-22 (220V with Spanish manual)                             |
|                      | 518-321D-23 (220V with German manual)                              |
|                      | 518-321D-24 (220V with French manual)                              |
|                      | 518-321D-25 (220V with Italian manual)                             |
|                      | 518-321E-21 (240V with English manual)                             |
| Range                | 0 - 972mm (0 - 38")  |
| Slider travel        | 600mm (34")  |
| Resolution           | 0.0001mm/0.001mm/0.01mm/0.1mm/.000001"/.00001"/.0001"/.001"        |
| Accuracy**           | (2+L/600)µm  |
| Repeatability (2σ)   | Plane: 0.5µm Bore: 1µm   |
| Perpendicularity     | 6µm  |
| Straightness         | 4µm  |
| Drive method         | Manual/Motor (5 - 40mm, 7 steps)                                   |
| Measuring force      | 1N   |
| Balancing method     | Counterweight (Auxiliary weights available.)                       |
| Floating method      | Air bearings with built-in air compressor                          |
| Display              | Graphic LCD (320x240 dot, with backlight)                          |
| Language for display | English/German/French/Spanish/Italian/Japanese                     |
| Data output          | RS-232C  |
| Power supply         | Built-in rechargeable battery or AC adapter (100-240V AC, 50/60Hz) |
| Dimensions (WxDxH)   | 240x287x1013mm   |
| Mass                 | 24kg   |

### FEATURES

- Excellent accuracy of (2+L/600)µm with 0.1µm/0.5µm resolution/repeatability.
- Unique pneumatic full/semi-floating system achieves rapid inspection speed while maintaining the accuracy.
- One-key operation for semiautomatic measuring run.
- Employs Icon display for informative GUI.
- Automatic stand-by in the repeat measurement.
- Immediate GO/NG judgment at each measurement.
- Complete stand-alone design with rechargeable battery pack and self-contained pneumatic system.
- 24kg smart body for high mobility.
- Large memory capacity for 50 measuring programs and 60,000 measured data.
- Off-line part programming.
- RS-232C data output.
- Data entry from a digital indicator for straightness measurement.
- Optional external battery charger and spare battery pack for continuous operation.

\*Power grip preinstalled models are available.

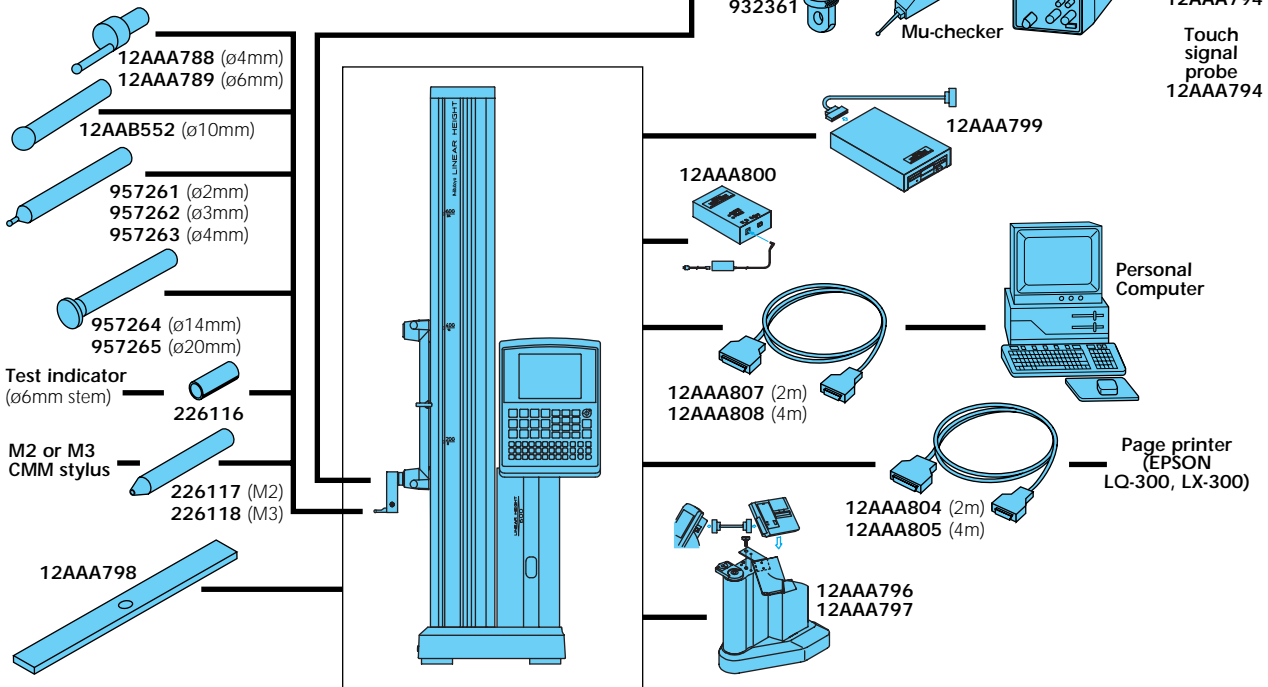
- 518-322A-21 (120V with English manual)
- 518-322A-22 (120V with Spanish manual)
- 518-322D-21 (220V with English manual)
- 518-322D-22 (220V with Spanish manual)
- 518-322D-23 (220V with German manual)
- 518-322D-24 (220V with French manual)
- 518-322D-25 (220V with Italian manual)
- 518-322E-21 (240V with English manual)

\*\*L = Measured length (mm)

## OPTIONAL ACCESSORIES

| Order No. | Description  |
|-----------|--|
| 12AAA787  | Setting block for taper probe                        |
| 957261    | ø2 ball probe  |
| 957262    | ø3 ball probe  |
| 957263    | ø4 ball probe  |
| 12AAB552  | ø10 carbide ball probe                               |
| 12AAA788  | ø4 ball offset probe                                 |
| 12AAA789  | ø6 ball offset probe                                 |
| 957264    | ø14 disk probe                                       |
| 957265    | ø20 disk probe                                       |
| 226116    | Test indicator (ø6 stem) adapter                     |
| 226117    | M2 CMM stylus adapter                                |
| 226118    | M3 CMM stylus adapter                                |
| 12AAC072  | Depth probe  |
| 12AAC073  | ø20 taper probe                                      |
| 12AAB136  | ø10 cylindrical probe                                |
| 12AAA793  | Probe extension holder (199mm)                       |
| 12AAA792  | Dial indicator (ø8 stem) holder                      |
| 12AAA837  | Dial indicator (ø3/8" stem) holder                   |
| 932361    | Mu-checker lever head holder                         |
| 06AAN066  | Touch signal probe                                   |
| 12AAA794  | Probe connecting cable                               |
| -----     | CMM ball and disk hard probes are available          |
| 12AAA798  | Auxiliary weight                                     |
| 12AAA796  | Thermal-receipt printer (230V)                       |
| 12AAA797  | Thermal-receipt printer (120V)                       |
| 12AAA802  | Thermal print paper (10 pcs.)                        |
| 12AAA804  | Cable for page printer (EPSON LQ-300 or LX-300) (2m) |
| 12AAA805  | Cable for page printer (EPSON LQ-300 or LX-300) (4m) |
| 12AAA799  | Floppy disk drive                                    |
| 12AAA800  | Battery charger                                      |
| 12AAA807  | RS-232C cable (2m/80")                               |
| 12AAA808  | RS-232C cable (4m/160")                              |
| 936937    | SPC cable for Digimatic data entry (1m)              |
| 965014    | SPC cable for Digimatic data entry (2m)              |
| 12AAA879  | Model workpiece for training                         |

## SYSTEM DIAGRAM



## Consumables

| Order No. | Description         | Qty.   |
|-----------|---------------------|--------|
| 12AAA802  | Thermal print paper | 10pcs. |





## QM-Hite

## SERIES 518

High Precision Digital Height Gage



518-222

## FEATURES

- Newly developed high accuracy and high resolution Absolute Type linear encoder for position detection.
- Easy reference icon keys.
- Possible to measure inside/outside diameter via a unique process (detect the circle apex and process by tracing measurement).
- Various types of probes (optional).
- Large size LCD.
- GO/±NG judgment is performed by setting the upper and lower tolerances. If a judgment result is out of tolerance, the display backlighting changes from green to red, so tolerance judgment can be made at a glance.
- Slider elevation knob/wheel.
- Digimatic and RS-232C output.

## SPECIFICATIONS

## Metric

| Order No.*    | 518-220          | 518-222   |
|---------------|------------------|-----------|
| Range         | 0 - 350mm        | 0 - 600mm |
| Resolution    | 0.001mm, 0.005mm |           |
| Accuracy**    | ±(2.8+5L/1000)μm |           |
| Repeatability | 2σ≤1.8μm         |           |

## Inch/Metric

| Order No.*    | 518-221                                   | 518-223           |
|---------------|---|-------------------|
| Range         | 0 - 14"/0 - 350mm                         | 0 - 24"/0 - 600mm |
| Resolution    | .00005", .0001", .0002", 0.001mm, 0.005mm |                   |
| Accuracy      | ±(2.8+5L/1000)μm                          |                   |
| Repeatability | 2σ≤1.8μm                                  |                   |

|                    |   |                |
|--------------------|---|----------------|
| Display            | LCD   |                |
| Functions          | Zero-setting, +/- switching, Presetting, Data hold, Probe tip diameter compensation, inch/mm conversion (Inch/Metric model only), Data output |                |
| Perpendicularity   | 0.008mm   | 0.013mm        |
| Measuring force    | 1.6±0.5N  |                |
| Data output        | SPC, RS-232C  |                |
| Power supply       | Via AC adapter (optional accessory)   |                |
| Dimensions (WxDxH) | 210x350x772mm   | 210x350x1022mm |
| Mass               | 22kg  | 27kg           |

\*Model with setting block for ball probe (12AAA715)

518-224 (350mm)

518-226 (600mm)

518-225 (14"/350mm)

518-227 (24"/600mm)

\*\*L=Measured length (mm)

## OPTIONAL ACCESSORIES

| Order No. | Description                              |
|-----------|--|
| 958261    | ø2 ball probe                            |
| 957262    | ø3 ball probe                            |
| 957263    | ø4 ball probe                            |
| 12AAA788  | ø4 ball offset probe                     |
| 12AAA789  | ø6 ball offset probe                     |
| 12AAA715  | Setting block for ball probe             |
| 957264    | ø14 disk probe                           |
| 957265    | ø20 disk probe                           |
| 226116    | Test indicator (ø6 stem) adapter         |
| 12AAA793  | Probe extension holder (199mm)           |
| 12AAA792  | Dial indicator (ø8 stem) holder          |
| 12AAA837  | Dial indicator (ø3/8" stem) holder       |
| 954232    | Depth probe                              |
| 05HZA173  | Scriber                                  |
| 05HZA143  | 9x9mm adapter for dial test indicator    |
| 05HZA144  | .25"x.5" adapter for dial test indicator |
| 05GZA033  | Clamp for 05HZA143                       |
| 901385    | Clamp for 05HZA144                       |
| 936937    | SPC cable for Digimatic data entry (1m)  |
| 965014    | SPC cable for Digimatic data entry (2m)  |



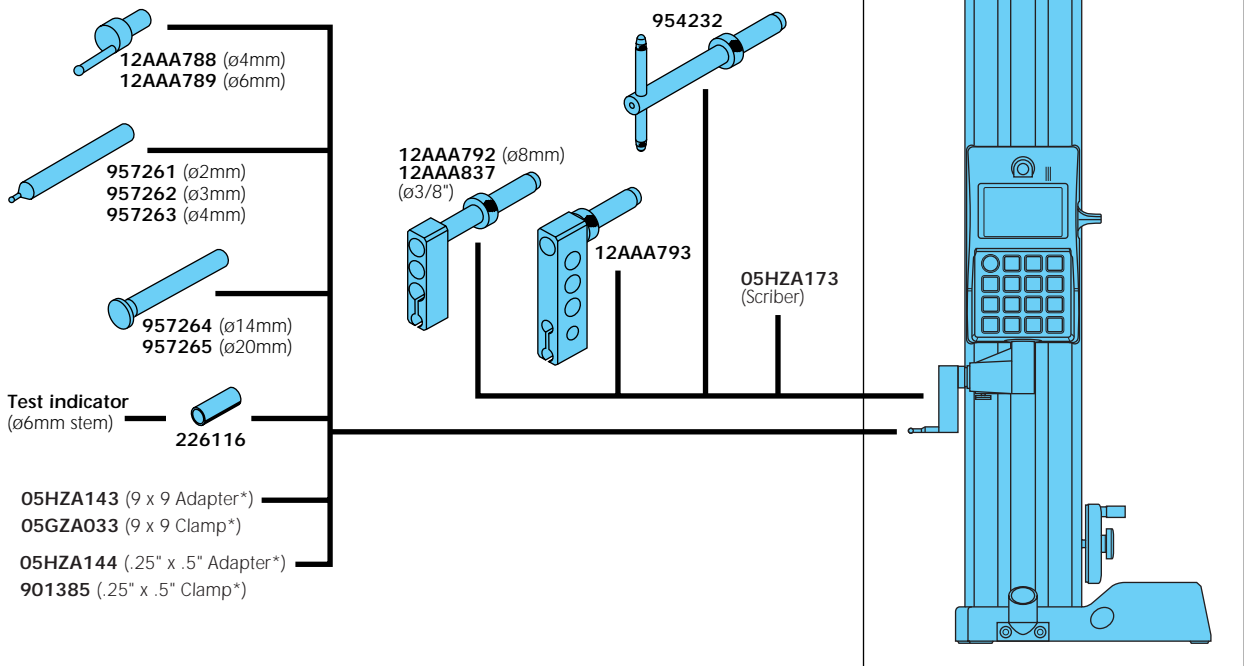
Digimatic mini processor DP-1VR



936937 (1m)  
965014 (2m)

AC adapter 526688 (100V)  
526688A (120V)  
526688D (220V)  
526688E (240/220V)

## SYSTEM DIAGRAM

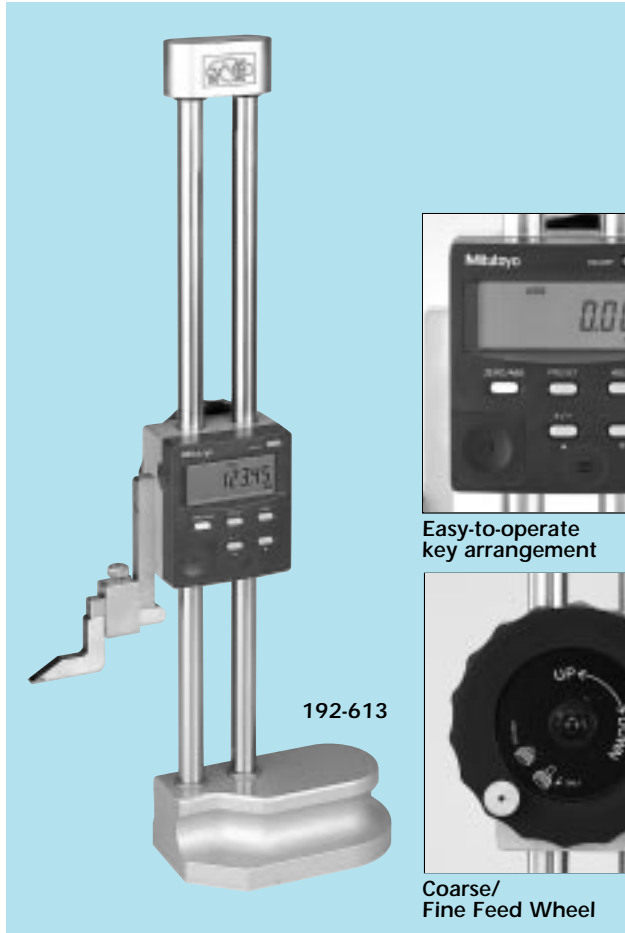


\* Possible to use the scriber for Height Gage.

# Digimatic Height Gages

## SERIES 192

Standard Type



### FEATURES

- Easy-to-use standard type.
- Double-column structure ensures high measuring accuracy.
- Carbide-tipped scriber.
- Coarse/Fine Feed switching.
- Without SPC data output.

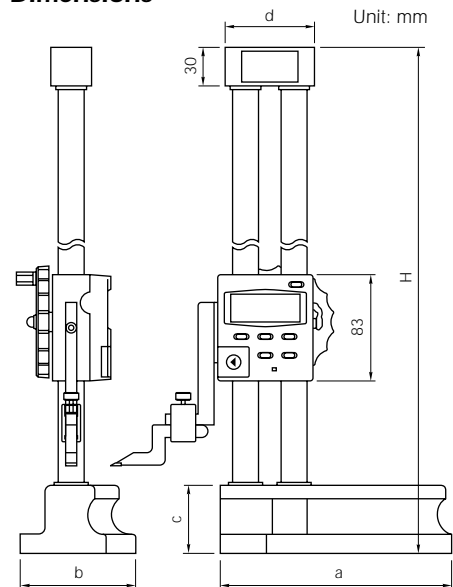


Easy-to-operate key arrangement



Coarse/Fine Feed Wheel

### Dimensions



| Range     | H   | a   | b   | c  | d  |
|-----------|-----|-----|-----|----|----|
| 0 - 300mm | 475 | 135 | 91  | 45 | 63 |
| 0 - 600mm | 802 | 180 | 120 | 54 | 70 |

Note: Please contact Mitutoyo Corporation directly for the dimensions of Digimatic Height Gage with a measuring range of 1000mm.

### Technical Data

**Display:** LCD

**Functions:** Zero-Set, presetting, preset value recalling, ABS/INC measurement mode switching, data hold, counting direction switching, power on/off, inch/mm conversion (inch/mm type only)

**Battery:** CR2032 lithium battery (1 pc.) (05SAA217)

**Battery life:** Approx. 2000 hours in continuous use

**Maximum response speed:** Approx. 500mm/s

**Alarm:** Low battery voltage, counting error

**Operating temperature:** 0°C to 40°C

### SPECIFICATIONS

#### Metric

| Range      | Order No. | Resolution | Accuracy | Mass   | Remarks                  |
|------------|-----------|------------|----------|--------|--------------------------|
| 0 - 300mm  | 192-613   | 0.01mm     | ±0.02mm  | 4.7kg  | Standard accessories:    |
| 0 - 600mm  | 192-614   | 0.01mm     | ±0.05mm  | 9.5kg  | Scriber (07GZA000) and   |
| 0 - 1000mm | 192-615   | 0.01mm     | ±0.07mm  | 19.8kg | scriber clamp (05GZA033) |

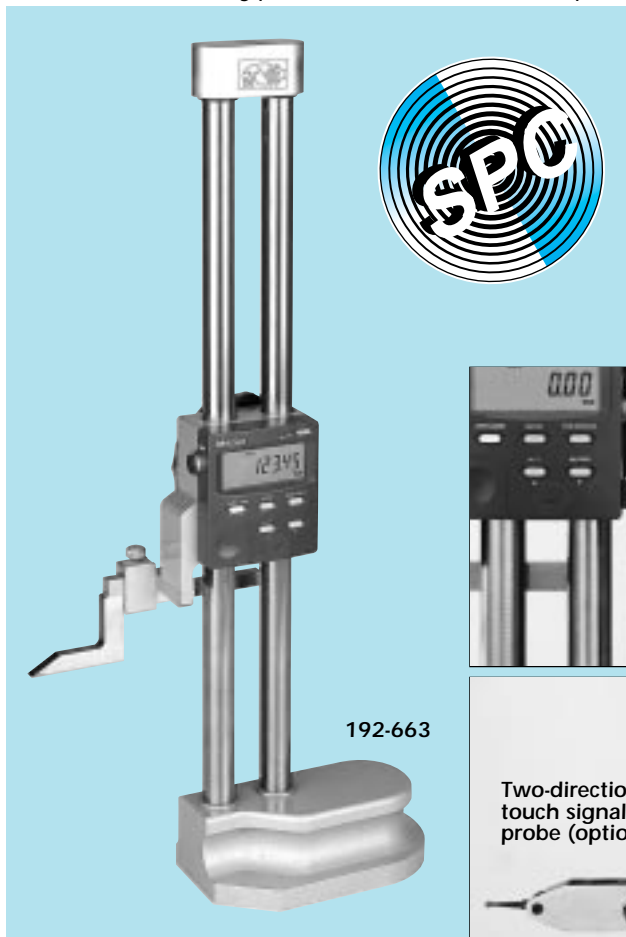
#### Inch/Metric

| Range                | Order No. | Resolution    | Accuracy | Mass      | Remarks                |
|----------------------|-----------|---------------|----------|-----------|------------------------|
| 0 - 12" (0 - 300mm)  | 192-630   | .0005"/0.01mm | ±.001"   | 10.3 lbs. | Standard accessories:  |
| 0 - 18" (0 - 450mm)  | 192-631   | .0005"/0.01mm | ±.002"   | 19.1 lbs. | Scriber (900258) and   |
| 0 - 24" (0 - 600mm)  | 192-632   | .0005"/0.01mm | ±.002"   | 20.9 lbs. | scriber clamp (901385) |
| 0 - 40" (0 - 1000mm) | 192-633   | .0005"/0.01mm | ±.003"   | 43.6 lbs. |                        |

## Digimatic Height Gages

### SERIES 192

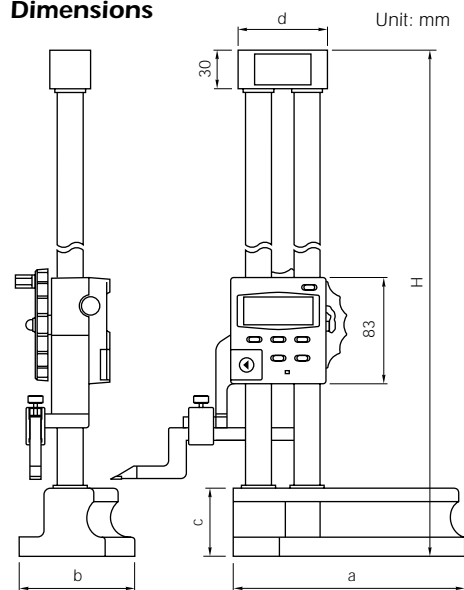
Multi-function Type with SPC Data Output



### FEATURES

- Highly versatile multi-function type.
- A carbide-tipped long scriber is provided.
- Rigid construction ensures repeatable measurement.
- Coarse/Fine Feed switching.
- Two-directional touch signal probe is an optional accessory. It can quickly and accurately measure steps, inside width, and outside width.
- With SPC data output.

### Dimensions



| Range     | H   | a   | b   | c  | d  |
|-----------|-----|-----|-----|----|----|
| 0 - 300mm | 510 | 149 | 100 | 48 | 70 |
| 0 - 600mm | 802 | 180 | 120 | 54 | 70 |

Note: Please contact Mitutoyo Corporation directly for the dimensions of Digimatic Height Gage with a measuring range of 1000mm.

### Technical Data

**Display:** LCD

**Functions:** Zero-Set, presetting, preset value recalling, ABS/INC measurement mode switching, SPC data output, data hold, two-directional touch signal probe, counting direction switching, power on/off, inch/mm conversion (inch/mm type only)

**Battery:** CR2032 lithium battery (1 pc.) (05SAA217)

**Battery life:** Approx. 2000 hours in continuous use

**Maximum response speed:** Approx. 500mm/s

**Alarm:** Low battery voltage, counting error

**Operating temperature:** 0°C to 40°C

### OPTIONAL ACCESSORIES

| Order No. | Description                                    |
|-----------|--|
| 192-007   | Two-directional touch signal probe (mm type)   |
| 192-008   | Two-directional touch signal probe (inch type) |
| 905338    | SPC cable (1m)                                 |
| 905409    | SPC cable (2m)                                 |
| 905691    | SPC cable (1m), L-shape type                   |
| 905692    | SPC cable (2m), L-shape type                   |

### SPECIFICATIONS

#### Metric

| Range      | Order No. | Resolution | Accuracy | Mass   | Remarks                  |
|------------|-----------|------------|----------|--------|--------------------------|
| 0 - 300mm  | 192-663   | 0.01mm     | ±0.02mm  | 6.5kg  | Standard accessories:    |
| 0 - 600mm  | 192-664   | 0.01mm     | ±0.04mm  | 9.5kg  | Scriber (905200) and     |
| 0 - 1000mm | 192-665   | 0.01mm     | ±0.06mm  | 19.8kg | scriber clamp (05GZA033) |

#### Inch/Metric

| Range                | Order No. | Resolution    | Accuracy | Mass      | Remarks                |
|----------------------|-----------|---------------|----------|-----------|------------------------|
| 0 - 12" (0 - 300mm)  | 192-670   | .0005"/0.01mm | ±.001"   | 14.3 lbs. | Standard accessories:  |
| 0 - 18" (0 - 450mm)  | 192-671   | .0005"/0.01mm | ±.0015"  | 19.1 lbs. | Scriber (905201) and   |
| 0 - 24" (0 - 600mm)  | 192-672   | .0005"/0.01mm | ±.0015"  | 20.9 lbs. | scriber clamp (901385) |
| 0 - 40" (0 - 1000mm) | 192-673   | .0005"/0.01mm | ±.0025"  | 43.6 lbs. |                        |

# Digimatic Height Gages

## SERIES 570

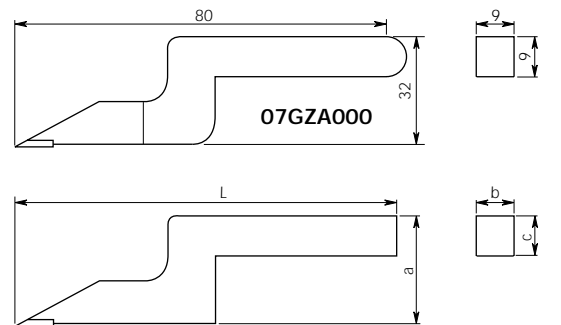
with SPC Output



### FEATURES

- Can easily measure the height of small parts.
- The clear LCD screen provides digital readout to 0.01mm for error-free reading.
- The robust construction with a thick column provides highly repeatable measurements.
- Fine-adjustment carriage to feed the slider finely.
- Carbide-tipped scriber.
- Functions include: Zero-setting, Presetting, Data hold, Data output, +/- switching, inch/mm conversion (Inch/Metric model only), Error alarm, Low battery alarm.
- Power supply: One SR44 battery (**938882**)

### Dimensions of Scribes



| Parts No. | L   | a    | b    | c    |
|-----------|-----|------|------|------|
| 900173    | 47  | 25   | 6.35 | 12.7 |
| 900258    | 60  | 30   | 6.35 | 12.7 |
| 905200    | 150 | 42   | 9    | 9    |
| 905201    | 150 | 45.7 | 6.35 | 12.7 |

### OPTIONAL ACCESSORIES

| Order No. | Description    |
|-----------|----------------|
| 905338    | SPC cable (1m) |
| 905409    | SPC cable (2m) |

### SPECIFICATIONS

#### Metric

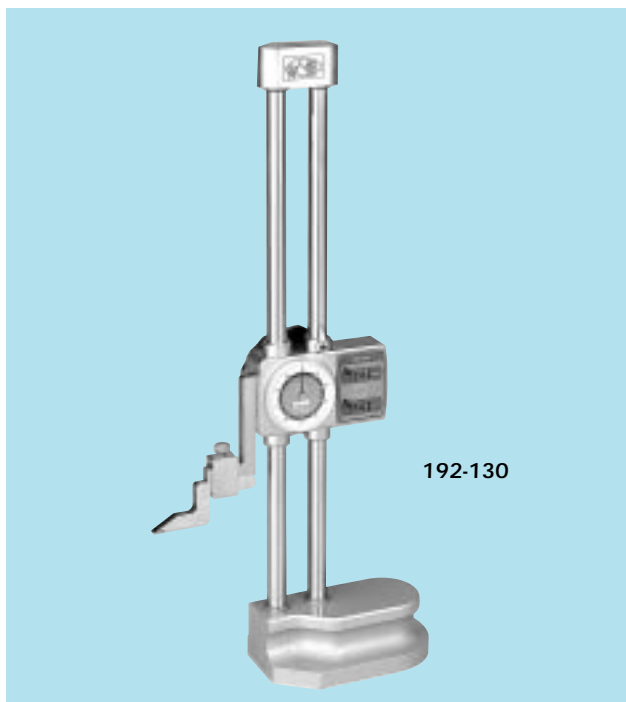
| Range      | Order No. | Resolution | Accuracy | Repeatability | Remarks                          |
|------------|-----------|------------|----------|---------------|----------------------------------|
| 0 - 200mm  | 570-227   | 0.01mm     | ±0.03mm  | 0.01mm        | with Scriber ( <b>900173</b> )   |
| 0 - 300mm  | 570-228   | 0.01mm     | ±0.04mm  | 0.01mm        | with Scriber ( <b>07GZA000</b> ) |
| 0 - 600mm  | 570-229   | 0.01mm     | ±0.05mm  | 0.01mm        | with Scriber ( <b>07GZA000</b> ) |
| 0 - 1000mm | 570-230   | 0.01mm     | ±0.07mm  | 0.01mm        | with Scriber ( <b>905200</b> )   |

#### Inch/Metric

| Range          | Order No. | Resolution    | Accuracy | Repeatability | Remarks                        |
|----------------|-----------|---------------|----------|---------------|--------------------------------|
| 0 - 8"/200mm   | 570-244   | .0005"/0.01mm | ±.001"   | .0005"        | with Scriber ( <b>900173</b> ) |
| 0 - 12"/300mm  | 570-245   | .0005"/0.01mm | ±.002"   | .0005"        | with Scriber ( <b>900258</b> ) |
| 0 - 18"/450mm  | 570-246   | .0005"/0.01mm | ±.002"   | .0005"        | with Scriber ( <b>900258</b> ) |
| 0 - 24"/600mm  | 570-247   | .0005"/0.01mm | ±.002"   | .0005"        | with Scriber ( <b>900258</b> ) |
| 0 - 40"/1000mm | 570-248   | .0005"/0.01mm | ±.003"   | .0005"        | with Scriber ( <b>905201</b> ) |

# Digital Counter Type Dial Height Gages

## SERIES 192

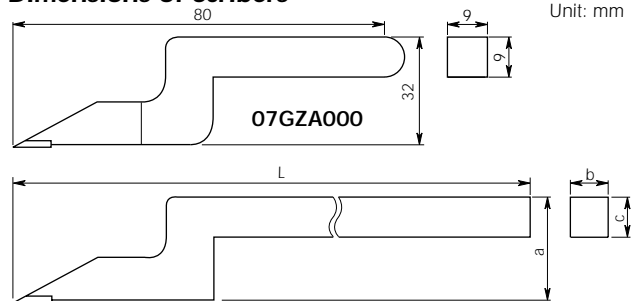


192-130

### FEATURES

- Easy and error-free reading with both up and down digital counters as well as a dial.
- Provided with a feed wheel for easy coarse feeding.
- Carbide-tipped scriber: **07GZA000** (metric) or **900258** (inch).

### Dimensions of Scribers



Unit: mm

| Parts No. | L  | a  | b    | c    |
|-----------|----|----|------|------|
| 900258    | 60 | 30 | 6.35 | 12.7 |

### SPECIFICATIONS

#### Metric

| Range      | Order No. | Dial reading | Accuracy |
|------------|-----------|--------------|----------|
| 0 - 300mm  | 192-130   | 0.01mm       | ±0.03mm  |
| 0 - 450mm  | 192-131   | 0.01mm       | ±0.05mm  |
| 0 - 600mm  | 192-132   | 0.01mm       | ±0.05mm  |
| 0 - 1000mm | 192-133   | 0.01mm       | ±0.07mm  |

\*Heavy duty type with a long scriber (900167)

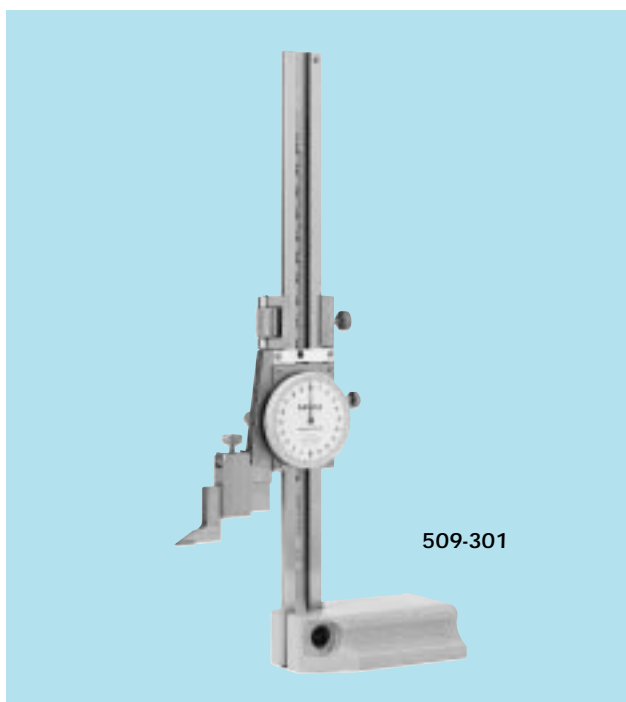
#### Inch

| Range   | Order No. | Dial reading | Accuracy |
|---------|-----------|--------------|----------|
| 0 - 12" | 192-140   | .001"        | ±.0015"  |
| 0 - 18" | 192-141   | .001"        | ±.002"   |
| 0 - 24" | 192-142   | .001"        | ±.002"   |
| 0 - 40" | 192-143   | .001"        | ±.003"   |



# Dial Height Gages

## SERIES 509

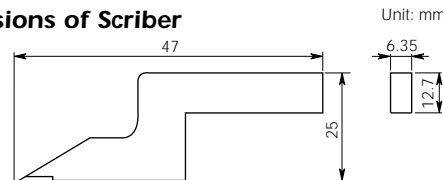


509-301

### FEATURES

- Easy and error-free reading with a dial.
- Made of stainless steel throughout.
- Provided with a carbide-tipped scriber (900173).

### Dimensions of Scriber



Unit: mm

### SPECIFICATIONS

#### Metric

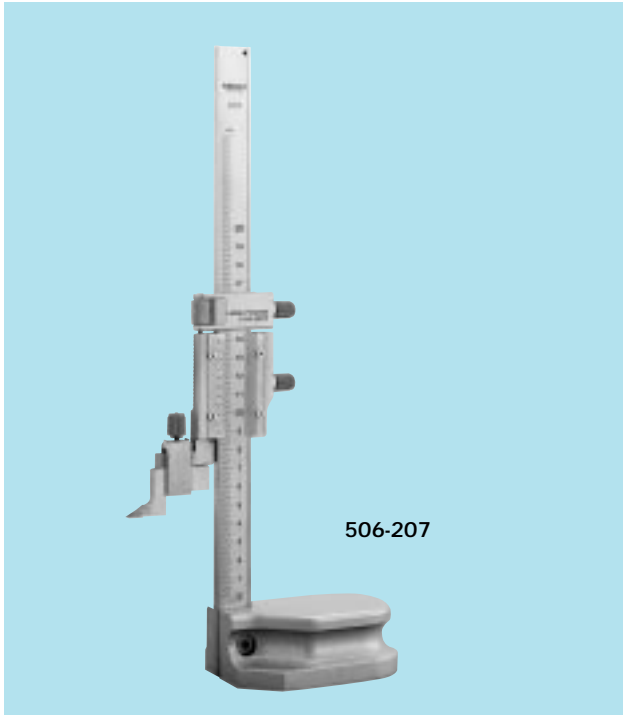
| Range     | Order No. | Dial reading | Accuracy |
|-----------|-----------|--------------|----------|
| 0 - 150mm | 509-301   | 0.02mm       | ±0.03mm  |
| 0 - 250mm | 509-302   | 0.02mm       | ±0.04mm  |

#### Inch

| Range   | Order No. | Dial reading | Accuracy |
|---------|-----------|--------------|----------|
| 0 - 6"  | 509-313   | .001"        | ±.001"   |
| 0 - 10" | 509-314   | .001"        | ±.0015"  |

## Vernier Height Gages

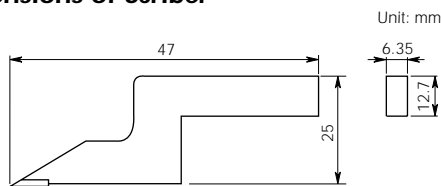
### SERIES 506



#### FEATURES

- Light weight type can measure easily the height of small parts.
- Beam and slider are made of stainless steel.
- Right hand type for easy use.
- Clear, crisp black graduations on a satin-chrome finish for easy reading.
- Provided with a carbide-tipped scriber (**900173**).

#### Dimensions of Scriber



#### SPECIFICATIONS

##### Metric

| Range      |             | Order No.      | Vernier reading |             | Accuracy |
|------------|-------------|----------------|-----------------|-------------|----------|
| Left scale | Right scale |                | Left scale      | Right scale |          |
| —          | 0 - 150mm   | <b>506-201</b> | —               | 0.02mm      | ±0.03mm  |
| 0 - 200mm  | —           | <b>506-207</b> | 0.02mm          | —           | ±0.03mm  |
| —          | 0 - 250mm   | <b>506-204</b> | —               | 0.02mm      | ±0.04mm  |

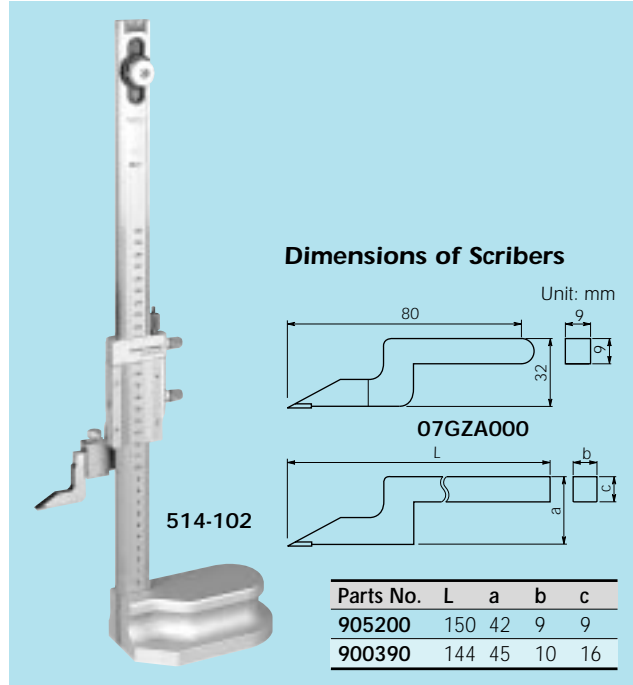
##### Metric / Inch

| Range      |             | Order No.      | Vernier reading |             | Accuracy |
|------------|-------------|----------------|-----------------|-------------|----------|
| Left scale | Right scale |                | Left scale      | Right scale |          |
| 0 - 6"     | 0 - 150mm   | <b>506-202</b> | .001"           | 0.02mm      | ±.001"   |
| 0 - 8"     | 0 - 200mm   | <b>506-208</b> | .001"           | 0.02mm      | ±.001"   |
| 0 - 10"    | 0 - 250mm   | <b>506-205</b> | .001"           | 0.02mm      | ±.0015"  |

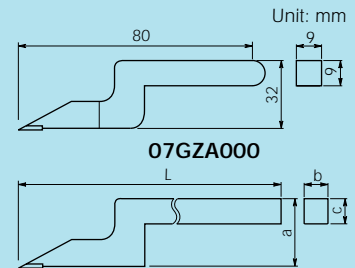
## Vernier Height Gages

### SERIES 514

with Adjustable Main Scale



#### Dimensions of Scribes



| Parts No.     | L   | a  | b  | c  |
|---------------|-----|----|----|----|
| <b>905200</b> | 150 | 42 | 9  | 9  |
| <b>900390</b> | 144 | 45 | 10 | 16 |

#### FEATURES

- Zero reference point can be adjusted (15mm/.59", 0-1000mm/0-24" model: 25mm/.98", 0-1500mm model: ±10mm).
- Satin chrome finished scales for glare-free reading.
- Final vernier readings can be assisted by the dedicated magnifier (optional, standard for **514-170**).
- Provided with carbide-tipped scriber (**107GZA000**, 0-1000mm/0-24" model: **905200**, 0-1500mm model: **900390**).
- Extra-large base for rigidity.

#### SPECIFICATIONS

##### Metric

| Range      |             | Order No.      | Vernier reading |             | Accuracy |
|------------|-------------|----------------|-----------------|-------------|----------|
| Left scale | Right scale |                | Left scale      | Right scale |          |
| 0 - 300mm  | —           | <b>514-102</b> | 0.02mm          | —           | ±0.04mm  |
| 0 - 450mm  | —           | <b>514-104</b> | 0.02mm          | —           | ±0.05mm  |
| 0 - 600mm  | —           | <b>514-106</b> | 0.02mm          | —           | ±0.05mm  |
| 0 - 1000mm | —           | <b>514-108</b> | 0.02mm          | —           | ±0.07mm  |
| —          | 0 - 1500mm  | <b>514-170</b> | —               | 0.05mm      | ±0.18mm  |

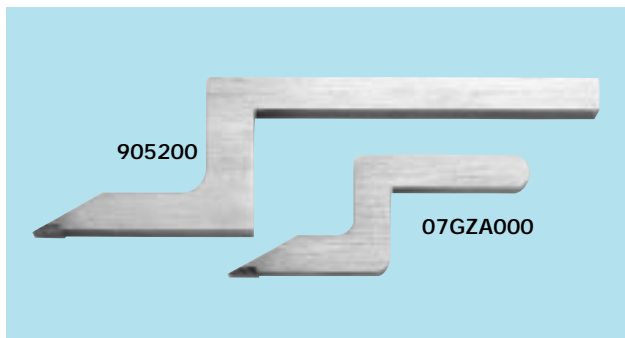
##### Metric / Inch

| Range      |             | Order No.      | Vernier reading |             | Accuracy |
|------------|-------------|----------------|-----------------|-------------|----------|
| Left scale | Right scale |                | Left scale      | Right scale |          |
| 0 - 12"    | 0 - 300mm   | <b>514-103</b> | .001"           | 0.02mm      | ±.002"   |
| 0 - 18"    | 0 - 450mm   | <b>514-105</b> | .001"           | 0.02mm      | ±.002"   |
| 0 - 24"    | 0 - 600mm   | <b>514-107</b> | .001"           | 0.02mm      | ±.002"   |
| 0 - 40"    | 0 - 1000mm  | <b>514-109</b> | .001"           | 0.02mm      | ±.003"   |

#### OPTIONAL ACCESSORIES

| Order No.       | Description                          |
|-----------------|--------------------------------------|
| <b>07GZA003</b> | Magnifier for 300, 450, 600mm models |
| <b>07GZA015</b> | Magnifier for 1000mm model           |

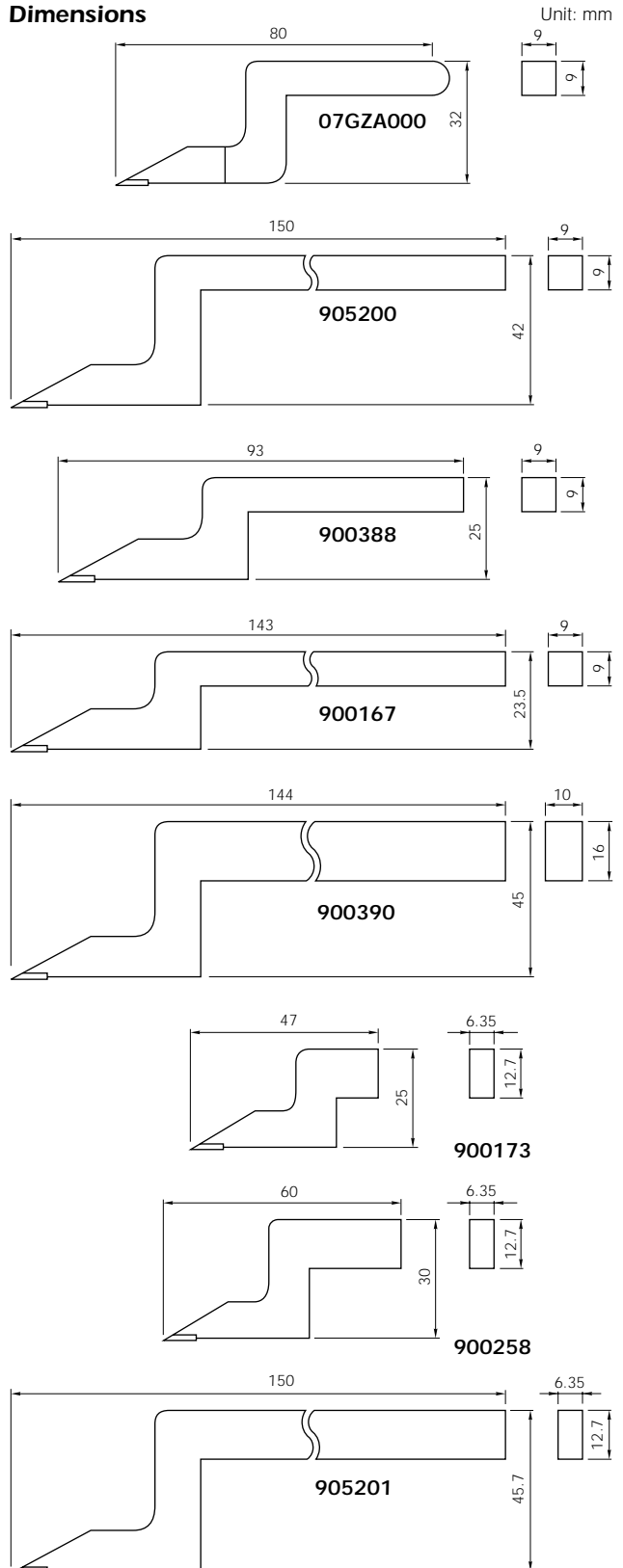
## Scribers for Height Gages



### FEATURES

- Carbide-tipped.
- Use the appropriate scriber and clamp for each height gage.

### Dimensions



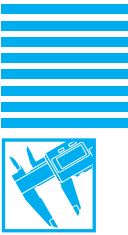
### SPECIFICATIONS

#### Metric

| Order No. | Height gages to be fitted   |
|-----------|---|
| 07GZA000  | 192 Series Digimatic Height Gages<br>(192-613, 192-614, 192-615)<br>570 Series Digimatic Height Gages<br>(570-228, 570-229)<br>192 Series Dial Height Gages<br>(192-130, 192-131, 192-132, 192-133)<br>514 Series Vernier Height Gages<br>(514-102, 514-104, 514-106, 514-103, 514-105, 514-107)<br>574 Series Heightmatic<br>(574-112-1, 574-111-1, 574-110-1) |
| 905200    | 192 Series Digimatic Height Gages<br>(192-663, 192-664, 192-665)<br>570 Series Digimatic Height Gages<br>(570-230)<br>514 Series Vernier Height Gages<br>(514-108, 514-109)   |
| 900167    | 192 Series Dial Height Gage<br>(192-201)  |
| 900390    | 514 Series Vernier Height Gage<br>(514-170)   |

#### Inch

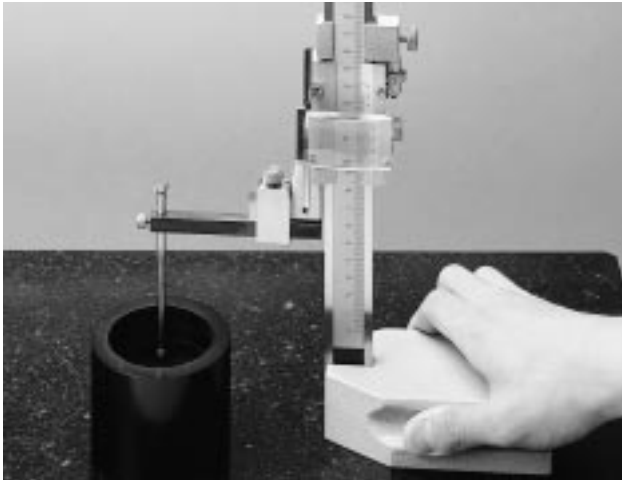
| Order No. | Height gages to be fitted  |
|-----------|--|
| 900173    | 570 Series Digimatic Height Gages<br>(570-202, 570-212)<br>506 Series Vernier Height Gages<br>(506-201, 506-202, 506-204, 506-205, 506-207, 506-208)<br>509 Series Vernier Height Gages<br>(509-301, 509-302, 509-313, 509-314)  |
| 900258    | 192 Series Digimatic Height Gages<br>(192-630, 192-631, 192-632, 192-633)<br>570 Series Digimatic Height Gages<br>(570-245, 570-246, 570-247)<br>192 Series Dial Height Gages<br>(192-140, 192-141, 192-142, 192-143)<br>574 Series Heightmatic<br>(574-212-1, 574-211-1, 574-210-1) |
| 905201    | 192 Series Digimatic Height Gages<br>(192-670, 192-671, 192-672, 192-673)<br>570 Series Digimatic Height Gages<br>(570-248)  |





# Accessories for Height Gages

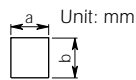
## Depth Gage Attachment



### FEATURES

- Attached to a height gage to measure groove and hole depth.
- Minimum hole diameter: 5.5mm
- Maximum distance from the bottom of the holding bar to the contact point: 80mm (900764) or 2.95" (900878)
- Contact points for dial indicators can be used.

#### Dimensions of Holding Bar



| Order No. | a    | b    |
|-----------|------|------|
| 900764    | 9    | 9    |
| 900878    | 6.35 | 12.7 |

### SPECIFICATIONS

| Order No. | Remarks                                    |
|-----------|--|
| 900764    | with Metric (Metric/Inch) type holding bar |
| 900878    | with Inch (Inch/Metric) type holding bar   |

## Contact Sensor



### FEATURES

- The Contact Sensor eliminates errors caused by jacking-up the height gage while taking measurements. When the scribe of a height gage touches a conductive workpiece, an indicator will light up to indicate that measurement can be taken, which will result in consistent height measurements.
- Incorporates magnets for easy attachment.
- Measurements should be taken on a granite surface plate or other non-conductive surface.

### SPECIFICATIONS

| Order No. | Remarks                          |
|-----------|----------------------------------|
| 900872    | Two MR44 batteries are optional. |

## Center Probe



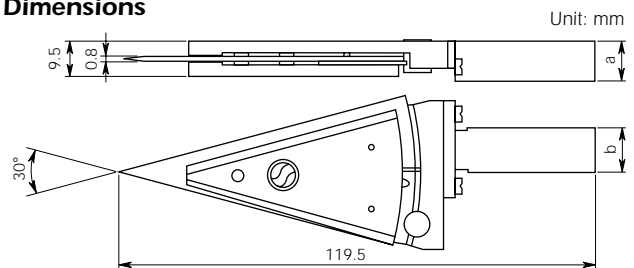
### FEATURES

- Allows quick measurement of center-to-center distance between holes.
- Measurable hole diameters: 1mm to 38mm

### SPECIFICATIONS

| Order No. | Remarks                                    |
|-----------|--|
| 951144    | with Metric (Metric/Inch) type holding bar |
| 900581    | with Inch (Inch/Metric) type holding bar   |

### Dimensions



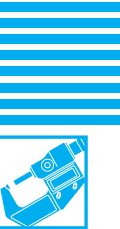
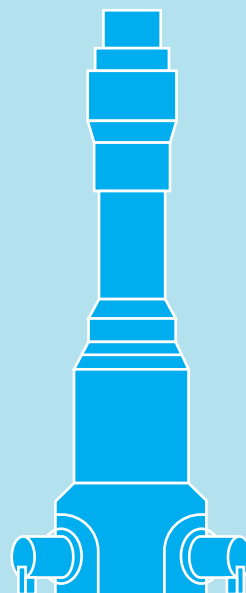
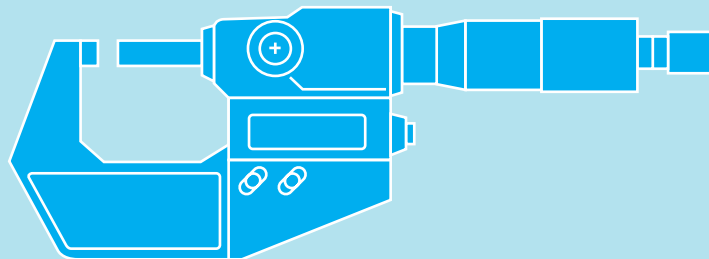
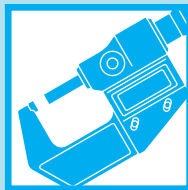
| Order No. | a    | b    |
|-----------|------|------|
| 951144    | 9    | 9    |
| 900581    | 6.35 | 12.7 |



Micrometers Pages 82 — 125

Inside Micrometers Pages 126 — 141

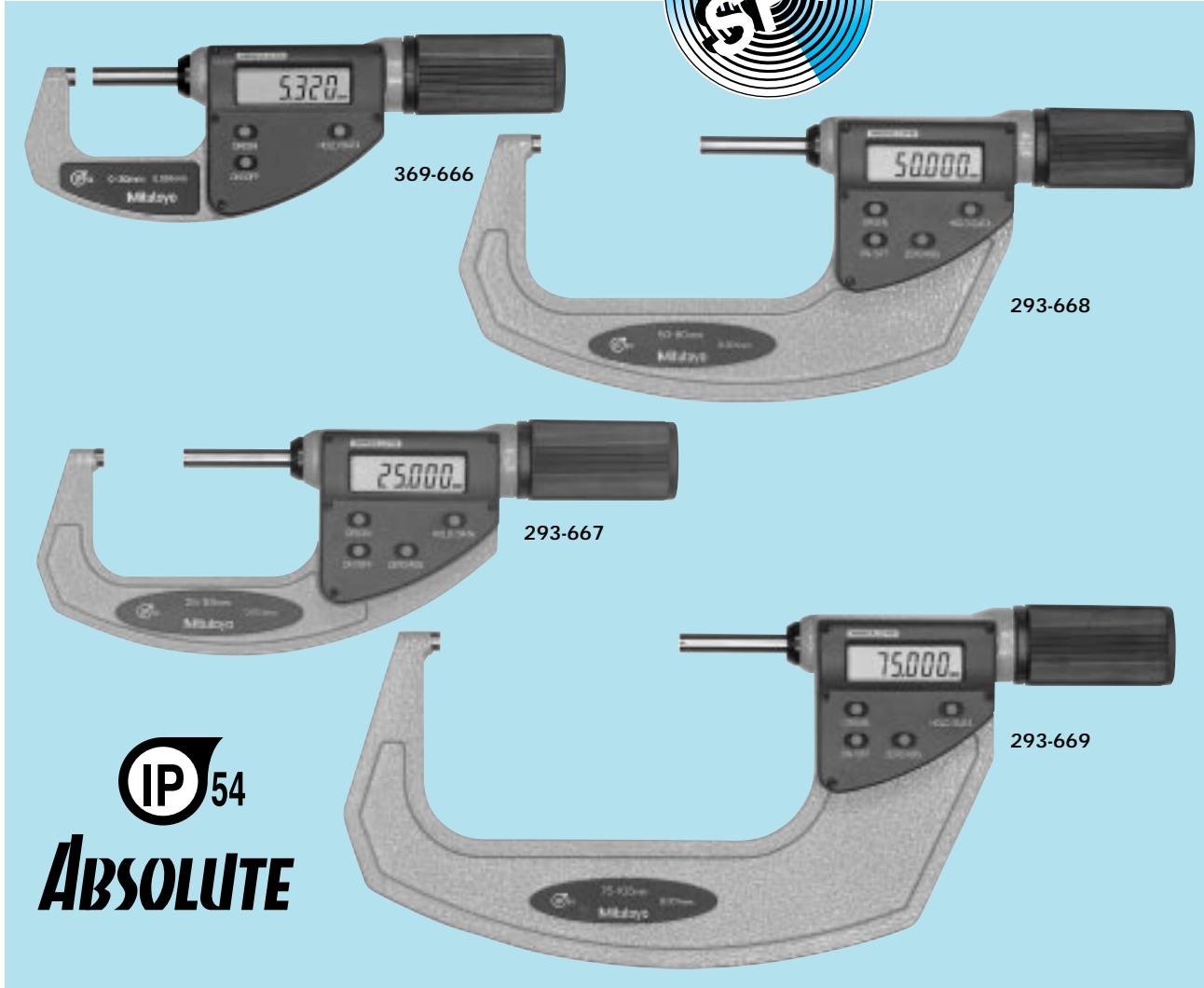
Micrometer Heads Pages 142 — 159



# Quickmike

SERIES 293, 369, 422

IP-54 Water Resistant Digimatic Micrometers



The Quickmake provides a speedy spindle feed of 10mm per thimble rotation as compared to the conventional micrometer with 0.5mm per rotation. Its wide 30mm measuring range allows various workpieces with different shapes to be measured quickly.

## SPECIFICATION

### Quickmike Metric

| Range      | Order No.   | Resolution | Accuracy | Mass |
|------------|-------------|------------|----------|------|
| 0 - 30mm   | 293-666     | 0.001mm    | ±2µm     | 275g |
|            | 293-661-10* | 0.001mm    | ±2µm     | 275g |
| 25 - 55mm  | 293-667     | 0.001mm    | ±2µm     | 355g |
| 50 - 80mm  | 293-668     | 0.001mm    | ±3µm     | 525g |
| 75 - 105mm | 293-669     | 0.001mm    | ±3µm     | 625g |

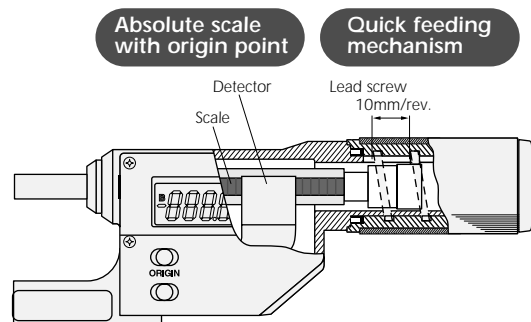
\*Without SPC data output

### Inch/Metric

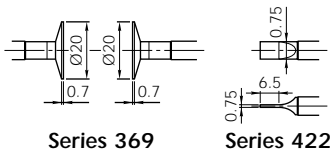
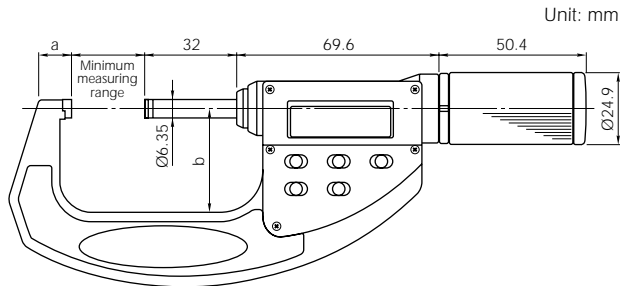
| Range     | Order No. | Resolution      | Accuracy | Mass      |
|-----------|-----------|-----------------|----------|-----------|
| 0 - 1.2"  | 293-676   | .00005"/0.001mm | ±.00008" | .61 lbs.  |
| 1" - 2.2" | 293-677   | .00005"/0.001mm | ±.00008" | .78 lbs.  |
| 2" - 3.2" | 293-678   | .00005"/0.001mm | ±.00012" | 1.16 lbs. |
| 3" - 4.2" | 293-679   | .00005"/0.001mm | ±.00012" | 1.38 lbs. |

## FEATURES

- Large LCD digits of 7.5mm height for error-free reading.
- Non-rotating spindle and the new ratchet friction thimble.
- With absolute linear scale.
- The IP54 level water resistance protection (when not connected with data output cable).
- Stainless steel spindle.
- With SPC data output.
- With a standard bar to set the origin point (for models with a range over 30mm).



## Dimensions



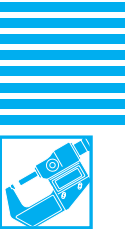
| Range      | a    | b  |
|------------|------|----|
| 0 - 30mm   | 9    | 25 |
| 25 - 55mm  | 11.3 | 36 |
| 50 - 80mm  | 13.1 | 47 |
| 75 - 105mm | 13.5 | 60 |

## Technical Data

**Display:** LCD  
**Functions:** Origin-Set, Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output\*, data hold  
 \*Not provided for **293-661-10** model  
**Battery:** SR44 (1 pc.) (**938882**)  
**Battery life:** Approx. 3 years (**293-666**, **293-661-10** and **293-676**)/Approx. 1 year  
**Measuring force:** 5 - 10N (500 - 1000gf)  
**Measuring faces:** Carbide-tipped (293 series only)  
**Alarm:** Low battery voltage, scale contamination  
**Dust/Water protection level:** Conforming to IP54

## OPTIONAL ACCESSORIES

| Order No. | Description    |
|-----------|----------------|
| 937387    | SPC cable (1m) |
| 965013    | SPC cable (2m) |



## Disk Quickmike

### Metric

| Range     | Order No. | Resolution | Accuracy | Mass |
|-----------|-----------|------------|----------|------|
| 0 - 30mm  | 369-411   | 0.001mm    | ±4µm     | 360g |
| 25 - 55mm | 369-412   | 0.001mm    | ±4µm     | 490g |

### Inch/Metric

| Range     | Order No. | Resolution      | Accuracy | Mass      |
|-----------|-----------|-----------------|----------|-----------|
| 0 - 1.2"  | 369-421   | .00005"/0.001mm | ±.00012" | .79 lbs.  |
| 1" - 2.2" | 369-422   | .00005"/0.001mm | ±.00012" | 1.08 lbs. |



## Blade Quickmike

### Metric

| Range     | Order No. | Resolution | Accuracy | Mass |
|-----------|-----------|------------|----------|------|
| 0 - 30mm  | 422-411   | 0.001mm    | ±3µm     | 350g |
| 25 - 55mm | 422-412   | 0.001mm    | ±3µm     | 490g |

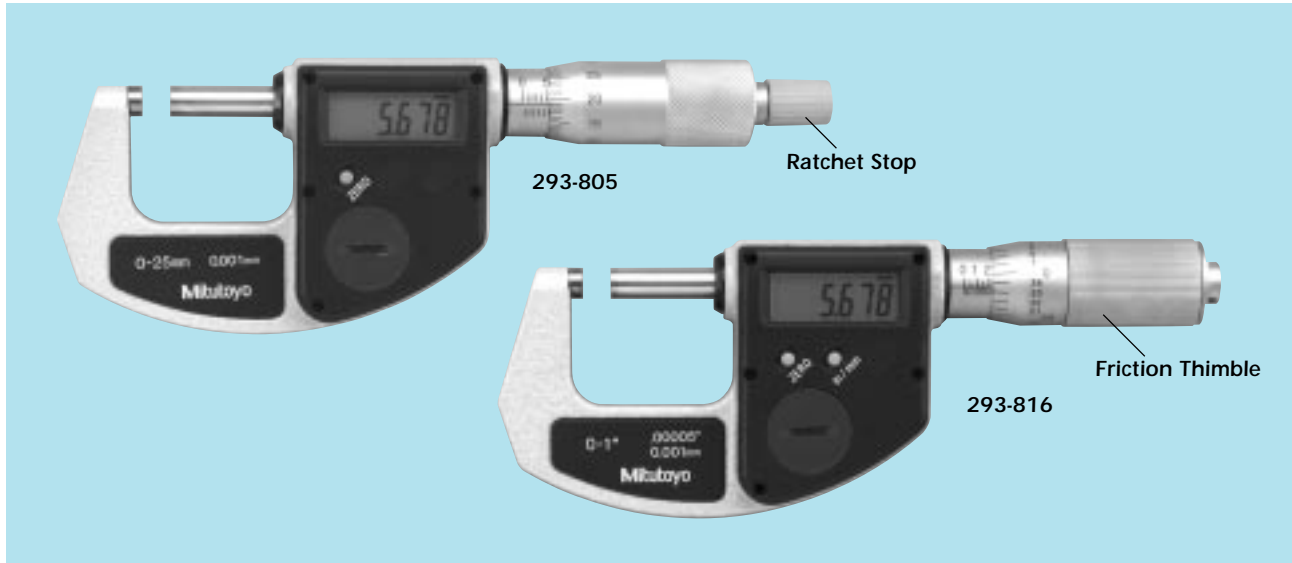
### Inch/Metric

| Range     | Order No. | Resolution      | Accuracy | Mass      |
|-----------|-----------|-----------------|----------|-----------|
| 0 - 1.2"  | 422-421   | .00005"/0.001mm | ±.00012" | .77 lbs.  |
| 1" - 2.2" | 422-422   | .00005"/0.001mm | ±.00012" | 1.08 lbs. |

Series 293

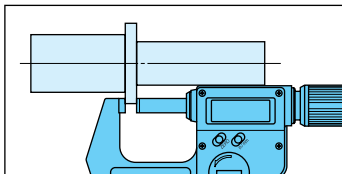
# Digimatic Micrometers

## SERIES 293

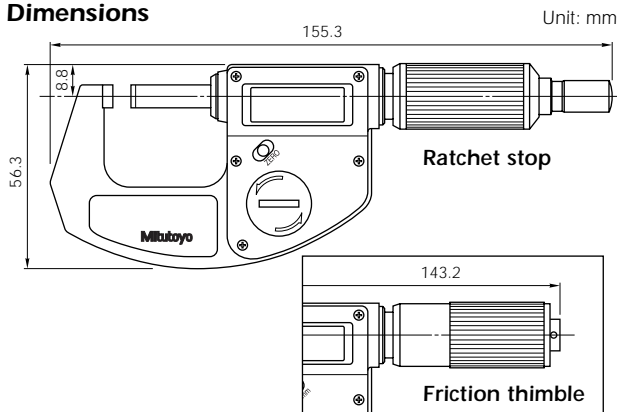


### FEATURES

- The world's lightest digital micrometer 215g in mass.
- Simply measures 0 through 25mm (1") with resolution to 0.001mm.
- Measuring faces carbide tipped.
- Provided only with a zero-set key for easy origin setting. (No spindle clamp, no data output, no auto-sleep function)
- A ratchet stop or friction thimble for a constant measuring force.
- Measurement readout with large characters on the LCD screen.
- Battery: SR44 (938882) x 1pc. for 1.2 years
- Slim construction for easy access to the stepped feature like the one shown.



### Dimensions



### SPECIFICATIONS

#### Digimatic Micrometers with Ratchet Stop

##### Metric

| Range    | Order No. | Resolution | Accuracy | Mass |
|----------|-----------|------------|----------|------|
| 0 - 25mm | 293-805   | 0.001mm    | ±2µm     | 215g |

##### Inch / Metric

| Range  | Order No. | Resolution      | Accuracy | Mass     |
|--------|-----------|-----------------|----------|----------|
| 0 - 1" | 293-815   | .00005"/0.001mm | ±.0001"  | .47 lbs. |

#### Digimatic Micrometers with Friction Thimble

##### Inch / Metric

| Range  | Order No. | Resolution      | Accuracy | Mass     |
|--------|-----------|-----------------|----------|----------|
| 0 - 1" | 293-816   | .00005"/0.001mm | ±.0001"  | .47 lbs. |

## Digimatic Micrometers

### SERIES 227

with constant & adjustable fine-loading device



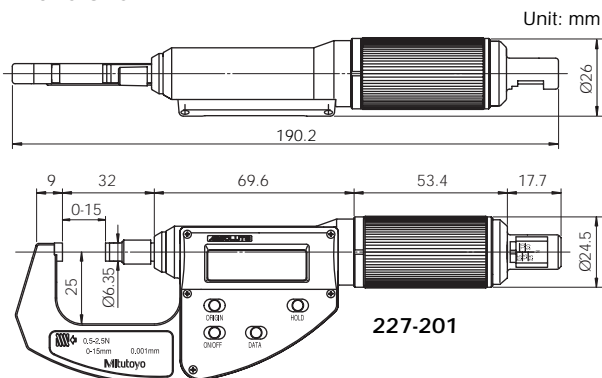
### FEATURES

- Constant and low measuring force mechanism in the thimble.
- Adjustable measuring force\* accommodates various kind of work materials. \*0.5-2.5N or 2-10N



- The measurement-value hold function automatically retains the data at a specified measuring force, ensuring accuracy.
- Large LCD digits of 7.5mm height for error-free reading.
- Non-rotating spindle and the new ratchet friction thimble.
- Speedy spindle feed of 10 mm/.4".
- With absolute linear scale.
- The IP54 level water resistance protection (when not connected with data output cable).
- With SPC data output.
- With a standard bar to set the origin point (for models with 15 - 30mm range).

### Dimensions



Plastic pipe



Rubber sheet

### SPECIFICATION

#### Digimatic Micrometers

##### Metric

| Range     | Order No. | Resolution | Accuracy | Measuring force |
|-----------|-----------|------------|----------|-----------------|
| 0 - 15mm  | 227-201   | 0.001mm    | ±2µm     | 0.5N - 2.5N     |
|           | 227-202   | 0.001mm    | ±2µm     | 2N - 10N        |
| 15 - 30mm | 227-203   | 0.001mm    | ±2µm     | 0.5N - 2.5N     |
|           | 227-204   | 0.001mm    | ±2µm     | 2N - 10N        |

##### Inch / Metric

| Range      | Order No. | Resolution      | Accuracy | Measuring force |
|------------|-----------|-----------------|----------|-----------------|
| 0 - .6"    | 227-211   | .00005"/0.001mm | ±.0001"  | 0.5N - 2.5N     |
|            | 227-212   | .00005"/0.001mm | ±.0001"  | 2N - 10N        |
| .6" - 1.2" | 227-213   | .00005"/0.001mm | ±.0001"  | 0.5N - 2.5N     |
|            | 227-214   | .00005"/0.001mm | ±.0001"  | 2N - 10N        |

#### Digimatic Micrometers (disk type)

##### Metric

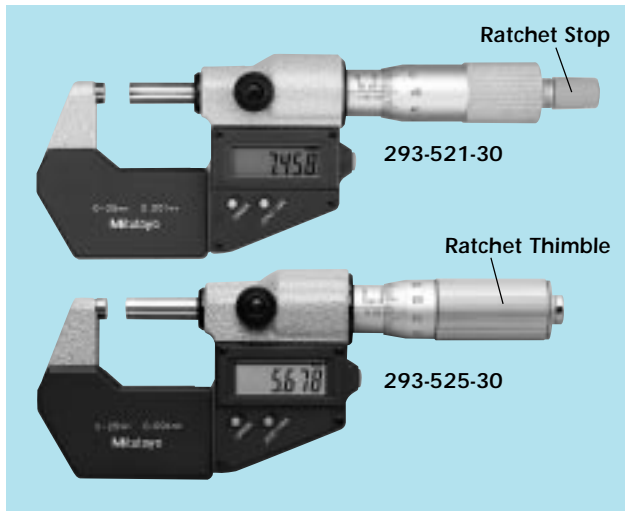
| Range    | Order No. | Resolution | Accuracy | Measuring force |
|----------|-----------|------------|----------|-----------------|
| 0 - 15mm | 227-221   | 0.001mm    | ±4µm     | 0.5N - 2.5N     |
|          | 227-222   | 0.001mm    | ±4µm     | 2N - 10N        |

##### Inch / Metric

| Range   | Order No. | Resolution      | Accuracy | Measuring force |
|---------|-----------|-----------------|----------|-----------------|
| 0 - .6" | 227-231   | .00005"/0.001mm | ±.0002"  | 0.5N - 2.5N     |
|         | 227-232   | .00005"/0.001mm | ±.0002"  | 2N - 10N        |

# Digimatic Micrometers

## SERIES 293



### FEATURES

- Extra large LCD readout with 0.001mm resolution.
- With SPC output.
- Lightweight design allows measurements to be taken with the micrometer held in one hand.
- Two measuring modes — Absolute and Incremental for efficient measurement.
- Functions available: Origin setting, Inch/mm selection, Zero-setting, Data hold, Error alarm, Data output.
- Two types of constant-force devices are available: Ratchet Stop and Ratchet Thimble.
- Carbide-tipped measuring faces.
- Battery: SR44 (938882) x 1pc. for models up to 275 - 300mm range.  
SR44 x 2pcs. for models of 300 - 325mm range and above.
- Micrometers of ranges up to 100mm are "One-touch preset type", whereas those of ranges exceeding 100mm are "All-digit preset type". (A standard is supplied for each micrometer to set the origin, excepting 0 - 25mm (0 - 1") model.)
- Provided with a standard except for 25mm (1") model.

#### For One-touch preset type

- Origin setting function (Absolute mode): The origin point value can be displayed with a touch of the ORIGIN button.
- Zero setting function (Incremental mode): The display can be set to zero at any spindle position with a touch of the ZERO/ABS button. Another touching the button allows the display returning to a value from the origin (in Absolute mode).

#### For All-digit preset type

- The origin setting function (Absolute mode): The origin point value can be set by presetting each of the digits.
- Zero setting function (Incremental mode)



### SPECIFICATIONS

#### Digimatic Micrometers with Ratchet Stop

| Metric      |             |            |          |
|-------------|-------------|------------|----------|
| Range       | Order No.   | Resolution | Accuracy |
| 0 - 25mm    | 293-521-30  | 0.001mm    | ±1µm     |
|             | 293-561-30* | 0.001mm    | ±1µm     |
| 25 - 50mm   | 293-522-30  | 0.001mm    | ±1µm     |
|             | 293-562-30* | 0.001mm    | ±1µm     |
| 50 - 75mm   | 293-523-30  | 0.001mm    | ±1µm     |
|             | 293-563-30* | 0.001mm    | ±1µm     |
| 75 - 100mm  | 293-524-30  | 0.001mm    | ±2µm     |
|             | 293-564-30* | 0.001mm    | ±2µm     |
| 100 - 125mm | 293-551-30  | 0.001mm    | ±2µm     |
| 125 - 150mm | 293-552-30  | 0.001mm    | ±2µm     |
| 150 - 175mm | 293-553-30  | 0.001mm    | ±3µm     |
| 175 - 200mm | 293-554-30  | 0.001mm    | ±3µm     |
| 200 - 225mm | 293-555-30  | 0.001mm    | ±3µm     |
| 225 - 250mm | 293-556-30  | 0.001mm    | ±4µm     |
| 250 - 275mm | 293-557-30  | 0.001mm    | ±4µm     |
| 275 - 300mm | 293-558-30  | 0.001mm    | ±4µm     |
| 300 - 325mm | 293-571     | 0.001mm    | ±6µm     |
| 325 - 350mm | 293-572     | 0.001mm    | ±6µm     |
| 350 - 375mm | 293-573     | 0.001mm    | ±6µm     |
| 375 - 400mm | 293-574     | 0.001mm    | ±7µm     |
| 400 - 425mm | 293-575     | 0.001mm    | ±7µm     |
| 425 - 450mm | 293-576     | 0.001mm    | ±7µm     |
| 450 - 475mm | 293-577     | 0.001mm    | ±8µm     |
| 475 - 500mm | 293-578     | 0.001mm    | ±8µm     |

\*without SPC output

#### Inch / Metric

| Range     | Order No.   | Resolution      | Accuracy |
|-----------|-------------|-----------------|----------|
| 0 - 1"    | 293-721-30  | .00005"/0.001mm | ±.00005" |
|           | 293-761-30* | .00005"/0.001mm | ±.00005" |
| 1" - 2"   | 293-722-30  | .00005"/0.001mm | ±.00005" |
|           | 293-762-30* | .00005"/0.001mm | ±.00005" |
| 2" - 3"   | 293-723-30  | .00005"/0.001mm | ±.00005" |
|           | 293-763-30* | .00005"/0.001mm | ±.00005" |
| 3" - 4"   | 293-724-30  | .00005"/0.001mm | ±.0001"  |
|           | 293-764-30* | .00005"/0.001mm | ±.0001"  |
| 4" - 5"   | 293-751-30  | .0001"/0.001mm  | ±.0001"  |
| 5" - 6"   | 293-752-30  | .0001"/0.001mm  | ±.0001"  |
| 6" - 7"   | 293-753-30  | .0001"/0.001mm  | ±.00015" |
| 7" - 8"   | 293-754-30  | .0001"/0.001mm  | ±.00015" |
| 8" - 9"   | 293-755-30  | .0001"/0.001mm  | ±.00015" |
| 9" - 10"  | 293-756-30  | .0001"/0.001mm  | ±.0002"  |
| 10" - 11" | 293-757-30  | .0001"/0.001mm  | ±.0002"  |
| 11" - 12" | 293-758-30  | .0001"/0.001mm  | ±.0002"  |
| 12" - 13" | 293-771     | .0001"/0.001mm  | ±.0003"  |
| 13" - 14" | 293-772     | .0001"/0.001mm  | ±.0003"  |
| 14" - 15" | 293-773     | .0001"/0.001mm  | ±.0003"  |
| 15" - 16" | 293-774     | .0001"/0.001mm  | ±.00035" |
| 16" - 17" | 293-775     | .0001"/0.001mm  | ±.00035" |
| 17" - 18" | 293-776     | .0001"/0.001mm  | ±.00035" |
| 18" - 19" | 293-777     | .0001"/0.001mm  | ±.0004"  |
| 19" - 20" | 293-778     | .0001"/0.001mm  | ±.0004"  |

\*without SPC output

## Digimatic Micrometers with Ratchet Thimble

### Metric

| Range      | Order No.   | Resolution | Accuracy |
|------------|-------------|------------|----------|
| 0 - 25mm   | 293-525-30  | 0.001mm    | ±1μm     |
|            | 293-565-30* | 0.001mm    | ±1μm     |
| 25 - 50mm  | 293-526-30  | 0.001mm    | ±1μm     |
|            | 293-567-30* | 0.001mm    | ±1μm     |
| 50 - 75mm  | 293-527-30  | 0.001mm    | ±1μm     |
| 75 - 100mm | 293-528-30  | 0.001mm    | ±2μm     |

\*without SPC output

### Inch/Metric

| Range   | Order No.   | Resolution      | Accuracy |
|---------|-------------|-----------------|----------|
| 0 - 1"  | 293-795-30  | .00005"/0.001mm | ±.00005" |
|         | 293-766-30* | .00005"/0.001mm | ±.00005" |
| 1" - 2" | 293-796-30  | .00005"/0.001mm | ±.00005" |
|         | 293-767-30* | .00005"/0.001mm | ±.00005" |

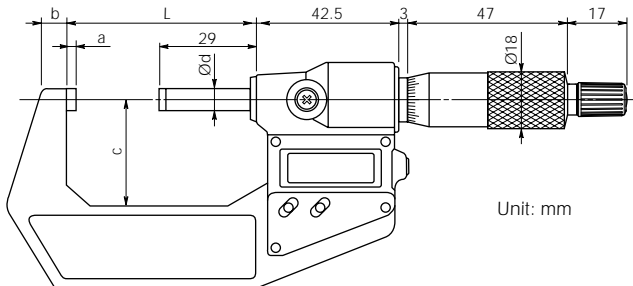
\*without SPC output

## Measuring faces

- Flatness: 0.3μm (.000012")
- Parallelism: 1μm (.00004") for models up to 50mm (2")  
2μm (.00008") for models up to 100mm (4")  
(2+L/100)μm [(0.00008+.00004 (L/4))"]  
for models over 100mm (4")\*

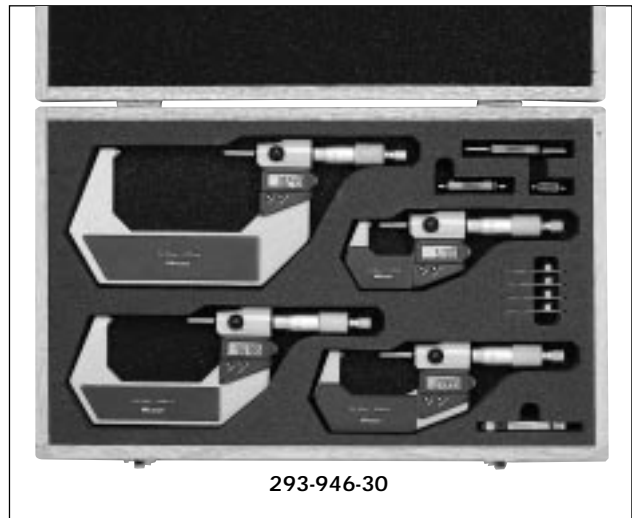
\*L=Maximum measuring length (mm) [(inch)], Fraction rounded down

## Dimensions



| Range       | L     | a   | b  | c   | d    |
|-------------|-------|-----|----|-----|------|
| 0 - 25mm    | 31.8  | 2.8 | 7  | 23  | 6.35 |
| 25 - 50mm   | 56.8  | 2.8 | 7  | 30  | 6.35 |
| 50 - 75mm   | 81.8  | 2.8 | 10 | 47  | 6.35 |
| 75 - 100mm  | 106.8 | 2.8 | 11 | 60  | 6.35 |
| 100 - 125mm | 134.3 | 5.3 | 18 | 90  | 6.35 |
| 125 - 150mm | 158.2 | 5.7 | 19 | 94  | 6.35 |
| 150 - 175mm | 183.6 | 6.1 | 19 | 106 | 6.35 |
| 175 - 200mm | 208.8 | 6.3 | 18 | 118 | 6.35 |
| 200 - 225mm | 234.2 | 6.7 | 17 | 130 | 6.35 |
| 225 - 250mm | 258   | 5.5 | 18 | 143 | 6.35 |
| 250 - 275mm | 284   | 6.5 | 18 | 156 | 6.35 |
| 275 - 300mm | 309   | 6.5 | 18 | 169 | 6.35 |
| 300 - 325mm | 353   | 18  | 28 | 187 | 8    |
| 325 - 350mm | 378   | 18  | 28 | 199 | 8    |
| 350 - 375mm | 403   | 18  | 28 | 212 | 8    |
| 375 - 400mm | 428   | 18  | 28 | 224 | 8    |
| 400 - 425mm | 453   | 18  | 28 | 236 | 8    |
| 425 - 450mm | 478   | 18  | 28 | 248 | 8    |
| 450 - 475mm | 503   | 18  | 28 | 261 | 8    |
| 475 - 500mm | 528   | 18  | 28 | 273 | 8    |

Note: The shape of the frame changes from measuring range 100 - 125mm and above.



## Digimatic Micrometer Sets

### Metric

| Range                      | Order No.  | Assortment of micrometers   |
|----------------------------|------------|---|
| 0 - 50mm<br>(2 Mikes/set)  | 293-953-30 | • 293-521-30,<br>293-522-30<br>• 25mm CERA Block                                      |
| 0 - 75mm<br>(3 Mikes/set)  | 293-945-30 | • 293-521-30,<br>293-522-30,<br>293-523-30<br>• 2 micrometer standards                |
| 0 - 100mm<br>(4 Mikes/set) | 293-946-30 | • 293-521-30,<br>293-522-30,<br>293-523-30,<br>293-524-30<br>• 3 micrometer standards |

### Inch/Metric

| Range                   | Order No.  | Assortment of micrometers  |
|-------------------------|------------|--|
| 0 - 3"<br>(3 Mikes/set) | 293-933-30 | • 293-721-30<br>293-722-30<br>293-723-30<br>• 2 micrometer standards               |
| 0 - 4"<br>(4 Mikes/set) | 293-934-30 | • 293-721-30<br>293-722-30<br>293-723-30<br>293-724-30<br>• 3 micrometer standards |

## OPTIONAL ACCESSORIES

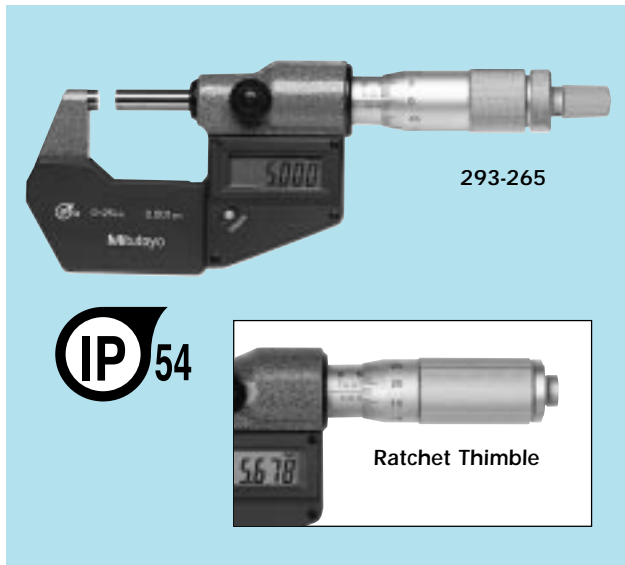
| Order No.       | Description                                       |
|-----------------|---|
| 937387          | SPC cable (1m)                                    |
| 965013          | SPC cable (2m)                                    |
| (See page 120.) | <b>Micrometer Stands</b>                          |
| (See page 263.) | <b>Gauge Block Sets for micrometer inspection</b> |





# Water-Resistant Digimatic Micrometers

## SERIES 293



**IP 54**

Ratchet Thimble

This is the world's first electronic micrometer to provide water resistance protection against direct coolant splash.

### FEATURES

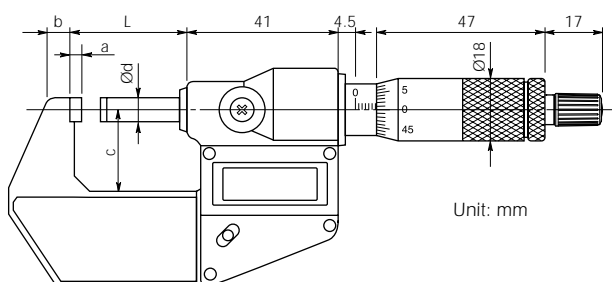
- IP-54 level water resistance protection.
- Extra large LCD readout with 0.001mm resolution.
- Carbide-tipped measuring faces.
- Battery: SR44 (938882) x 1pc. for 1.2 years
- Provided with a standard except for 25mm (1") model.

### IP-54 Protection Requirements:

- Water splash from any direction against the equipment must not adversely affect its operation.
- Dust must not penetrate to the extent that it adversely affects equipment operation.



### Dimensions



### SPECIFICATIONS

#### Digimatic Micrometers with Ratchet Stop

##### Metric

| Range      | Order No. | Resolution | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 293-265   | 0.001mm    | ±1µm     |
| 25 - 50mm  | 293-266   | 0.001mm    | ±1µm     |
| 50 - 75mm  | 293-267   | 0.001mm    | ±1µm     |
| 75 - 100mm | 293-268   | 0.001mm    | ±2µm     |

##### Inch / Metric

| Range   | Order No. | Resolution      | Accuracy |
|---------|-----------|-----------------|----------|
| 0 - 1"  | 293-365   | .00005"/0.001mm | ±.00005" |
| 1" - 2" | 293-366   | .00005"/0.001mm | ±.00005" |
| 2" - 3" | 293-367   | .00005"/0.001mm | ±.00005" |
| 3" - 4" | 293-368   | .00005"/0.001mm | ±.0001"  |

#### Digimatic Micrometers with Ratchet Thimble

##### Metric

| Range      | Order No. | Resolution | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 293-269   | 0.001mm    | ±1µm     |
| 25 - 50mm  | 293-270   | 0.001mm    | ±1µm     |
| 50 - 75mm  | 293-271   | 0.001mm    | ±1µm     |
| 75 - 100mm | 293-272   | 0.001mm    | ±2µm     |

##### Inch / Metric

| Range   | Order No. | Resolution      | Accuracy |
|---------|-----------|-----------------|----------|
| 0 - 1"  | 293-369   | .00005"/0.001mm | ±.00005" |
| 1" - 2" | 293-370   | .00005"/0.001mm | ±.00005" |
| 2" - 3" | 293-371   | .00005"/0.001mm | ±.00005" |
| 3" - 4" | 293-372   | .00005"/0.001mm | ±.0001"  |

#### Digimatic Micrometers with Friction Thimble

##### Metric

| Range      | Order No. | Resolution | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 293-273   | 0.001mm    | ±1µm     |
| 25 - 50mm  | 293-274   | 0.001mm    | ±1µm     |
| 50 - 75mm  | 293-275   | 0.001mm    | ±1µm     |
| 75 - 100mm | 293-276   | 0.001mm    | ±2µm     |

##### Inch / Metric

| Range   | Order No. | Resolution      | Accuracy |
|---------|-----------|-----------------|----------|
| 0 - 1"  | 293-373   | .00005"/0.001mm | ±.00005" |
| 1" - 2" | 293-374   | .00005"/0.001mm | ±.00005" |
| 2" - 3" | 293-375   | .00005"/0.001mm | ±.00005" |
| 3" - 4" | 293-376   | .00005"/0.001mm | ±.0001"  |

### Measuring faces

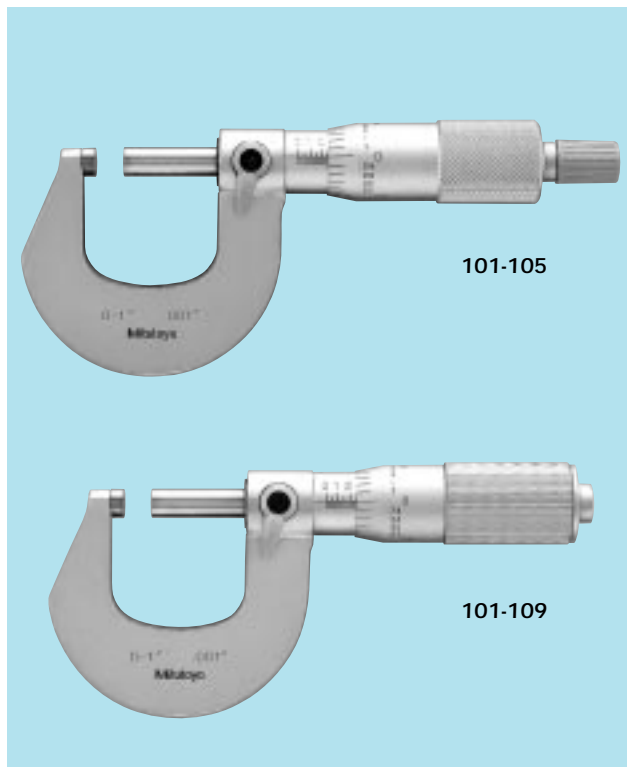
- Flatness: 0.3µm (.000012")
- Parallelism: 1µm (.00004") for models up to 50mm (2")  
2µm (.00008") for models up to 100mm (4")

| Range      | L     | a   | b  | c  | d    |
|------------|-------|-----|----|----|------|
| 0 - 25mm   | 31.8  | 2.8 | 7  | 23 | 6.35 |
| 25 - 50mm  | 56.8  | 2.8 | 7  | 30 | 6.35 |
| 50 - 75mm  | 81.8  | 2.8 | 10 | 47 | 6.35 |
| 75 - 100mm | 106.8 | 2.8 | 11 | 60 | 6.35 |

Note: The shape of the thimble changes on the model with Ratchet Thimble or Friction Thimble.

## Outside Micrometers

### SERIES 101

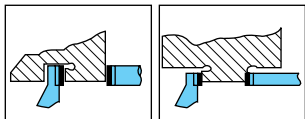


101-105

101-109

### FEATURES

- Satin-chrome-finished frame, tapered (on the anvil side) for hard-to-reach places.



- Carbide-tipped measuring faces.
- Designed to be operated efficiently with one hand.
- Provided with a standard except for 1" model.

### SPECIFICATIONS

#### Outside Micrometers with Ratchet Stop

##### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - .5" | 101-230   | .0001"     | ±.0001"  |
| 0 - 1"  | 101-105   | .001"      | ±.0001"  |
|         | 101-113   | .0001"     | ±.0001"  |
| 1" - 2" | 101-106   | .001"      | ±.0001"  |
|         | 101-114   | .0001"     | ±.0001"  |
| 2" - 3" | 101-119   | .0001"     | ±.0001"  |
| 3" - 4" | 101-120   | .0001"     | ±.00015" |

Note: .0001" reading is obtained with vernier.

#### Outside Micrometers with Friction Thimble

##### Inch

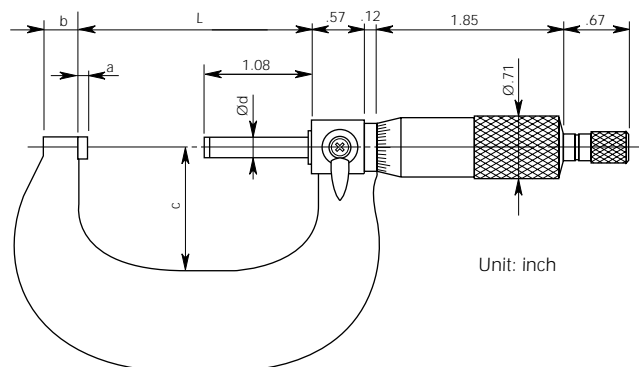
| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 101-109   | .001"      | ±.0001"  |
|         | 101-117   | .0001"     | ±.0001"  |
| 1" - 2" | 101-110   | .001"      | ±.0001"  |
|         | 101-118   | .0001"     | ±.0001"  |

Note: .0001" reading is obtained with vernier.

### Measuring faces

- Flatness: .000024"
- Parallelism: .00005" for .5" model  
.00008" for models up to 3"  
.00012" for 3" - 4" model

### Dimensions



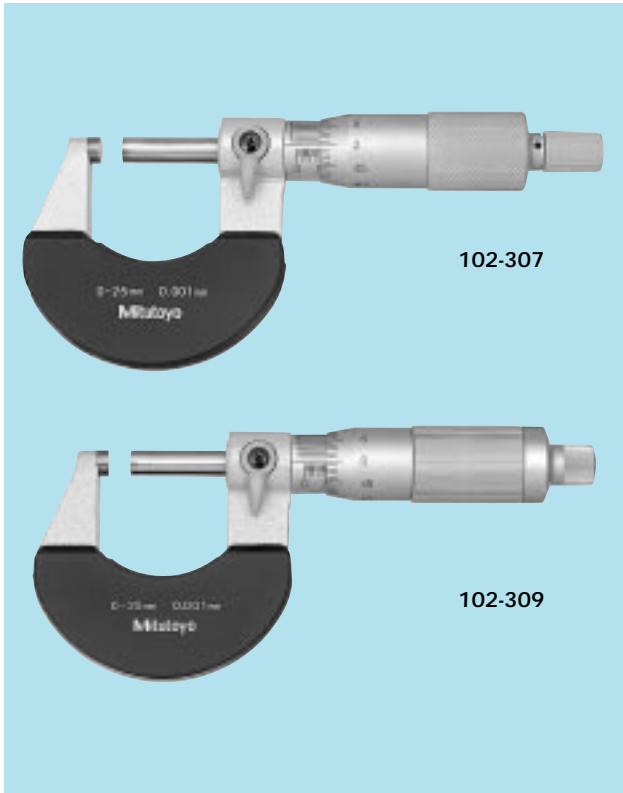
| Range  | L    | a   | b   | c    | d   |
|--------|------|-----|-----|------|-----|
| 1 - 1" | 1.19 | .11 | .20 | 1.10 | .25 |
| 1 - 2" | 2.18 | .11 | .30 | 1.28 | .25 |
| 2 - 3" | 3.16 | .11 | .37 | 1.77 | .25 |
| 3 - 4" | 4.15 | .11 | .38 | 2.28 | .25 |

Note: The shape of the thimble changes on the model with Friction Thimble.



# Outside Micrometers

## SERIES 102



### Outside Micrometers with Friction Thimble

#### Metric

| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 0 - 25mm  | 102-305   | 0.01mm     | ±2µm     |
|           | 102-309   | 0.001mm    | ±2µm     |
| 25 - 50mm | 102-306   | 0.01mm     | ±2µm     |

#### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 102-325   | .001"      | ±.0001"  |
|         | 102-329   | .0001"     | ±.0001"  |
| 1" - 2" | 102-326   | .001"      | ±.0001"  |
|         | 102-330   | .0001"     | ±.0001"  |

Note: 0.001mm (.0001") reading is obtained with vernier.

### Measuring faces

- Flatness:
  - 0.6µm (.000024") for models of 0.01mm (.001") reading
  - 0.3µm (.000012") for models of 0.001mm (.0001") reading
- Parallelism:
  - 1µm (.00004") for 25mm (1") model
  - 2µm (.00008") for models up to 100mm (4")

### Outside Micrometer Set

#### Metric

| Range                      | Order No. | Assortment of micrometers  |
|----------------------------|-----------|--|
| 0 - 100mm<br>(4 Mikes/set) | 102-911   | <ul style="list-style-type: none"> <li>102-301</li> <li>102-302</li> <li>102-303</li> <li>102-304</li> </ul> |
|                            |           | <ul style="list-style-type: none"> <li>3 micrometer standards</li> </ul>                                     |

### FEATURES

- Heat-insulated frame, tapered (on the anvil side) for hard-to-reach places.
- Carbide-tipped measuring faces.
- Provided with a standard except for 25mm (1") model.

### SPECIFICATIONS

#### Outside Micrometers with Ratchet Stop

##### Metric

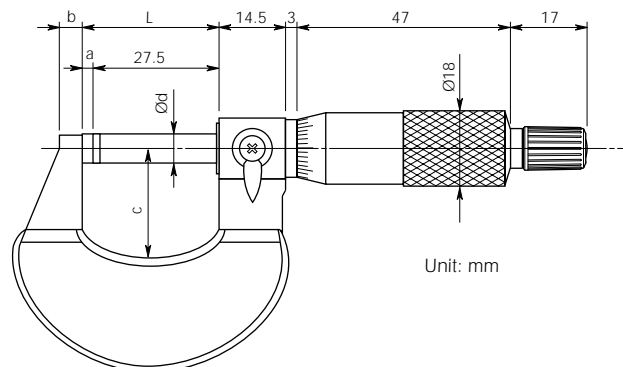
| Range      | Order No. | Graduation | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 102-301   | 0.01mm     | ±2µm     |
|            | 102-307   | 0.001mm    | ±2µm     |
| 25 - 50mm  | 102-302   | 0.01mm     | ±2µm     |
|            | 102-308   | 0.001mm    | ±2µm     |
| 50 - 75mm  | 102-303   | 0.01mm     | ±2µm     |
| 75 - 100mm | 102-304   | 0.01mm     | ±3µm     |

##### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 102-321   | .001"      | ±.0001"  |
|         | 102-327   | .0001"     | ±.0001"  |
| 1" - 2" | 102-322   | .001"      | ±.0001"  |
|         | 102-328   | .0001"     | ±.0001"  |
| 2" - 3" | 102-323   | .001"      | ±.0001"  |
| 3" - 4" | 102-324   | .001"      | ±.00015" |

Note: 0.001mm (.0001") reading is obtained with vernier.

### Dimensions

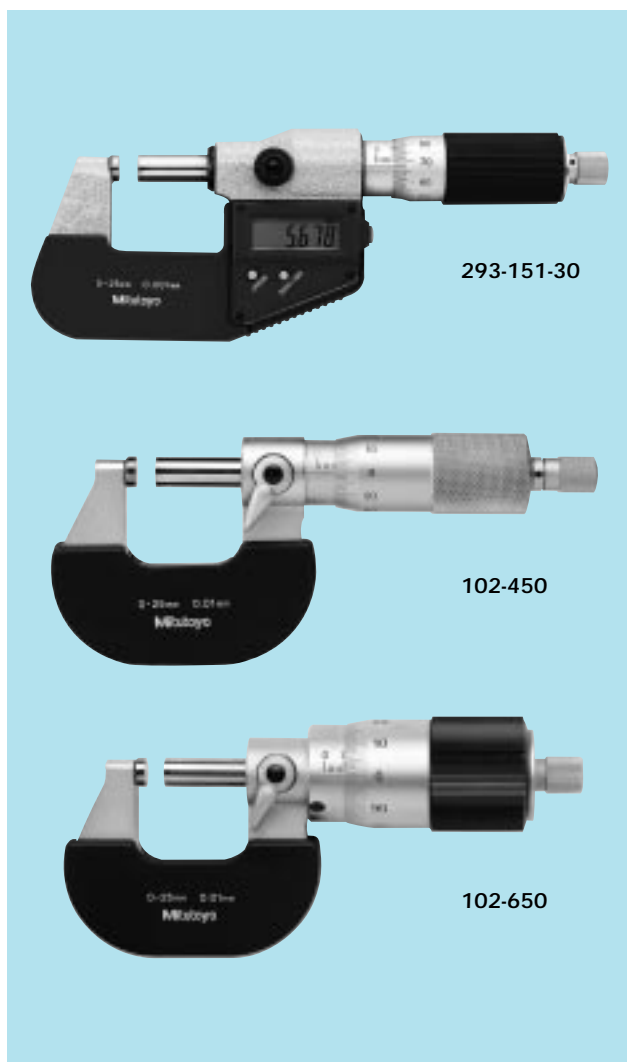


| Range      | L     | a   | b  | c  | d    |
|------------|-------|-----|----|----|------|
| 0 - 25mm   | 30.3  | 2.8 | 5  | 26 | 6.35 |
| 25 - 50mm  | 55.3  | 2.8 | 8  | 32 | 6.35 |
| 50 - 75mm  | 80.3  | 2.8 | 9  | 45 | 6.35 |
| 75 - 100mm | 105.3 | 2.8 | 10 | 58 | 6.35 |

Note: The shape of the thimble changes on the model with Friction Thimble.

## Quick-Setting Outside Micrometers

SERIES 293, 102



### SPECIFICATIONS

#### Digimatic Micrometers

##### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 0 - 25mm   | 293-151-30 | 0.001mm    | ±1μm     |
| 25 - 50mm  | 293-152-30 | 0.001mm    | ±1μm     |
| 50 - 75mm  | 293-153-30 | 0.001mm    | ±1μm     |
| 75 - 100mm | 293-154-30 | 0.001mm    | ±2μm     |

#### Outside Micrometers with Ratchet Stop

##### Metric

| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 0 - 25mm  | 102-450   | 0.01mm     | ±2μm     |
| 25 - 50mm | 102-451   | 0.01mm     | ±2μm     |

#### Outside Micrometers with Ratchet Thimble

##### Metric

| Range      | Order No. | Graduation | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 102-650   | 0.01mm     | ±2μm     |
| 25 - 50mm  | 102-651   | 0.01mm     | ±2μm     |
| 50 - 75mm  | 102-652   | 0.01mm     | ±2μm     |
| 75 - 100mm | 102-653   | 0.01mm     | ±3μm     |

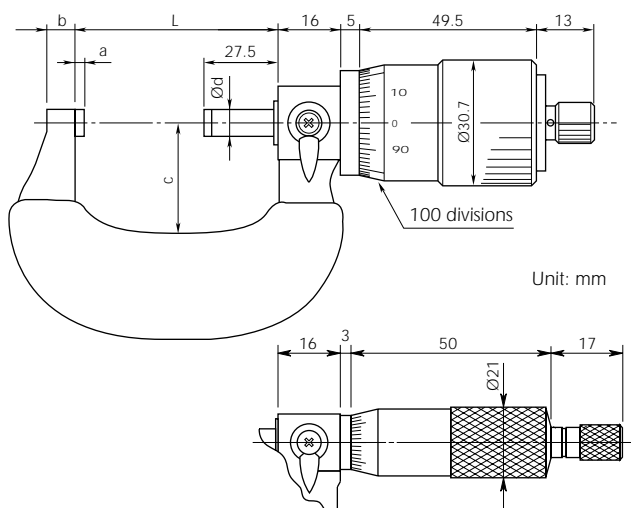
### FEATURES

- 1mm spindle thread pitch for quick setting.
- The measurement can be read directly from the thimble due to the 100 step graduation.
- Carbide-tipped measuring faces.
- With Ratchet Thimble for constant force. (Ratchet Stop is also available for the 102 series.)
- Provided with a standard except for 25mm (1") model.
- The 293 series (LCD readout type) is provided with SPC output.

### Measuring faces

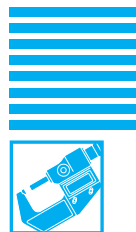
- Flatness: 0.6μm
- Parallelism: 2μm

### Dimensions



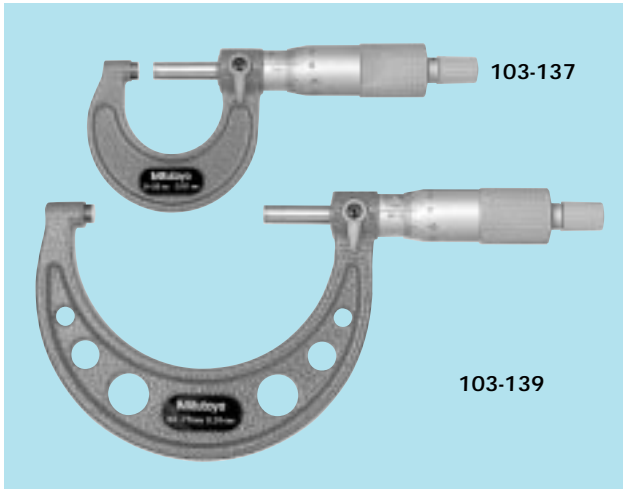
| Range      | L   | a   | b | c    | d |
|------------|-----|-----|---|------|---|
| 0 - 25mm   | 30  | 2.5 | 5 | 26   | 8 |
| 25 - 50mm  | 55  | 2.5 | 8 | 32.5 | 8 |
| 50 - 75mm  | 80  | 2.5 | 9 | 45   | 8 |
| 75 - 100mm | 105 | 2.5 | 9 | 58   | 8 |

Note: The shape of the thimble changes on the model with Ratchet Stop.



# Outside Micrometers

## SERIES 103



### FEATURES

- Hammertone-green, baked-enamel-finished frame.
- Carbide-tipped measuring faces.
- Clear graduations on satin-chrome finish.
- Positive locking clamp.
- Ratchet Stop or Friction Thimble for exact repetitive readings.
- Provided with a standard except for 25mm (1") model.

### SPECIFICATIONS

#### Outside Micrometers with Ratchet Stop

| Metric      |            |            |          |
|-------------|------------|------------|----------|
| Range       | Order No.  | Graduation | Accuracy |
| 0 - 25mm    | 103-137    | 0.01mm     | ±2µm     |
|             | 103-129    | 0.001mm    | ±2µm     |
| 25 - 50mm   | 103-138    | 0.01mm     | ±2µm     |
|             | 103-130    | 0.001mm    | ±2µm     |
| 50 - 75mm   | 103-139-10 | 0.01mm     | ±2µm     |
| 75 - 100mm  | 103-140-10 | 0.01mm     | ±3µm     |
| 100 - 125mm | 103-141-10 | 0.01mm     | ±3µm     |
| 125 - 150mm | 103-142-10 | 0.01mm     | ±3µm     |
| 150 - 175mm | 103-143-10 | 0.01mm     | ±4µm     |
| 175 - 200mm | 103-144-10 | 0.01mm     | ±4µm     |
| 200 - 225mm | 103-145-10 | 0.01mm     | ±4µm     |
| 225 - 250mm | 103-146-10 | 0.01mm     | ±5µm     |
| 250 - 275mm | 103-147-10 | 0.01mm     | ±5µm     |
| 275 - 300mm | 103-148-10 | 0.01mm     | ±5µm     |
| 300 - 325mm | 103-149    | 0.01mm     | ±6µm     |
| 325 - 350mm | 103-150    | 0.01mm     | ±6µm     |
| 350 - 375mm | 103-151    | 0.01mm     | ±6µm     |
| 375 - 400mm | 103-152    | 0.01mm     | ±7µm     |
| 400 - 425mm | 103-153    | 0.01mm     | ±7µm     |
| 425 - 450mm | 103-154    | 0.01mm     | ±7µm     |
| 450 - 475mm | 103-155    | 0.01mm     | ±8µm     |
| 475 - 500mm | 103-156    | 0.01mm     | ±8µm     |

(Models with a range up to 1000mm are available.)

### Inch

| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 0 - 1"    | 103-177   | .001"      | ±.0001"  |
|           | 103-131   | .0001"     | ±.0001"  |
| 1" - 2"   | 103-178   | .001"      | ±.0001"  |
|           | 103-132   | .0001"     | ±.0001"  |
| 2" - 3"   | 103-179   | .001"      | ±.0001"  |
| 3" - 4"   | 103-180   | .001"      | ±.00015" |
| 4" - 5"   | 103-181   | .001"      | ±.00015" |
| 5" - 6"   | 103-182   | .001"      | ±.00015" |
| 6" - 7"   | 103-183   | .001"      | ±.0002"  |
| 7" - 8"   | 103-184   | .001"      | ±.0002"  |
| 8" - 9"   | 103-185   | .001"      | ±.0002"  |
| 9" - 10"  | 103-186   | .001"      | ±.00025" |
| 10" - 11" | 103-187   | .001"      | ±.00025" |
| 11" - 12" | 103-188   | .001"      | ±.00025" |
| 12" - 13" | 103-189   | .001"      | ±.0003"  |
| 13" - 14" | 103-190   | .001"      | ±.0003"  |
| 14" - 15" | 103-191   | .001"      | ±.0003"  |
| 15" - 16" | 103-192   | .001"      | ±.00035" |
| 16" - 17" | 103-193   | .001"      | ±.00035" |
| 17" - 18" | 103-194   | .001"      | ±.00035" |
| 18" - 19" | 103-195   | .001"      | ±.0004"  |
| 19" - 20" | 103-196   | .001"      | ±.0004"  |

(Models with a range up to 40" are available.)

Note: 0.001mm (.0001") reading is obtained with vernier.

#### Outside Micrometers with Friction Thimble

| Metric    |           |            |          |
|-----------|-----------|------------|----------|
| Range     | Order No. | Graduation | Accuracy |
| 0 - 25mm  | 103-125   | 0.01mm     | ±2µm     |
|           | 103-133   | 0.001mm    | ±2µm     |
| 25 - 50mm | 103-126   | 0.01mm     | ±2µm     |

### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 103-127   | .001"      | ±.0001"  |
|         | 103-135T  | .0001"     | ±.0001"  |
| 1" - 2" | 103-128   | .001"      | ±.0001"  |
|         | 103-136T  | .0001"     | ±.0001"  |

Note: 0.001mm (.0001") reading is obtained with vernier.

### Measuring faces

- Flatness: 0.6µm (.000024") for models up to 300mm (12")  
1µm (.00004") for models over 300mm (12")
- Parallelism:  $(2+L/100)\mu\text{m} [(.00008+.00004 (L/4))"]^*$   
\*L=Maximum measuring length (mm) [(inch)], Fraction rounded down



103-913

### Outside Micrometer Sets

#### Metric

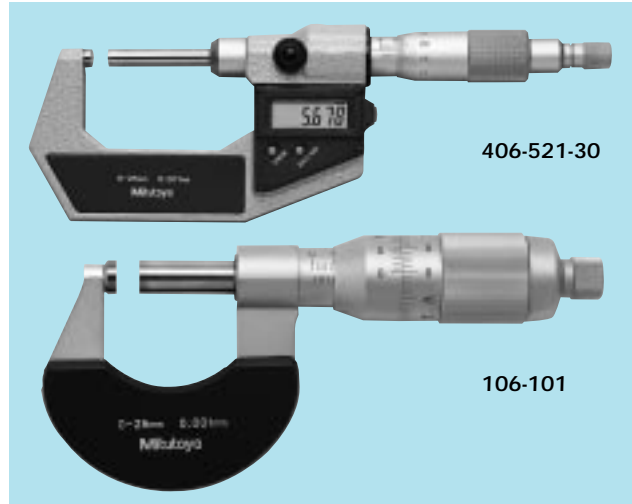
| Range                        | Order No.  | Assortment of micrometers  |
|------------------------------|------------|--|
| 0 - 75mm<br>(3 Mikes/set)    | 103-927-10 | <ul style="list-style-type: none"> <li>• 103-137, 103-138, 103-139</li> <li>• 2 micrometer standards</li> </ul>                                |
| 0 - 150mm<br>(6 Mikes/set)   | 103-913-20 | <ul style="list-style-type: none"> <li>• 101-137, 101-138, 103-139, 103-140, 103-141, 103-142</li> <li>• 5 micrometer standards</li> </ul>     |
| 150 - 300mm<br>(6 Mikes/set) | 103-915-10 | <ul style="list-style-type: none"> <li>• 103-143, 103-144, 103-145, 103-146, 103-147, 103-148</li> <li>• 6 micrometer standards</li> </ul>     |
| 0 - 300mm<br>(12 Mikes/set)  | 103-914-20 | <ul style="list-style-type: none"> <li>• All micrometers of 103-913-20 and 103-915-10 in one set</li> <li>• 11 micrometer standards</li> </ul> |

#### Inch

| Range                     | Order No. | Assortment of micrometers  |
|---------------------------|-----------|--|
| 0 - 3"<br>(3 Mikes/set)   | 103-929   | <ul style="list-style-type: none"> <li>• 103-177, 103-178, 103-179</li> <li>• 2 micrometer standards</li> </ul>                            |
| 0 - 4"<br>(4 Mikes/set)   | 103-930   | <ul style="list-style-type: none"> <li>• 103-177, 103-178, 103-179, 103-180</li> <li>• 3 micrometer standards</li> </ul>                   |
| 0 - 6"<br>(6 Mikes/set)   | 103-904   | <ul style="list-style-type: none"> <li>• 101-105, 101-106, 103-179, 103-180, 103-181, 103-182</li> <li>• 5 micrometer standards</li> </ul> |
| 6" - 12"<br>(6 Mikes/set) | 103-906   | <ul style="list-style-type: none"> <li>• 103-183, 103-184, 103-185, 103-186, 103-187, 103-188</li> <li>• 6 micrometer standards</li> </ul> |
| 0 - 12"<br>(12 Mikes/set) | 103-905   | <ul style="list-style-type: none"> <li>• All micrometers of 103-904 and 103-906 in one set</li> <li>• 11 micrometer standards</li> </ul>   |

## Outside Micrometers

SERIES 406, 106  
Non-Rotating Spindle Type



406-521-30

106-101

### FEATURES

- Carbide-tipped measuring faces.
- Easy-to-read with large vernier on the thimble.
- Provided with a standard except for 25mm (1") model.

### SPECIFICATIONS

#### Digimatic Micrometers with Ratchet Stop

##### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 0 - 25mm   | 406-521-30 | 0.001mm    | ±3μm     |
| 25 - 50mm  | 406-522-30 | 0.001mm    | ±3μm     |
| 50 - 75mm  | 406-523-30 | 0.001mm    | ±3μm     |
| 75 - 100mm | 406-524-30 | 0.001mm    | ±4μm     |

##### Inch / Metric

| Range   | Order No.  | Resolution      | Accuracy |
|---------|------------|-----------------|----------|
| 0 - 1"  | 406-721-30 | .00005"/0.001mm | ±.00015" |
| 1" - 2" | 406-722-30 | .00005"/0.001mm | ±.00015" |
| 2" - 3" | 406-723-30 | .00005"/0.001mm | ±.00015" |
| 3" - 4" | 406-724-30 | .00005"/0.001mm | ±.0002"  |

#### Outside Micrometers with Ratchet Thimble

##### Metric

| Range      | Order No. | Graduation | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 106-101   | 0.001mm    | ±2μm     |
| 25 - 50mm  | 106-103   | 0.001mm    | ±2μm     |
| 50 - 75mm  | 106-105   | 0.001mm    | ±3μm     |
| 75 - 100mm | 106-106   | 0.001mm    | ±3μm     |

#### Outside Micrometers with Friction Thimble

##### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 106-102   | .0001"     | ±.0001"  |
| 1" - 2" | 106-104   | .0001"     | ±.0001"  |

### Measuring faces

- Flatness: 0.3μm (.000012")
- Parallelism: 4μm (.00016") for Series 406  
2μm (.00008") for Series 106
- Diameter: 6.35mm (.25") for Series 406  
8mm (.315") for Series 106



# Digit Outside Micrometers

## SERIES 193



193-101

### FEATURES

- Mechanical digit counter for quick and error-free reading.
- Direct readout on the counter to 0.01mm (.001").
- Carbide-tipped measuring faces for long life.
- Provided with a standard except for 25mm (1") model.

### SPECIFICATIONS

#### Digit Outside Micrometers with Ratchet Stop Metric

| Range       | Order No. | Graduation | Accuracy |
|-------------|-----------|------------|----------|
| 0 - 25mm    | 193-101   | 0.01mm     | ±2µm     |
|             | 193-111   | 0.001mm    | ±2µm     |
| 25 - 50mm   | 193-102   | 0.01mm     | ±2µm     |
|             | 193-112   | 0.001mm    | ±2µm     |
| 50 - 75mm   | 193-103   | 0.01mm     | ±2µm     |
|             | 193-113   | 0.001mm    | ±2µm     |
| 75 - 100mm  | 193-104   | 0.01mm     | ±3µm     |
|             | 193-114   | 0.001mm    | ±3µm     |
| 100 - 125mm | 193-105   | 0.01mm     | ±3µm     |
| 125 - 150mm | 193-106   | 0.01mm     | ±3µm     |
| 150 - 175mm | 193-107   | 0.01mm     | ±4µm     |
| 175 - 200mm | 193-108   | 0.01mm     | ±4µm     |
| 200 - 225mm | 193-109   | 0.01mm     | ±4µm     |
| 225 - 250mm | 193-110   | 0.01mm     | ±5µm     |

#### Inch

| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 2" - 3"   | 193-213   | .0001"     | ±.0001"  |
| 3" - 4"   | 193-214   | .0001"     | ±.00015" |
| 4" - 5"   | 193-215   | .0001"     | ±.00015" |
| 5" - 6"   | 193-216   | .0001"     | ±.00015" |
| 6" - 7"   | 193-217   | .0001"     | ±.0002"  |
| 7" - 8"   | 193-218   | .0001"     | ±.0002"  |
| 8" - 9"   | 193-219   | .0001"     | ±.0002"  |
| 9" - 10"  | 193-220   | .0001"     | ±.00025" |
| 10" - 11" | 193-221   | .0001"     | ±.00025" |
| 11" - 12" | 193-222   | .0001"     | ±.00025" |

Note: 0.001mm (.0001") reading is obtained with vernier.

#### Digit Outside Micrometers with Friction Thimble

#### Inch

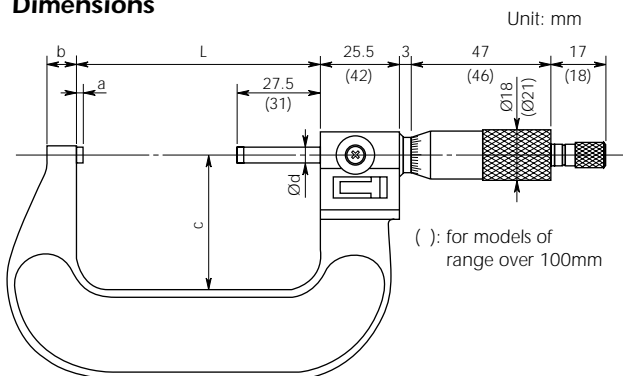
| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 193-201   | .001"      | ±.0001"  |
|         | 193-211   | .0001"     | ±.0001"  |
| 1" - 2" | 193-202   | .001"      | ±.0001"  |
|         | 193-212   | .0001"     | ±.0001"  |

Note: .0001" reading is obtained with vernier.

#### Measuring faces

- Flatness: 0.6µm (.000024") for models up to 300mm (12")
- Parallelism:  $(2+L/100)\mu\text{m} [(.00008+.00004 (L/4))"]^*$   
\*L=Maximum measuring length (mm) [(inch)], Fraction rounded down.

#### Dimensions

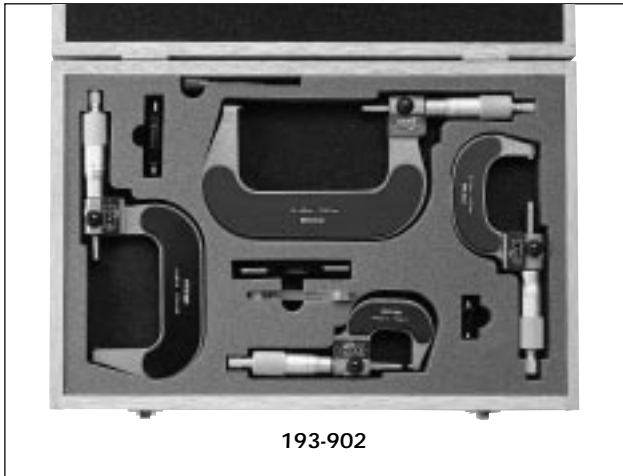


| Range       | L   | a   | b  | c   | d    |
|-------------|-----|-----|----|-----|------|
| 0 - 25mm    | 30  | 2.5 | 5  | 26  | 6.35 |
| 25 - 50mm   | 55  | 2.5 | 8  | 32  | 6.35 |
| 50 - 75mm   | 80  | 2.5 | 9  | 45  | 6.35 |
| 75 - 100mm  | 105 | 2.5 | 9  | 57  | 6.35 |
| 100 - 125mm | 137 | 6   | 18 | 80  | 8    |
| 125 - 150mm | 162 | 6   | 18 | 93  | 8    |
| 150 - 175mm | 187 | 6   | 18 | 106 | 8    |
| 175 - 200mm | 212 | 6   | 19 | 119 | 8    |
| 200 - 225mm | 238 | 7   | 20 | 132 | 8    |
| 225 - 250mm | 263 | 7   | 19 | 145 | 8    |
| 250 - 275mm | 289 | 8   | 19 | 158 | 8    |
| 275 - 300mm | 314 | 8   | 20 | 171 | 8    |

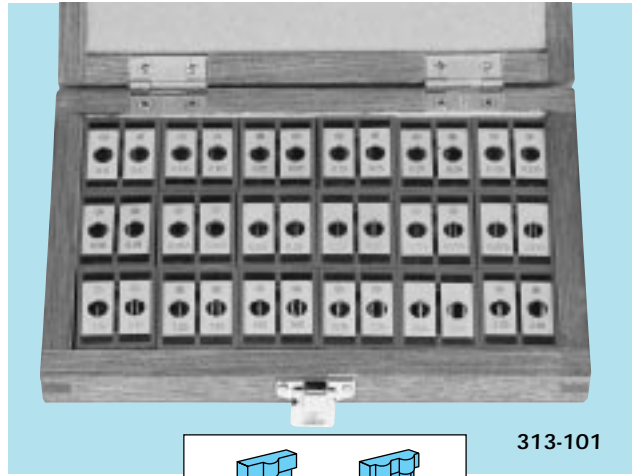
Note: The shape of the thimble changes on the model with Friction Thimble.

## 3-Wire Units

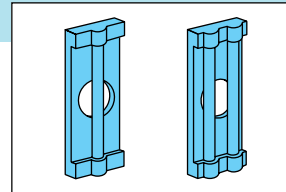
### SERIES 313



193-902



313-101



### Digit Outside Micrometer Sets

#### Metric

| Range                        | Order No. | Assortment of micrometers  |
|------------------------------|-----------|--|
| 0 - 75mm<br>(3 Mikes/set)    | 193-901   | <ul style="list-style-type: none"> <li>193-101, 193-102, 193-103</li> <li>2 micrometer standards</li> </ul>                            |
| 0 - 100mm<br>(4 Mikes/set)   | 193-902   | <ul style="list-style-type: none"> <li>193-101, 193-102, 193-103, 193-104</li> <li>3 micrometer standards</li> </ul>                   |
| 0 - 150mm<br>(6 Mikes/set)   | 193-903   | <ul style="list-style-type: none"> <li>193-101, 193-102, 193-103, 193-104, 193-105, 193-106</li> <li>5 micrometer standards</li> </ul> |
| 150 - 300mm<br>(6 Mikes/set) | 193-905   | <ul style="list-style-type: none"> <li>193-107, 193-108, 193-109, 193-110, 193-131, 193-132</li> <li>6 micrometer standards</li> </ul> |
| 0 - 300mm<br>(12 Mikes/set)  | 193-904   | <ul style="list-style-type: none"> <li>All micrometers of 193-903 and 193-905 in one set</li> <li>11 micrometer standards</li> </ul>   |

#### Inch

| Range                     | Order No. | Assortment of micrometers  |
|---------------------------|-----------|--|
| 0 - 3"<br>(3 Mikes/set)   | 193-923   | <ul style="list-style-type: none"> <li>193-211, 193-212, 193-213</li> <li>2 micrometer standards</li> </ul>                            |
| 0 - 6"<br>(6 Mikes/set)   | 193-925   | <ul style="list-style-type: none"> <li>193-211, 193-212, 193-213, 193-214, 193-215, 193-216</li> <li>5 micrometer standards</li> </ul> |
| 6" - 12"<br>(6 Mikes/set) | 193-927   | <ul style="list-style-type: none"> <li>193-217, 193-218, 193-219, 193-220, 193-221, 193-222</li> <li>6 micrometer standards</li> </ul> |

### FEATURES

- Facilitates measurement of the pitch diameter of screw threads with a standard micrometer.
- 18 sizes of wires are assorted in a set.
- Roundness of wire: within 0.5µm
- Cylindricity of wire: within 1µm
- Hardness of wire: 59 - 63HRC

### SPECIFICATIONS

| Application            | Order No. | Assortment of wire units  |
|------------------------|-----------|---|
| Ø6.35mm<br>(.25" DIA.) | 313-101   | 0.17mm (952131), 0.195mm (952132), 0.22mm (952133), 0.25mm (952134), 0.29mm (952135), 0.335mm (952136), 0.39mm (952137), 0.455mm (952138), 0.53mm (952139), 0.62mm (952140), 0.725mm (952141), 0.895mm (952142), 1.1mm (952143), 1.35mm (952144), 1.65mm (952145), 2.05mm (952146), 2.55mm (952147), 3.2mm (952148) |
| Ø8mm<br>(.315" DIA.)   | 313-102   | 0.17mm (952149), 0.195mm (952150), 0.22mm (952151), 0.25mm (952152), 0.29mm (952153), 0.335mm (952154), 0.39mm (952155), 0.455mm (952156), 0.53mm (952157), 0.62mm (952158), 0.725mm (952159), 0.895mm (952160), 1.1mm (952161), 1.35mm (952162), 1.65mm (952163), 2.05mm (952164), 2.55mm (952165), 3.2mm (952166) |

### TECHNICAL INFORMATION

#### 3-wire method

Formula to obtain the pitch diameter (E)\*:

$$E = M - 3d + 0.866025P$$

where

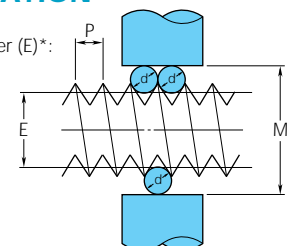
P= Screw thread pitch

d= Diameter of wire

E= Pitch diameter

M= Measured length

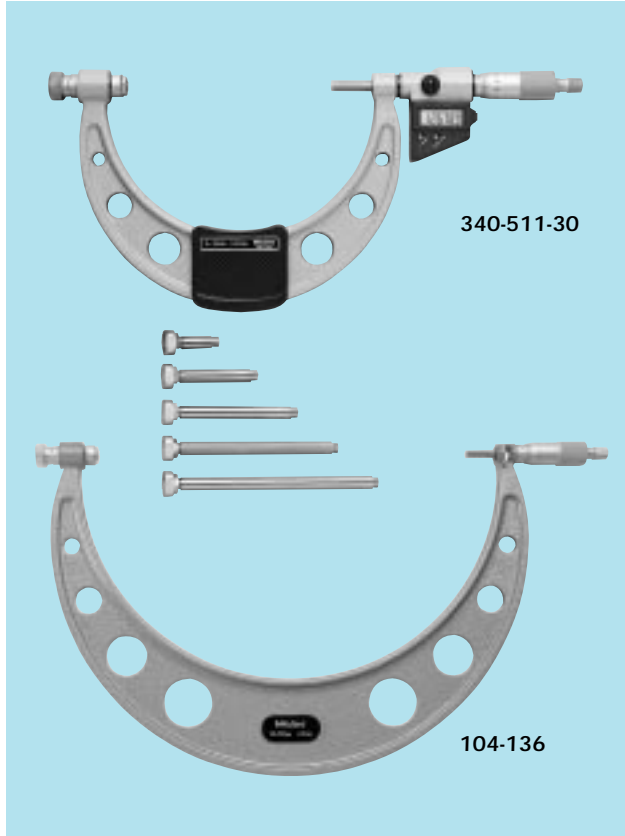
\*For metric or UNF screw





# Outside Micrometers

SERIES 340, 104  
with Interchangeable Anvils



## Outside Micrometers

### Metric

| Range        | Order No. | Graduation | Interchangeable anvils    |
|--------------|-----------|------------|---------------------------|
| 0 - 50mm     | 104-171*  | 0.01mm     | 0, 25mm                   |
| 0 - 100mm    | 104-139A  | 0.01mm     | 0, 25, 50, 75mm           |
| 0 - 150mm    | 104-135A  | 0.01mm     | 0, 25, 50, 75, 100, 125mm |
| 100 - 200mm  | 104-140A  | 0.01mm     | 0, 25, 50, 75mm           |
| 150 - 300mm  | 104-136A  | 0.01mm     | 0, 25, 50, 75, 100, 125mm |
| 200 - 300mm  | 104-141A  | 0.01mm     | 0, 25, 50, 75mm           |
| 300 - 400mm  | 104-142A  | 0.01mm     | 0, 25, 50, 75mm           |
| 400 - 500mm  | 104-143A  | 0.01mm     | 0, 25, 50, 75mm           |
| 500 - 600mm  | 104-144A  | 0.01mm     | 0, 25, 50, 75mm           |
| 600 - 700mm  | 104-145A  | 0.01mm     | 0, 25, 50, 75mm           |
| 700 - 800mm  | 104-146A  | 0.01mm     | 0, 25, 50, 75mm           |
| 800 - 900mm  | 104-147A  | 0.01mm     | 0, 25, 50, 75mm           |
| 900 - 1000mm | 104-148A  | 0.01mm     | 0, 25, 50, 75mm           |

\*The frame in a heat insulating cover

### Inch

| Range     | Order No. | Graduation | Interchangeable anvils |
|-----------|-----------|------------|------------------------|
| 0 - 2"    | 104-166   | .001"      | 0, 1"                  |
|           | 104-165   | .0001"     | 0, 1"                  |
| 0 - 4"    | 104-149   | .001"      | 0, 1", 2", 3"          |
| 0 - 6"    | 104-137   | .001"      | 0, 1", 2", 3", 4", 5"  |
| 6" - 12"  | 104-138   | .001"      | 0, 1", 2", 3", 4", 5"  |
| 12" - 18" | 104-201   | .001"      | 0, 1", 2", 3", 4", 5"  |
| 18" - 24" | 104-202   | .001"      | 0, 1", 2", 3", 4", 5"  |
| 24" - 30" | 104-203   | .001"      | 0, 1", 2", 3", 4", 5"  |
| 30" - 36" | 104-204   | .001"      | 0, 1", 2", 3", 4", 5"  |
| 36" - 42" | 104-205   | .001"      | 0, 1", 2", 3", 4", 5"  |

Note: .0001" reading is obtained with vernier.

## FEATURES

- Wide measuring range with interchangeable anvils.
- Carbide-tipped spindle face.
- Provided with a Ratchet Stop for constant force.
- Supplied with zero-setting standards for each range.
- The 340 series (LCD readout type) is provided with SPC output.

## SPECIFICATIONS

### Digimatic Micrometers

#### Metric

| Range        | Order No.  | Resolution | Interchangeable anvils    |
|--------------|------------|------------|---------------------------|
| 0 - 150mm    | 340-511-30 | 0.001mm    | 0, 25, 50, 75, 100, 125mm |
| 150 - 300mm  | 340-512-30 | 0.001mm    | 0, 25, 50, 75, 100, 125mm |
| 300 - 400mm  | 340-513    | 0.001mm    | 0, 25, 50, 75mm           |
| 400 - 500mm  | 340-514    | 0.001mm    | 0, 25, 50, 75mm           |
| 500 - 600mm  | 340-515    | 0.001mm    | 0, 25, 50, 75mm           |
| 600 - 700mm  | 340-516    | 0.001mm    | 0, 25, 50, 75mm           |
| 700 - 800mm  | 340-517    | 0.001mm    | 0, 25, 50, 75mm           |
| 800 - 900mm  | 340-518    | 0.001mm    | 0, 25, 50, 75mm           |
| 900 - 1000mm | 340-519    | 0.001mm    | 0, 25, 50, 75mm           |

#### Inch/Metric

| Range     | Order No.  | Resolution      | Interchangeable anvils |
|-----------|------------|-----------------|------------------------|
| 0 - 6"    | 340-711-30 | .00005"/0.001mm | 0, 1", 2", 3", 4", 5"  |
| 6" - 12"  | 340-712-30 | .0001"/0.001mm  | 0, 1", 2", 3", 4", 5"  |
| 12" - 18" | 340-713    | .0001"/0.001mm  | 0, 1", 2", 3", 4", 5"  |
| 18" - 24" | 340-714    | .0001"/0.001mm  | 0, 1", 2", 3", 4", 5"  |
| 24" - 30" | 340-715    | .0001"/0.001mm  | 0, 1", 2", 3", 4", 5"  |
| 30" - 36" | 340-716    | .0001"/0.001mm  | 0, 1", 2", 3", 4", 5"  |

## Accuracy

- $\pm(4+L/75)\mu\text{m}$  [ $\pm(0.0002+0.00005(L/3))$ "]\*
- \*L=Maximum measuring length (mm) [(inch)], Fraction rounded up

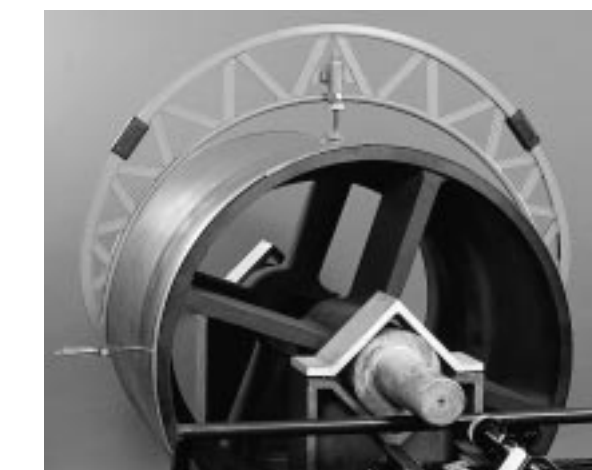
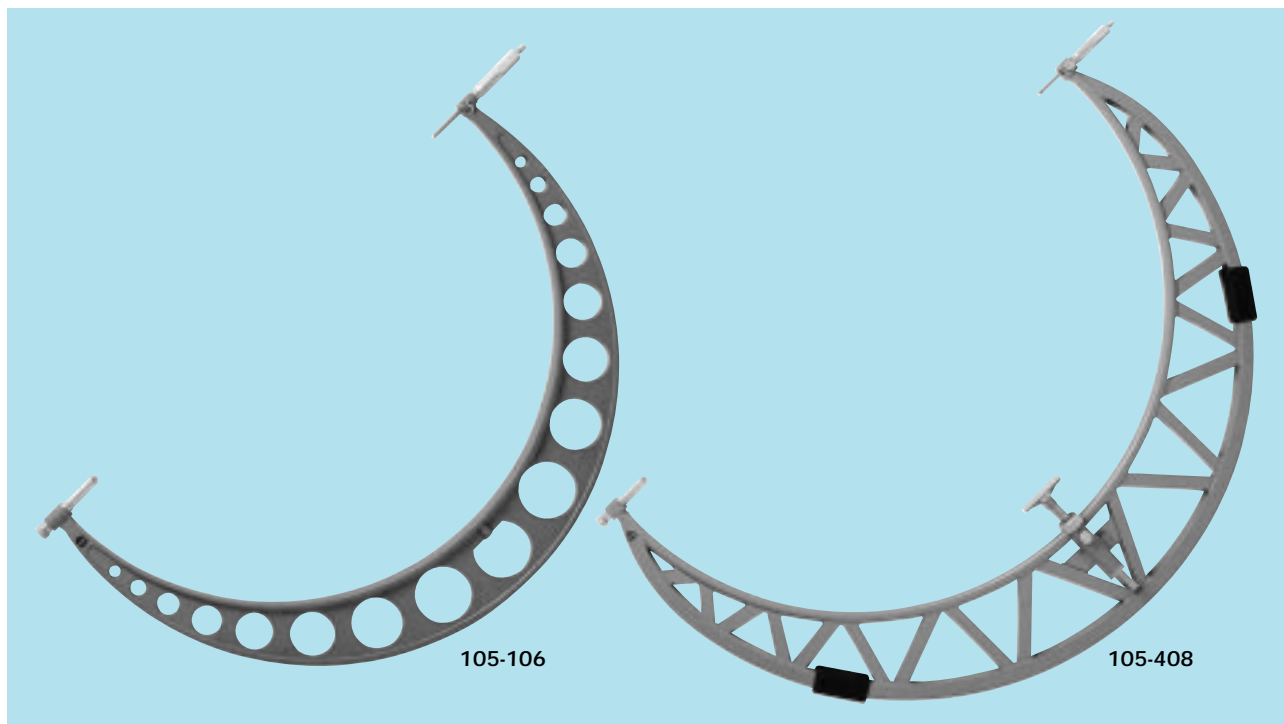
## Measuring faces

- Flatness:
  - 0.6 $\mu\text{m}$  (.000024") for models up to 300mm (12")
  - 1 $\mu\text{m}$  (.00004") for models over 300mm (12")
- Parallelism:  $(2+L/100)\mu\text{m}$  [(0.00008+.00004(L/4))"]\*\*
- \*\*L=Maximum measuring length (mm) [(inch)], Fraction rounded up

## Outside Micrometers

### SERIES 105

with Extension Anvil Collars



### FEATURES

- Wide measuring range with extension anvil collars.



- 50mm (2") spindle stroke.
- Carbide-tipped measuring faces.
- Provided with Ratchet Stop for constant force.
- Supplied with zero-setting standards for each range.
- Square and round pipes are combined for light weight and rigid frame (for models over 1000mm range).
- Workpiece stopper (for models over 1000mm range).

### SPECIFICATIONS

#### Metric

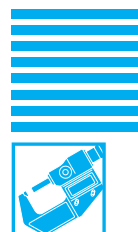
| Range         | Order No.      | Graduation | Extension collars |
|---------------|----------------|------------|-------------------|
| 500 - 600mm   | <b>105-103</b> | 0.01mm     | 50mm              |
| 600 - 700mm   | <b>105-104</b> | 0.01mm     | 50mm              |
| 700 - 800mm   | <b>105-105</b> | 0.01mm     | 50mm              |
| 800 - 900mm   | <b>105-106</b> | 0.01mm     | 50mm              |
| 900 - 1000mm  | <b>105-107</b> | 0.01mm     | 50mm              |
| 1000 - 1100mm | <b>105-408</b> | 0.01mm     | 50mm              |
| 1100 - 1200mm | <b>105-409</b> | 0.01mm     | 50mm              |
| 1000 - 1200mm | <b>105-418</b> | 0.01mm     | 50mm, 100mm       |
| 1200 - 1300mm | <b>105-410</b> | 0.01mm     | 50mm              |
| 1300 - 1400mm | <b>105-411</b> | 0.01mm     | 50mm              |
| 1200 - 1400mm | <b>105-419</b> | 0.01mm     | 50mm, 100mm       |
| 1400 - 1500mm | <b>105-412</b> | 0.01mm     | 50mm              |
| 1500 - 1600mm | <b>105-413</b> | 0.01mm     | 50mm              |
| 1400 - 1600mm | <b>105-420</b> | 0.01mm     | 50mm, 100mm       |
| 1600 - 1700mm | <b>105-414</b> | 0.01mm     | 50mm              |
| 1700 - 1800mm | <b>105-415</b> | 0.01mm     | 50mm              |
| 1600 - 1800mm | <b>105-421</b> | 0.01mm     | 50mm, 100mm       |
| 1800 - 1900mm | <b>105-416</b> | 0.01mm     | 50mm              |
| 1900 - 2000mm | <b>105-417</b> | 0.01mm     | 50mm              |
| 1800 - 2000mm | <b>105-422</b> | 0.01mm     | 50mm, 100mm       |

### Accuracy

- $\pm(6+L/75)\mu\text{m}^*$
- \*L=Maximum measuring length (mm), Fraction rounded up

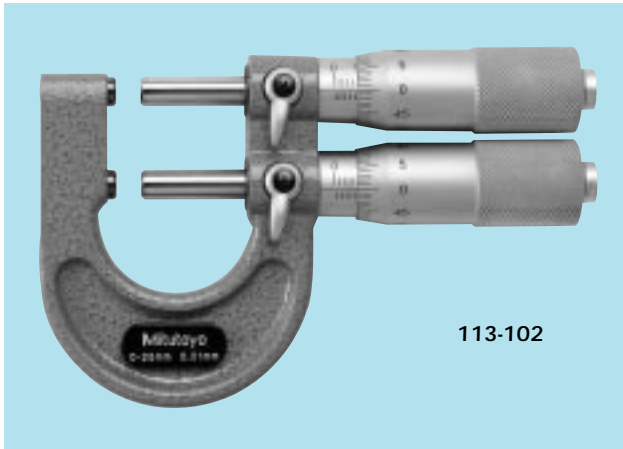
### Measuring faces

- Flatness:  $1\mu\text{m}$
- Parallelism:  $(2+L/100)\mu\text{m}^{**}$
- \*\*L=Maximum measuring length (mm), Fraction rounded down



## Limit Micrometers

### SERIES 113



113-102



#### FEATURES

- Can be used as a GO/±NG gage by setting the upper and lower limits.
- Carbide-tipped measuring faces.
- Provided with a standard for 25mm - 50mm model.

#### SPECIFICATIONS

##### Metric

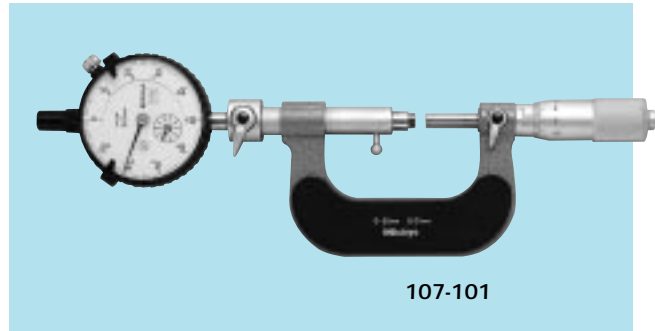
| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 0 - 25mm  | 113-102   | 0.01mm     | ±3μm     |
| 25 - 50mm | 113-103   | 0.01mm     | ±3μm     |

#### Measuring faces

- Flatness: 0.6μm
  - Parallelism: (3+L/100)μm\*
- \* L=Maximum measuring length (mm) Fraction rounded down

## Outside Micrometers

### SERIES 107



107-101

#### FEATURES

- With dial indicator for direct GO/NG-GO judgment for mass-produced parts.
- Anvil retracting trigger for quick measurement.
- Anvil retracting range: 4mm (.16")
- Carbide-tipped measuring faces.
- Provided with a standard except for 25mm (1") model.



#### SPECIFICATIONS

##### Metric

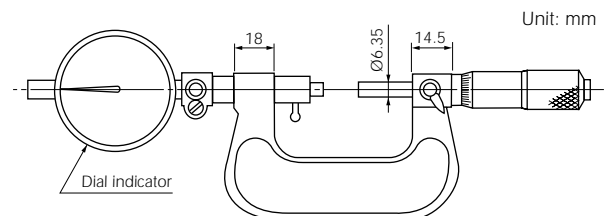
| Range      | Order No. | Dial indicator provided (Graduation) | Accuracy of mike |
|------------|-----------|--------------------------------------|------------------|
| 0 - 25mm   | 107-101   | 2046FEB (0.01mm)                     | ±2μm             |
|            | 107-181   | 2109FB (0.001mm)                     | ±2μm             |
| 25 - 50mm  | 107-102   | 2046FEB (0.01mm)                     | ±2μm             |
|            | 107-182   | 2109FB (0.001mm)                     | ±2μm             |
| 50 - 75mm  | 107-103   | 2046FEB (0.01mm)                     | ±2μm             |
|            | 107-183   | 2109FB (0.001mm)                     | ±2μm             |
| 75 - 100mm | 107-104   | 2046FEB (0.01mm)                     | ±3μm             |
|            | 107-184   | 2109FB (0.001mm)                     | ±3μm             |

(Models with a range up to 200mm are available.)

#### Measuring faces

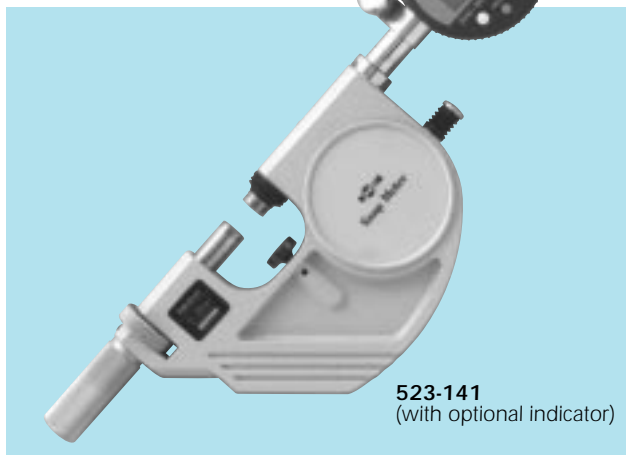
- Flatness: 0.6μm (.00003")
  - Parallelism: (2+L/100)μm [(0.00008+.00004(L/4))"]\*
- \* L=Maximum measuring length (mm) [(inch)], Fraction rounded down.

#### Dimensions



## Snap Meters

SERIES 523



523-141  
(with optional indicator)

### FEATURES

- Various types of indicator can be selected according to the measurement applications.
- Spindle diameter: 10.8mm (.425")
- Carbide-tipped measuring faces.
- Measuring force: 5 - 15N (500 - 1500gf)

### SPECIFICATIONS

#### Metric

| Range      | Order No. | Anvil movement |
|------------|-----------|----------------|
| 0 - 25mm   | 523-141   | 2mm            |
| 25 - 50mm  | 523-142   | 2mm            |
| 50 - 75mm  | 523-143   | 2mm            |
| 75 - 100mm | 523-144   | 2mm            |

#### Inch

| Range   | Order No. | Anvil movement |
|---------|-----------|----------------|
| 0 - 1"  | 523-115   | .078"          |
| 1" - 2" | 523-152   | .078"          |
| 2" - 3" | 523-153   | .078"          |
| 3" - 4" | 523-154   | .078"          |

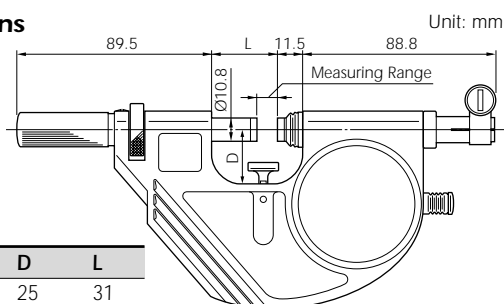
### Accuracy (dispersion of indication)

0.4μm (.00002")

### Measuring faces

- Flatness: 0.3μm (.000015")
- Parallelism:  
0.6μm (.00003") for models up to 50mm (2")  
1μm (.00005") for models up to 100mm (4")

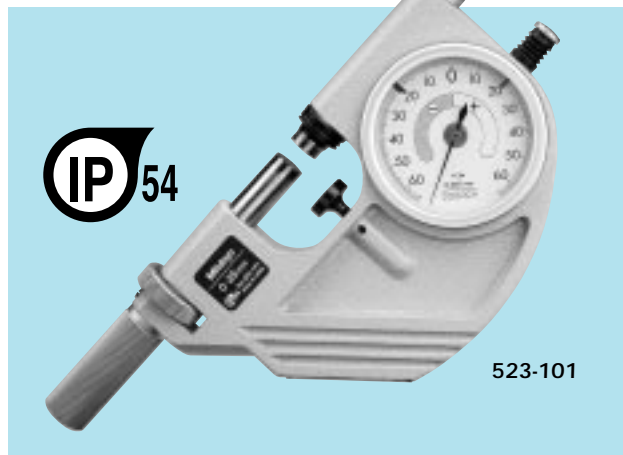
### Dimensions



| Range      | D    | L   |
|------------|------|-----|
| 0 - 25mm   | 25   | 31  |
| 25 - 50mm  | 35   | 56  |
| 50 - 75mm  | 47.5 | 81  |
| 75 - 100mm | 60   | 106 |

## Dial Snap Meters

SERIES 523



523-101



### FEATURES

- Direct GO/NO-GO judgment for mass-produced parts.
- Spindle diameter: 10.8mm (.425")
- Carbide-tipped measuring faces.
- Measuring force: 6 - 15N (600 - 1500gf)
- IP protection level: 54

### SPECIFICATIONS

#### Metric

| Range      | Order No. | Graduation of indicator | Indicating range |
|------------|-----------|-------------------------|------------------|
| 0 - 25mm   | 523-121   | 0.001mm                 | ±0.060mm         |
| 25 - 50mm  | 523-122   | 0.001mm                 | ±0.060mm         |
| 50 - 75mm  | 523-123   | 0.001mm                 | ±0.060mm         |
| 75 - 100mm | 523-124   | 0.001mm                 | ±0.060mm         |

#### Inch

| Range   | Order No. | Graduation of indicator | Indicating range |
|---------|-----------|-------------------------|------------------|
| 0 - 1"  | 523-131   | .00005"                 | ±.0023"          |
| 1" - 2" | 523-132   | .00005"                 | ±.0023"          |
| 2" - 3" | 523-133   | .00005"                 | ±.0023"          |
| 3" - 4" | 523-134   | .00005"                 | ±.0023"          |

### Accuracy

1μm (.00005") for ±0.060mm (±.0023") indicating range

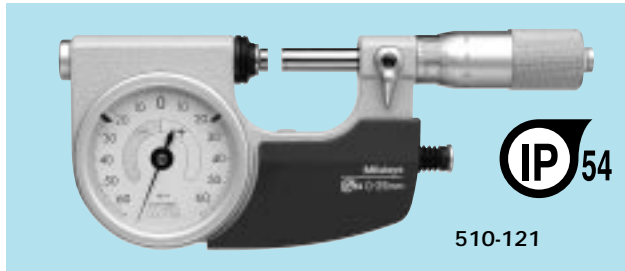
### Measuring faces

- Flatness: 0.3μm (.000015")
- Parallelism:  
0.6μm (.00003") for models up to 50mm (2")  
1μm (.00005") for models up to 100mm (4")



# Indicating Micrometers

## SERIES 510



### FEATURES

- Retractable anvil with indicator for three-wire measurements of pitch diameter of precision screws, roundness and parallelism measurements.
- Spindle diameter: 8mm (.315")
- Carbide-tipped measuring faces.
- Measuring force: 5 - 15N (500 - 1500gf)
- Provided with a standard except for 25mm (1") model.
- IP protection level: 54

### SPECIFICATIONS

#### Metric

| Range      | Order No. | Graduation of indicator | Indicating range |
|------------|-----------|-------------------------|------------------|
| 0 - 25mm   | 510-121   | 0.001mm                 | ±0.060mm         |
| 25 - 50mm  | 510-122   | 0.001mm                 | ±0.060mm         |
| 50 - 75mm  | 510-123   | 0.001mm                 | ±0.060mm         |
| 75 - 100mm | 510-124   | 0.001mm                 | ±0.060mm         |

#### Inch

| Range   | Order No. | Graduation of indicator | Indicating range |
|---------|-----------|-------------------------|------------------|
| 0 - 1"  | 510-131   | .00005"                 | ±.0023"          |
| 1" - 2" | 510-132   | .00005"                 | ±.0023"          |
| 2" - 3" | 510-133   | .00005"                 | ±.0023"          |
| 3" - 4" | 510-134   | .00005"                 | ±.0023"          |

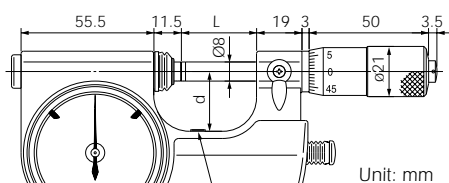
### Accuracy

- Micrometer: 3µm (.00015")
- Indicator: 1µm (.00005")

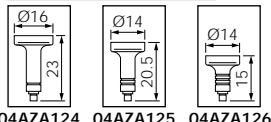
### Measuring faces

- Flatness: 0.3µm (.000015")
- Parallelism: 0.6µm (.00003") for models up to 50mm (2")  
1µm (.00005") for models over 50mm (2")

### Dimensions



Workpiece stopper (optional)



| Range      | L     | d  |
|------------|-------|----|
| 0 - 25mm   | 31.5  | 25 |
| 25 - 50mm  | 56.5  | 38 |
| 50 - 75mm  | 81.5  | 50 |
| 75 - 100mm | 106.5 | 63 |

# Screw Thread Micrometers

## SERIES 125



### FEATURES

- Provided with a 60 degree V-anvil and conical spindle for easily measuring pitch diameters of metric or unified screw threads.
- With Ratchet Stop for constant force.
- With a standard for zero point adjustment.

### SPECIFICATIONS

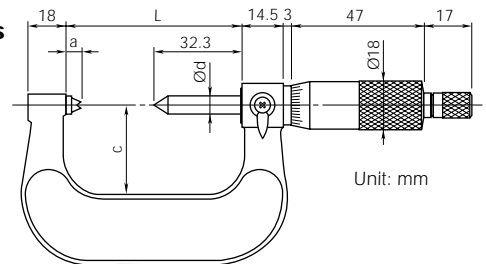
#### Metric

| Range      | Order No. | Graduation | Screw to be measured (Metric/Unified) |
|------------|-----------|------------|---------------------------------------|
| 0 - 25mm   | 125-101   | 0.01mm     | 0.4 - 0.5mm/64 - 48TPI                |
|            | 125-102   | 0.01mm     | 0.6 - 0.9mm/44 - 28TPI                |
|            | 125-103   | 0.01mm     | 1 - 1.75mm/24 - 14TPI                 |
|            | 125-104   | 0.01mm     | 2 - 3mm/13 - 9TPI                     |
|            | 125-105   | 0.01mm     | 3.5 - 5mm/8 - 5TPI                    |
| 25 - 50mm  | 125-106   | 0.01mm     | 0.4 - 0.5mm/64 - 48TPI                |
|            | 125-107   | 0.01mm     | 0.6 - 0.9mm/44 - 28TPI                |
|            | 125-108   | 0.01mm     | 1 - 1.75mm/24 - 14TPI                 |
|            | 125-109   | 0.01mm     | 2 - 3mm/13 - 9TPI                     |
|            | 125-110   | 0.01mm     | 3.5 - 5mm/8 - 5TPI                    |
| 50 - 75mm  | 125-111   | 0.01mm     | 0.6 - 0.9mm/44 - 28TPI                |
|            | 125-112   | 0.01mm     | 1 - 1.75mm/24 - 14TPI                 |
|            | 125-113   | 0.01mm     | 2 - 3mm/13 - 9TPI                     |
|            | 125-114   | 0.01mm     | 3.5 - 5mm/8 - 5TPI                    |
|            | 125-115   | 0.01mm     | 5.5 - 7mm/4.5 - 3.5TPI                |
| 75 - 100mm | 125-116   | 0.01mm     | 0.6 - 0.9mm/44 - 28TPI                |
|            | 125-117   | 0.01mm     | 1 - 1.75mm/24 - 14TPI                 |
|            | 125-118   | 0.01mm     | 2 - 3mm/13 - 9TPI                     |
|            | 125-119   | 0.01mm     | 3.5 - 5mm/8 - 5TPI                    |
|            | 125-120   | 0.01mm     | 5.5 - 7mm/4.5 - 3.5TPI                |

### Accuracy

- ±(2+L/75)µm\*
- \*L=Maximum measuring length (mm), Fraction rounded up

### Dimensions

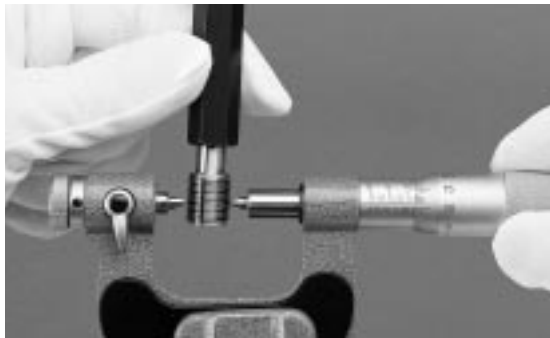
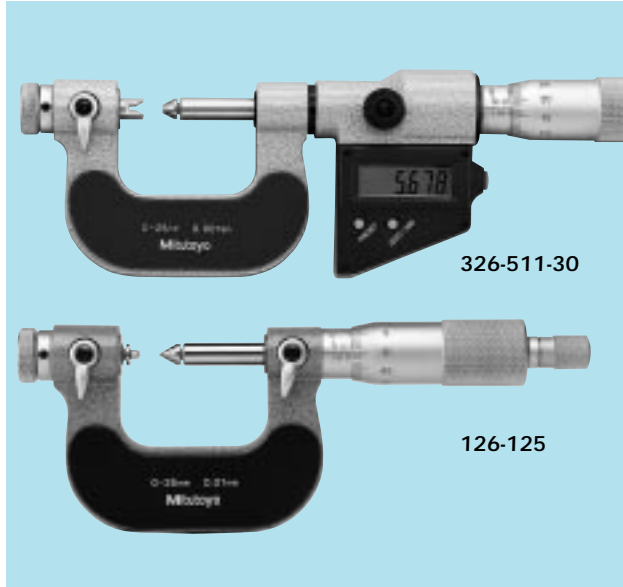


| Range      | L    | a   | c    | d    |
|------------|------|-----|------|------|
| 0 - 25mm   | 37.5 | 5.2 | 25   | 6.35 |
| 25 - 50mm  | 62.5 | 5.2 | 32   | 6.35 |
| 50 - 75mm  | 87   | 4.7 | 49.5 | 6.35 |
| 75 - 100mm | 112  | 4.7 | 63.5 | 6.35 |

## Screw Thread Micrometers

### SERIES 326, 126

Interchangeable Anvil Type



### SPECIFICATIONS

#### Digimatic Screw Thread Micrometers

##### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 0 - 25mm   | 326-511-30 | 0.001mm    | ±4μm     |
| 25 - 50mm  | 326-512-30 | 0.001mm    | ±4μm     |
| 50 - 75mm  | 326-513-30 | 0.001mm    | ±4μm     |
| 75 - 100mm | 326-514-30 | 0.001mm    | ±5μm     |

##### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy |
|---------|------------|-----------------|----------|
| 0 - 1"  | 326-711-30 | .00005"/0.001mm | ±.0002"  |
| 1" - 2" | 326-712-30 | .00005"/0.001mm | ±.0002"  |
| 2" - 3" | 326-713-30 | .00005"/0.001mm | ±.0002"  |
| 3" - 4" | 326-714-30 | .00005"/0.001mm | ±.00025" |

#### Screw Thread Micrometers

##### Metric

| Range       | Order No. | Graduation | Accuracy |
|-------------|-----------|------------|----------|
| 0 - 25mm    | 126-125   | 0.01mm     | ±4μm     |
| 25 - 50mm   | 126-126   | 0.01mm     | ±4μm     |
| 50 - 75mm   | 126-127   | 0.01mm     | ±4μm     |
| 75 - 100mm  | 126-128   | 0.01mm     | ±5μm     |
| 100 - 125mm | 126-129   | 0.01mm     | ±5μm     |
| 125 - 150mm | 126-130   | 0.01mm     | ±5μm     |
| 150 - 175mm | 126-131   | 0.01mm     | ±6μm     |
| 175 - 200mm | 126-132   | 0.01mm     | ±6μm     |
| 200 - 225mm | 126-133   | 0.01mm     | ±6μm     |
| 225 - 250mm | 126-134   | 0.01mm     | ±7μm     |
| 250 - 275mm | 126-135   | 0.01mm     | ±7μm     |
| 275 - 300mm | 126-136   | 0.01mm     | ±7μm     |

##### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 126-137   | .001"      | ±.0002"  |
| 1" - 2" | 126-138   | .001"      | ±.0002"  |
| 2" - 3" | 126-139   | .001"      | ±.0002"  |
| 3" - 4" | 126-140   | .001"      | ±.00025" |

(Models with a range up to 12" are available.)

#### Standards for Screw Thread Micrometers (Optional)

##### Metric

| Size  | Order No. |         |
|-------|-----------|---------|
|       | V=60°     | V=55°   |
| 25mm  | 167-261   | 167-272 |
| 50mm  | 167-262   | 167-273 |
| 75mm  | 167-263   | 167-274 |
| 100mm | 167-264   | 167-275 |
| 125mm | 167-265   | 167-276 |
| 150mm | 167-266   | 167-277 |
| 175mm | 167-267   | 167-278 |
| 200mm | 167-268   | 167-279 |
| 225mm | 167-269   | 167-280 |
| 250mm | 167-270   | 167-281 |
| 275mm | 167-271   | 167-282 |

##### Inch

| Size | Order No. |         |
|------|-----------|---------|
|      | V=60°     | V=55°   |
| 1"   | 167-294   | 167-283 |
| 2"   | 167-295   | 167-284 |
| 3"   | 167-296   | 167-285 |
| 4"   | 167-297   | 167-286 |
| 5"   | 167-298   | 167-287 |
| 6"   | 167-299   | 167-288 |
| 7"   | 167-300   | 167-289 |
| 8"   | 167-301   | 167-290 |
| 9"   | 167-302   | 167-291 |
| 10"  | 167-303   | 167-292 |
| 11"  | 167-304   | 167-293 |

### FEATURES

- 60 degree or 55 degree V-anvil and conical spindle (interchangeable) are optional, which are made of high-grade special steel, hardened and precision ground.

| Applications                                    | Order No. | Assortment of anvil-spindle tips |
|---|-----------|----------------------------------|
| Metric screw,<br>Unified screw<br>(60° threads) | 126-800   | 0.4 - 0.5mm/64 - 48TPI (126-801) |
|   |           | 0.6 - 0.9mm/44 - 28TPI (126-802) |
|   |           | 1 - 1.75mm/24 - 14TPI (126-803)  |
|   |           | 2 - 3mm/13 - 9TPI (126-804)      |
|   |           | 3.5 - 5mm/8 - 5TPI (126-805)     |
|   |           | 5.5 - 7mm/4.5 - 3.5TPI (126-806) |
| Whitworth<br>screw<br>(55° threads)             | 126-810   | 60 - 48TPI (126-811)             |
|   |           | 48 - 40TPI (126-812)             |
|   |           | 40 - 32TPI (126-813)             |
|   |           | 32 - 24TPI (126-814)             |
|   |           | 24 - 18TPI (126-815)             |
|   |           | 18 - 14TPI (126-816)             |
|   |           | 14 - 10TPI (126-817)             |
|   |           | 10 - 7TPI (126-818)              |
|   |           | 7 - 4.5TPI (126-819)             |
|   |           | 4.5 - 3.5TPI (126-820)           |

- Provided with Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.
- The 326 series (LCD readout type) is provided with SPC output.

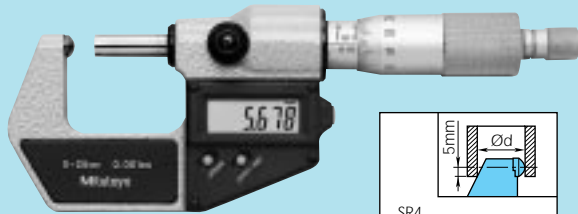


# Tube Micrometers

SERIES 395, 295, 115

Spherical and Cylindrical Anvils

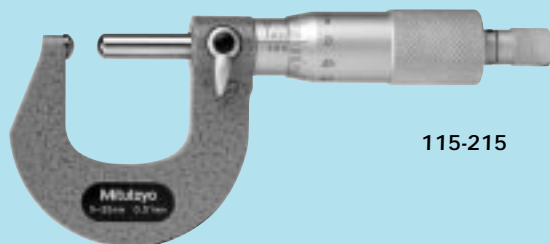
### Spherical Anvil Type



395-511-30



395-541-30



115-215

### FEATURES

- Designed to measure the wall thickness of various tubing.
- The Tube Micrometers have two combinations of measuring faces (carbide-tipped): spherical-flat type, and spherical-spherical type.
- Cylindrical anvils (perpendicular) are also available.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.
- The 295 series is provided with a digit counter.

### SPECIFICATIONS

#### Digimatic Tube Micrometers

##### Metric

| Range      | Order No.   | Resolution | Accuracy           | Mini. ID of tubing |
|------------|-------------|------------|--------------------|--------------------|
| 0 - 25mm   | 395-511-30  | 0.001mm    | $\pm 2\mu\text{m}$ | d: 15mm            |
|            | 395-541-30* | 0.001mm    | $\pm 2\mu\text{m}$ | d: 15mm            |
| 25 - 50mm  | 395-512-30  | 0.001mm    | $\pm 2\mu\text{m}$ | d: 15mm            |
|            | 395-542-30* | 0.001mm    | $\pm 2\mu\text{m}$ | d: 15mm            |
| 50 - 75mm  | 395-513-30  | 0.001mm    | $\pm 2\mu\text{m}$ | d: 19mm            |
|            | 395-543-30* | 0.001mm    | $\pm 2\mu\text{m}$ | d: 19mm            |
| 75 - 100mm | 395-514-30  | 0.001mm    | $\pm 3\mu\text{m}$ | d: 20mm            |
|            | 395-544-30* | 0.001mm    | $\pm 3\mu\text{m}$ | d: 20mm            |

\*Spherical-spherical type

##### Inch/Metric

| Range   | Order No.   | Resolution      | Accuracy      | Mini. ID of tubing |
|---------|-------------|-----------------|---------------|--------------------|
| 0 - 1"  | 395-711-30  | .00005"/0.001mm | $\pm .0001"$  | d: .59"            |
|         | 395-741-30* | .00005"/0.001mm | $\pm .0001"$  | d: .59"            |
| 1" - 2" | 395-712-30  | .00005"/0.001mm | $\pm .0001"$  | d: .59"            |
|         | 395-742-30* | .00005"/0.001mm | $\pm .0001"$  | d: .59"            |
| 2" - 3" | 395-713-30  | .00005"/0.001mm | $\pm .0001"$  | d: .75"            |
|         | 395-743-30* | .00005"/0.001mm | $\pm .0001"$  | d: .75"            |
| 3" - 4" | 395-714-30  | .00005"/0.001mm | $\pm .00015"$ | d: .79"            |
|         | 395-744-30* | .00005"/0.001mm | $\pm .00015"$ | d: .79"            |

\*Spherical-spherical type

#### Digit Tube Micrometers

##### Metric

| Range    | Order No. | Graduation | Accuracy           | Mini. ID of tubing |
|----------|-----------|------------|--------------------|--------------------|
| 0 - 25mm | 295-115   | 0.01mm     | $\pm 3\mu\text{m}$ | d: 10mm            |
|          | 295-215*  | 0.01mm     | $\pm 3\mu\text{m}$ | d: 10mm            |

\*Spherical-spherical type

##### Inch

| Range  | Order No. | Graduation | Accuracy      | Mini. ID of tubing |
|--------|-----------|------------|---------------|--------------------|
| 0 - 1" | 295-153   | .0001"     | $\pm .00015"$ | d: .40"            |
|        | 295-253*  | .0001"     | $\pm .00015"$ | d: .40"            |

\*Spherical-spherical type

## Tube Micrometers

### Metric

| Range      | Order No. | Graduation | Accuracy | Mini. ID of tubing |
|------------|-----------|------------|----------|--------------------|
| 0 - 25mm   | 115-115   | 0.01mm     | ±3μm     | d: 10mm            |
|            | 115-215*  | 0.01mm     | ±3μm     | d: 10mm            |
| 25 - 50mm  | 115-116   | 0.01mm     | ±3μm     | d: 11mm            |
|            | 115-216*  | 0.01mm     | ±3μm     | d: 11mm            |
| 50 - 75mm  | 115-117   | 0.01mm     | ±3μm     | d: 17mm            |
|            | 115-217*  | 0.01mm     | ±3μm     | d: 17mm            |
| 75 - 100mm | 115-118   | 0.01mm     | ±4μm     | d: 18mm            |
|            | 115-218*  | 0.01mm     | ±4μm     | d: 18mm            |

\*Spherical-spherical type

### Inch

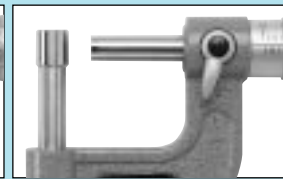
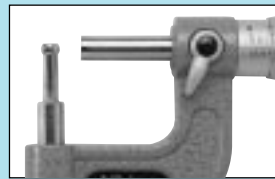
| Range   | Order No. | Graduation | Accuracy | Mini. ID of tubing |
|---------|-----------|------------|----------|--------------------|
| 0 - 1"  | 115-153   | .0001"     | ±.00015" | d: .40"            |
|         | 115-253*  | .0001"     | ±.00015" | d: .40"            |
| 1" - 2" | 115-142   | .001"      | ±.00015" | d: .44"            |
|         | 115-242*  | .001"      | ±.00015" | d: .44"            |
| 2" - 3" | 115-143   | .001"      | ±.00015" | d: .67"            |
|         | 115-243*  | .001"      | ±.00015" | d: .67"            |
| 3" - 4" | 115-144   | .001"      | ±.0002"  | d: .71"            |

\*Spherical-spherical type  
Note: .0001" reading is obtained with vernier.

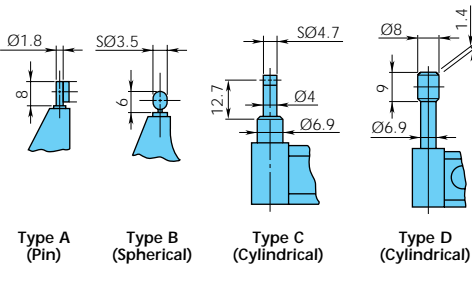
### Cylindrical Anvil Type



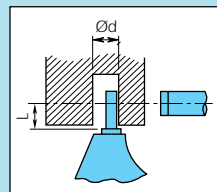
395-531-30



### Cylindrical (Perpendicular) Anvil Dimensions



Unit: mm



(Unit: mm)

| Anvil  | d   | L  |
|--------|-----|----|
| Type A | 2   | 4  |
| Type B | 3.6 | 4  |
| Type C | 4.8 | 12 |
| Type D | 8.2 | 22 |

## Digimatic Tube Micrometers, Cylindrical Anvil (Perpendicular) Type

### Metric

| Range    | Order No.  | Resolution | Accuracy | Remarks |
|----------|------------|------------|----------|---------|
| 0 - 25mm | 395-531-30 | 0.001mm    | ±3μm     | Type A  |
|          | 395-532-30 | 0.001mm    | ±3μm     | Type B  |
|          | 395-533-30 | 0.001mm    | ±3μm     | Type C  |
|          | 395-534-30 | 0.001mm    | ±3μm     | Type D  |

### Inch/Metric

| Range  | Order No.  | Resolution      | Accuracy | Remarks |
|--------|------------|-----------------|----------|---------|
| 0 - 1" | 395-732-30 | .00005"/0.001mm | ±.00015" | Type B  |
|        | 395-733-30 | .00005"/0.001mm | ±.00015" | Type C  |
|        | 395-734-30 | .00005"/0.001mm | ±.00015" | Type D  |

## Tube Micrometers, Cylindrical Anvil (Perpendicular) Type

### Metric

| Range     | Order No. | Graduation | Accuracy | Remarks |
|-----------|-----------|------------|----------|---------|
| 0 - 25mm  | 115-302   | 0.01mm     | ±3μm     | Type A  |
|           | 115-308   | 0.01mm     | ±3μm     | Type B  |
|           | 115-315   | 0.01mm     | ±3μm     | Type C  |
|           | 115-316   | 0.01mm     | ±3μm     | Type D  |
| 25 - 50mm | 115-303   | 0.01mm     | ±3μm     | Type A  |
|           | 115-309   | 0.01mm     | ±3μm     | Type B  |

### Inch

| Range  | Order No. | Graduation | Accuracy | Remarks |
|--------|-----------|------------|----------|---------|
| 0 - 1" | 115-305   | .001"      | ±.00015" | Type A  |
|        | 115-313   | .0001"     | ±.00015" | Type C  |
|        | 115-314   | .0001"     | ±.00015" | Type D  |

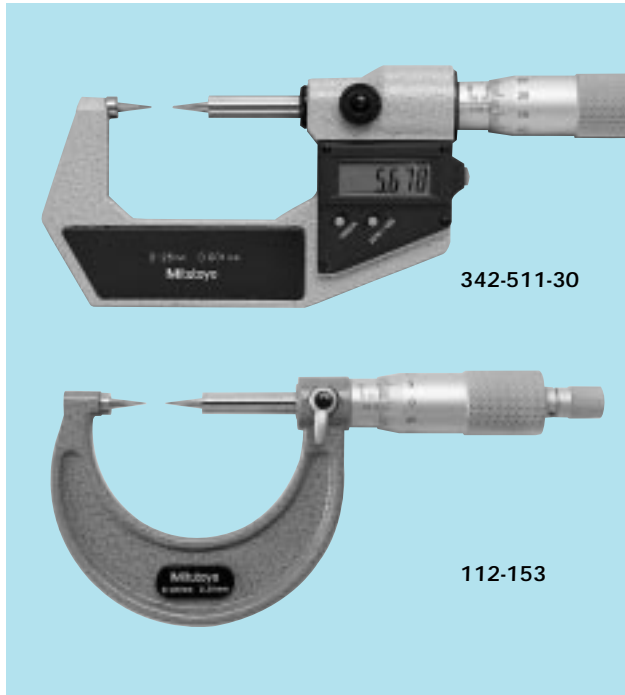
Note: .0001" reading is obtained with vernier.





# Point Micrometers

SERIES 342, 142, 112



## SPECIFICATIONS

### Digimatic Point Micrometers

#### Metric

| Range      | Order No.  | Resolution | Accuracy | Point |
|------------|------------|------------|----------|-------|
| 0 - 25mm   | 342-511-30 | 0.001mm    | ±2µm     | 15°   |
|            | 342-541-30 | 0.001mm    | ±2µm     | 30°   |
| 25 - 50mm  | 342-512-30 | 0.001mm    | ±2µm     | 15°   |
|            | 342-542-30 | 0.001mm    | ±2µm     | 30°   |
| 50 - 75mm  | 342-513-30 | 0.001mm    | ±2µm     | 15°   |
|            | 342-543-30 | 0.001mm    | ±2µm     | 30°   |
| 75 - 100mm | 342-514-30 | 0.001mm    | ±3µm     | 15°   |
|            | 342-544-30 | 0.001mm    | ±3µm     | 30°   |

#### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy | Point |
|---------|------------|-----------------|----------|-------|
| 0 - 1"  | 342-711-30 | .00005"/0.001mm | ±.0001"  | 15°   |
|         | 342-741-30 | .00005"/0.001mm | ±.0001"  | 30°   |
| 1" - 2" | 342-712-30 | .00005"/0.001mm | ±.0001"  | 15°   |
|         | 342-742-30 | .00005"/0.001mm | ±.0001"  | 30°   |
| 2" - 3" | 342-713-30 | .00005"/0.001mm | ±.0001"  | 15°   |
|         | 342-743-30 | .00005"/0.001mm | ±.0001"  | 30°   |
| 3" - 4" | 342-714-30 | .00005"/0.001mm | ±.00015" | 15°   |
|         | 342-744-30 | .00005"/0.001mm | ±.00015" | 30°   |

### Measuring points

- Parallelism: 3µm (.00012")

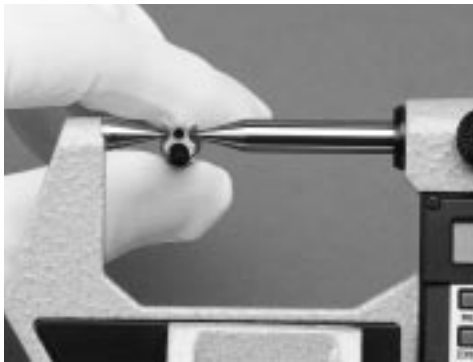
### Digit Point Micrometers

#### Metric

| Range    | Order No. | Graduation | Accuracy | Point |
|----------|-----------|------------|----------|-------|
| 0 - 25mm | 142-153   | 0.01mm     | ±3µm     | 15°   |
|          | 142-201   | 0.01mm     | ±3µm     | 30°   |

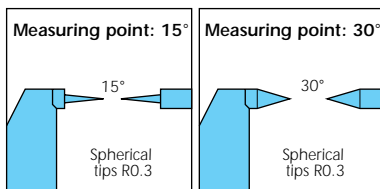
#### Inch

| Range  | Order No. | Graduation | Accuracy | Point |
|--------|-----------|------------|----------|-------|
| 0 - 1" | 142-177   | .001"      | ±.00015" | 15°   |
|        | 142-225   | .001"      | ±.00015" | 30°   |



## FEATURES

- Pointed spindle and anvil for measuring the web thickness of drills, small grooves, keyways, and other hard-to-reach dimensions.
- 15 degree and 30 degree measuring points are available.
- The measuring points (carbide-tipped) have approximately 0.3mm (.012") radius.



- With Ratchet Stop for constant force.
- The 342 series (LCD readout type) is provided with SPC output.
- The 142 series is provided with a digit counter.
- Provided with a standard except for 25mm (1") models.

## Point Micrometers

### Metric

| Range      | Order No. | Graduation | Accuracy | Point |
|------------|-----------|------------|----------|-------|
| 0 - 25mm   | 112-165   | 0.01mm     | ±3μm     | 15°   |
|            | 112-153*  | 0.01mm     | ±3μm     | 15°   |
|            | 112-213   | 0.01mm     | ±3μm     | 30°   |
|            | 112-201*  | 0.01mm     | ±3μm     | 30°   |
| 25 - 50mm  | 112-166   | 0.01mm     | ±3μm     | 15°   |
|            | 112-154*  | 0.01mm     | ±3μm     | 15°   |
|            | 112-214   | 0.01mm     | ±3μm     | 30°   |
|            | 112-202*  | 0.01mm     | ±3μm     | 30°   |
| 50 - 75mm  | 112-167   | 0.01mm     | ±3μm     | 15°   |
|            | 112-155*  | 0.01mm     | ±3μm     | 15°   |
|            | 112-215   | 0.01mm     | ±3μm     | 30°   |
|            | 112-203*  | 0.01mm     | ±3μm     | 30°   |
| 75 - 100mm | 112-168   | 0.01mm     | ±4μm     | 15°   |
|            | 112-156*  | 0.01mm     | ±4μm     | 15°   |
|            | 112-216   | 0.01mm     | ±4μm     | 30°   |
|            | 112-204*  | 0.01mm     | ±4μm     | 30°   |

\*The points have not carbide tips.

### Inch

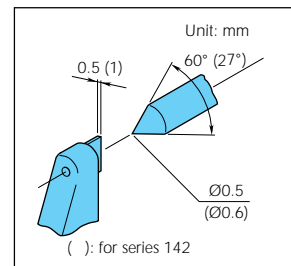
| Range   | Order No. | Graduation | Accuracy | Point |
|---------|-----------|------------|----------|-------|
| 0 - 1"  | 112-189   | .001"      | ±.00015" | 15°   |
|         | 112-177*  | .001"      | ±.00015" | 15°   |
|         | 112-237   | .001"      | ±.00015" | 30°   |
|         | 112-225*  | .001"      | ±.00015" | 30°   |
| 1" - 2" | 112-190   | .001"      | ±.00015" | 15°   |
|         | 112-178*  | .001"      | ±.00015" | 15°   |
|         | 112-238   | .001"      | ±.00015" | 30°   |
|         | 112-226*  | .001"      | ±.00015" | 30°   |
| 2" - 3" | 112-191   | .001"      | ±.00015" | 15°   |

\*The points have not carbide tips.

## Crimp Height Micrometers

SERIES 342, 142, 112

Point Spindle and Blade Anvil



### FEATURES

- Measures the height of crimp contacts.
- With Ratchet Stop for constant force.
- The 342 series (LCD readout type) is provided with SPC output.
- The 142 series is provided with a digit counter.

### SPECIFICATIONS

#### Digimatic Crimp Height Micrometers

##### Metric

| Range    | Order No.  | Resolution | Accuracy |
|----------|------------|------------|----------|
| 0 - 25mm | 342-411-30 | 0.001mm    | ±3μm     |

##### Inch / Metric

| Range  | Order No.  | Resolution      | Accuracy |
|--------|------------|-----------------|----------|
| 0 - 1" | 342-431-30 | .00005"/0.001mm | ±.00015" |

#### Digit Crimp Height Micrometers

##### Metric

| Range    | Order No. | Graduation | Accuracy |
|----------|-----------|------------|----------|
| 0 - 25mm | 142-402   | 0.01mm     | ±3μm     |
|          | 142-403   | 0.001mm    | ±3μm     |

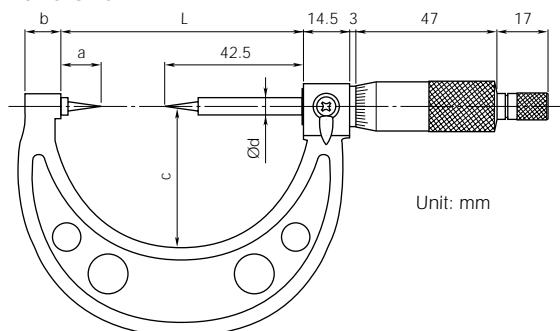
Note: 0.001mm reading is obtained with vernier.

#### Crimp Height Micrometer

##### Metric

| Range    | Order No. | Graduation | Accuracy |
|----------|-----------|------------|----------|
| 0 - 25mm | 112-401   | 0.01mm     | ±3μm     |

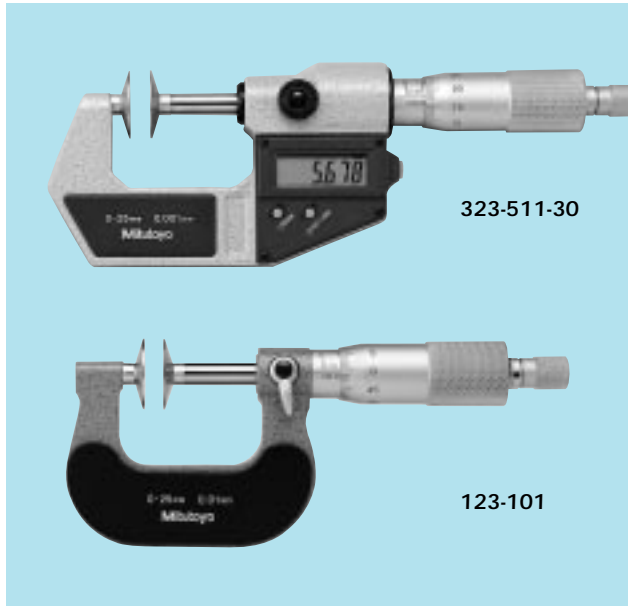
### Dimensions



| Range      | L     | a    | b  | c  | d    |
|------------|-------|------|----|----|------|
| 0 - 25mm   | 55.3  | 12.8 | 10 | 38 | 6.35 |
| 25 - 50mm  | 80.3  | 12.8 | 12 | 49 | 6.35 |
| 50 - 75mm  | 105.3 | 12.8 | 14 | 60 | 6.35 |
| 75 - 100mm | 132.8 | 15.3 | 17 | 79 | 6.35 |

# Disk Micrometers

SERIES 323, 223, 123



## FEATURES

- The Disk Micrometer is designed to easily measure root tangent length of spur gears and helical gears.
- Diameter of measuring disk: 20mm (.79")
- 0.7mm edge thickness to enter narrow recesses.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.
- The 323 series (LCD readout type) is provided with SPC output.
- The 223 series is provided with a mechanical digit counter for quick reading of measurements.

## SPECIFICATIONS

### Digimatic Disk Micrometers

| Metric     |                   |            |          |
|------------|-------------------|------------|----------|
| Range      | Order No.         | Resolution | Accuracy |
| 0 - 25mm   | <b>323-511-30</b> | 0.001mm    | ±4μm     |
| 25 - 50mm  | <b>323-512-30</b> | 0.001mm    | ±4μm     |
| 50 - 75mm  | <b>323-513-30</b> | 0.001mm    | ±6μm     |
| 75 - 100mm | <b>323-514-30</b> | 0.001mm    | ±6μm     |

| Inch / Metric |                   |                 |          |
|---------------|-------------------|-----------------|----------|
| Range         | Order No.         | Resolution      | Accuracy |
| 0 - 1"        | <b>323-711-30</b> | .00005"/0.001mm | ±.0002"  |
| 1" - 2"       | <b>323-712-30</b> | .00005"/0.001mm | ±.0002"  |
| 2" - 3"       | <b>323-713-30</b> | .00005"/0.001mm | ±.0003"  |
| 3" - 4"       | <b>323-714-30</b> | .00005"/0.001mm | ±.0003"  |

### Digit Disk Micrometers

| Metric    |                |            |          |
|-----------|----------------|------------|----------|
| Range     | Order No.      | Resolution | Accuracy |
| 0 - 25mm  | <b>223-101</b> | 0.01mm     | ±4μm     |
| 25 - 50mm | <b>223-102</b> | 0.01mm     | ±4μm     |

| Inch   |                |            |          |
|--------|----------------|------------|----------|
| Range  | Order No.      | Resolution | Accuracy |
| 0 - 1" | <b>223-125</b> | .001"      | ±.0002"  |

### Disk Micrometers

| Metric      |                 |            |          |
|-------------|-----------------|------------|----------|
| Range       | Order No.       | Graduation | Accuracy |
| 0 - 25mm    | <b>123-101</b>  | 0.01mm     | ±4μm     |
|             | <b>123-113*</b> | 0.01mm     | ±4μm     |
| 25 - 50mm   | <b>123-102</b>  | 0.01mm     | ±4μm     |
|             | <b>123-114*</b> | 0.01mm     | ±4μm     |
| 50 - 75mm   | <b>123-103</b>  | 0.01mm     | ±6μm     |
|             | <b>123-115*</b> | 0.01mm     | ±6μm     |
| 75 - 100mm  | <b>123-104</b>  | 0.01mm     | ±6μm     |
|             | <b>123-116*</b> | 0.01mm     | ±6μm     |
| 100 - 125mm | <b>123-105</b>  | 0.01mm     | ±7μm     |
| 125 - 150mm | <b>123-106</b>  | 0.01mm     | ±7μm     |
| 150 - 175mm | <b>123-107</b>  | 0.01mm     | ±8μm     |
| 175 - 200mm | <b>123-108</b>  | 0.01mm     | ±8μm     |
| 200 - 225mm | <b>123-109</b>  | 0.01mm     | ±8μm     |
| 225 - 250mm | <b>123-110</b>  | 0.01mm     | ±9μm     |
| 250 - 275mm | <b>123-111</b>  | 0.01mm     | ±9μm     |
| 275 - 300mm | <b>123-112</b>  | 0.01mm     | ±9μm     |

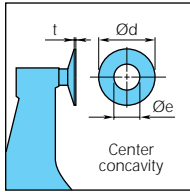
\*The measuring disks have carbide tips.  
Note: The disk diameter of models over 100mm is 30mm.

| Inch    |                |            |          |
|---------|----------------|------------|----------|
| Range   | Order No.      | Graduation | Accuracy |
| 0 - 1"  | <b>123-125</b> | .001"      | ±.0002"  |
| 1" - 2" | <b>123-126</b> | .001"      | ±.0002"  |
| 2" - 3" | <b>123-127</b> | .001"      | ±.0003"  |
| 3" - 4" | <b>123-128</b> | .001"      | ±.0003"  |

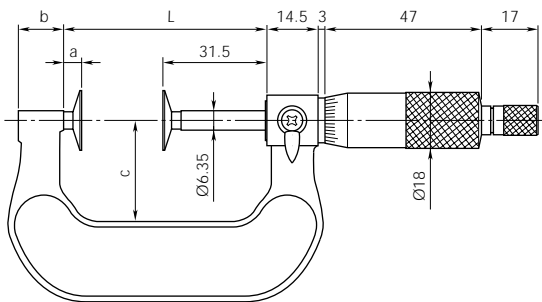
### Measuring faces

- Flatness: 1μm (.00004") for models up to 100mm (4")  
1.6μm for models over 100mm
  - Parallelism: 4μm (.00016") for models up to 50mm (2")  
(4+L/50)μm [(0.0016+.00004 (L/2))"]\*  
for models up to 100mm (4") over 50mm (2")  
(5+L/75)μm\* for models over 100mm
- \* L=Maximum measuring length (mm) [(inch)], Fraction rounded up

### Dimensions



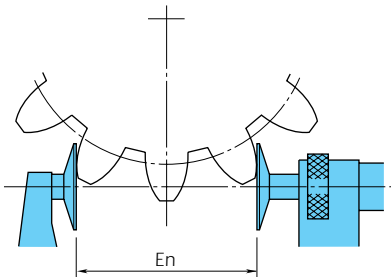
Unit: mm



| Range       | L     | a   | b  | c   | d  | e       | t   |
|-------------|-------|-----|----|-----|----|---------|-----|
| 0 - 25mm    | 37.5  | 6   | 14 | 25  | 20 | 8 (9.8) | 0.7 |
| 25 - 50mm   | 62.5  | 6   | 14 | 32  | 20 | 8 (9.8) | 0.7 |
| 50 - 75mm   | 87    | 5.5 | 11 | 49  | 20 | 8 (9.8) | 0.7 |
| 75 - 100mm  | 112   | 5.5 | 11 | 63  | 20 | 8 (9.8) | 0.7 |
| 100 - 125mm | 137.5 | 6   | 12 | 79  | 30 | 12      | 1   |
| 125 - 150mm | 162.5 | 6   | 15 | 94  | 30 | 12      | 1   |
| 150 - 175mm | 187.5 | 6   | 16 | 106 | 30 | 12      | 1   |
| 175 - 200mm | 212.5 | 6   | 15 | 118 | 30 | 12      | 1   |
| 200 - 225mm | 237.5 | 6   | 14 | 130 | 30 | 12      | 1   |
| 225 - 250mm | 262.5 | 6   | 14 | 143 | 30 | 12      | 1   |
| 250 - 275mm | 287.5 | 6   | 15 | 156 | 30 | 12      | 1   |
| 275 - 300mm | 312.5 | 6   | 15 | 169 | 30 | 12      | 1   |

Data in ( ) applies to those with carbide tipped disks.

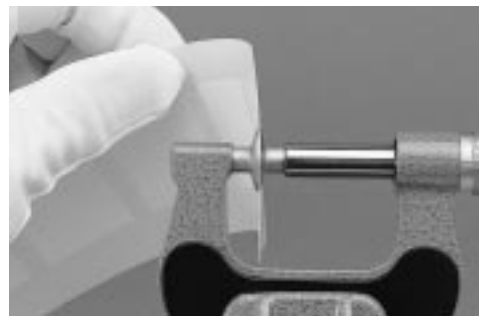
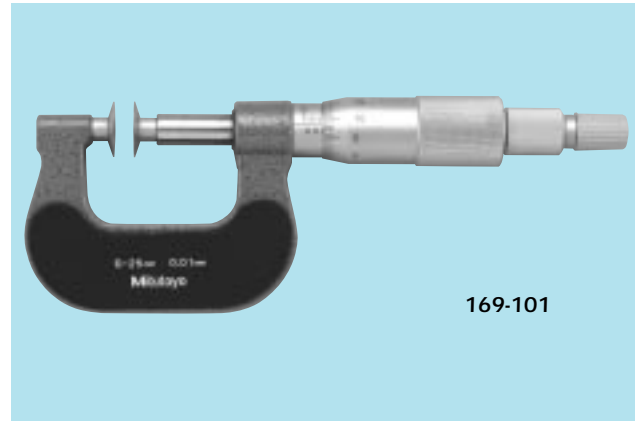
### TECHNICAL INFORMATION



En = Root tangent length  
 Note: Root tangent length measurement is not available for some types of gears.

## Paper Thickness Micrometers

### SERIES 169



### FEATURES

- Designed to measure paper thickness.
- Non-rotating spindle.
- With Ratchet Stop for constant force.

### SPECIFICATIONS

#### Metric

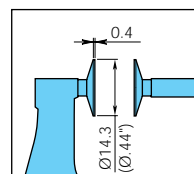
| Range    | Order No. | Graduation | Accuracy |
|----------|-----------|------------|----------|
| 0 - 25mm | 169-101   | 0.01mm     | ±4µm     |

#### Inch

| Range  | Order No. | Graduation | Accuracy |
|--------|-----------|------------|----------|
| 0 - 1" | 169-103   | .001"      | ±.0002"  |

### Measuring faces

- Flatness: 1µm (.00004")
- Parallelism: 3µm (.00012")
- Dimensions



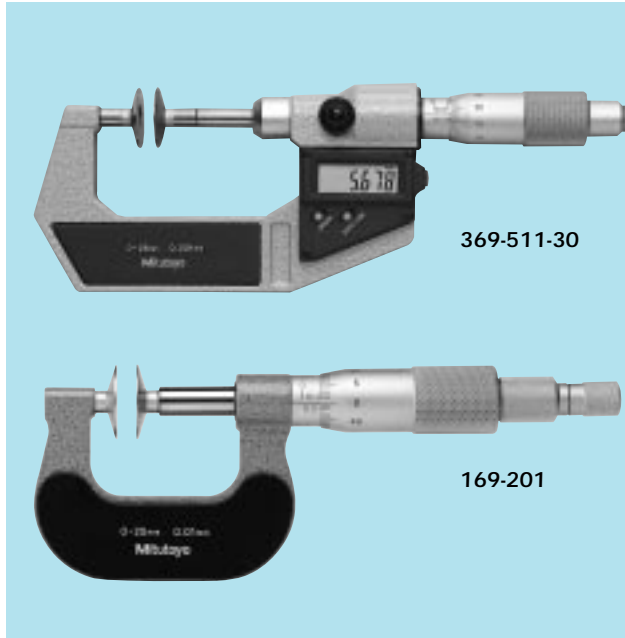
Unit: mm

( ) : Inch model

# Disk Micrometers

SERIES 369, 169

Non-Rotating Spindle Type



## Disk Micrometers

### Metric

| Range      | Order No. | Graduation | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 169-201   | 0.01mm     | ±4µm     |
| 25 - 50mm  | 169-202   | 0.01mm     | ±4µm     |
| 50 - 75mm  | 169-205   | 0.01mm     | ±6µm     |
| 75 - 100mm | 169-207   | 0.01mm     | ±6µm     |

### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 169-203   | .001"      | ±.0002"  |
| 1" - 2" | 169-204   | .001"      | ±.0002"  |
| 2" - 3" | 169-206   | .001"      | ±.0003"  |
| 3" - 4" | 169-208   | .001"      | ±.0003"  |

## FEATURES

- Non-rotating spindle eliminates torque on workpiece.
- Diameter of measuring disk: 20mm (.79")
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.
- The 369 series (LCD readout type) is provided with SPC output.

## SPECIFICATIONS

### Digimatic Disk Micrometers

#### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 0 - 25mm   | 369-511-30 | 0.001mm    | ±4µm     |
| 25 - 50mm  | 369-512-30 | 0.001mm    | ±4µm     |
| 50 - 75mm  | 369-513-30 | 0.001mm    | ±6µm     |
| 75 - 100mm | 369-514-30 | 0.001mm    | ±6µm     |

#### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy |
|---------|------------|-----------------|----------|
| 0 - 1"  | 369-711-30 | .00005"/0.001mm | ±.0002"  |
| 1" - 2" | 369-712-30 | .00005"/0.001mm | ±.0002"  |
| 2" - 3" | 369-713-30 | .00005"/0.001mm | ±.0003"  |
| 3" - 4" | 369-714-30 | .00005"/0.001mm | ±.0003"  |

### Disk Quickmike (See page 83.)

#### Metric

| Range     | Order No. | Resolution | Accuracy | Mass |
|-----------|-----------|------------|----------|------|
| 0 - 30mm  | 369-411   | 0.001mm    | ±4µm     | 360g |
| 25 - 55mm | 369-412   | 0.001mm    | ±4µm     | 490g |

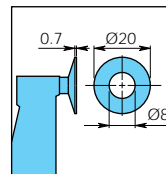
#### Inch/Metric

| Range     | Order No. | Resolution      | Accuracy | Mass      |
|-----------|-----------|-----------------|----------|-----------|
| 0 - 1.2"  | 369-421   | .00005"/0.001mm | ±.00016" | .79 lbs.  |
| 1" - 2.2" | 369-422   | .00005"/0.001mm | ±.00016" | 1.08 lbs. |

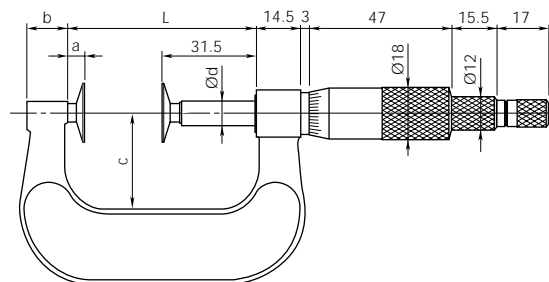
## Measuring faces

- Flatness: 1µm (.00004")
- Parallelism: 4µm (.00016") for models up to 50mm (2")  
6µm (.00024") for models over 50mm (2")

## Dimensions



Unit: mm

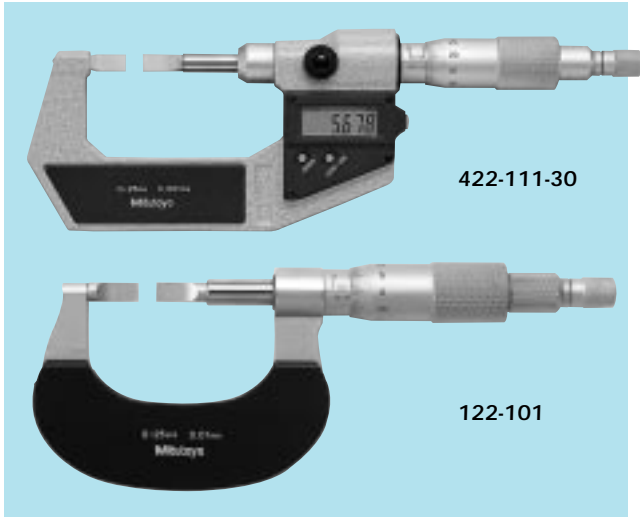


| Range      | L    | a   | b    | c    | d |
|------------|------|-----|------|------|---|
| 0 - 25mm   | 37.5 | 6   | 13.5 | 25   | 8 |
| 25 - 50mm  | 62.5 | 6   | 13.5 | 32   | 8 |
| 50 - 75mm  | 87   | 5.5 | 13   | 49.5 | 8 |
| 75 - 100mm | 112  | 5.5 | 13   | 63.5 | 8 |

## Blade Micrometers

SERIES 422, 122

Non-Rotating Spindle Type

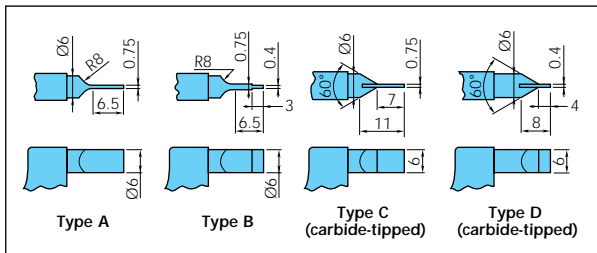


### FEATURES

- The anvil and the spindle have a blade for measuring the groove diameter of shafts, keyways, and other hard-to-reach portions.

#### Blade Dimensions

Unit: mm



- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.
- The 222 series is provided with a digit counter.

**Blade Quickmike** (See page 83.)

#### Metric

| Range     | Order No. | Resolution | Accuracy | Mass |
|-----------|-----------|------------|----------|------|
| 0 - 30mm  | 422-411   | 0.001mm    | ±3µm     | 350g |
| 25 - 55mm | 422-412   | 0.001mm    | ±3µm     | 490g |

#### Inch/Metric

| Range     | Order No. | Resolution      | Accuracy | Mass      |
|-----------|-----------|-----------------|----------|-----------|
| 0 - 1.2"  | 422-421   | .00005"/0.001mm | ±.00012" | .77 lbs.  |
| 1" - 2.2" | 422-422   | .00005"/0.001mm | ±.00012" | 1.08 lbs. |

### SPECIFICATIONS

#### Digimatic Blade Micrometers

##### Metric

| Range      | Order No.  | Resolution | Accuracy | Remarks |
|------------|------------|------------|----------|---------|
| 0 - 25mm   | 422-111-30 | 0.001mm    | ±3µm     | Type A  |
|            | 422-141-30 | 0.001mm    | ±3µm     | Type B  |
|            | 422-121-30 | 0.001mm    | ±3µm     | Type C  |
|            | 422-151-30 | 0.001mm    | ±3µm     | Type D  |
| 25 - 50mm  | 422-112-30 | 0.001mm    | ±3µm     | Type A  |
|            | 422-142-30 | 0.001mm    | ±3µm     | Type B  |
| 50 - 75mm  | 422-113-30 | 0.001mm    | ±3µm     | Type A  |
| 75 - 100mm | 422-114-30 | 0.001mm    | ±4µm     | Type A  |

##### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy | Remarks |
|---------|------------|-----------------|----------|---------|
| 0 - 1"  | 422-311-30 | .00005"/0.001mm | ±.00015" | Type A  |
|         | 422-341-30 | .00005"/0.001mm | ±.00015" | Type B  |
|         | 422-321-30 | .00005"/0.001mm | ±.00015" | Type C  |
|         | 422-351-30 | .00005"/0.001mm | ±.00015" | Type D  |
| 1" - 2" | 422-312-30 | .00005"/0.001mm | ±.00015" | Type A  |
|         | 422-342-30 | .00005"/0.001mm | ±.00015" | Type B  |
| 2" - 3" | 422-313-30 | .00005"/0.001mm | ±.00015" | Type A  |
| 3" - 4" | 422-314-30 | .00005"/0.001mm | ±.0002"  | Type A  |

#### Blade Micrometers

##### Metric

| Range       | Order No. | Graduation | Accuracy | Remarks |
|-------------|-----------|------------|----------|---------|
| 0 - 25mm    | 122-101   | 0.01mm     | ±3µm     | Type A  |
|             | 122-111   | 0.01mm     | ±3µm     | Type B  |
|             | 122-161   | 0.01mm     | ±3µm     | Type C  |
|             | 122-141   | 0.01mm     | ±3µm     | Type D  |
| 25 - 50mm   | 122-102   | 0.01mm     | ±3µm     | Type A  |
|             | 122-112   | 0.01mm     | ±3µm     | Type B  |
|             | 122-162   | 0.01mm     | ±3µm     | Type C  |
|             | 122-142   | 0.01mm     | ±3µm     | Type D  |
| 50 - 75mm   | 122-103   | 0.01mm     | ±3µm     | Type A  |
| 75 - 100mm  | 122-104   | 0.01mm     | ±4µm     | Type A  |
| 100 - 125mm | 122-105   | 0.01mm     | ±4µm     | Type A  |
| 125 - 150mm | 122-106   | 0.01mm     | ±4µm     | Type A  |
| 150 - 175mm | 122-107   | 0.01mm     | ±5µm     | Type A  |
| 175 - 200mm | 122-108   | 0.01mm     | ±5µm     | Type A  |

##### Inch

| Range   | Order No. | Graduation | Accuracy | Remarks |
|---------|-----------|------------|----------|---------|
| 0 - 1"  | 122-125   | .0001"     | ±.00015" | Type A  |
|         | 122-135   | .0001"     | ±.00015" | Type B  |
|         | 122-151   | .0001"     | ±.00015" | Type D  |
| 1" - 2" | 122-126   | .0001"     | ±.00015" | Type A  |
|         | 122-136   | .0001"     | ±.00015" | Type B  |
| 2" - 3" | 122-127   | .0001"     | ±.00015" | Type A  |
| 3" - 4" | 122-128   | .0001"     | ±.0002"  | Type A  |

#### Measuring faces

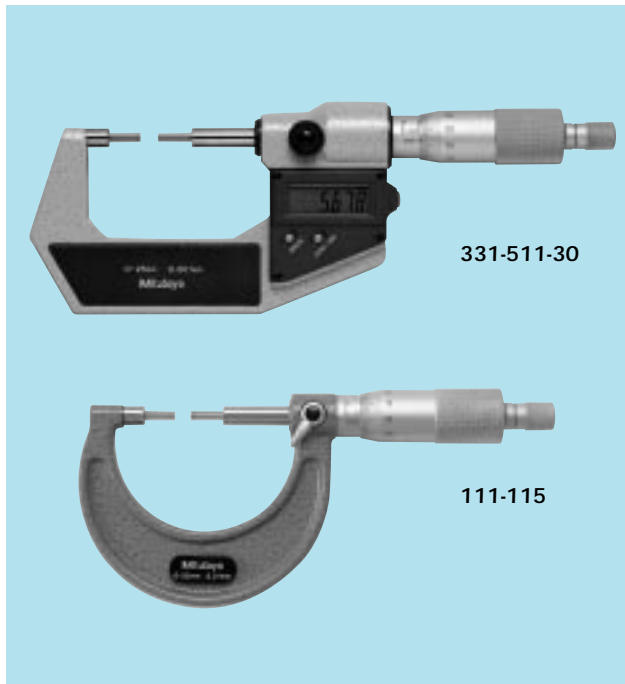
- Parallelism: 3µm (.00012") for models up to 50mm (2") (3+L/100)µm [(0.00012+.00004 (L/4))"] for models over 50mm (2")\*

\* L=Maximum measuring length (mm) [(Inch)], Fraction rounded up



# Spline Micrometers

SERIES 331, 111



## SPECIFICATIONS

### Digimatic Spline Micrometers

#### Metric

| Range      | Order No.  | Resolution | Accuracy | Remarks |
|------------|------------|------------|----------|---------|
| 0 - 25mm   | 331-511-30 | 0.001mm    | ±2µm     | Type A  |
|            | 331-541-30 | 0.001mm    | ±2µm     | Type B  |
| 25 - 50mm  | 331-512-30 | 0.001mm    | ±2µm     | Type A  |
|            | 331-542-30 | 0.001mm    | ±2µm     | Type B  |
| 50 - 75mm  | 331-513-30 | 0.001mm    | ±2µm     | Type A  |
|            | 331-543-30 | 0.001mm    | ±2µm     | Type B  |
| 75 - 100mm | 331-514-30 | 0.001mm    | ±3µm     | Type A  |
|            | 331-544-30 | 0.001mm    | ±3µm     | Type B  |

#### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy | Remarks |
|---------|------------|-----------------|----------|---------|
| 0 - 1"  | 331-711-30 | .00005"/0.001mm | ±.0001"  | Type A  |
|         | 331-741-30 | .00005"/0.001mm | ±.0001"  | Type B  |
| 1" - 2" | 331-712-30 | .00005"/0.001mm | ±.0001"  | Type A  |
|         | 331-742-30 | .00005"/0.001mm | ±.0001"  | Type B  |
| 2" - 3" | 331-713-30 | .00005"/0.001mm | ±.0001"  | Type A  |
|         | 331-743-30 | .00005"/0.001mm | ±.0001"  | Type B  |
| 3" - 4" | 331-714-30 | .00005"/0.001mm | ±.00015" | Type A  |
|         | 331-744-30 | .00005"/0.001mm | ±.00015" | Type B  |

### Spline Micrometers

#### Metric

| Range       | Order No. | Graduation | Accuracy | Remarks |
|-------------|-----------|------------|----------|---------|
| 0 - 25mm    | 111-115   | 0.01mm     | ±3µm     | Type A  |
|             | 111-215   | 0.01mm     | ±3µm     | Type B  |
| 25 - 50mm   | 111-116   | 0.01mm     | ±3µm     | Type A  |
| 50 - 75mm   | 111-117   | 0.01mm     | ±3µm     | Type A  |
| 75 - 100mm  | 111-118   | 0.01mm     | ±4µm     | Type A  |
| 100 - 125mm | 111-119   | 0.01mm     | ±4µm     | Type A  |
| 125 - 150mm | 111-120   | 0.01mm     | ±4µm     | Type A  |
| 150 - 175mm | 111-121   | 0.01mm     | ±5µm     | Type A  |
| 175 - 200mm | 111-122   | 0.01mm     | ±5µm     | Type A  |

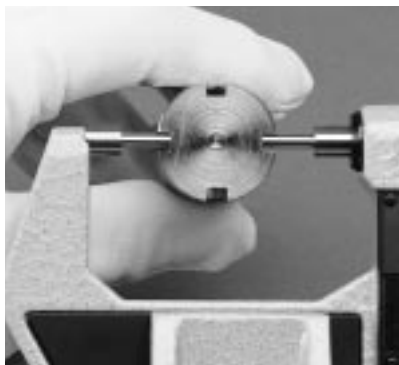
#### Inch

| Range   | Order No. | Graduation | Accuracy | Remarks |
|---------|-----------|------------|----------|---------|
| 0 - 1"  | 111-166   | .0001"     | ±.00015" | Type A  |
| 1" - 2" | 111-142   | .001"      | ±.00015" | Type A  |
| 2" - 3" | 111-143   | .001"      | ±.00015" | Type A  |

Note: .0001" reading is obtained with vernier.

### Measuring faces

- Flatness: 0.3µm (.000012")
  - Parallelism: (2+L/100)µm [(.00008+.00004 (L/4))"]\*
- \*L=Maximum measuring length (mm) [(inch)], Fraction rounded up

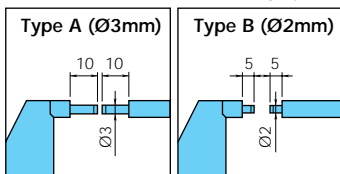


## FEATURES

- The anvil and spindle have a small diameter for measuring splined shafts, slots, and keyways.

### Anvil/Spindle Dimensions

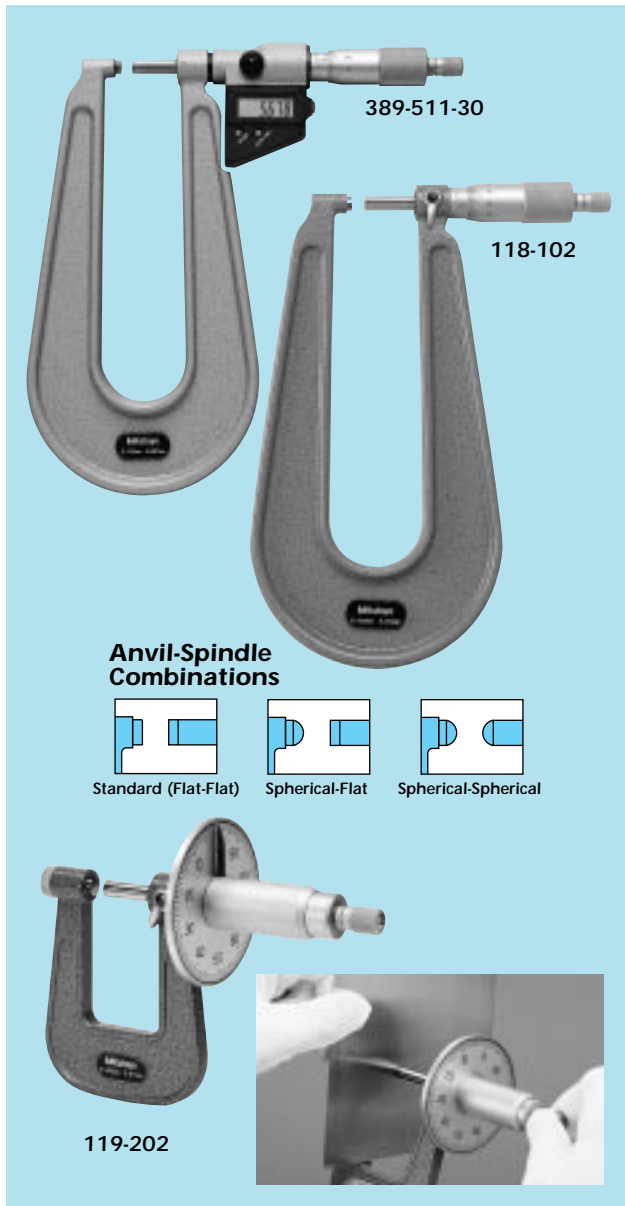
Unit: mm



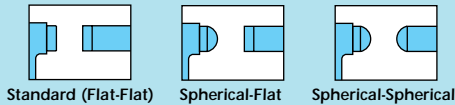
- Carbide-tipped measuring faces.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.
- The 331 series (LCD readout type) is provided with SPC output.

## Sheet Metal Micrometers

SERIES 389, 189, 119, 118



### Anvil-Spindle Combinations



Standard (Flat-Flat) Spherical-Flat Spherical-Spherical

119-202

### FEATURES

- Measures thickness of sheet metal, paper, plastic, and rubber parts.
- Carbide-tipped measuring faces.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.
- The 189 series is provided with a digit counter.
- The 119 series is provided with a dial for making easy and quick reading.
- The 118 series has three combinations of measuring faces: flat-flat type, spherical-flat type, and spherical-spherical type.

### Measuring faces

- Flatness: 0.6μm (.000024") for models with 150mm (6") or less throat depth  
1μm (.00004") for models with 300mm (12") throat depth
- Parallelism: 3μm (.00012")

### SPECIFICATIONS

#### Digimatic Sheet Metal Micrometers

##### Metric

| Range     | Order No.    | Resolution | Accuracy | Throat |
|-----------|--------------|------------|----------|--------|
| 0 - 25mm  | 389-511-30   | 0.001mm    | ±4μm     | 160mm  |
|           | 389-531-30*  | 0.001mm    | ±4μm     | 160mm  |
|           | 389-541-30** | 0.001mm    | ±4μm     | 160mm  |
| 25 - 50mm | 389-513      | 0.001mm    | ±5μm     | 300mm  |
|           | 389-521-30   | 0.001mm    | ±4μm     | 165mm  |
|           | 389-532-30*  | 0.001mm    | ±4μm     | 165mm  |
|           | 389-542-30** | 0.001mm    | ±4μm     | 165mm  |

\*Spherical anvil and flat spindle

\*\*Spherical anvil and spherical spindle

##### Inch/Metric

| Range   | Order No.    | Resolution      | Accuracy | Throat |
|---------|--------------|-----------------|----------|--------|
| 0 - 1"  | 389-711-30   | .00005"/0.001mm | ±.0002"  | 6"     |
|         | 389-731-30*  | .00005"/0.001mm | ±.0002"  | 6"     |
|         | 389-741-30** | .00005"/0.001mm | ±.0002"  | 6"     |
|         | 389-713      | .00005"/0.001mm | ±.00025" | 12"    |
| 1" - 2" | 389-721-30   | .00005"/0.001mm | ±.0002"  | 6"     |
|         | 389-732-30*  | .00005"/0.001mm | ±.0002"  | 6"     |
|         | 389-742-30** | .00005"/0.001mm | ±.0002"  | 6"     |

\*Spherical anvil and flat spindle

\*\*Spherical anvil and spherical spindle

#### Digit Sheet Metal Micrometers

##### Metric

| Range    | Order No. | Resolution | Accuracy | Throat |
|----------|-----------|------------|----------|--------|
| 0 - 25mm | 189-102   | 0.01mm     | ±4μm     | 150mm  |

##### Inch

| Range  | Order No. | Resolution | Accuracy | Throat |
|--------|-----------|------------|----------|--------|
| 0 - 1" | 189-129   | .0001"     | ±.0002"  | 6"     |

Note: .0001" reading is obtained with vernier.

#### Sheet Metal Micrometers

##### Metric

| Range     | Order No. | Graduation | Accuracy | Throat |
|-----------|-----------|------------|----------|--------|
| 0 - 25mm  | 118-101   | 0.01mm     | ±4μm     | 100mm  |
|           | 118-102   | 0.01mm     | ±4μm     | 150mm  |
|           | 118-114*  | 0.01mm     | ±4μm     | 150mm  |
|           | 118-118** | 0.01mm     | ±4μm     | 150mm  |
|           | 118-103   | 0.01mm     | ±5μm     | 300mm  |
| 25 - 50mm | 118-110   | 0.01mm     | ±4μm     | 150mm  |

\*Spherical anvil and flat spindle

\*\*Spherical anvil and spherical spindle

##### Inch

| Range   | Order No. | Graduation | Accuracy | Throat |
|---------|-----------|------------|----------|--------|
| 0 - 1"  | 118-129   | .0001"     | ±.0002"  | 6"     |
|         | 118-116*  | .0001"     | ±.0002"  | 6"     |
|         | 118-120** | .0001"     | ±.0002"  | 6"     |
|         | 118-107   | .001"      | ±.00025" | 12"    |
| 1" - 2" | 118-112   | .001"      | ±.0002"  | 6"     |

\*Spherical anvil and flat spindle

\*\*Spherical anvil and spherical spindle

Note: .0001" reading is obtained with vernier.

#### Sheet Metal Micrometer with dial

##### Metric

| Range    | Order No. | Graduation | Accuracy | Throat |
|----------|-----------|------------|----------|--------|
| 0 - 25mm | 119-202*  | 0.01mm     | ±4μm     | 50mm   |

\*Spherical anvil and flat spindle

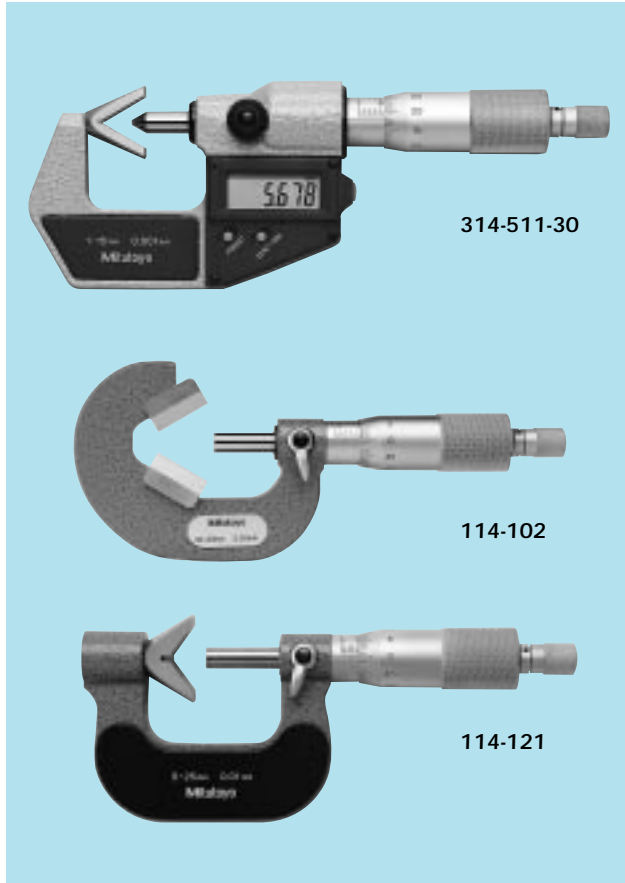




# V-Anvil Micrometers

SERIES 314, 114

3 Flutes and 5 Flutes



## SPECIFICATIONS

### Digimatic V-Anvil Micrometers (3 Flutes)

#### Metric

| Range     | Order No.  | Resolution | Accuracy | Remarks   |
|-----------|------------|------------|----------|-----------|
| 1 - 15mm  | 314-511-30 | 0.001mm    | ±4µm     | w/ Groove |
|           | 314-521-30 | 0.001mm    | ±4µm     | —         |
| 10 - 25mm | 314-512-30 | 0.001mm    | ±4µm     | w/ Groove |
|           | 314-522-30 | 0.001mm    | ±4µm     | —         |
| 25 - 40mm | 314-513-30 | 0.001mm    | ±5µm     | —         |

#### Inch / Metric

| Range      | Order No.  | Resolution      | Accuracy | Remarks   |
|------------|------------|-----------------|----------|-----------|
| .05" - .6" | 314-711-30 | .00005"/0.001mm | ±.0002"  | w/ Groove |
|            | 314-721-30 | .00005"/0.001mm | ±.0002"  | —         |
| .4" - 1"   | 314-712-30 | .00005"/0.001mm | ±.0002"  | w/ Groove |
|            | 314-722-30 | .00005"/0.001mm | ±.0002"  | —         |
| 1" - 1.6"  | 314-713-30 | .00005"/0.001mm | ±.00025" | —         |

### V-Anvil Micrometers (3 Flutes)

#### Metric

| Range      | Order No. | Graduation | Accuracy | Remarks   |
|------------|-----------|------------|----------|-----------|
| 1 - 15mm   | 114-101   | 0.01mm     | ±4µm     | w/ Groove |
|            | 114-161   | 0.01mm     | ±4µm     | —         |
| 10 - 25mm  | 114-102   | 0.01mm     | ±4µm     | w/ Groove |
|            | 114-162   | 0.01mm     | ±4µm     | —         |
| 2.3 - 25mm | 114-204*  | 0.01mm     | ±4µm     | —         |
| 25 - 40mm  | 114-103   | 0.01mm     | ±5µm     | —         |
| 40 - 55mm  | 114-104   | 0.01mm     | ±6µm     | —         |
| 55 - 70mm  | 114-105   | 0.01mm     | ±6µm     | —         |
| 70 - 85mm  | 114-106   | 0.01mm     | ±7µm     | —         |
| 85 - 100mm | 114-107   | 0.01mm     | ±7µm     | —         |

\*Carbide-tipped anvil

#### Inch

| Range       | Order No. | Graduation | Accuracy | Remarks |
|-------------|-----------|------------|----------|---------|
| .05" - .6"  | 114-163   | .001"      | ±.0002"  | —       |
| .09" - 1"   | 114-202*  | .0001"     | ±.0002"  | —       |
| 1" - 1.6"   | 114-113   | .001"      | ±.00025" | —       |
| 1.6" - 2.2" | 114-114   | .001"      | ±.0003"  | —       |

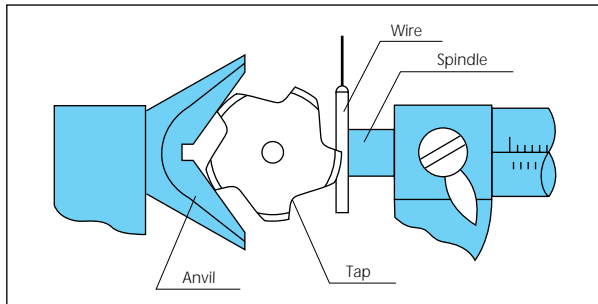
\*Carbide-tipped anvil

Note: .0001" reading is obtained with vernier.

## FEATURES

- Measures the outside diameter of cutting heads (such as taps, reamers, end mills) with an odd number of flutes.
- Carbide-tipped spindle.
- With Ratchet Stop for constant force.
- V-anvils with a centerline groove are available. They are useful for measuring pitch diameters of taps which have a small diameter by using single-wire method.

### Pitch Diameter Measurement of Tap by Single-wire Method



- Supplied with a standard for zero point adjustment.
- The 314 series (LCD readout type) is provided with SPC output.

## V-Anvil Micrometers (5 Flutes)

### Metric

| Range      | Order No. | Graduation | Accuracy | Remarks   |
|------------|-----------|------------|----------|-----------|
| 5 - 25mm   | 114-121   | 0.01mm     | ±4μm     | w/ Groove |
|            | 114-165   | 0.01mm     | ±4μm     | —         |
| 2.3 - 25mm | 114-137*  | 0.01mm     | ±4μm     | —         |
| 25 - 45mm  | 114-122   | 0.01mm     | ±5μm     | —         |
| 45 - 65mm  | 114-123   | 0.01mm     | ±6μm     | —         |
| 65 - 85mm  | 114-124   | 0.01mm     | ±7μm     | —         |

\*Carbide-tipped anvil

### Inch

| Range     | Order No. | Graduation | Accuracy | Remarks |
|-----------|-----------|------------|----------|---------|
| .09" - 1" | 114-135*  | .0001"     | ±.0002"  | —       |
| 1" - 1.8" | 114-129   | .001"      | ±.00025" | —       |

\*Carbide-tipped anvil

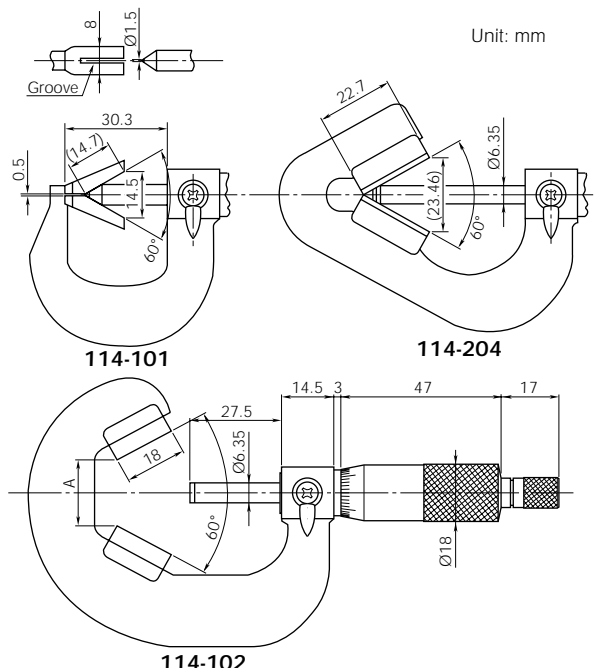
Note: .0001" reading is obtained with vernier.

## V-Anvil Micrometers (7 Flutes)

### Metric

| Range     | Order No. | Graduation | Accuracy | Remarks |
|-----------|-----------|------------|----------|---------|
| 5 - 25mm  | 114-151   | 0.01mm     | ±4μm     | —       |
| 25 - 45mm | 114-152   | 0.01mm     | ±5μm     | —       |

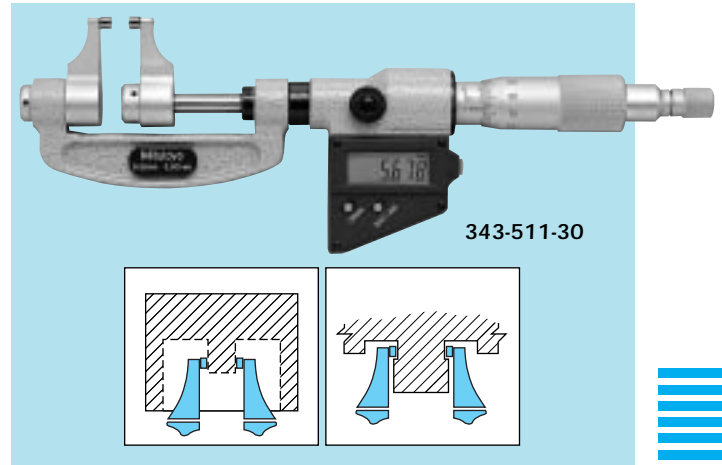
## Dimensions



| Range      | A     |
|------------|-------|
| 10 - 25mm  | 6.2   |
| 25 - 40mm  | 19.14 |
| 40 - 55mm  | 32.13 |
| 55 - 70mm  | 45.12 |
| 70 - 85mm  | 58.11 |
| 85 - 100mm | 71.1  |

## Caliper Type Micrometers

### SERIES 343, 143



## FEATURES

- Carbide-tipped measuring faces.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.

## SPECIFICATIONS

### Digimatic Caliper Type Micrometers

#### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 0 - 25mm   | 343-511-30 | 0.001mm    | ±5μm     |
| 25 - 50mm  | 343-512-30 | 0.001mm    | ±6μm     |
| 50 - 75mm  | 343-513-30 | 0.001mm    | ±7μm     |
| 75 - 100mm | 343-514-30 | 0.001mm    | ±8μm     |

#### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy |
|---------|------------|-----------------|----------|
| 0 - 1"  | 343-711-30 | .00005"/0.001mm | ±.00025" |
| 1" - 2" | 343-712-30 | .00005"/0.001mm | ±.0003"  |
| 2" - 3" | 343-713-30 | .00005"/0.001mm | ±.00035" |
| 3" - 4" | 343-714-30 | .00005"/0.001mm | ±.0004"  |

## Caliper Type Micrometers

#### Metric

| Range       | Order No. | Graduation | Accuracy |
|-------------|-----------|------------|----------|
| 0 - 25mm    | 143-101   | 0.01mm     | ±5μm     |
| 25 - 50mm   | 143-102   | 0.01mm     | ±6μm     |
| 50 - 75mm   | 143-103   | 0.01mm     | ±7μm     |
| 75 - 100mm  | 143-104   | 0.01mm     | ±8μm     |
| 100 - 125mm | 143-105   | 0.01mm     | ±9μm     |

Models with a range up to 300mm are available.

#### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 143-121   | .001"      | ±.00025" |
| 1" - 2" | 143-122   | .001"      | ±.0003"  |

Models with a range up to 4" are available.

## Measuring faces

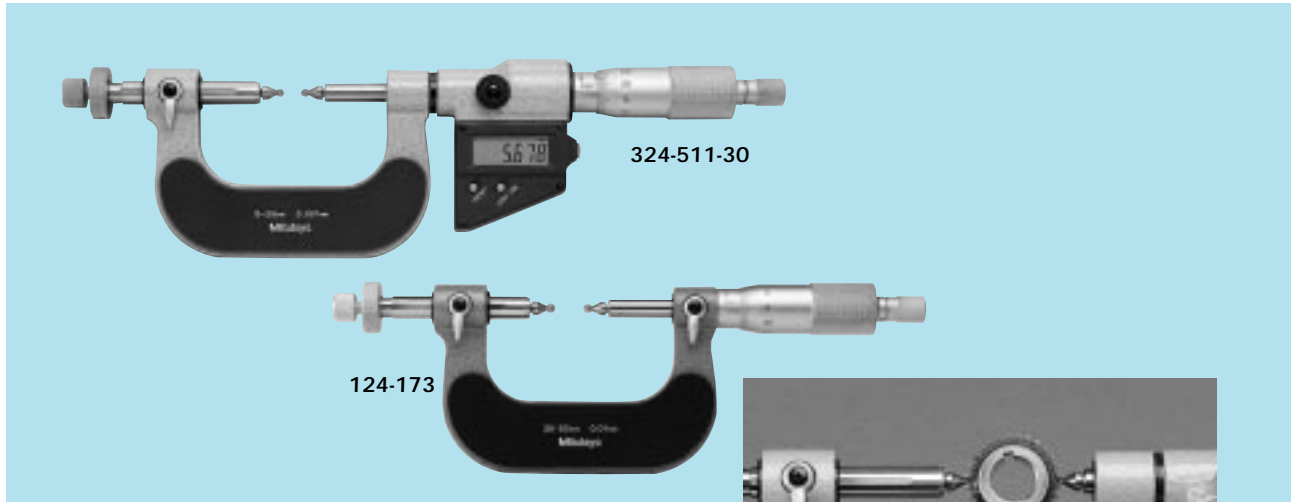
- Flatness: 0.3μm (.000012")
  - Parallelism: (3+L/75)μm [(0.00012+.00004 (L/3))"]\*
- \* L=Maximum measuring length (mm) [(inch)], Fraction rounded down



# Gear Tooth Micrometers

SERIES 324, 124

Interchangeable Ball Anvil Type



## FEATURES

- Measures over-pin diameter of gears with precision steel (carbide) ball-tipped measuring faces.
- Interchangeable ball anvils for various gear modules (0.5 - 5.25) are optional.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.

## SPECIFICATIONS

### Digimatic Gear Tooth Micrometers

#### Metric

| Range      | Order No.  | Resolution | Accuracy |
|------------|------------|------------|----------|
| 0 - 25mm   | 324-511-30 | 0.001mm    | ±4μm     |
| 25 - 50mm  | 324-512-30 | 0.001mm    | ±4μm     |
| 50 - 75mm  | 324-513-30 | 0.001mm    | ±4μm     |
| 75 - 100mm | 324-514-30 | 0.001mm    | ±5μm     |

#### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy |
|---------|------------|-----------------|----------|
| 0 - 1"  | 324-711-30 | .00005"/0.001mm | ±.0002"  |
| 1" - 2" | 324-712-30 | .00005"/0.001mm | ±.0002"  |
| 2" - 3" | 324-713-30 | .00005"/0.001mm | ±.0002"  |
| 3" - 4" | 324-714-30 | .00005"/0.001mm | ±.00025" |

### Gear Tooth Micrometers

#### Metric

| Range       | Order No. | Graduation | Accuracy |
|-------------|-----------|------------|----------|
| 0 - 25mm    | 124-173   | 0.01mm     | ±4μm     |
| 25 - 50mm   | 124-174   | 0.01mm     | ±4μm     |
| 50 - 75mm   | 124-175   | 0.01mm     | ±4μm     |
| 75 - 100mm  | 124-176   | 0.01mm     | ±5μm     |
| 100 - 125mm | 124-177   | 0.01mm     | ±5μm     |
| 125 - 150mm | 124-178   | 0.01mm     | ±5μm     |
| 150 - 175mm | 124-179   | 0.01mm     | ±6μm     |
| 175 - 200mm | 124-180   | 0.01mm     | ±6μm     |
| 200 - 225mm | 124-181   | 0.01mm     | ±6μm     |
| 225 - 250mm | 124-182   | 0.01mm     | ±7μm     |
| 250 - 275mm | 124-183   | 0.01mm     | ±7μm     |
| 275 - 300mm | 124-195   | 0.01mm     | ±7μm     |

### Interchangeable Ball Anvils (Optional)

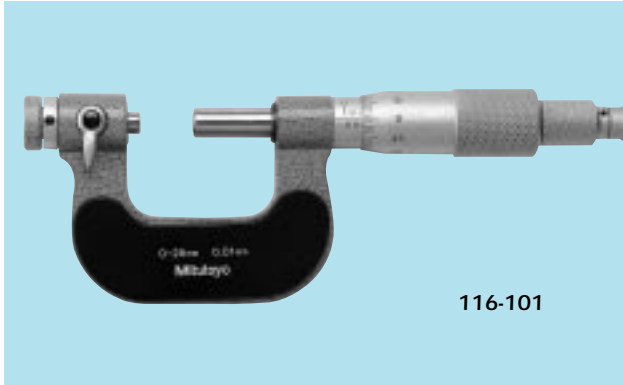
| Diameter of ball anvils | Order No. | Gears to be measured |                 |
|-------------------------|-----------|----------------------|-----------------|
|                         |           | Module               | Diametral pitch |
| 0.8mm                   | 124-801*  | 0.5 - 0.55           | 50              |
| 1mm                     | 124-802*  | 0.6 - 0.65           | 45              |
| 1.191mm (3/64")         | 124-803*  | 0.7 - 0.8            | 35 - 30         |
| 1.5mm                   | 124-821*  | 0.9 - 1              | 28 - 26         |
| 1.588mm (1/16")         | 124-804*  | 0.9 - 1              | 28 - 26         |
| 2mm                     | 124-805   | 1.25                 | 22              |
| 2.381mm (3/32")         | 124-806   | 1.5                  | 17              |
| 2.5mm                   | 124-822   | 1.5                  | 17              |
| 3mm                     | 124-807   | 1.75                 | 15              |
| 3.175mm (1/8")          | 124-808   | —                    | 14              |
| 3.5mm                   | 124-823   | 2                    | 13              |
| 3.969mm (5/32")         | 124-809   | 2                    | 13              |
| 4mm                     | 124-810   | 2.25                 | 11              |
| 4.5mm                   | 124-824   | 2.5                  | 10              |
| 4.763mm (3/16")         | 124-811   | 2.5                  | 10              |
| 5mm                     | 124-812   | 2.75                 | 9               |
| 5.556mm (7/32")         | 124-813   | 3.0 - 3.25           | 8               |
| 6mm                     | 124-814   | 3.5                  | 7               |
| 6.35mm (1/4")           | 124-815   | 3.75                 | 7               |
| 7mm                     | 124-816   | 4.0                  | 6.5             |
| 7.144mm (9/32")         | 124-817   | 4.25                 | 6               |
| 7.938mm (5/16")         | 124-818   | 4.5                  | 5.5             |
| 8mm                     | 124-819   | 4.75                 | 5.5             |
| 8.731mm (11/32")        | 124-820   | 5.0 - 5.25           | 5               |

\*Carbide-tipped anvil

## Universal Micrometers

### SERIES 116

Interchangeable Anvil Type



116-101

#### FEATURES

- Non-rotating spindle with seven interchangeable anvils (flat, spline, spherical, point, knife-edge, disk, and blade) for a wide range of applications.
- Interchangeable anvils (pair) are optional.
- V-anvils and conical spindle tips (matching pair) for screw thread measurement are also available.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.

#### SPECIFICATIONS

##### Metric

| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 0 - 25mm  | 116-101   | 0.01mm     | ±4μm     |
| 25 - 50mm | 116-102   | 0.01mm     | ±4μm     |

##### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 116-105   | .001"      | ±.0002"  |
| 1" - 2" | 116-106   | .001"      | ±.0002"  |

#### Interchangeable Anvils Set (Optional)

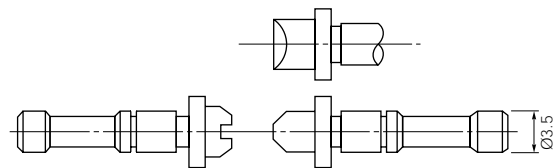
| Applications               | Order No. | Assortment of anvils        |
|----------------------------|-----------|-----------------------------|
| Multi-purpose measurements | 116-800   | Flat anvils (116-801)       |
|                            |           | Spline anvils (116-802)     |
|                            |           | Spherical anvils (116-803)  |
|                            |           | Point anvils (116-804)      |
|                            |           | Knife-edge anvils (116-805) |
|                            |           | Disk anvils (116-806)       |
|                            |           | Blade anvils (116-807)      |

#### V-Anvils and Conical Spindle Tips Sets (Optional)

| Applications   | Order No. | Assortment of anvils and tips    |
|--|-----------|----------------------------------|
| Screw thread measurements<br>(Metric screw, Unified screw) | 116-830   | 0.4 - 0.5mm/64 - 48TPI (116-831) |
|  |           | 0.6 - 0.9mm/44 - 28TPI (116-832) |
|  |           | 1 - 1.75mm/24 - 14TPI (116-833)  |
|  |           | 2 - 3mm/13 - 9TPI (116-834)      |
|  |           | 3.5 - 5mm/8 - 5TPI (116-835)     |
|  |           | 5.5 - 7mm/4.5 - 3.5TPI (116-836) |
| Screw thread measurements<br>(Whitworth screw)             | 116-840   | 60 - 48TPI (116-841)             |
|  |           | 48 - 40TPI (116-842)             |
|  |           | 40 - 32TPI (116-843)             |
|  |           | 32 - 24TPI (116-844)             |
|  |           | 24 - 18TPI (116-845)             |
|  |           | 18 - 14TPI (116-846)             |
|  |           | 14 - 10TPI (116-847)             |
|  |           | 10 - 7TPI (116-848)              |
|  |           | 7 - 4.5TPI (116-849)             |
| 4.5 - 3.5TPI (116-850)                                     |           |                                  |

#### V-anvil and conical spindle tip

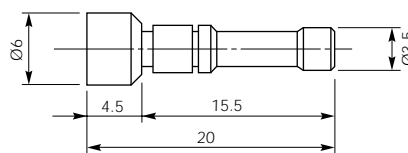
Unit: mm



116-830

#### Flat

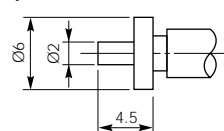
Unit: mm



116-801

#### Spline

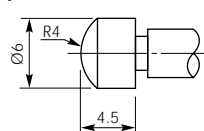
Unit: mm



116-802

#### Spherical

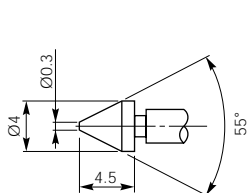
Unit: mm



116-803

#### Point

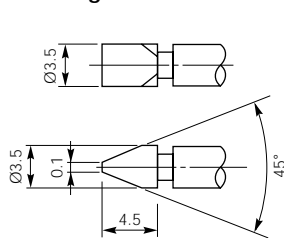
Unit: mm



116-804

#### Knife-edge

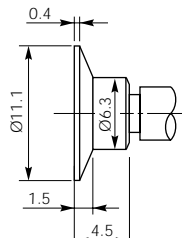
Unit: mm



116-805

#### Disk

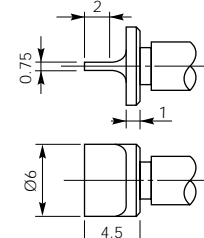
Unit: mm



116-806

#### Blade

Unit: mm

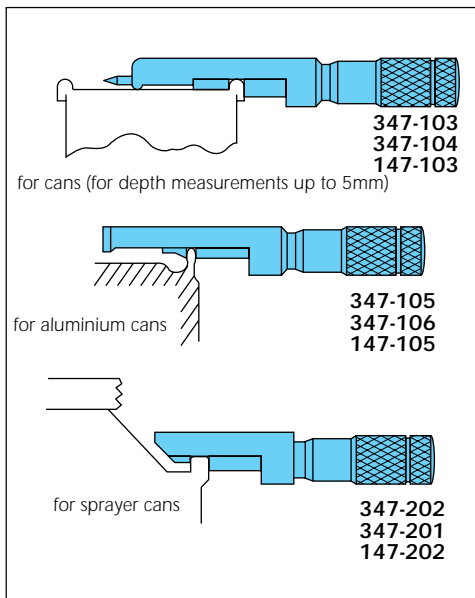
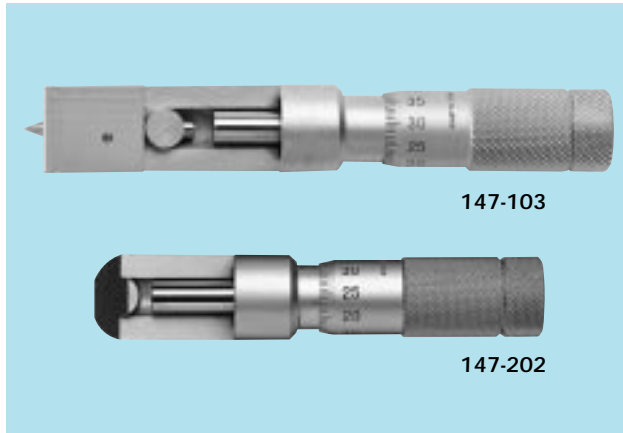


116-807

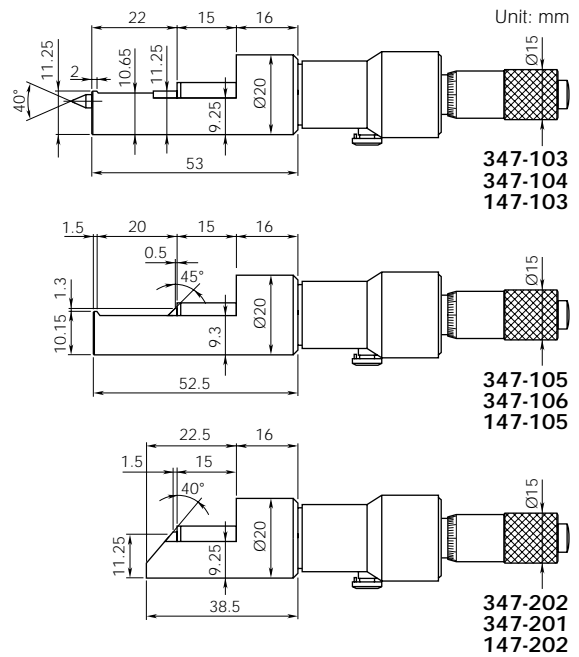


# Can Seam Micrometers

SERIES 347, 147



## Dimensions



## FEATURES

- Measures the width, height, and depth of can seams.
- Three types of micrometers are available for : steel cans, aluminum cans, and sprayer cans.

## SPECIFICATIONS

### Digimatic Can Seam Micrometers

#### Metric

| Range    | Order No.      | Resolution | Remarks           |
|----------|----------------|------------|-------------------|
| 0 - 13mm | <b>347-103</b> | 0.01mm     | for Steel cans    |
|          | <b>347-105</b> | 0.01mm     | for Aluminum cans |
|          | <b>347-202</b> | 0.01mm     | for Sprayer cans  |

#### Inch / Metric

| Range   | Order No.      | Resolution | Remarks           |
|---------|----------------|------------|-------------------|
| 0 - .5" | <b>347-104</b> | .001"      | for Steel cans    |
|         | <b>347-106</b> | .001"      | for Aluminum cans |
|         | <b>347-201</b> | .001"      | for Sprayer cans  |

### Can Seam Micrometers

#### Metric

| Range    | Order No.      | Graduation | Remarks           |
|----------|----------------|------------|-------------------|
| 0 - 13mm | <b>147-103</b> | 0.01mm     | for Steel cans    |
|          | <b>147-105</b> | 0.01mm     | for Aluminum cans |
|          | <b>147-202</b> | 0.01mm     | for Sprayer cans  |

#### Inch

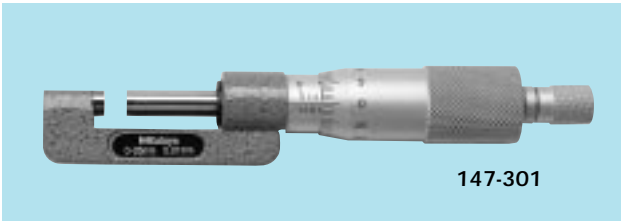
| Range   | Order No.      | Graduation | Remarks           |
|---------|----------------|------------|-------------------|
| 0 - .5" | <b>147-104</b> | .001"      | for Steel cans    |
|         | <b>147-106</b> | .001"      | for Aluminum cans |
|         | <b>147-201</b> | .001"      | for Sprayer cans  |

## Accuracy

- ±3µm (±.00015")

## Hub Micrometers

### SERIES 147



147-301



#### FEATURES

- Measures hub thickness and shoulders inside a bore.
- Carbide-tipped measuring faces.
- With Ratchet Stop for constant force.
- Provided with a standard except for 25mm (1") model.

#### SPECIFICATIONS

##### Metric

| Range      | Order No. | Graduation | Accuracy |
|------------|-----------|------------|----------|
| 0 - 25mm   | 147-301   | 0.01mm     | ±2μm     |
| 25 - 50mm  | 147-302   | 0.01mm     | ±2μm     |
| 50 - 75mm  | 147-303   | 0.01mm     | ±2μm     |
| 75 - 100mm | 147-304   | 0.01mm     | ±3μm     |

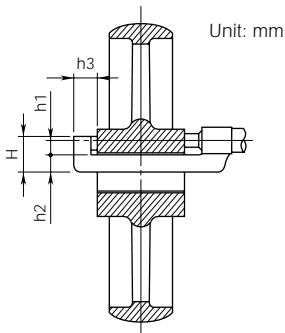
##### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 147-351   | .001"      | ±.0001"  |
| 1" - 2" | 147-352   | .001"      | ±.0001"  |
| 2" - 3" | 147-353   | .001"      | ±.0001"  |
| 3" - 4" | 147-354   | .001"      | ±.00015" |

#### Measuring faces

- Flatness: 0.6μm (.000024")
- Parallelism:  $(2+L/100)\mu\text{m} [(0.00008+.00004 (L/4))"]^*$   
\*L=Maximum measuring length (mm) [(inch)], Fraction rounded up

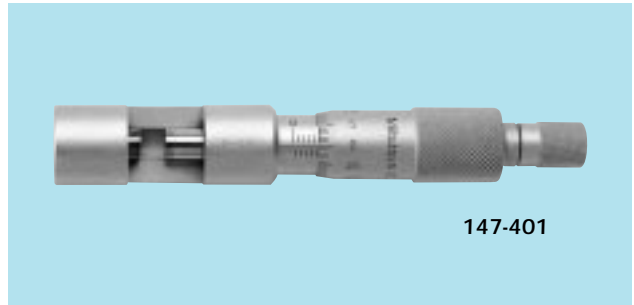
#### Dimensions



| Order No. of micrometer | h1  | h2  | h3   | H    |
|-------------------------|-----|-----|------|------|
| 147-301                 | 6   | 8.5 | 13.5 | 17.5 |
| 147-302                 | 6.5 | 11  | 14   | 20.5 |
| 147-303                 | 6.5 | 11  | 13   | 20.5 |
| 147-304                 | 6.5 | 11  | 13   | 20.5 |

## Wire Micrometers

### SERIES 147



147-401



#### FEATURES

- Designed for measuring wire thickness.
- Also used to measure the diameter of a small ball.
- Carbide-tipped measuring faces

#### SPECIFICATIONS

##### Metric

| Range    | Order No. | Graduation | Accuracy |
|----------|-----------|------------|----------|
| 0 - 10mm | 147-401   | 0.01mm     | ±3μm     |

##### Inch

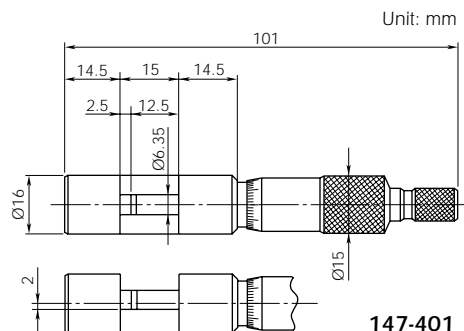
| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - .4" | 147-402   | .0001"     | ±.00015" |

Note: .0001" reading is obtained with vernier.

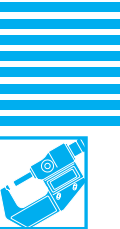
#### Measuring faces

- Flatness: 0.6μm (.000024")
- Parallelism: 1.3μm (.00006")

#### Dimensions



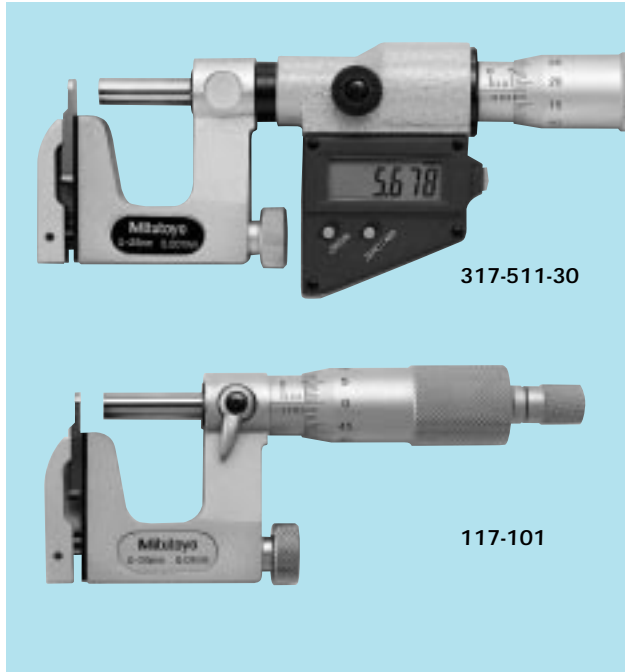
147-401



# "Uni-Mike"

SERIES 317, 117

Interchangeable Anvil Type



317-511-30

117-101



## FEATURES

- Measures tubing thickness, shoulder-edge distance, rivet head height, etc. with interchangeable anvils (flat anvil, rod anvil, V-anvil).
- Supplied with Flat Anvil (201216) and Rod Anvil: Ø3mm rod anvil (201217) for 0-25mm (0-1") models, Ø5mm (201379) for 25-50mm (1"-2") model.
- With special Disk Anvils. The Uni-Mike is used as a height micrometer. The disks have a lapped, mirror surface.



- Provided with a standard except for 25mm (1") model.

## SPECIFICATIONS

### Digimatic "Uni-Mike" with Ratchet Stop

#### Metric

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 0 - 25mm  | 317-511-30 | 0.001mm    | ±4µm     |
| 25 - 50mm | 317-512-30 | 0.001mm    | ±4µm     |

### Digimatic "Uni-Mike" with Friction Thimble

#### Inch/Metric

| Range   | Order No.  | Resolution      | Accuracy |
|---------|------------|-----------------|----------|
| 0 - 1"  | 317-711-30 | .00005"/0.001mm | ±.0002"  |
| 1" - 2" | 317-712-30 | .00005"/0.001mm | ±.0002"  |

### "Uni-Mike" with Ratchet Stop

#### Metric

| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 0 - 25mm  | 117-101   | 0.01mm     | ±4µm     |
| 25 - 50mm | 117-102   | 0.01mm     | ±4µm     |

### "Uni-Mike" with Friction Thimble

#### Inch

| Range   | Order No. | Graduation | Accuracy |
|---------|-----------|------------|----------|
| 0 - 1"  | 117-107   | .001"      | ±.0002"  |
| 1" - 2" | 117-108   | .001"      | ±.0002"  |

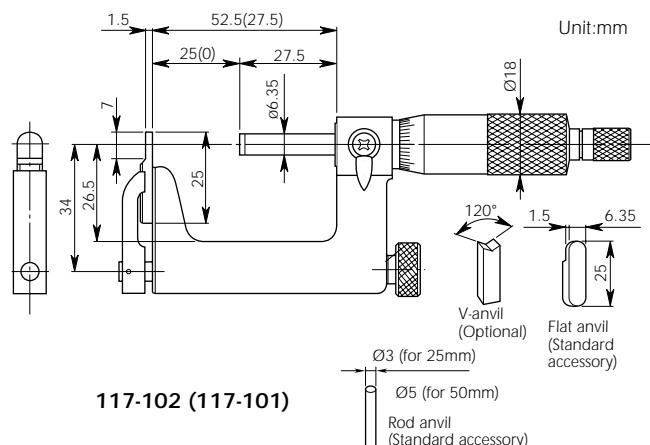
## Measuring faces

- Flatness: 0.6µm (.000024") for spindle face  
2µm (.00008") for anvil face
- Parallelism: 3µm (.00012")

## OPTIONAL ACCESSORIES

| Order No. | Description                     |
|-----------|---------------------------------|
| 201218    | V-anvil                         |
| 950758    | Disk Anvil for 25mm (1") models |
| 950759    | Disk Anvil for 50mm (2") models |

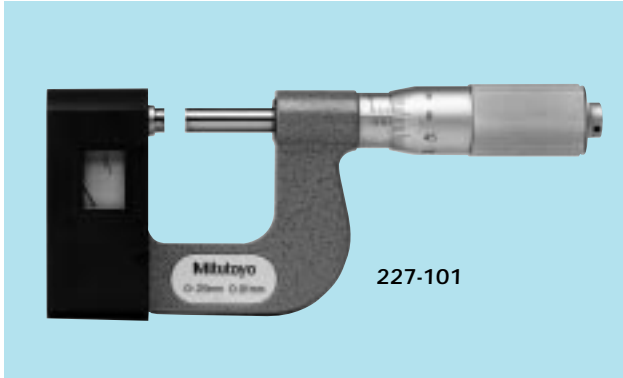
## Dimensions



117-102 (117-101)

## Low Force Micrometers

SERIES 227



### FEATURES

- Low Force Micrometers are specially designed for elastic workpieces such as plastic parts.
- Constant measuring force of 1N is ensured by the spring-loaded anvil.
- The spindle does not rotate.
- With a friction thimble.
- Carbide-tipped measuring faces.
- Provided with a standard to set the origin point for 25-50mm model.

### SPECIFICATION

#### Metric

| Range     | Order No. | Graduation | Accuracy | Mass |
|-----------|-----------|------------|----------|------|
| 0 - 25mm  | 227-101   | 0.01mm     | ±2µm     | 262g |
| 25 - 50mm | 227-102   | 0.01mm     | ±2µm     | 290g |

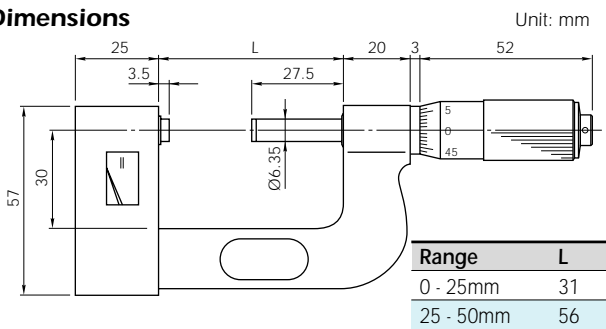
#### Inch

| Range  | Order No. | Graduation | Accuracy | Mass     |
|--------|-----------|------------|----------|----------|
| 0 - 1" | 227-111   | .0001"     | ±.0001"  | .58 lbs. |

### Technical Data

Measuring faces: Carbide-tipped  
 Flatness of measuring faces: 0.6µm  
 Parallelism between measuring faces: 3µm  
 Measuring force: 1N

### Dimensions



## Digimatic Bench Micrometer

SERIES 121

Interchangeable Anvil Type



### FEATURES

- The LCD panel rotates within 330 degrees for use in horizontal or vertical position.
- Interchangeable anvils allow a wide measuring range of 50mm (2").
- Provided with a ratchet stop for constant force.
- Provided with a standard to set the origin for 25-50mm measurement.

### SPECIFICATION

#### Metric

| Range    | Order No. | Resolution | Accuracy | Mass  |
|----------|-----------|------------|----------|-------|
| 0 - 50mm | 121-145   | 0.001mm    | ±2µm     | 2.3kg |

#### Inch/Metric

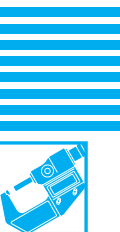
| Range  | Order No. | Resolution          | Accuracy | Mass      |
|--------|-----------|---------------------|----------|-----------|
| 0 - 2" | 121-155   | .00005"/<br>0.001mm | ±.0001"  | 5.07 lbs. |

### Technical Data

Display: LCD  
 Functions: Zero-Set, presetting, power on/off, counting direction switching, inch/mm conversion (inch/mm type only), SPC data output  
 Micrometer head stroke: 25mm (1")  
 Measuring faces: Carbide-tipped  
 Measuring force: 6N - 10N  
 Battery: SR44 (2 pcs.) (938882 X 2 pcs.)  
 Battery life: Approx. 1.8 years under normal use  
 Alarm: Low battery voltage, over-speed error, over-flow error  
 Operating temperature: 5°C to 40°C

### OPTIONAL ACCESSORIES

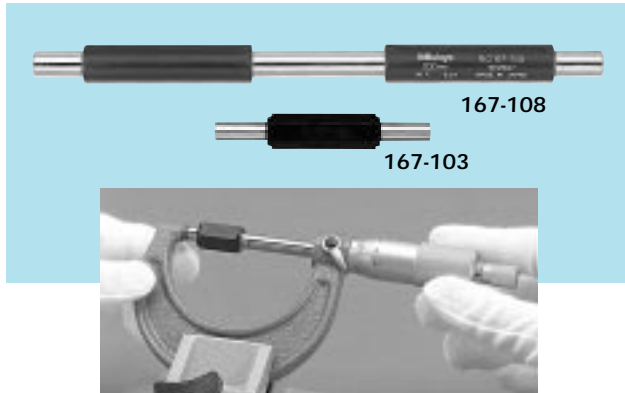
| Order No. | Description    |
|-----------|----------------|
| 937387    | SPC cable (1m) |
| 965013    | SPC cable (2m) |





## Micrometer Standards

### SERIES 167



#### FEATURES

- Used for the zero point setting of outside micrometers.
- Flat and lapped measuring faces.
- Heat insulating handle for preventing expansion due to body temperature.

#### SPECIFICATIONS

| Metric |           |          | Inch   |           |          |
|--------|-----------|----------|--------|-----------|----------|
| Length | Order No. | Diameter | Length | Order No. | Diameter |
| 25mm   | 167-101   | 6.35mm   | 1"     | 167-141   | .25"     |
| 50mm   | 167-102   | 6.35mm   | 2"     | 167-142   | .25"     |
| 75mm   | 167-103   | 6.35mm   | 3"     | 167-143   | .25"     |
| 100mm  | 167-104   | 7.9mm    | 4"     | 167-144   | .31"     |
| 125mm  | 167-105   | 7.9mm    | 5"     | 167-145   | .31"     |
| 150mm  | 167-106   | 7.9mm    | 6"     | 167-146   | .31"     |
| 175mm  | 167-107   | 7.9mm    | 7"     | 167-147   | .31"     |
| 200mm  | 167-108   | 9.4mm    | 8"     | 167-148   | .37"     |
| 225mm  | 167-109   | 9.4mm    | 9"     | 167-149   | .37"     |
| 250mm  | 167-110   | 9.4mm    | 10"    | 167-150   | .37"     |
| 275mm  | 167-111   | 9.4mm    | 11"    | 167-151   | .37"     |
| 300mm  | 167-112   | 9.4mm    | 12"    | 167-152   | .37"     |
| 325mm  | 167-113   | 9.4mm    | 13"    | 167-153   | .37"     |
| 350mm  | 167-114   | 9.4mm    | 14"    | 167-154   | .37"     |
| 375mm  | 167-115   | 9.4mm    | 15"    | 167-155   | .37"     |
| 400mm  | 167-116   | 9.4mm    | 16"    | 167-156   | .37"     |
| 425mm  | 167-117   | 9.4mm    | 17"    | 167-157   | .37"     |
| 450mm  | 167-118   | 9.4mm    | 18"    | 167-158   | .37"     |
| 475mm  | 167-119   | 9.4mm    | 19"    | 167-159   | .37"     |
| 500mm  | 167-120   | 11.9mm   | 20"    | 167-160   | .47"     |
| 525mm  | 167-121   | 11.9mm   | 21"    | 167-161   | .47"     |
| 550mm  | 167-122   | 11.9mm   | 22"    | 167-162   | .47"     |
| 575mm  | 167-123   | 11.9mm   | 23"    | 167-163   | .47"     |
| 600mm  | 167-124   | 11.9mm   | 24"    | 167-164   | .47"     |
| 625mm  | 167-125   | 11.9mm   | 25"    | 167-165   | .47"     |
| 650mm  | 167-126   | 11.9mm   | 26"    | 167-166   | .47"     |
| 675mm  | 167-127   | 11.9mm   | 27"    | 167-167   | .47"     |
| 700mm  | 167-128   | 11.9mm   | 28"    | 167-168   | .47"     |
| 725mm  | 167-129   | 11.9mm   | 29"    | 167-169   | .47"     |
| 750mm  | 167-130   | 11.9mm   | 30"    | 167-170   | .47"     |
| 775mm  | 167-131   | 11.9mm   | 31"    | 167-171   | .47"     |
| 800mm  | 167-132   | 11.9mm   | 32"    | 167-172   | .47"     |
| 825mm  | 167-133   | 11.9mm   | 33"    | 167-173   | .47"     |
| 850mm  | 167-134   | 11.9mm   | 34"    | 167-174   | .47"     |
| 875mm  | 167-135   | 11.9mm   | 35"    | 167-175   | .47"     |
| 900mm  | 167-136   | 11.9mm   | 36"    | 167-176   | .47"     |
| 925mm  | 167-137   | 11.9mm   | 37"    | 167-177   | .47"     |
| 950mm  | 167-138   | 11.9mm   | 38"    | 167-178   | .47"     |
| 975mm  | 167-139   | 11.9mm   | 39"    | 167-179   | .47"     |
| 1000mm | 167-140   | 11.9mm   | 40"    | 167-180   | .47"     |

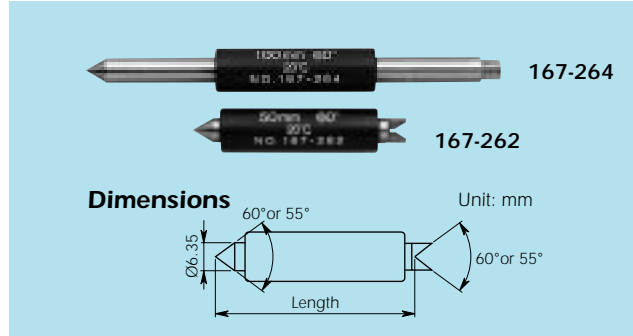
#### Technical Data

Flatness of measuring faces: 0.3μm (.000012")  
 Parallelism between measuring faces: 2μm (.00008")

## Standards for Screw Thread Micrometers

### SERIES 167

60 degree and 55 degree



#### FEATURES

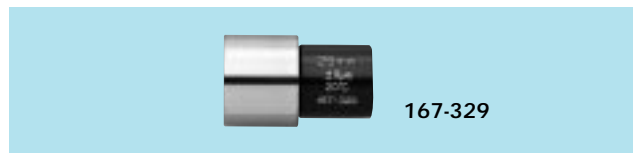
- Specially designed for the zero point setting of screw thread micrometers.

#### SPECIFICATIONS

| Metric |           |              | Inch   |           |              |
|--------|-----------|--------------|--------|-----------|--------------|
| Length | Order No. | Thread angle | Length | Order No. | Thread angle |
| 25mm   | 167-261   | 60°          | 1"     | 167-294   | 60°          |
|        | 167-272   | 55°          |        | 167-283   | 55°          |
| 50mm   | 167-262   | 60°          | 2"     | 167-295   | 60°          |
|        | 167-273   | 55°          |        | 167-284   | 55°          |
| 75mm   | 167-263   | 60°          | 3"     | 167-296   | 60°          |
|        | 167-274   | 55°          |        | 167-285   | 55°          |
| 100mm  | 167-264   | 60°          | 4"     | 167-297   | 60°          |
|        | 167-275   | 55°          |        | 167-286   | 55°          |

## Standards for V-Anvil Micrometers

### SERIES 167



#### FEATURES

- Specially designed for the zero point setting of V-anvil micrometers.

#### SPECIFICATIONS

| Metric |           |      | Inch   |           |      |
|--------|-----------|------|--------|-----------|------|
| Length | Order No. | Type | Length | Order No. | Type |
| 5mm    | 167-327   | Plug | .2"    | 167-337   | Plug |
| 10mm   | 167-328   | Plug | .4"    | 167-338   | Plug |
| 25mm   | 167-329   | Plug | 1"     | 167-339   | Plug |
| 40mm   | 167-330   | Ring | 1.6"   | 167-340   | Ring |
| 55mm   | 167-331   | Ring | 2.2"   | 167-341   | Ring |
| 70mm   | 167-332   | Ring | 2.8"   | 167-342   | Ring |
| 85mm   | 167-333   | Ring | 3.4"   | 167-343   | Ring |

## Optical Flats

SERIES 158



158-118

### FEATURES

- Used for inspecting the flatness of micrometer's or gauge block's measuring faces with high accuracy.

### SPECIFICATIONS

#### Metric

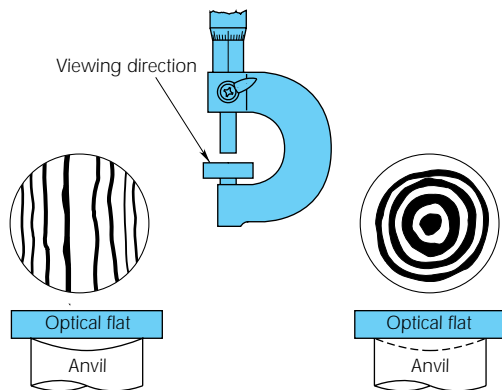
| Flatness | Order No. | Diameter | Thickness |
|----------|-----------|----------|-----------|
| 0.2µm    | 158-117   | 45mm     | 12mm      |
|          | 158-119   | 60mm     | 15mm      |
| 0.1µm    | 158-118   | 45mm     | 12mm      |
|          | 158-120   | 60mm     | 15mm      |

#### Inch

| Flatness | Order No. | Diameter | Thickness |
|----------|-----------|----------|-----------|
| .000004" | 158-122   | 1.8"     | .5"       |
|          | 158-124   | 2.4"     | .6"       |

### TECHNICAL INFORMATION

**Flatness Check of Measuring Faces Using Interference Fringe Pattern Produced by an Optical Flat**



## Optical Parallels

SERIES 157



157-903

### FEATURES

- Designed to inspect parallelism and flatness of measuring faces of micrometers.
- Each set consists of 4 thicknesses.
- Flatness: 0.1µm (.000004")
- Parallelism: 0.2µm (.000008")
- Diameter of optical parallel: 30mm (1.19")
- Supplied with fitted carrying case.

### SPECIFICATIONS

#### Metric

| Micrometers to be checked | Order No. | Assortment of parallels (Thickness of parallel) |
|---------------------------|-----------|---|
| 0-25mm micrometers        | 157-903   | 12.00, 12.12, 12.25, 12.37mm                    |
| 25-50mm micrometers       | 157-904   | 25.00, 25.12, 25.25, 25.37mm                    |

#### Inch

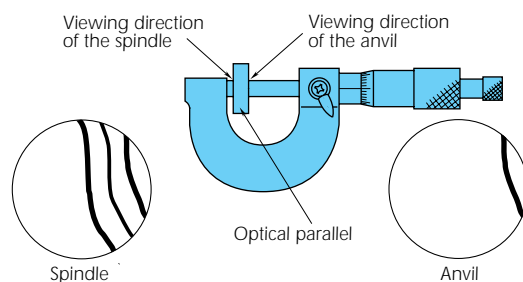
| Micrometers to be checked | Order No. | Assortment of parallels (Thickness of parallel) |
|---------------------------|-----------|---|
| 0-1" micrometers          | 157-901   | .5000", .5062", .5125", .5187"                  |
| 1"-2" micrometers         | 157-902   | 1.0000", 1.0062", 1.0125", 1.0187"              |

### TECHNICAL INFORMATION

**Parallelism Check between Measuring Faces by Means of Interference Fringe Produced by an Optical Parallel**

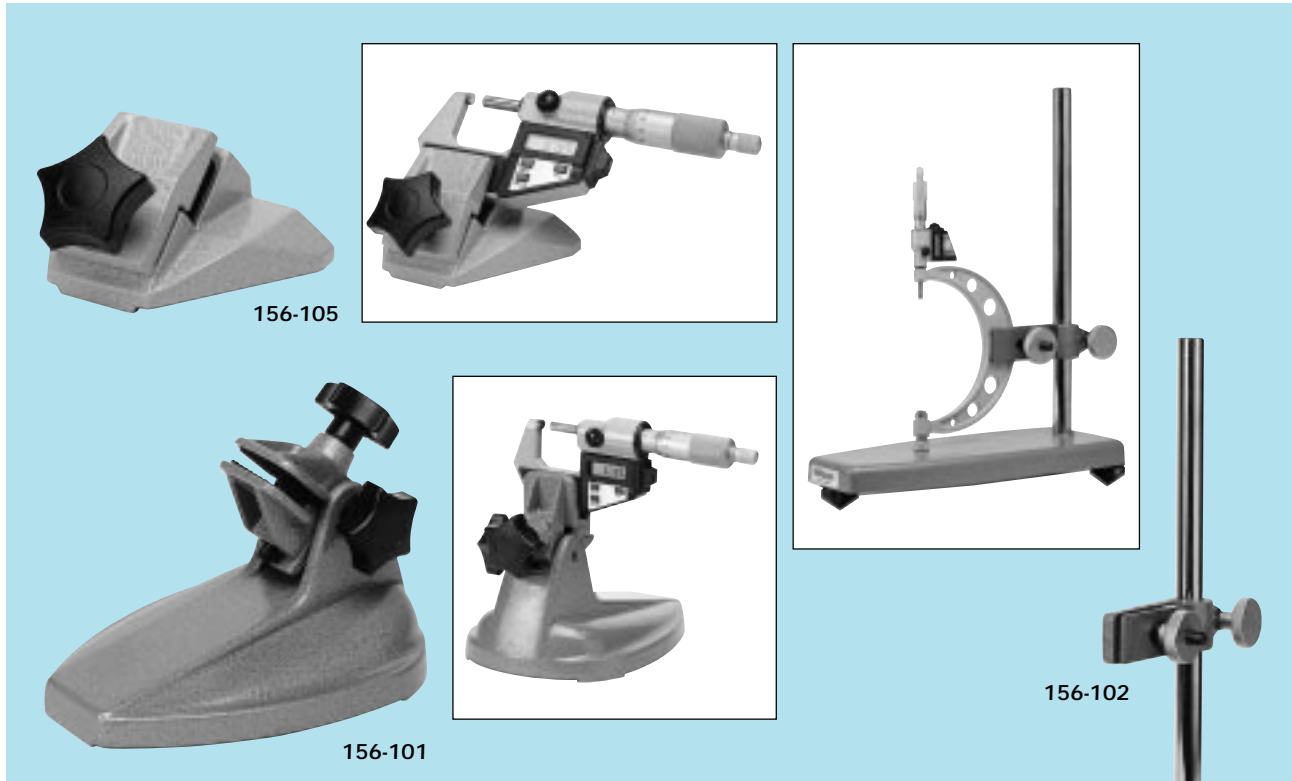
The parallelism between the measuring faces can be determined as follows; bring the optical parallel to the anvil and observe the number of interference fringes produced on the spindle side under the measuring force of the micrometers.

The parallelism is about 1µm (0.32µm x 3 = 0.96µm). Fringe on the anvil side must not be more than one.



# Micrometer Stands

## SERIES 156

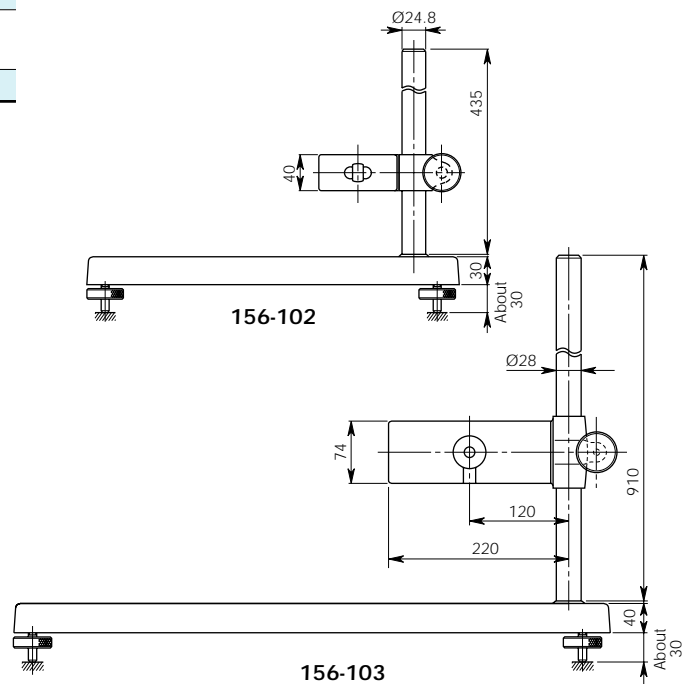
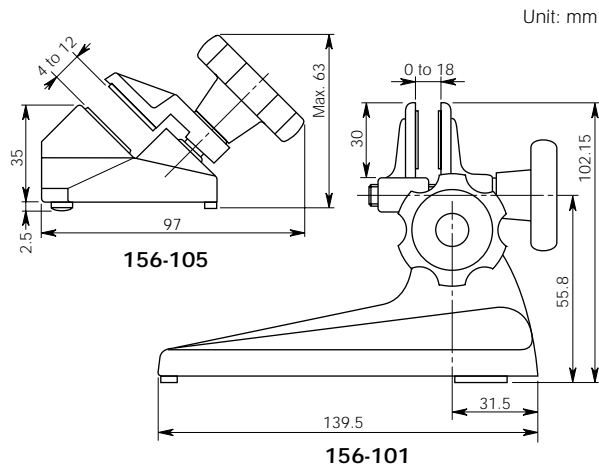


These stands are designed to allow bench-top use with hand micrometers or other gages which have frame area sufficient to grab onto.

### SPECIFICATIONS

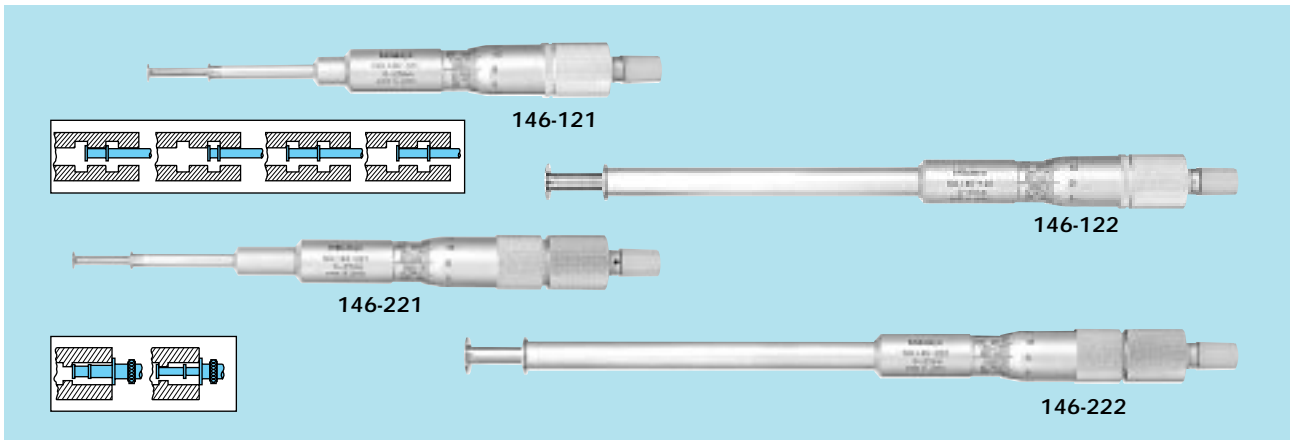
| Micrometer ranges                    | Order No. | Remarks               |
|--------------------------------------|-----------|-----------------------|
| 0-25mm (0-1"),<br>25-50mm (1"-2")    | 156-105   | Fixed angle type      |
| Up to 100mm (4")                     | 156-101   | Adjustable angle type |
| Up to 300mm (12")<br>over 100mm (4") | 156-102   | Vertical type         |
| Over 300mm (12")                     | 156-103   | Vertical type         |

### Dimensions



## Groove Micrometers

### SERIES 146



#### FEATURES

- Flanged spindle for measuring width, depth, and location of grooves inside/outside bores, and tubes.
- Provided with two types of graduations for inside and outside measurements.
- Non-rotating spindle type has two-directional ratchet stop (Measuring force: 5-10N).



#### SPECIFICATIONS

##### Groove Micrometers (Rotating Spindle Type)

| Metric     |                | Order No.      | Graduation | Flange diameter |
|------------|----------------|----------------|------------|-----------------|
| Range      | Order No.      |                |            |                 |
| 0 - 25mm   | 1.6 - 26.5mm   | <b>146-121</b> | 0.01mm     | 6.35mm          |
|            |                | <b>146-122</b> | 0.01mm     | 12.7mm          |
| 25 - 50mm  | 26.5 - 51.5mm  | <b>146-123</b> | 0.01mm     | 12.7mm          |
| 50 - 75mm  | 51.5 - 76.5mm  | <b>146-124</b> | 0.01mm     | 12.7mm          |
| 75 - 100mm | 76.5 - 101.5mm | <b>146-125</b> | 0.01mm     | 12.7mm          |

| Inch    |               | Order No.      | Graduation | Flange diameter |
|---------|---------------|----------------|------------|-----------------|
| Range   | Order No.     |                |            |                 |
| 0 - 1"  | .055" - 1.05" | <b>146-131</b> | .001"      | .25"            |
|         |               | <b>146-132</b> | .001"      | .5"             |
| 1" - 2" | 1.05" - 2.05" | <b>146-133</b> | .001"      | .5"             |
| 2" - 3" | 2.05" - 3.05" | <b>146-134</b> | .001"      | .5"             |
| 3" - 4" | 3.05" - 4.05" | <b>146-135</b> | .001"      | .5"             |

##### Groove Micrometers (Non-Rotating Spindle Type)

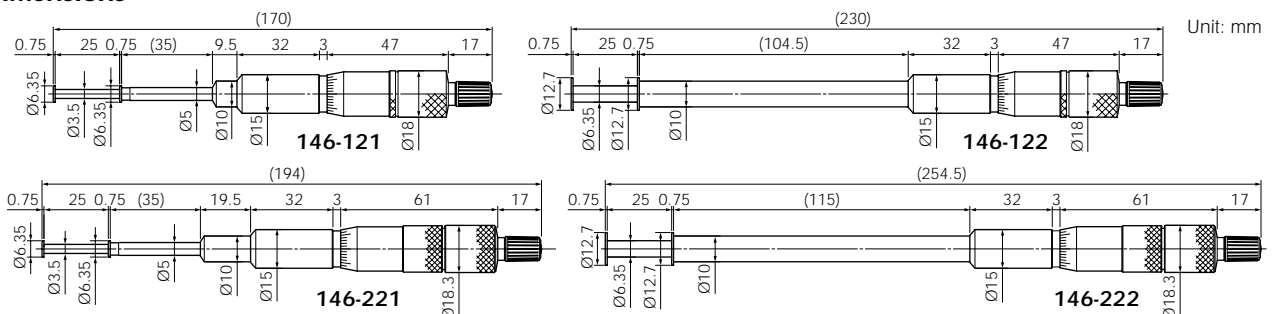
| Metric     |                | Order No.      | Graduation | Flange diameter |
|------------|----------------|----------------|------------|-----------------|
| Range      | Order No.      |                |            |                 |
| 0 - 25mm   | 1.6 - 26.5mm   | <b>146-221</b> | 0.01mm     | 6.35mm          |
|            |                | <b>146-222</b> | 0.01mm     | 12.7mm          |
| 25 - 50mm  | 26.5 - 51.5mm  | <b>146-223</b> | 0.01mm     | 12.7mm          |
| 50 - 75mm  | 51.5 - 76.5mm  | <b>146-224</b> | 0.01mm     | 12.7mm          |
| 75 - 100mm | 76.5 - 101.5mm | <b>146-225</b> | 0.01mm     | 12.7mm          |

| Inch    |               | Order No.      | Graduation | Flange diameter |
|---------|---------------|----------------|------------|-----------------|
| Range   | Order No.     |                |            |                 |
| 0 - 1"  | .055" - 1.05" | <b>146-231</b> | .001"      | .25"            |
|         |               | <b>146-232</b> | .001"      | .5"             |
| 1" - 2" | 1.05" - 2.05" | <b>146-233</b> | .001"      | .5"             |
| 2" - 3" | 2.05" - 3.05" | <b>146-234</b> | .001"      | .5"             |
| 3" - 4" | 3.05" - 4.05" | <b>146-235</b> | .001"      | .5"             |

#### Accuracy

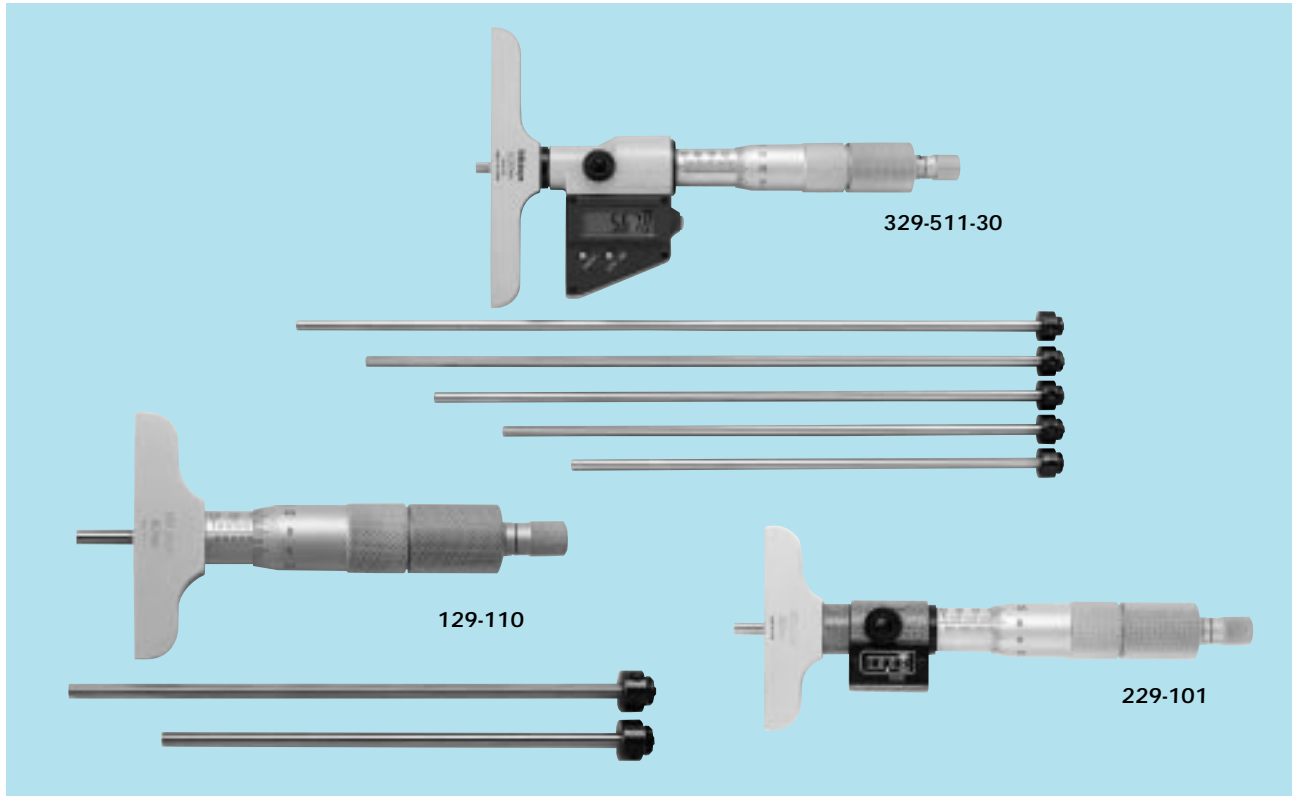
- Accuracy:  $\pm 10\mu\text{m}$  ( $\pm .0004"$ )
- Parallelism:  $10\mu\text{m}$  (.0004")

#### Dimensions



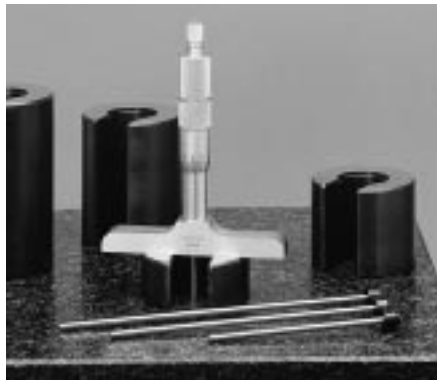
# Depth Micrometers

SERIES 329, 229, 129  
Interchangeable Rod Type



## FEATURES

- Ø4mm (.157" DIA.) interchangeable rods, with lapped measuring end, provide a wide measuring range.
- The rod length can be adjusted in 25mm (1") increments.
- With Ratchet Stop for consistent force.
- Crisp clear graduations on the thimble.
- The 329 series (LCD readout type) are provided with SPC output.
- The 229 series are provided with a mechanical digit counter for quick and error-free reading.
- Complete with fitted carrying case.

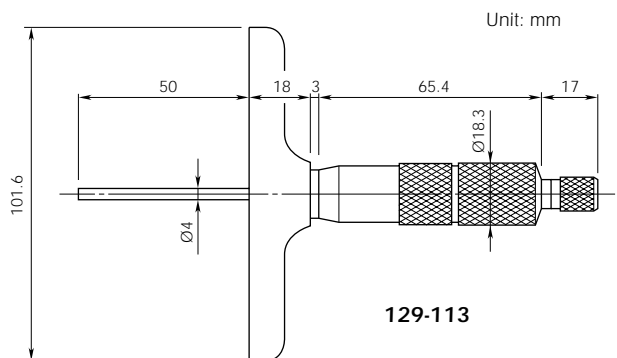


## SPECIFICATIONS

### Accuracy

- Accuracy of micrometer head:  $\pm 3\mu\text{m}$  (.00015")
- Flatness of reference face:  
 $1.3\mu\text{m}$  (.00005") for base with 63.5mm (2.5") width  
 $2\mu\text{m}$  (.00008") for base with 101.6mm (4") width
- Flatness of measuring face of rod:  $0.3\mu\text{m}$  (.000012")
- Parallelism between reference face and measuring face:  
 $(4+L/50)\mu\text{m}$  [ $(.00016+.00004 (L/2))$ ]"\*  
 \* L=Maximum measuring length (mm) [(inch)], Fraction rounded up
- Accuracy of interchangeable rod:  
 $\pm(2+L/75)\mu\text{m}$  [ $\pm(.0001+.00005 (L/3))$ ]"\*  
 \* L=Maximum measuring length (mm) [(inch)], Fraction rounded up

### Dimensions



## OPTIONAL ACCESSORIES

| Order No. | Description    |
|-----------|----------------|
| 937387    | SPC cable (1m) |
| 965013    | SPC cable (2m) |

## Digimatic Depth Micrometers

### Metric

| Range     | Order No.  | Resolution | Dimensions of reference face | Remarks      |
|-----------|------------|------------|------------------------------|--------------|
| 0 - 150mm | 329-511-30 | 0.001mm    | 101.6X16mm                   | with 6 Rods  |
| 0 - 300mm | 329-512-30 | 0.001mm    | 101.6X16mm                   | with 12 Rods |

### Inch/Metric

| Range   | Order No.  | Resolution          | Dimensions of reference face | Remarks      |
|---------|------------|---------------------|------------------------------|--------------|
| 0 - 6"  | 329-711-30 | .00005"/<br>0.001mm | 4"X.63"                      | with 6 Rods  |
| 0 - 12" | 329-712-30 | .0001"/<br>0.001mm  | 4"X.63"                      | with 12 Rods |

## Digit Depth Micrometers

### Metric

| Range    | Order No. | Graduation | Dimensions of reference face | Remarks     |
|----------|-----------|------------|------------------------------|-------------|
| 0 - 25mm | 229-101   | 0.01mm     | 63.5X16mm                    | with 1 Rod  |
|          | 229-102   | 0.01mm     | 101.6X16mm                   | with 1 Rod  |
| 0 - 50mm | 229-109   | 0.01mm     | 63.5X16mm                    | with 2 Rods |
|          | 229-113   | 0.01mm     | 101.6X16mm                   | with 2 Rods |

### Inch

| Range  | Order No. | Graduation | Dimensions of reference face | Remarks     |
|--------|-----------|------------|------------------------------|-------------|
| 0 - 4" | 229-127   | .001"      | 2.5"X.63"                    | with 4 Rods |
|        | 229-131   | .001"      | 4"X.63"                      | with 4 Rods |
| 0 - 6" | 229-128   | .001"      | 2.5"X.63"                    | with 6 Rods |
|        | 229-132   | .001"      | 4"X.63"                      | with 6 Rods |

## Depth Micrometers

### Metric

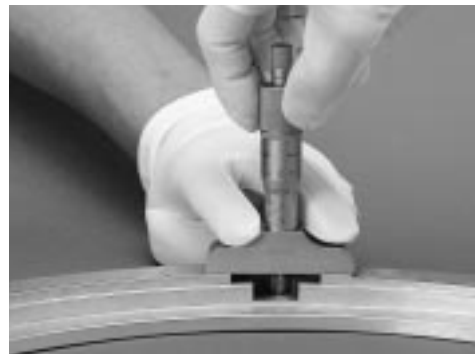
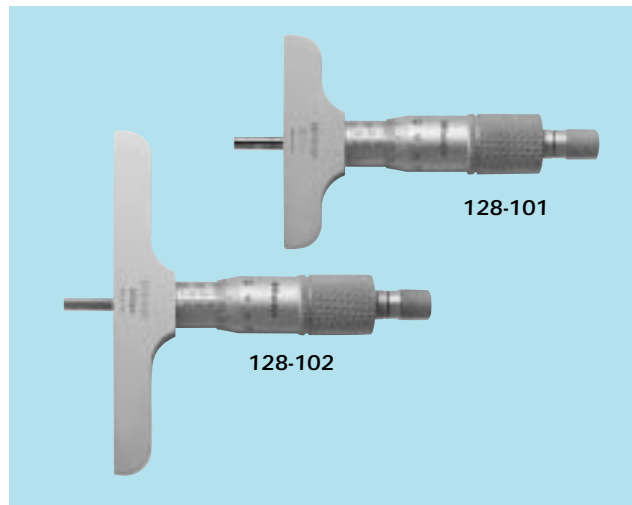
| Range     | Order No. | Graduation | Dimensions of reference face | Remarks     |
|-----------|-----------|------------|------------------------------|-------------|
| 0 - 50mm  | 129-109   | 0.01mm     | 63.5X16mm                    | with 2 Rods |
|           | 129-113   | 0.01mm     | 101.6X16mm                   | with 2 Rods |
| 0 - 75mm  | 129-110   | 0.01mm     | 63.5X16mm                    | with 3 Rods |
|           | 129-114   | 0.01mm     | 101.6X16mm                   | with 3 Rods |
| 0 - 100mm | 129-111   | 0.01mm     | 63.5X16mm                    | with 4 Rods |
|           | 129-115   | 0.01mm     | 101.6X16mm                   | with 4 Rods |
| 0 - 150mm | 129-112   | 0.01mm     | 63.5X16mm                    | with 6 Rods |
|           | 129-116   | 0.01mm     | 101.6X16mm                   | with 6 Rods |

### Inch

| Range   | Order No. | Graduation | Dimensions of reference face | Remarks      |
|---------|-----------|------------|------------------------------|--------------|
| 0 - 3"  | 129-126   | .001"      | 2.5"X.63"                    | with 3 Rods  |
|         | 129-130   | .001"      | 4"X.63"                      | with 3 Rods  |
| 0 - 4"  | 129-127   | .001"      | 2.5"X.63"                    | with 4 Rods  |
|         | 129-131   | .001"      | 4"X.63"                      | with 4 Rods  |
| 0 - 6"  | 129-128   | .001"      | 2.5"X.63"                    | with 6 Rods  |
|         | 129-132   | .001"      | 4"X.63"                      | with 6 Rods  |
| 0 - 12" | 129-149   | .001"      | 2.5"X.63"                    | with 12 Rods |
|         | 129-150   | .001"      | 4"X.63"                      | with 12 Rods |

## Depth Micrometers

### SERIES 128



### FEATURES

- Ratchet Stop for consistent and repetitive measurements.
- Ø4mm (.157" DIA.) measuring face.
- Satin-chrome finished throughout.
- With spindle locking clamp.
- Crisp clear graduations on the thimble.

### SPECIFICATIONS

#### Metric

| Range    | Order No. | Graduation | Dimensions of reference face |
|----------|-----------|------------|------------------------------|
| 0 - 25mm | 128-101   | 0.01mm     | 63.5 x 16mm                  |
|          | 128-103*  | 0.01mm     | 63.5 x 16mm                  |
|          | 128-102   | 0.01mm     | 101.6 x 16mm                 |
|          | 128-104*  | 0.01mm     | 101.6 x 16mm                 |

\*The measuring face has a carbide tip.

#### Inch

| Range  | Order No. | Graduation | Dimensions of reference face |
|--------|-----------|------------|------------------------------|
| 0 - 1" | 128-105   | .001"      | 2.5" x .63"                  |
|        | 128-106   | .001"      | 4" x .63"                    |

\*The measuring face has a carbide tip.

### Accuracy

- Accuracy of micrometer head:  $\pm 3\mu\text{m}$  (.00015")
- Flatness of reference face:
  - 1.3 $\mu\text{m}$  (.00005") for base with 63.5mm (2.5") width
  - 2 $\mu\text{m}$  (.00008") for base with 101.6mm (4") width



# Borematic

## SERIES 568

Digimatic Snap-Open Bore Gages



568-439

Note: Close contact of the measuring surfaces is necessary for the assured accuracy.

The Borematic enables the operator to take measurements more accurately and more quickly than ever before. One the origin point is set with the ORIGIN button, the Borematic retains the setting for the entire battery life. Therefore no longer repeated origin setting (presetting) is necessary.

### FEATURES

- Large LCD digits of 8.5mm height for error-free reading.
- Carbide-tipped contact points (=anvils) ensure long life.
- 330-degree rotatable display unit for easy reading at any angle.
- GO/NO-GO judgment function.
- The absolute linear scale eliminates the fear of over-speed errors.
- With SPC data output.
- Setting rings for origin point setting are optional.
- Can measure deep holes by attaching an optional extension rod.
- Measurement can be taken closer to the bottom of a blind bore.

### Technical Data

**Display:** LCD

**Functions:** Zero-Set, presetting, GO/NO-GO judgment, power on/off, inch/mm conversion (inch/mm type only), SPC data output, data hold

**Battery:** SR44 (1 pc.) (938882)

**Battery life:** Approx. 1 year

**Operating temperature:** 5°C to 40°C

**Measuring faces:** Carbide-tipped

### SPECIFICATION

#### Individual Borematic

##### Metric

| Range                       | Order No. | Resolution | Accuracy | Mass |
|-----------------------------|-----------|------------|----------|------|
| 6 - 8mm                     | 568-331   | 0.001mm    | 5µm      | 480g |
| 8 - 10mm                    | 568-332   | 0.001mm    | 5µm      | 485g |
| 10 - 12mm                   | 568-333   | 0.001mm    | 5µm      | 485g |
| 12 - 16mm                   | 568-334   | 0.001mm    | 5µm      | 475g |
| 16 - 20mm                   | 568-335   | 0.001mm    | 5µm      | 480g |
| 20 - 25mm                   | 568-336   | 0.001mm    | 6µm      | 540g |
| 25 - 30mm                   | 568-337   | 0.001mm    | 6µm      | 555g |
| 30 - 40mm                   | 568-338   | 0.001mm    | 6µm      | 565g |
| 40 - 50mm                   | 568-339   | 0.001mm    | 6µm      | 610g |
| 50 - 63mm                   | 568-340   | 0.001mm    | 6µm      | 730g |
| 62 - 75mm                   | 568-341   | 0.001mm    | 6µm      | 740g |
| 75 - 88mm                   | 568-342   | 0.001mm    | 6µm      | 790g |
| 87 - 100mm                  | 568-343   | 0.001mm    | 6µm      | 800g |
| 100 - 113mm                 | 568-344   | 0.001mm    | 6µm      | 900g |
| 112 - 125mm                 | 568-345   | 0.001mm    | 6µm      | 910g |
| 50 - 63mm/<br>62 - 75mm     | 568-346*  | 0.001mm    | 6µm      | 780g |
| 75 - 88mm/<br>87 - 100mm    | 568-347*  | 0.001mm    | 6µm      | 850g |
| 100 - 113mm/<br>112 - 125mm | 568-348*  | 0.001mm    | 6µm      | 970g |

\*With extra anvils (interchangeable) giving a wide measuring range

##### Inch/Metric

| Range                       | Order No. | Resolution      | Accuracy | Mass      |
|-----------------------------|-----------|-----------------|----------|-----------|
| .275" - .350"               | 568-431   | .00005"/0.001mm | .0002"   | 1.06 lbs. |
| .350" - .425"               | 568-432   | .00005"/0.001mm | .0002"   | 1.07 lbs. |
| .425" - .500"               | 568-433   | .00005"/0.001mm | .0002"   | 1.07 lbs. |
| .50" - .65"                 | 568-434   | .00005"/0.001mm | .0002"   | 1.05 lbs. |
| .65" - .80"                 | 568-435   | .00005"/0.001mm | .0002"   | 1.06 lbs. |
| .8" - 1"                    | 568-436   | .00005"/0.001mm | .00025"  | 1.19 lbs. |
| 1.0" - 1.2"                 | 568-437   | .00005"/0.001mm | .00025"  | 1.22 lbs. |
| 1.2" - 1.6"                 | 568-438   | .00005"/0.001mm | .00025"  | 1.24 lbs. |
| 1.6" - 2.0"                 | 568-439   | .00005"/0.001mm | .00025"  | 1.34 lbs. |
| 2.0" - 2.5"                 | 568-440   | .00005"/0.001mm | .00025"  | 1.61 lbs. |
| 2.5" - 3.0"                 | 568-441   | .00005"/0.001mm | .00025"  | 1.63 lbs. |
| 3.0" - 3.5"                 | 568-442   | .00005"/0.001mm | .00025"  | 1.74 lbs. |
| 3.5" - 4.0"                 | 568-443   | .00005"/0.001mm | .00025"  | 1.76 lbs. |
| 4.0" - 4.5"                 | 568-444   | .00005"/0.001mm | .00025"  | 1.98 lbs. |
| 4.5" - 5.0"                 | 568-445   | .00005"/0.001mm | .00025"  | 2.00 lbs. |
| 2.0" - 2.5"/<br>2.5" - 3.0" | 568-446*  | .00005"/0.001mm | .00025"  | 1.72 lbs. |
| 3.0" - 3.5"/<br>3.5" - 4.0" | 568-447*  | .00005"/0.001mm | .00025"  | 1.87 lbs. |
| 4.0" - 4.5"/<br>4.5" - 5.0" | 568-448*  | .00005"/0.001mm | .00025"  | 2.13 lbs. |

\*With extra anvils (interchangeable) giving a wide measuring range

### OPTIONAL ACCESSORIES

| Order No.       | Description                                      |
|-----------------|--|
| 937387          | SPC cable (1m)                                   |
| 965013          | SPC cable (2m)                                   |
| 952322          | Extension rod for 6 - 12mm (.275" - .500") gages |
| 952621          | Extension rod for 12 - 20mm (.50" - .80") gages  |
| 952622          | Extension rod for 20 - 50mm (.8" - 2.0") gages   |
| 952623          | Extension rod for 50 - 125mm (2.0" - 5.0") gages |
| (See page 141.) | Setting rings                                    |

## Borematic Interchangeable-Contact Head Sets

(Each set includes one display unit with contact heads of the sizes specified)

### Metric

| Order No. | Range  | Set configuration   | Mass  |
|-----------|--|---|-------|
| 568-971   | 6 - 8mm/8 - 10mm/<br>10 - 12mm               | Display unit (568-012), contact heads (952906, 952907, 952908), adapter (954595), setting rings (177-125: Ø8mm, 177-126: Ø10mm)           | 0.6kg |
| 568-972   | 12 - 16mm/16 - 20mm/<br>20 - 25mm            | Display unit (568-012), contact heads (952605, 952606, 952607), adapters (216556, 216557), setting rings (177-177: Ø16mm, 177-286: Ø20mm) | 0.8kg |
| 568-973   | 25 - 30mm/30 - 40mm/<br>40 - 50mm            | Display unit (568-012), contact heads (952608, 982147, 982148), adapter (216557), setting rings (177-288: Ø30mm, 177-290: Ø40mm)          | 1.3kg |
| 568-974   | 50 - 63mm/62 - 75mm/<br>75 - 88mm/87 - 100mm | Display unit (568-012), contact heads (982174, 982175, 982176, 982177), adapter (216558), setting rings (177-314: Ø62mm, 177-318: Ø87mm)  | 3.5kg |
| 568-975*  | 50 - 63mm/62 - 75mm/<br>75 - 88mm/87 - 100mm | Display unit (568-012), contact heads (04AZA044, 04AZA045), adapter (216558), setting rings (177-314: Ø62mm, 177-318: Ø87mm)              | 3.5kg |

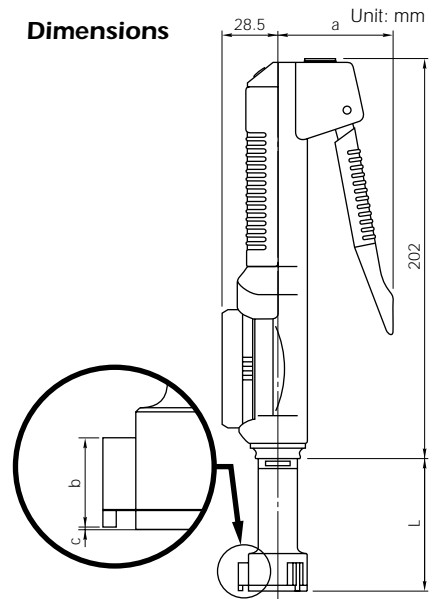
\*Interchangeable anvil type

### Inch/Metric

| Order No. | Range   | Set configuration  | Mass      |
|-----------|---|--|-----------|
| 568-976   | .275" - .350"/.350" - .425"/.425" - .500"           | Display unit (568-013), contact heads (952909, 952910, 952911), adapter (954595), setting rings (177-179: Ø.35", 177-283: Ø.425")        | 1.32 lbs. |
| 568-977   | .50" - .65"/.65" - .80"/<br>.8" - 1"                | Display unit (568-013), contact heads (952670, 952671, 952672), adapters (216556, 216557), setting rings (177-182: Ø.65", 177-287: Ø.8") | 1.76 lbs. |
| 568-978   | 1.0" - 1.2"/1.2" - 1.6"/<br>1.6" - 2.0"             | Display unit (568-013), contact heads (952673, 982149, 982150), adapter (216557), setting rings (177-289: Ø1.2", 177-291: Ø1.6")         | 2.86 lbs. |
| 568-979   | 2.0" - 2.5"/2.5" - 3.0"/<br>3.0" - 3.5"/3.5" - 4.0" | Display unit (568-013), contact heads (982178, 982179, 982180, 982181), adapter (216558), setting rings (177-315: Ø2.5", 177-319: Ø3.5") | 7.7 lbs.  |
| 568-980*  | 2.0" - 2.5"/2.5" - 3.0"/<br>3.0" - 3.5"/3.5" - 4.0" | Display unit (568-013), contact heads (04AZA047, 04AZA048), adapter (216558), setting rings (177-315: Ø2.5", 177-319: Ø3.5")             | 7.7 lbs.  |

\*Interchangeable anvil type

### Dimensions



| Range      | L    | a  | b   | c   |
|------------|------|----|-----|-----|
| 6 - 12mm   | 83   | 58 | 2.5 | 2   |
| 12 - 20mm  | 52.6 | 58 | 6.3 | 0.3 |
| 20 - 30mm  | 58.2 | 58 | 8.8 | 0.3 |
| 30 - 50mm  | 67.3 | 58 | 14  | 0.3 |
| 50 - 125mm | 74.8 | 67 | 17  | 0.3 |

## Borematic Complete-Unit Sets

(Each set includes display units and contact heads for each size specified)

### Metric

| Order No. | Range  | Set configuration  | Mass  |
|-----------|--|--|-------|
| 568-981   | 6 - 8mm/8 - 10mm/<br>10 - 12mm               | Individual Borematic gages (568-331, 568-332, 568-333), setting rings (177-125: Ø8mm, 177-126: Ø10mm)  | 1.6kg |
| 568-982   | 12 - 16mm/16 - 20mm/<br>20 - 25mm            | Individual Borematic gages (568-334, 568-335, 568-336), setting rings (177-177: Ø16mm, 177-286: Ø20mm) | 1.8kg |
| 568-983   | 25 - 30mm/30 - 40mm/<br>40 - 50mm            | Individual Borematic gages (568-337, 568-338, 568-339), setting rings (177-288: Ø30mm, 177-290: Ø40mm) | 2.5kg |
| 568-984   | 50 - 63mm/62 - 75mm                          | Individual Borematic gages (568-340, 568-341), setting ring (177-314: Ø62mm)                           | 2.6kg |
| 568-985   | 75 - 88mm/87 - 100mm                         | Individual Borematic gages (568-342, 568-343), setting ring (177-318: Ø87mm)                           | 3.4kg |
| 568-986*  | 50 - 63mm/62 - 75mm/<br>75 - 88mm/87 - 100mm | Individual Borematic gages (568-346, 568-347), setting rings (177-314: Ø62mm, 177-318: Ø87mm)          | 4.6kg |

\*Interchangeable anvil type

### Inch/Metric

| Order No. | Range   | Set configuration   | Mass       |
|-----------|---|---|------------|
| 568-987   | .275" - .350"/.350" - .425"/.425" - .500"           | Individual Borematic gages (568-431, 568-432, 568-433), setting rings (177-179: Ø.35", 177-283: Ø.425") | 3.52 lbs.  |
| 568-988   | .50" - .65"/.65" - .80"/<br>.8" - 1"                | Individual Borematic gages (568-434, 568-435, 568-436), setting rings (177-182: Ø.65", 177-287: Ø.8")   | 3.96 lbs.  |
| 568-989   | 1.0" - 1.2"/1.2" - 1.6"/<br>1.6" - 2.0"             | Individual Borematic gages (568-437, 568-438, 568-439), setting rings (177-289: Ø1.2", 177-291: Ø1.6")  | 5.5 lbs.   |
| 568-990   | 2.0" - 2.5"/2.5" - 3.0"                             | Individual Borematic gages (568-440, 568-441), setting ring (177-315: Ø2.5")                            | 5.72 lbs.  |
| 568-991   | 3.0" - 3.5"/3.5" - 4.0"                             | Individual Borematic gages (568-442, 568-443), setting ring (177-319: Ø3.5")                            | 7.48 lbs.  |
| 568-992*  | 2.0" - 2.5"/2.5" - 3.0"/<br>3.0" - 3.5"/3.5" - 4.0" | Individual Borematic gages (568-446, 568-447), setting rings (177-315: Ø2.5", 177-319: Ø3.5")           | 10.12 lbs. |

\*Interchangeable anvil type

### Borematic Interchangeable-Contact Head Sets



568-971

### Borematic Complete-Unit Sets



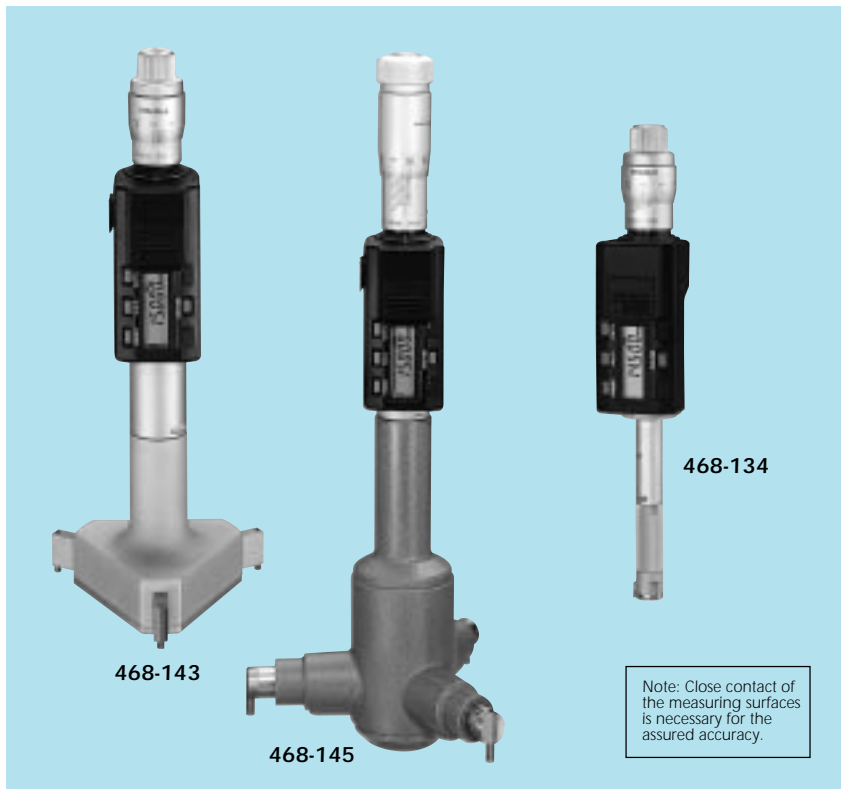
568-983



# Digimatic Holtest

## SERIES 468

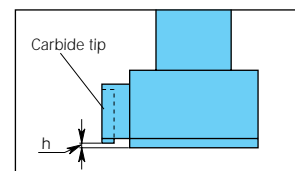
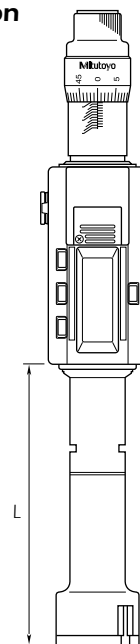
### Three-Point Internal Micrometers



### FEATURES

- Large LCD readout.
- Carbide-tipped contact points (anvils) ensure long life.
- Functions available: Presetting, Zero-setting, Data hold, Data out put, Error alarm, Battery replacement alarm.
- Battery: SR44 (938882) x 1pc.
- With Ratchet Stop for constant force.
- Measurement can be taken closer to the bottom of the blind bore.
- Can measure deep holes by attaching an Extension Rod (optional).
- Setting Rings for origin point setting are optional.

### Dimension



### SPECIFICATIONS

#### Individual Digimatic Holtest

#### Metric

| Range       | Order No. | Resolution | Accuracy | Dimension h | Dimension L | Extension Rod (optional) |
|-------------|-----------|------------|----------|-------------|-------------|--------------------------|
| 6 - 8mm     | 468-131   | 0.001mm    | 2µm      | 2mm         | 45mm        | 100mm (952322)           |
| 8 - 10mm    | 468-132   | 0.001mm    | 2µm      | 2mm         | 45mm        | 100mm (952322)           |
| 10 - 12mm   | 468-133   | 0.001mm    | 2µm      | 2mm         | 45mm        | 100mm (952322)           |
| 12 - 16mm   | 468-134   | 0.001mm    | 2µm      | 0.3mm       | 76mm        | 150mm (952621)           |
| 16 - 20mm   | 468-135   | 0.001mm    | 2µm      | 0.3mm       | 76mm        | 150mm (952621)           |
| 20 - 25mm   | 468-136   | 0.001mm    | 3µm      | 0.3mm       | 88mm        | 150mm (952622)           |
| 25 - 30mm   | 468-137   | 0.001mm    | 3µm      | 0.3mm       | 88mm        | 150mm (952622)           |
| 30 - 40mm   | 468-138   | 0.001mm    | 3µm      | 0.3mm       | 102mm       | 150mm (952622)           |
| 40 - 50mm   | 468-139   | 0.001mm    | 3µm      | 0.3mm       | 102mm       | 150mm (952622)           |
| 50 - 63mm   | 468-140   | 0.001mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 62 - 75mm   | 468-141   | 0.001mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 75 - 88mm   | 468-142   | 0.001mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 87 - 100mm  | 468-143   | 0.001mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 100 - 125mm | 468-144   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |
| 125 - 150mm | 468-145   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |
| 150 - 175mm | 468-146   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |
| 175 - 200mm | 468-147   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |
| 200 - 225mm | 468-148   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |
| 225 - 250mm | 468-149   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |
| 250 - 275mm | 468-150   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |
| 275 - 300mm | 468-151   | 0.001mm    | 5µm      | 13mm        | 151mm       | 150mm (952623)           |

### OPTIONAL ACCESSORIES

| Order No.       | Description    |
|-----------------|----------------|
| 937387          | SPC cable (1m) |
| 965013          | SPC cable (2m) |
| 982693          | Mounting plate |
| 156-101         | Stand          |
| (See listing.)  | Extension Rods |
| (See page 141.) | Setting Rings  |

## Inch/Metric

| Range        | Order No. | Resolution      | Accuracy | Dimension h | Dimension L | Extension Rod (optional) |
|--------------|-----------|-----------------|----------|-------------|-------------|--------------------------|
| .275" - .35" | 468-231   | .00005"/0.001mm | .0001"   | .079"       | 1.77"       | 4" (952322)              |
| .35" - .425" | 468-232   | .00005"/0.001mm | .0001"   | .079"       | 1.77"       | 4" (952322)              |
| .425" - .5"  | 468-233   | .00005"/0.001mm | .0001"   | .079"       | 1.77"       | 4" (952322)              |
| .5" - .65"   | 468-234   | .00005"/0.001mm | .0001"   | .012"       | 2.99"       | 6" (952621)              |
| .65" - .8"   | 468-235   | .00005"/0.001mm | .0001"   | .012"       | 2.99"       | 6" (952621)              |
| .8" - 1"     | 468-236   | .00005"/0.001mm | .00015"  | .012"       | 3.46"       | 6" (952622)              |
| 1" - 1.2"    | 468-237   | .00005"/0.001mm | .00015"  | .012"       | 3.46"       | 6" (952622)              |
| 1.2" - 1.6"  | 468-238   | .00005"/0.001mm | .00015"  | .012"       | 4.02"       | 6" (952622)              |
| 1.6" - 2"    | 468-239   | .00005"/0.001mm | .00015"  | .012"       | 4.02"       | 6" (952622)              |
| 2" - 2.5"    | 468-240   | .00005"/0.001mm | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 2.5" - 3"    | 468-241   | .00005"/0.001mm | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 3" - 3.5"    | 468-242   | .00005"/0.001mm | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 3.5" - 4"    | 468-243   | .00005"/0.001mm | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 4" - 5"      | 468-244   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |
| 5" - 6"      | 468-245   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |
| 6" - 7"      | 468-246   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |
| 7" - 8"      | 468-247   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |
| 8" - 9"      | 468-248   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |
| 9" - 10"     | 468-249   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |
| 10" - 11"    | 468-250   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |
| 11" - 12"    | 468-251   | .00005"/0.001mm | .0002"   | .51"        | 5.94"       | 6" (952623)              |



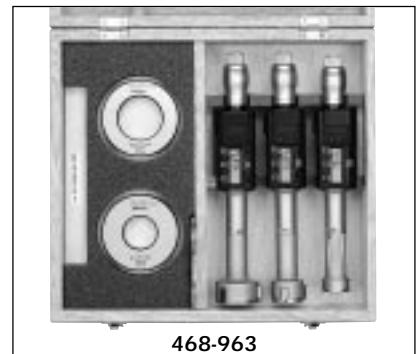
## Digimatic Holtest Complete-Unit Sets

### Metric

| Range      | Order No. | Individual range      | Setting Rings included | Remarks |
|------------|-----------|-----------------------|------------------------|---------|
| 6 - 12mm   | 468-961   | 6-8, 8-10, 10-12mm    | Ø8mm, Ø10mm            | —       |
| 12 - 25mm  | 468-962   | 12-16, 16-20, 20-25mm | Ø16mm, Ø20mm           | —       |
| 25 - 50mm  | 468-963   | 25-30, 30-40, 40-50mm | Ø30mm, Ø40mm           | —       |
| 50 - 75mm  | 468-964   | 50-63, 62-75mm        | Ø62mm                  | —       |
| 75 - 100mm | 468-965   | 75-88, 87-100mm       | Ø87mm                  | —       |

### Inch/Metric

| Range       | Order No. | Individual range               | Setting Rings included | Remarks |
|-------------|-----------|--------------------------------|------------------------|---------|
| .275" - .5" | 468-966   | .275-.35", .35-.425", .425-.5" | .35" DIA., .425" DIA.  | —       |
| .5" - 1"    | 468-967   | .5-.65", .65-.8", .8-1"        | .65" DIA., .8" DIA.    | —       |
| 1" - 2"     | 468-968   | 1-1.2", 1.2-1.6", 1.6-2"       | 1.2" DIA., 1.6" DIA.   | —       |
| 2" - 3"     | 468-969   | 2-2.5", 2.5-3"                 | 2.5" DIA.              | —       |
| 3" - 4"     | 468-970   | 3-3.5", 3.5-4"                 | 3.5" DIA.              | —       |



### Digimatic Holtest Complete-Unit Sets:

Each set includes complete gages (display units and measuring heads for each size).

## Digimatic Holtest with Interchangeable-Head Sets (Economy Sets)

### Metric

| Range       | Order No. | Individual range                     | Setting Rings included | Remarks            |
|-------------|-----------|--------------------------------------|------------------------|--------------------|
| 6 - 12mm    | 468-951   | 6-8, 8-10, 10-12mm                   | Ø8mm, Ø10mm            | with Extension Rod |
| 12 - 20mm   | 468-952   | 12-16, 16-20mm                       | Ø16mm                  | with Extension Rod |
| 20 - 50mm   | 468-953   | 20-25, 25-30, 30-40, 40-50mm         | Ø25mm, Ø40mm           | with Extension Rod |
| 50 - 100mm  | 468-954   | 50-63, 62-75, 75-88, 87-100mm        | Ø62mm, Ø87mm           | with Extension Rod |
| 100 - 200mm | 468-955   | 100-125, 125-150, 150-175, 175-200mm | Ø125mm, Ø175mm         | with Extension Rod |

### Inch/Metric

| Range       | Order No. | Individual range                | Setting Rings included | Remarks            |
|-------------|-----------|---------------------------------|------------------------|--------------------|
| .275" - .5" | 468-956   | .275-.35", .35-.425", .425-.5"  | .35" DIA., .425" DIA.  | with Extension Rod |
| .5" - .8"   | 468-957   | .5-.65", .65-.8"                | .65" DIA.              | with Extension Rod |
| .8" - 2"    | 468-958   | .8-1", 1-1.2", 1.2-1.6", 1.6-2" | 1" DIA., 1.6" DIA.     | with Extension Rod |
| 2" - 4"     | 468-959   | 2-2.5", 2.5-3", 3-3.5", 3.5-4"  | 2.5" DIA., 3.5" DIA.   | with Extension Rod |
| 4" - 8"     | 468-960   | 4-5", 5-6", 6-7", 7-8"          | 5" DIA., 7" DIA.       | with Extension Rod |



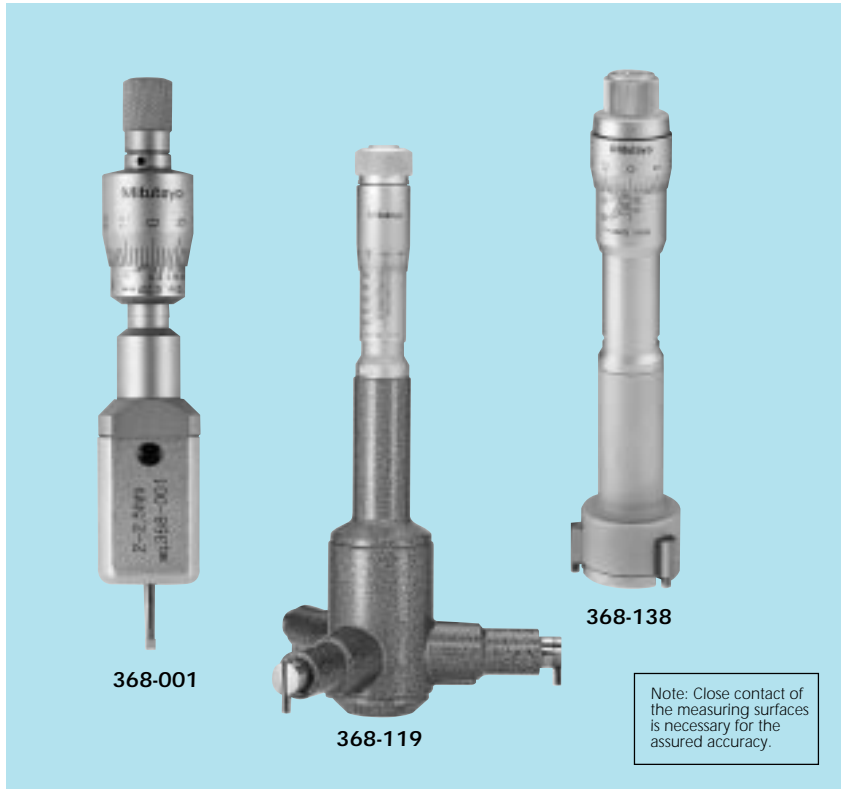
### Digimatic Holtest with Interchangeable-Head Sets (Economy Sets):

Each set includes one display unit with interchangeable measuring heads of the sizes specified.

# Holtest

## SERIES 368

### Three-Point Internal Micrometers



These Holtests are versatile, self-centering three-point internal micrometers for the accurate and efficient direct-measurement of internal diameters. Three anvils, evenly spaced at 120° apart, contact the internal wall surfaces and find true alignment with the axis of the bore for accurate ID measurement.

#### FEATURES

- Highly durable because of carbide-tipped contact points (anvils).
- Measurement can be taken closer to the bottom of the blind bore.
- Can measure deep holes using an Extension Rod (optional) which is available on models over 6mm (.275") measuring range.
- With Ratchet Stop for constant force.
- Setting Rings for zero point adjustment are optional.

#### SPECIFICATIONS

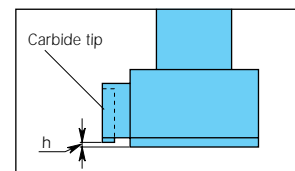
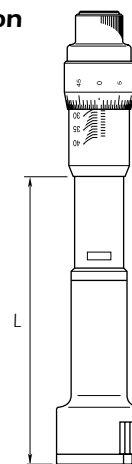
##### Individual Holtest

##### Metric

| Range       | Order No. | Graduation | Accuracy | Dimension h | Dimension L | Extension Rod (optional) |
|-------------|-----------|------------|----------|-------------|-------------|--------------------------|
| 2 - 2.5mm   | 368-001*  | 0.001mm    | 2µm      | —           | 12mm        | —                        |
| 2.5 - 3mm   | 368-002*  | 0.001mm    | 2µm      | —           | 12mm        | —                        |
| 3 - 4mm     | 368-003*  | 0.001mm    | 2µm      | —           | 22mm        | —                        |
| 4 - 5mm     | 368-004*  | 0.001mm    | 2µm      | —           | 22mm        | —                        |
| 5 - 6mm     | 368-005*  | 0.001mm    | 2µm      | —           | 22mm        | —                        |
| 6 - 8mm     | 368-101   | 0.001mm    | 2µm      | 2mm         | 59mm        | 100mm (952322)           |
| 8 - 10mm    | 368-102   | 0.001mm    | 2µm      | 2mm         | 59mm        | 100mm (952322)           |
| 10 - 12mm   | 368-103   | 0.001mm    | 2µm      | 2mm         | 59mm        | 100mm (952322)           |
| 12 - 16mm   | 368-104   | 0.005mm    | 2µm      | 0.3mm       | 80mm        | 150mm (952621)           |
| 16 - 20mm   | 368-105   | 0.005mm    | 2µm      | 0.3mm       | 80mm        | 150mm (952621)           |
| 20 - 25mm   | 368-106   | 0.005mm    | 3µm      | 0.3mm       | 90mm        | 150mm (952622)           |
| 25 - 30mm   | 368-107   | 0.005mm    | 3µm      | 0.3mm       | 90mm        | 150mm (952622)           |
| 30 - 40mm   | 368-138   | 0.005mm    | 3µm      | 0.3mm       | 98mm        | 150mm (952622)           |
| 40 - 50mm   | 368-139   | 0.005mm    | 3µm      | 0.3mm       | 98mm        | 150mm (952622)           |
| 50 - 63mm   | 368-140   | 0.005mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 62 - 75mm   | 368-141   | 0.005mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 75 - 88mm   | 368-142   | 0.005mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 87 - 100mm  | 368-143   | 0.005mm    | 3µm      | 0.3mm       | 105mm       | 150mm (952623)           |
| 100 - 125mm | 368-117   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |
| 125 - 150mm | 368-118   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |
| 150 - 175mm | 368-119   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |
| 175 - 200mm | 368-120   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |
| 200 - 225mm | 368-121   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |
| 225 - 250mm | 368-122   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |
| 250 - 275mm | 368-123   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |
| 275 - 300mm | 368-124   | 0.005mm    | 5µm      | 13mm        | 158mm       | 150mm (952623)           |

\*Two-point contact type for very small holes

#### Dimension



#### OPTIONAL ACCESSORIES

| Order No.       | Description    |
|-----------------|----------------|
| (See listing.)  | Extension Rods |
| (See page 141.) | Setting Rings  |

## Inch

| Range        | Order No. | Graduation | Accuracy | Dimension h | Dimension L | Extension Rod (optional) |
|--------------|-----------|------------|----------|-------------|-------------|--------------------------|
| .08" - .1"   | 368-021*  | .0001"     | .0001"   | —           | .47"        | —                        |
| .1" - .12"   | 368-022*  | .0001"     | .0001"   | —           | .47"        | —                        |
| .12" - .16"  | 368-023*  | .0001"     | .0001"   | —           | .87"        | —                        |
| .16" - .2"   | 368-024*  | .0001"     | .0001"   | —           | .87"        | —                        |
| .2" - .24"   | 368-025*  | .0001"     | .0001"   | —           | .87"        | —                        |
| .24" - .28"  | 368-026*  | .0001"     | .0001"   | —           | .87"        | —                        |
| .275" - .35" | 368-201   | .0001"     | .0001"   | .079"       | 2.32"       | 4" (952322)              |
| .35" - .425" | 368-202   | .0001"     | .0001"   | .079"       | 2.32"       | 4" (952322)              |
| .425" - .5"  | 368-203   | .0001"     | .0001"   | .079"       | 2.32"       | 4" (952322)              |
| .5" - .65"   | 368-204   | .0002"     | .0001"   | .012"       | 3.15"       | 6" (952621)              |
| .65" - .8"   | 368-205   | .0002"     | .0001"   | .012"       | 3.15"       | 6" (952621)              |
| .8" - 1"     | 368-206   | .0002"     | .00015"  | .012"       | 3.54"       | 6" (952622)              |
| 1" - 1.2"    | 368-207   | .0002"     | .00015"  | .012"       | 3.54"       | 6" (952622)              |
| 1.2" - 1.6"  | 368-238   | .0002"     | .00015"  | .012"       | 3.86"       | 6" (952622)              |
| 1.6" - 2"    | 368-239   | .0002"     | .00015"  | .012"       | 3.86"       | 6" (952622)              |
| 2" - 2.5"    | 368-240   | .0002"     | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 2.5" - 3"    | 368-241   | .0002"     | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 3" - 3.5"    | 368-242   | .0002"     | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 3.5" - 4"    | 368-243   | .0002"     | .00015"  | .012"       | 4.13"       | 6" (952623)              |
| 4" - 5"      | 368-217   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |
| 5" - 6"      | 368-218   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |
| 6" - 7"      | 368-219   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |
| 7" - 8"      | 368-220   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |
| 8" - 9"      | 368-221   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |
| 9" - 10"     | 368-222   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |
| 10" - 11"    | 368-223   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |
| 11" - 12"    | 368-224   | .0002"     | .0002"   | .51"        | 6.22"       | 6" (952623)              |

\*Two-point contact type for very small holes



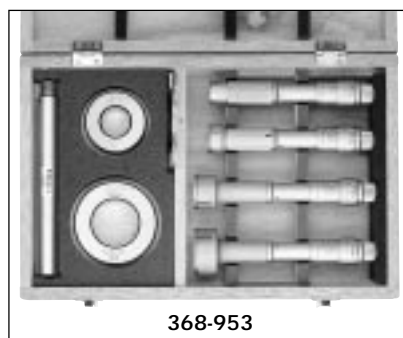
## Holtest Complete-Unit Sets

### Metric

| Range       | Order No. | Individual range                     | Setting Rings included | Remarks            |
|-------------|-----------|--------------------------------------|------------------------|--------------------|
| 2 - 3mm     | 368-906   | 2-2.5, 2.5-3mm                       | Ø2.5mm                 | —                  |
| 3 - 6mm     | 368-907   | 3-4, 4-5, 5-6mm                      | Ø4mm, Ø5mm             | —                  |
| 6 - 12mm    | 368-901   | 6-8, 8-10, 10-12mm                   | Ø8mm, Ø10mm            | with Extension Rod |
| 12 - 20mm   | 368-902   | 12-16, 16-20mm                       | Ø16mm                  | with Extension Rod |
| 20 - 50mm   | 368-953   | 20-25, 25-30, 30-40, 40-50mm         | Ø25mm, Ø40mm           | with Extension Rod |
| 50 - 100mm  | 368-954   | 50-63, 62-75, 75-88, 87-100mm        | Ø62mm, Ø87mm           | with Extension Rod |
| 100 - 200mm | 368-905   | 100-125, 125-150, 150-175, 175-200mm | Ø125mm, Ø175mm         | with Extension Rod |

### Inch

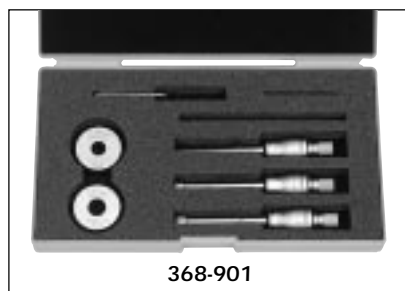
| Range       | Order No. | Individual range                     | Setting Rings included | Remarks            |
|-------------|-----------|--------------------------------------|------------------------|--------------------|
| .08" - .12" | 368-926   | .08-.1", .1-.12"                     | .1" DIA.               | —                  |
| .12" - .28" | 368-927   | .12-.16", .16-.2", .2-.24", .24-.28" | .16" DIA., .24" DIA.   | —                  |
| .275" - .5" | 368-921   | .275-.35", .35-.425", .425-.5"       | .35" DIA., .5" DIA.    | with Extension Rod |
| .5" - .8"   | 368-922   | .5-.65", .65-.8"                     | .65" DIA.              | with Extension Rod |
| .8" - 2"    | 368-958   | .8-1", 1-1.2", 1.2-1.6", 1.6-2"      | 1" DIA., 1.6" DIA.     | with Extension Rod |
| 2" - 4"     | 368-959   | 2-2.5", 2.5-3", 3-3.5", 3.5-4"       | 2.5" DIA., 3.5" DIA.   | with Extension Rod |
| 4" - 8"     | 368-925   | 4-5", 5-6", 6-7", 7-8"               | 5" DIA., 7" DIA.       | with Extension Rod |



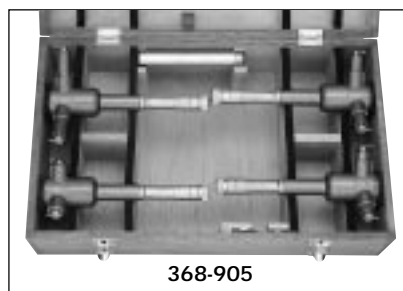
368-953



368-906



368-901

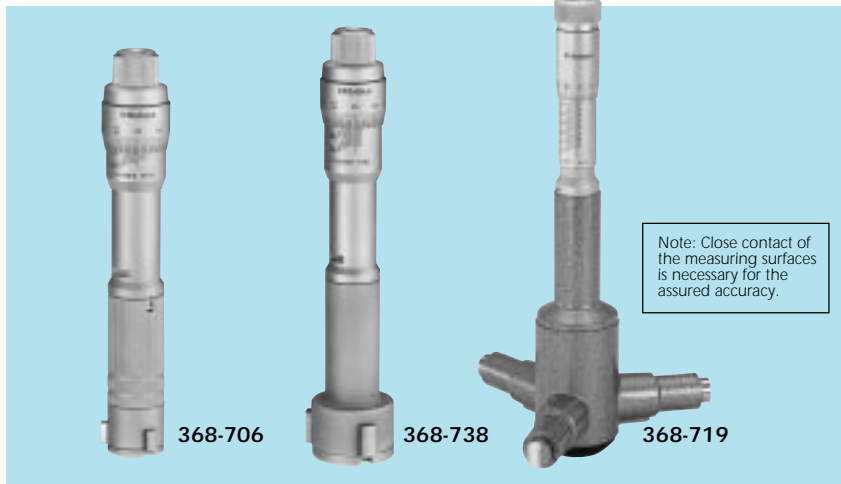


368-905

# Holtest (Type II)

## SERIES 368

### Three-Point Internal Micrometers



### FEATURES

- The Holtests (type II) have three contact points made of alloyed steel.
- Economy price.
- The same accuracy as carbide-tipped Holtests.
- Measurement can be taken closer to the bottom of the blind bore.
- Can measure deep holes using an Extension Rod (optional).
- With Ratchet Stop for constant force.
- Setting Rings for zero point adjustment are optional.

### SPECIFICATIONS

#### Individual Holtest (Type II)

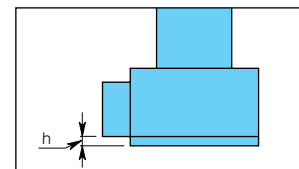
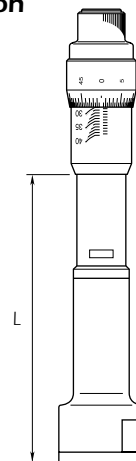
##### Metric

| Range       | Order No. | Graduation | Accuracy | Dimension h | Dimension L | Extension Rod (optional) |
|-------------|-----------|------------|----------|-------------|-------------|--------------------------|
| 12 - 16mm   | 368-704   | 0.005mm    | 2µm      | 2.2mm       | 80mm        | 150mm (952621)           |
| 16 - 20mm   | 368-705   | 0.005mm    | 2µm      | 2.2mm       | 80mm        | 150mm (952621)           |
| 20 - 25mm   | 368-706   | 0.005mm    | 3µm      | 2.2mm       | 90mm        | 150mm (952622)           |
| 25 - 30mm   | 368-707   | 0.005mm    | 3µm      | 2.2mm       | 90mm        | 150mm (952622)           |
| 30 - 40mm   | 368-738   | 0.005mm    | 3µm      | 3.4mm       | 98mm        | 150mm (952622)           |
| 40 - 50mm   | 368-739   | 0.005mm    | 3µm      | 3.4mm       | 98mm        | 150mm (952622)           |
| 50 - 63mm   | 368-740   | 0.005mm    | 3µm      | 3.4mm       | 105mm       | 150mm (952623)           |
| 62 - 75mm   | 368-741   | 0.005mm    | 3µm      | 3.4mm       | 105mm       | 150mm (952623)           |
| 75 - 88mm   | 368-742   | 0.005mm    | 3µm      | 3.4mm       | 105mm       | 150mm (952623)           |
| 87 - 100mm  | 368-743   | 0.005mm    | 3µm      | 3.4mm       | 105mm       | 150mm (952623)           |
| 100 - 125mm | 368-717   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |
| 125 - 150mm | 368-718   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |
| 150 - 175mm | 368-719   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |
| 175 - 200mm | 368-720   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |
| 200 - 225mm | 368-721   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |
| 225 - 250mm | 368-722   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |
| 250 - 275mm | 368-723   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |
| 275 - 300mm | 368-724   | 0.005mm    | 5µm      | 19.6mm      | 158mm       | 150mm (952623)           |

##### Inch

| Range       | Order No. | Graduation | Accuracy | Dimension h | Dimension L | Extension Rod (optional) |
|-------------|-----------|------------|----------|-------------|-------------|--------------------------|
| .5" - .65"  | 368-804   | .0002"     | .0001"   | .09"        | 3.15"       | 6" (952621)              |
| .65" - .8"  | 368-805   | .0002"     | .0001"   | .09"        | 3.15"       | 6" (952621)              |
| .8" - 1"    | 368-806   | .0002"     | .00015"  | .09"        | 3.54"       | 6" (952622)              |
| 1" - 1.2"   | 368-807   | .0002"     | .00015"  | .09"        | 3.54"       | 6" (952622)              |
| 1.2" - 1.6" | 368-838   | .0002"     | .00015"  | .014"       | 3.86"       | 6" (952622)              |
| 1.6" - 2"   | 368-839   | .0002"     | .00015"  | .014"       | 3.86"       | 6" (952622)              |
| 2" - 2.5"   | 368-840   | .0002"     | .00015"  | .014"       | 4.13"       | 6" (952623)              |
| 2.5" - 3"   | 368-841   | .0002"     | .00015"  | .014"       | 4.13"       | 6" (952623)              |
| 3" - 3.5"   | 368-842   | .0002"     | .00015"  | .014"       | 4.13"       | 6" (952623)              |
| 3.5" - 4"   | 368-843   | .0002"     | .00015"  | .014"       | 4.13"       | 6" (952623)              |
| 4" - 5"     | 368-817   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |
| 5" - 6"     | 368-818   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |
| 6" - 7"     | 368-819   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |
| 7" - 8"     | 368-820   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |
| 8" - 9"     | 368-821   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |
| 9" - 10"    | 368-822   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |
| 10" - 11"   | 368-823   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |
| 11" - 12"   | 368-824   | .0002"     | .0002"   | .78"        | 6.22"       | 6" (952623)              |

### Dimension



### OPTIONAL ACCESSORIES

| Order No.       | Description    |
|-----------------|----------------|
| (See listing.)  | Extension Rods |
| (See page 141.) | Setting Rings  |

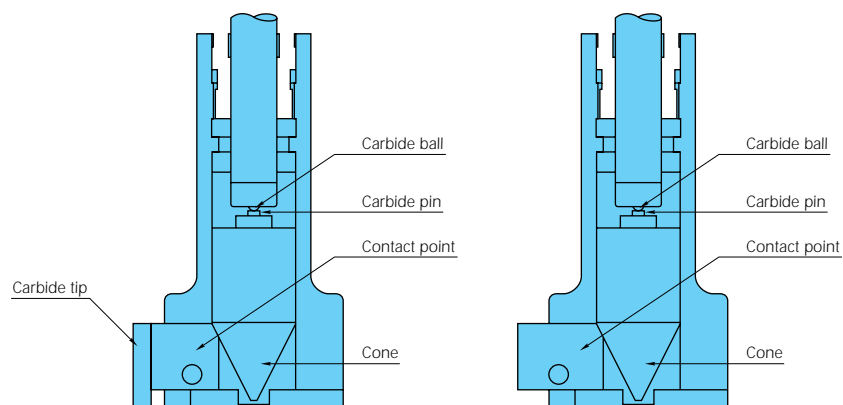
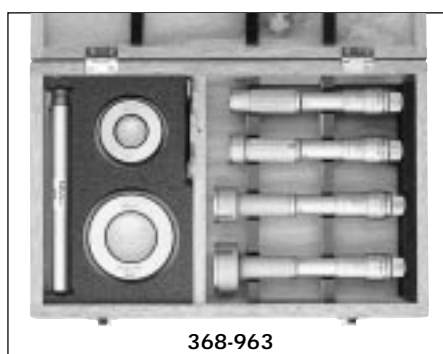
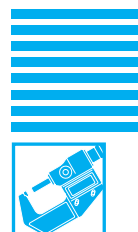
## Holtest (Type II) Complete-Unit Sets

### Metric

| Range       | Order No.      | Individual range                     | Setting Rings included | Remarks            |
|-------------|----------------|--------------------------------------|------------------------|--------------------|
| 12 - 20mm   | <b>368-972</b> | 12-16, 16-20mm                       | Ø16mm                  | with Extension Rod |
| 20 - 50mm   | <b>368-963</b> | 20-25, 25-30, 30-40, 40-50mm         | Ø25mm, Ø40mm           | with Extension Rod |
| 50 - 100mm  | <b>368-964</b> | 50-63, 62-75, 75-88, 87-100mm        | Ø62mm, Ø87mm           | with Extension Rod |
| 100 - 200mm | <b>368-975</b> | 100-125, 125-150, 150-175, 175-200mm | Ø125mm, Ø175mm         | with Extension Rod |

### Inch

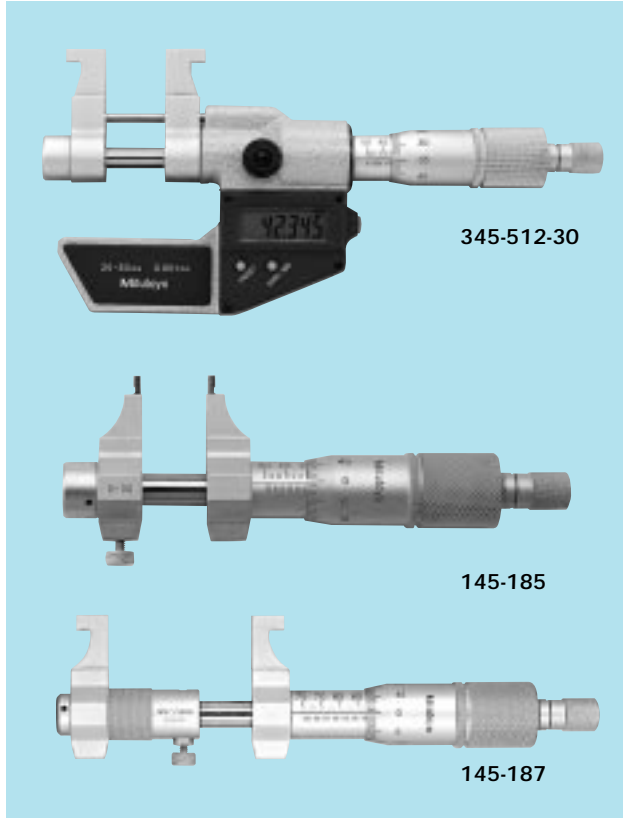
| Range     | Order No.      | Individual range                | Setting Rings included | Remarks            |
|-----------|----------------|---------------------------------|------------------------|--------------------|
| .5" - .8" | <b>368-982</b> | .5-.65", .65-.8"                | .65" DIA.              | with Extension Rod |
| .8" - 2"  | <b>368-968</b> | .8-1", 1-1.2", 1.2-1.6", 1.6-2" | 1" DIA., 1.6" DIA.     | with Extension Rod |
| 2" - 4"   | <b>368-969</b> | 2-2.5", 2.5-3", 3-3.5", 3.5-4"  | 2.5" DIA., 3.5" DIA.   | with Extension Rod |
| 4" - 8"   | <b>368-985</b> | 4-5", 5-6", 6-7", 7-8"          | 5" DIA., 7" DIA.       | with Extension Rod |



# Inside Micrometers

SERIES 345, 145

Caliper Type



## SPECIFICATIONS

### Digimatic Inside Micrometers

#### Metric

| Range     | Order No.  | Resolution | Accuracy |
|-----------|------------|------------|----------|
| 5 - 30mm  | 345-511-30 | 0.001mm    | ±5µm     |
| 25 - 50mm | 345-512-30 | 0.001mm    | ±6µm     |

#### Inch/Metric

| Range      | Order No.  | Resolution      | Accuracy |
|------------|------------|-----------------|----------|
| .2" - 1.2" | 345-711-30 | .00005"/0.001mm | ±.00025" |
| 1" - 2"    | 345-712-30 | .00005"/0.001mm | ±.0003"  |

### Inside Micrometers

#### Metric

| Range       | Order No. | Graduation | Accuracy |
|-------------|-----------|------------|----------|
| 5 - 30mm    | 145-185   | 0.01mm     | ±5µm     |
| 25 - 50mm   | 145-186   | 0.01mm     | ±6µm     |
| 50 - 75mm   | 145-187   | 0.01mm     | ±7µm     |
| 75 - 100mm  | 145-188   | 0.01mm     | ±8µm     |
| 100 - 125mm | 145-189   | 0.01mm     | ±9µm     |
| 125 - 150mm | 145-190   | 0.01mm     | ±9µm     |
| 150 - 175mm | 145-191   | 0.01mm     | ±10µm    |
| 175 - 200mm | 145-192   | 0.01mm     | ±10µm    |
| 200 - 225mm | 145-217   | 0.01mm     | ±11µm    |
| 225 - 250mm | 145-218   | 0.01mm     | ±11µm    |
| 250 - 275mm | 145-219   | 0.01mm     | ±12µm    |
| 275 - 300mm | 145-220   | 0.01mm     | ±12µm    |

#### Inch

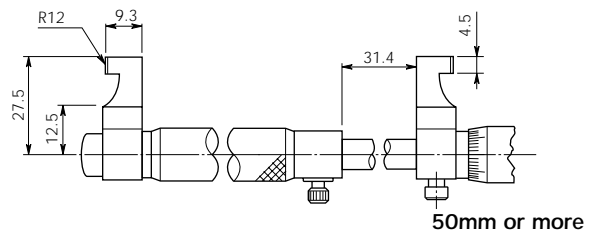
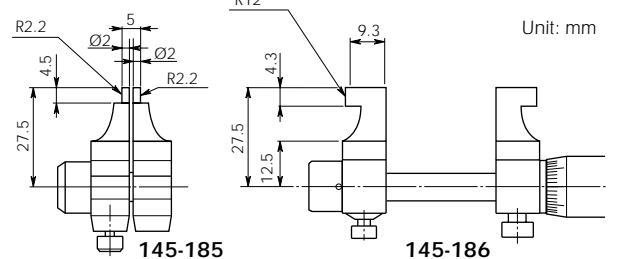
| Range      | Order No. | Graduation | Accuracy |
|------------|-----------|------------|----------|
| .2" - 1.2" | 145-193   | .001"      | ±.00025" |
| 1" - 2"    | 145-194   | .001"      | ±.0003"  |
| 2" - 3"    | 145-195   | .001"      | ±.00035" |
| 3" - 4"    | 145-196   | .001"      | ±.0004"  |
| 6" - 7"    | 145-199   | .001"      | ±.0005"  |

## FEATURES

- Caliper type jaws are made of high-grade, tool steel.
- Satin-chrome finished.
- Locking clamp for positive locking of spindle.
- Setting Rings for origin point setting are optional.
- The 245 series is provided with a digit counter.
- A special holder is available. The holder (300400) and cap (300401) must be used with Mitutoyo Micrometer Stand or any other similar stand available in the shop.

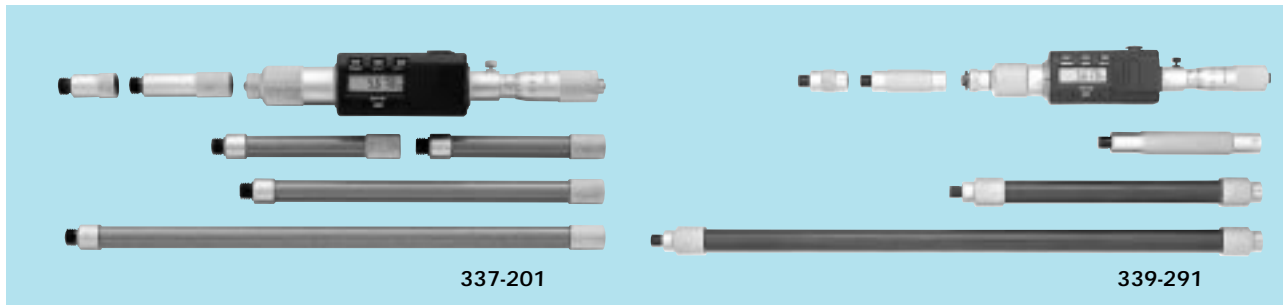


## Dimensions



# Digimatic Tubular Inside Micrometers

SERIES 337 (Extension Rod Type)  
 SERIES 339 (Extension Pipe Type)



## FEATURES

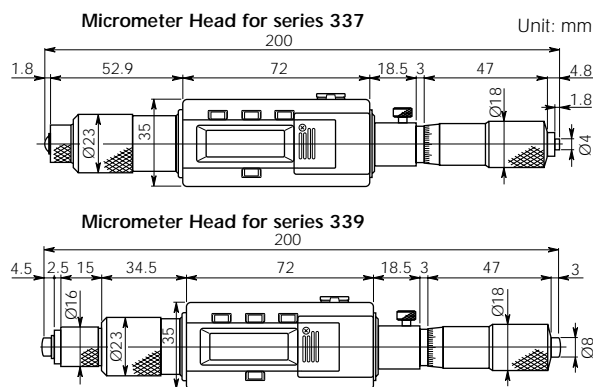
- Wide range of ID measurements by combining extension rods (pipes) and anvils with the micrometer head.
- Functions available: Presetting, Zero-setting, Inch/mm conversion (in/mm model only), Data hold, Error alarm, Data output.
- The 339 series uses highly-durable extension pipes.
- Carbide-tipped measuring faces (Series 339).

## SPECIFICATIONS

### Accuracy

- $\pm(3+n+L/50)\mu\text{m}$  [ $\pm(.00015+.00005n+.00005(L/2))$ "]\*  
 \*n=Number of rod, L=Maximum measuring length (mm) [(inch)], Fraction rounded up

## Dimensions



## OPTIONAL ACCESSORIES

| Order No.       | Description    |
|-----------------|----------------|
| 937387          | SPC cable (1m) |
| 965013          | SPC cable (2m) |
| (See page 141.) | Setting Rings  |

## Extension Rod Type Digimatic Tubular Inside Micrometers

### Metric

| Range        | Order No. | Resolution | Travel of micrometer head | Extension rods                           |
|--------------|-----------|------------|---------------------------|--|
| 200 - 1000mm | 337-201   | 0.001mm    | 25mm                      | 25mm, 50mm, 100mm (2 pcs.), 200mm, 300mm |
| 200 - 1500mm | 337-202   | 0.001mm    | 25mm                      | 25mm, 50mm, 100mm, 200mm, 300mm (3 pcs.) |

### Inch/Metric

| Range    | Order No. | Resolution     | Travel of micrometer head | Extension rods               |
|----------|-----------|----------------|---------------------------|------------------------------|
| 8" - 40" | 337-203   | .0001"/0.001mm | 1"                        | 1", 2", 4" (2 pcs.), 8", 12" |
| 8" - 60" | 337-204   | .0001"/0.001mm | 1"                        | 1", 2", 4", 8", 12" (3 pcs.) |

## Extension Pipe Type Digimatic Tubular Inside Micrometers

### Metric

| Range        | Order No. | Resolution | Travel of micrometer head | Extension pipes                                   |
|--------------|-----------|------------|---------------------------|---|
| 200 - 1000mm | 339-291   | 0.001mm    | 25mm                      | 25mm, 50mm, 100mm, 200mm, 400mm                   |
| 200 - 2000mm | 339-292   | 0.001mm    | 25mm                      | 25mm, 50mm, 100mm, 200mm (2 pcs.), 400mm (3 pcs.) |

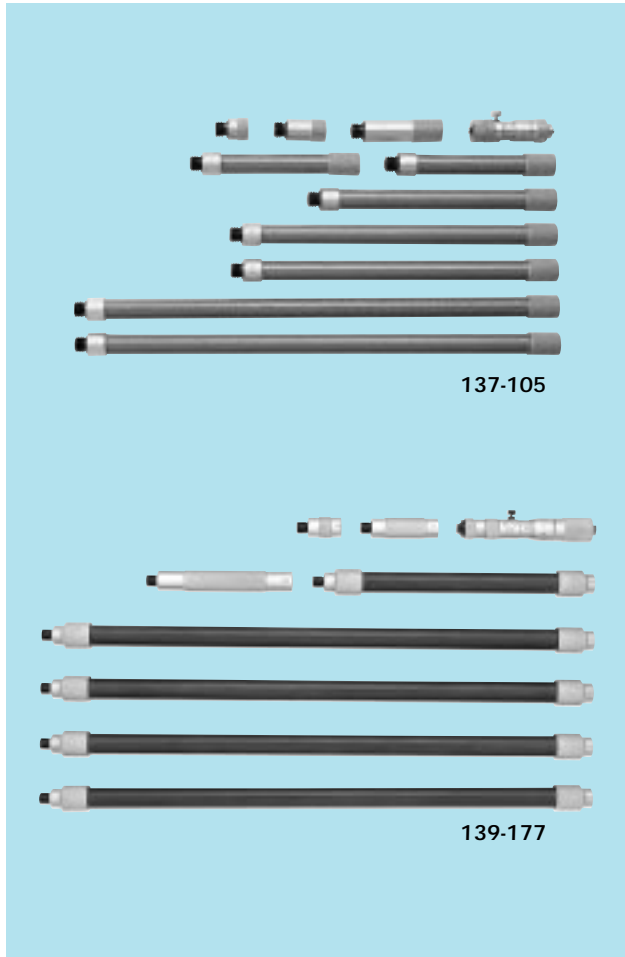
### Inch/Metric

| Range    | Order No. | Resolution     | Travel of micrometer head | Extension pipes                       |
|----------|-----------|----------------|---------------------------|---------------------------------------|
| 8" - 40" | 339-293   | .0001"/0.001mm | 1"                        | 1", 2", 4", 8", 16"                   |
| 8" - 80" | 339-294   | .0001"/0.001mm | 1"                        | 1", 2", 4", 8" (2 pcs.), 16" (3 pcs.) |



# Tubular Inside Micrometers

SERIES 137 (Extension Rod Type, Up to 1500mm)  
 SERIES 139 (Extension Pipe Type, Up to 2100mm)  
 SERIES 140 (Extension Pipe Type, Up to 5000mm)



### FEATURES

- Wide range of ID measurements by combining extension rods (pipes) and anvils with the micrometer head.
- Carbide-tipped measuring faces. (Economy models which have not carbide tips are also available on the 137 series.)
- The 139 series uses highly-durable extension pipes.
- The 140 series uses large-diameter extension pipes.

### SPECIFICATIONS

#### Accuracy

- Series 137, 139:  
 $\pm(3+n+L/50)\mu\text{m} [\pm(.00015+.00005n+.00005 (L/2))"]^*$
  - Series 140:  
 $\pm(7+n+L/50)\mu\text{m} [\pm(.0003+.00005n+.00005 (L/2))"]^*$
- \*n=Number of rod, L=Maximum measuring length (mm) [(inch)], Fraction rounded up

## Extension Rod Type Tubular Inside Micrometers (Up to 1500mm)

### Metric

| Range       | Order No.   |                      | Graduation | Travel of micrometer head | Extension rods  |
|-------------|-------------|----------------------|------------|---------------------------|---|
|             | Plain faces | Carbide-tipped faces |            |                           |   |
| 50 - 63mm   | 137-001     | 137-003              | 0.01mm     | 13mm                      | —   |
| 50 - 150mm  | 137-101     | 137-106              | 0.01mm     | 13mm                      | 13mm, 25mm, 50mm  |
| 50 - 300mm  | 137-102     | 137-107              | 0.01mm     | 13mm                      | 13mm, 25mm, 50mm (2 pcs.), 100mm  |
| 50 - 500mm  | 137-103     | 137-108              | 0.01mm     | 13mm                      | 13mm, 25mm, 50mm (2 pcs.), 100mm, 200mm                                 |
| 50 - 1000mm | 137-104     | 137-109              | 0.01mm     | 13mm                      | 13mm, 25mm, 50mm, 100mm (2 pcs.), 150mm, 200mm, 300mm                   |
| 50 - 1500mm | 137-105     | 137-110              | 0.01mm     | 13mm                      | 13mm, 25mm, 50mm, 100mm (2 pcs.), 150mm, 200mm (2 pcs.), 300mm (2 pcs.) |

### Inch

| Range     | Order No.   |                      | Graduation | Travel of micrometer head | Extension rods  |
|-----------|-------------|----------------------|------------|---------------------------|---|
|           | Plain faces | Carbide-tipped faces |            |                           |   |
| 2" - 2.5" | 137-002     | 137-004              | .001"      | .5"                       | —   |
| 2" - 6"   | 137-111     | 137-116              | .001"      | .5"                       | .5", 1", 2"   |
| 2" - 12"  | 137-112     | 137-117              | .001"      | .5"                       | .5", 1", 2" (2 pcs.), 4"                                |
| 2" - 20"  | 137-113     | 137-118              | .001"      | .5"                       | .5", 1", 2" (2 pcs.), 4", 8"                            |
| 2" - 40"  | 137-114     | 137-119              | .001"      | .5"                       | .5", 1", 2", 4" (2 pcs.), 6", 8", 12"                   |
| 2" - 60"  | 137-115     | 137-120              | .001"      | .5"                       | .5", 1", 2", 4" (2 pcs.), 6", 8" (2 pcs.), 12" (2 pcs.) |

## Extension Pipe Type Tubular Inside Micrometers (Up to 2100mm)

### Metric

| Range        | Order No. | Graduation | Travel of micrometer head | Extension pipes                          |
|--------------|-----------|------------|---------------------------|--|
| 100 - 125mm  | 139-001   | 0.01mm     | 25mm                      | —  |
| 100 - 500mm  | 139-173   | 0.01mm     | 25mm                      | 25mm, 50mm, 100mm, 200mm                 |
| 100 - 900mm  | 139-174   | 0.01mm     | 25mm                      | 25mm, 50mm, 100mm, 200mm, 400mm          |
| 100 - 1300mm | 139-175   | 0.01mm     | 25mm                      | 25mm, 50mm, 100mm, 200mm, 400mm (2 pcs.) |
| 100 - 1700mm | 139-176   | 0.01mm     | 25mm                      | 25mm, 50mm, 100mm, 200mm, 400mm (3 pcs.) |
| 100 - 2100mm | 139-177   | 0.01mm     | 25mm                      | 25mm, 50mm, 100mm, 200mm, 400mm (4 pcs.) |

### Inch

| Range    | Order No. | Graduation | Travel of micrometer head | Extension pipes              |
|----------|-----------|------------|---------------------------|------------------------------|
| 4" - 5"  | 139-002   | .001"      | 1"                        | —                            |
| 4" - 20" | 139-178   | .001"      | 1"                        | 1", 2", 4", 8"               |
| 4" - 36" | 139-179   | .001"      | 1"                        | 1", 2", 4", 8", 16"          |
| 4" - 52" | 139-180   | .001"      | 1"                        | 1", 2", 4", 8", 16" (2 pcs.) |
| 4" - 68" | 139-181   | .001"      | 1"                        | 1", 2", 4", 8", 16" (3 pcs.) |
| 4" - 84" | 139-182   | .001"      | 1"                        | 1", 2", 4", 8", 16" (4 pcs.) |

## Extension Pipe Type Tubular Inside Micrometers (Up to 5000mm)

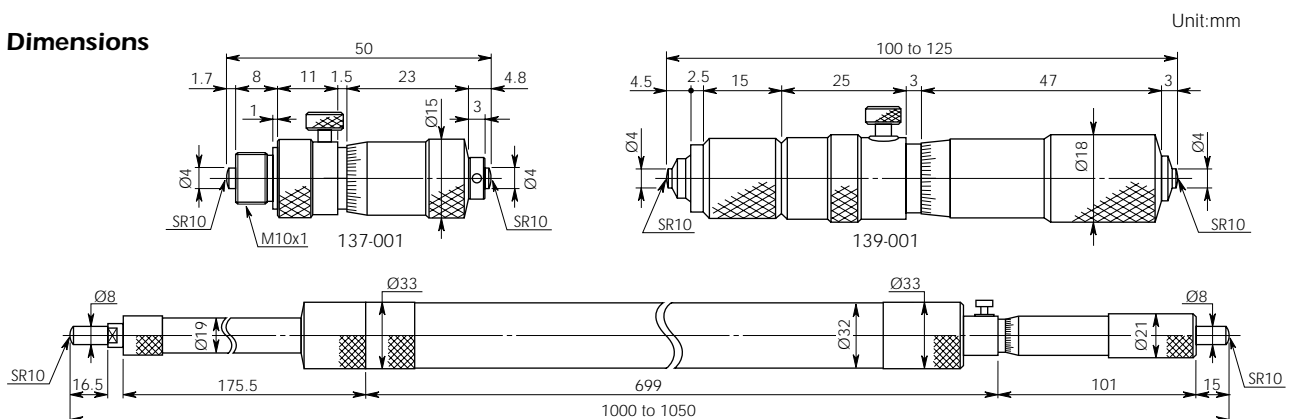
### Metric

| Range         | Order No. | Graduation | Travel of micrometer head | Extension pipes                                     |
|---------------|-----------|------------|---------------------------|---|
| 1000 - 2000mm | 140-157   | 0.01mm     | 50mm                      | 50mm, 100mm (2 pcs.), 200mm, 500mm                  |
| 1000 - 3000mm | 140-158   | 0.01mm     | 50mm                      | 50mm, 100mm (2 pcs.), 200mm, 500mm, 1000mm          |
| 1000 - 4000mm | 140-159   | 0.01mm     | 50mm                      | 50mm, 100mm (2 pcs.), 200mm, 500mm, 1000mm (2 pcs.) |
| 1000 - 5000mm | 140-160   | 0.01mm     | 50mm                      | 50mm, 100mm (2 pcs.), 200mm, 500mm, 1000mm (3 pcs.) |

### Inch

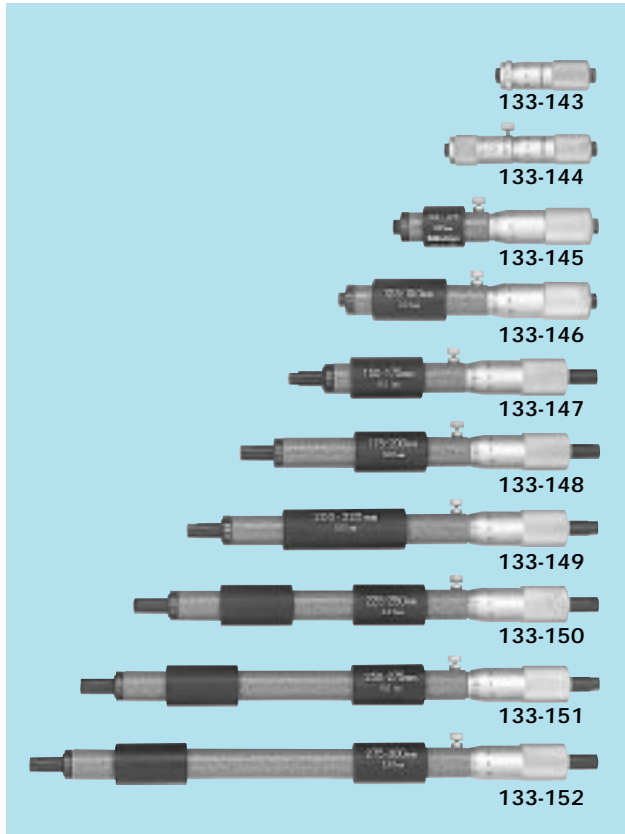
| Range      | Order No. | Graduation | Travel of micrometer head | Extension pipes                        |
|------------|-----------|------------|---------------------------|--|
| 40" - 80"  | 140-161   | .001"      | 2"                        | 2", 4" (2 pcs.), 8", 20"               |
| 40" - 120" | 140-162   | .001"      | 2"                        | 2", 4" (2 pcs.), 8", 20", 40"          |
| 40" - 160" | 140-163   | .001"      | 2"                        | 2", 4" (2 pcs.), 8", 20", 40" (2 pcs.) |
| 40" - 200" | 140-164   | .001"      | 2"                        | 2", 4" (2 pcs.), 8", 20", 40" (3 pcs.) |

## Dimensions



# Tubular Inside Micrometers

SERIES 133  
Single Rod Type



## SPECIFICATIONS

### Individual Tubular Inside Micrometers

#### Metric

| Range        | Order No. | Graduation | Accuracy |
|--------------|-----------|------------|----------|
| 50 - 75mm    | 133-143   | 0.01mm     | ±3µm     |
| 75 - 100mm   | 133-144   | 0.01mm     | ±4µm     |
| 100 - 125mm  | 133-145   | 0.01mm     | ±5µm     |
| 125 - 150mm  | 133-146   | 0.01mm     | ±5µm     |
| 150 - 175mm  | 133-147   | 0.01mm     | ±5µm     |
| 175 - 200mm  | 133-148   | 0.01mm     | ±5µm     |
| 200 - 225mm  | 133-149   | 0.01mm     | ±5µm     |
| 225 - 250mm  | 133-150   | 0.01mm     | ±6µm     |
| 250 - 275mm  | 133-151   | 0.01mm     | ±6µm     |
| 275 - 300mm  | 133-152   | 0.01mm     | ±6µm     |
| 300 - 325mm  | 133-153   | 0.01mm     | ±7µm     |
| 325 - 350mm  | 133-154   | 0.01mm     | ±7µm     |
| 350 - 375mm  | 133-155   | 0.01mm     | ±7µm     |
| 375 - 400mm  | 133-156   | 0.01mm     | ±8µm     |
| 400 - 425mm  | 133-157   | 0.01mm     | ±8µm     |
| 425 - 450mm  | 133-158   | 0.01mm     | ±8µm     |
| 450 - 475mm  | 133-159   | 0.01mm     | ±9µm     |
| 475 - 500mm  | 133-160   | 0.01mm     | ±9µm     |
| 500 - 525mm  | 133-161   | 0.01mm     | ±9µm     |
| 525 - 550mm  | 133-162   | 0.01mm     | ±10µm    |
| 550 - 575mm  | 133-163   | 0.01mm     | ±10µm    |
| 575 - 600mm  | 133-164   | 0.01mm     | ±10µm    |
| 600 - 625mm  | 133-165   | 0.01mm     | ±11µm    |
| 625 - 650mm  | 133-166   | 0.01mm     | ±11µm    |
| 650 - 675mm  | 133-167   | 0.01mm     | ±11µm    |
| 675 - 700mm  | 133-168   | 0.01mm     | ±12µm    |
| 700 - 725mm  | 133-169   | 0.01mm     | ±12µm    |
| 725 - 750mm  | 133-170   | 0.01mm     | ±12µm    |
| 750 - 775mm  | 133-171   | 0.01mm     | ±13µm    |
| 775 - 800mm  | 133-172   | 0.01mm     | ±13µm    |
| 800 - 825mm  | 133-173   | 0.01mm     | ±13µm    |
| 825 - 850mm  | 133-174   | 0.01mm     | ±14µm    |
| 850 - 875mm  | 133-175   | 0.01mm     | ±14µm    |
| 875 - 900mm  | 133-176   | 0.01mm     | ±14µm    |
| 900 - 925mm  | 133-177   | 0.01mm     | ±15µm    |
| 925 - 950mm  | 133-178   | 0.01mm     | ±15µm    |
| 950 - 975mm  | 133-179   | 0.01mm     | ±15µm    |
| 975 - 1000mm | 133-180   | 0.01mm     | ±16µm    |

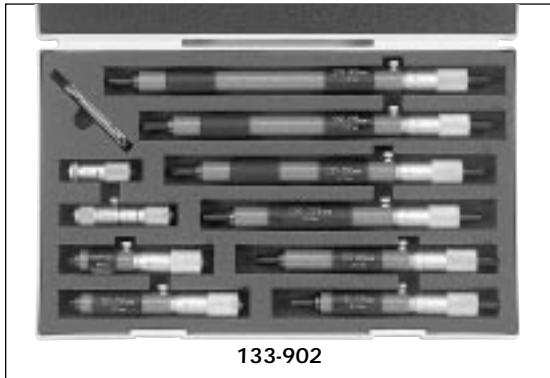
## FEATURES

- With locking clamp.
- Zero point can be readjusted by twisting the micrometer head sleeve. A key wrench is supplied.
- Clear, crisp graduations on the satin chrome finished micrometer head.
- Carbide-tipped measuring faces.
- The 233 series is provided with a digit counter.



#### Inch

| Range     | Order No. | Graduation | Accuracy |
|-----------|-----------|------------|----------|
| 2" - 3"   | 133-223   | .001"      | ±.00015" |
| 3" - 4"   | 133-224   | .001"      | ±.0002"  |
| 4" - 5"   | 133-225   | .001"      | ±.00025" |
| 5" - 6"   | 133-226   | .001"      | ±.00025" |
| 6" - 7"   | 133-227   | .001"      | ±.00025" |
| 7" - 8"   | 133-228   | .001"      | ±.00025" |
| 8" - 9"   | 133-229   | .001"      | ±.00025" |
| 9" - 10"  | 133-230   | .001"      | ±.0003"  |
| 10" - 11" | 133-231   | .001"      | ±.0003"  |
| 11" - 12" | 133-232   | .001"      | ±.0003"  |



133-902

## Tubular Inside Micrometer Sets

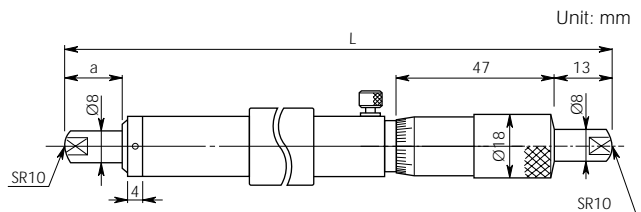
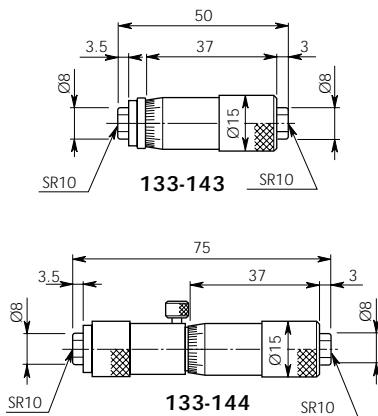
### Metric

| Range                        | Order No. | Assortment of micrometers  |
|------------------------------|-----------|--|
| 50 - 150mm<br>(4 Mikes/set)  | 133-901   | • No. 133-143, No. 133-144,<br>No. 133-145, No. 133-146<br>• with fitted case  |
| 50 - 300mm<br>(10 Mikes/set) | 133-902   | • No. 133-143, No. 133-144,<br>No. 133-145, No. 133-146,<br>No. 133-147, No. 133-148,<br>No. 133-149, No. 133-150,<br>No. 133-151, No. 133-152<br>• with fitted case |

### Inch

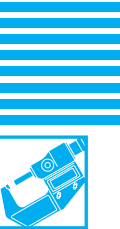
| Range                      | Order No. | Assortment of micrometers  |
|----------------------------|-----------|--|
| 2" - 6"<br>(4 Mikes/set)   | 133-903   | • No. 133-223, No. 133-224,<br>No. 133-225, No. 133-226<br>• with fitted case  |
| 2" - 12"<br>(10 Mikes/set) | 133-904   | • No. 133-223, No. 133-224,<br>No. 133-225, No. 133-226,<br>No. 133-227, No. 133-228,<br>No. 133-229, No. 133-230,<br>No. 133-231, No. 133-232<br>• with fitted case |

## Dimensions



| Order No. | L   | a    |
|-----------|-----|------|
| 133-145   | 100 | 14   |
| 133-146   | 125 | 14   |
| 133-147   | 150 | 14   |
| 133-148   | 175 | 14   |
| 133-149   | 200 | 16.5 |
| ⋮         | ⋮   | ⋮    |
| 133-180   | 975 | 16.5 |

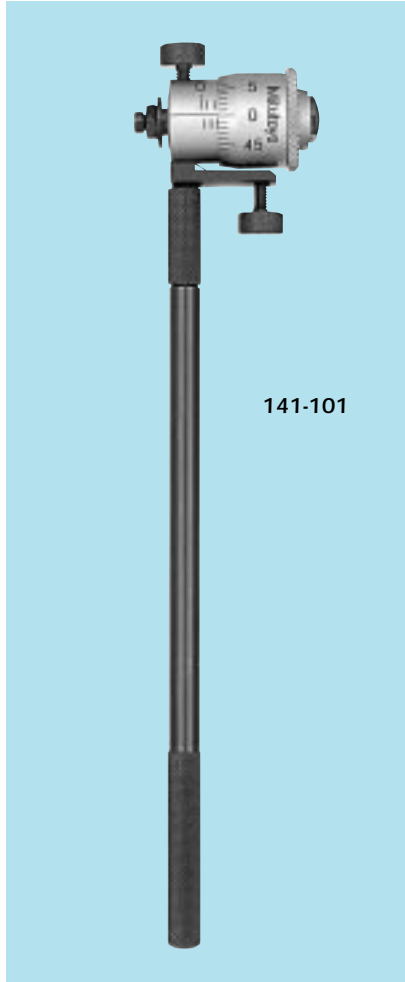
Note: The dimensions change on the Digit Tubular Inside Micrometer.



# Inside Micrometers

## SERIES 141

### Interchangeable Rod Type



141-101

### SPECIFICATIONS

#### Metric

| Range       | Order No.   |                      | Graduation | Travel of micrometer head | Remarks     |
|-------------|-------------|----------------------|------------|---------------------------|-------------|
|             | Plain faces | Carbide-tipped faces |            |                           |             |
| 25 - 32mm   | 141-001     | 141-003              | 0.01mm     | 7mm                       | —           |
| 25 - 50mm   | 141-101     | 141-103              | 0.01mm     | 7mm                       | with 2 rods |
| 50 - 63mm   | 141-025     | 141-027              | 0.01mm     | 13mm                      | —           |
| 50 - 200mm  | 141-205     | 141-211              | 0.01mm     | 13mm                      | with 3 rods |
| 50 - 300mm  | 141-206     | 141-212              | 0.01mm     | 13mm                      | with 5 rods |
| 200 - 225mm | 141-009     | 141-011              | 0.01mm     | 25mm                      | —           |

#### Inch

| Range      | Order No.   |                      | Graduation | Travel of micrometer head | Remarks     |
|------------|-------------|----------------------|------------|---------------------------|-------------|
|            | Plain faces | Carbide-tipped faces |            |                           |             |
| 1" - 1.25" | 141-002     | 141-004              | .001"      | .25"                      | —           |
| 1" - 2"    | 141-102     | 141-104              | .001"      | .25"                      | with 2 rods |
| 2" - 2.5"  | 141-026     | 141-028              | .001"      | .5"                       | —           |
| 2" - 8"    | 141-208     | 141-214              | .001"      | .5"                       | with 3 rods |
| 2" - 12"   | 141-233     | 141-215              | .001"      | .5"                       | with 5 rods |
| 8" - 9"    | 141-010     | 141-012              | .001"      | 1"                        | —           |

### FEATURES

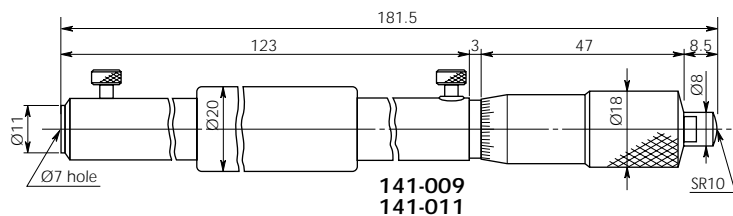
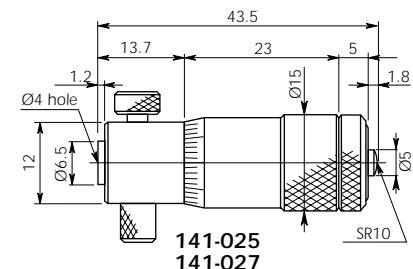
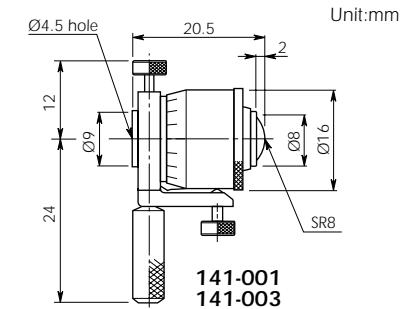
- Wide range of ID measurements with interchangeable rods.
- Each interchangeable rod is marked with its measuring range.
- The sizes of interchangeable rods can be adjusted with spacing collars.
- Both micrometer head and furnished rods are satin-chrome finished throughout.

### Accuracy

- $\pm(6+L/50)\mu\text{m}$   
 $[\pm(.0003+.00005(L/2))"]^*$
- \*L=Maximum measuring length (mm) [(Inch)], Fraction rounded up



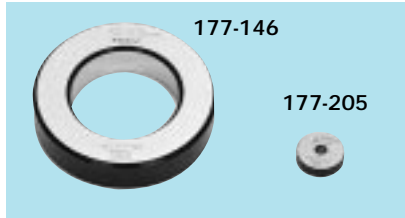
### Dimensions



## Setting Rings

### SERIES 177

Accessories for Inside Micrometers, Holtest and Dial Bore Gages



### SPECIFICATION

#### Setting Rings

| Metric |           |          |        |
|--------|-----------|----------|--------|
| Size   | Order No. | Accuracy | Mass   |
| 1mm    | 177-220   | ±1.5µm   | 12g    |
| 1.1mm  | 177-222   | ±1.5µm   | 12g    |
| 1.2mm  | 177-225   | ±1.5µm   | 12g    |
| 1.3mm  | 177-227   | ±1.5µm   | 12g    |
| 1.4mm  | 177-230   | ±1.5µm   | 12g    |
| 1.75mm | 177-236   | ±1.5µm   | 27g    |
| 2mm    | 177-239   | ±1.5µm   | 27g    |
| 2.25mm | 177-242   | ±1.5µm   | 27g    |
| 2.5mm  | 177-208   | ±1.5µm   | 27g    |
| 2.75mm | 177-246   | ±1.5µm   | 27g    |
| 3mm    | 177-248   | ±1.5µm   | 27g    |
| 3.25mm | 177-250   | ±1.5µm   | 27g    |
| 3.5mm  | 177-252   | ±1.5µm   | 27g    |
| 3.75mm | 177-255   | ±1.5µm   | 30g    |
| 4mm    | 177-204   | ±1.5µm   | 30g    |
| 4.5mm  | 177-257   | ±1.5µm   | 30g    |
| 5mm    | 177-205   | ±1.5µm   | 30g    |
| 5.5mm  | 177-263   | ±1.5µm   | 30g    |
| 6mm    | 177-267   | ±1.5µm   | 30g    |
| 6.5mm  | 177-271   | ±1.5µm   | 30g    |
| 7mm    | 177-275   | ±1.5µm   | 30g    |
| 8mm    | 177-125   | ±1.5µm   | 60g    |
| 10mm   | 177-126   | ±1.5µm   | 58g    |
| 12mm   | 177-284   | ±1.5µm   | 62g    |
| 14mm   | 177-132   | ±1.5µm   | 110g   |
| 16mm   | 177-177   | ±1.5µm   | 110g   |
| 17mm   | 177-133   | ±1.5µm   | 190g   |
| 20mm   | 177-286   | ±1.5µm   | 110g   |
| 25mm   | 177-139   | ±1.5µm   | 204g   |
| 30mm   | 177-288   | ±1.5µm   | 400g   |
| 35mm   | 177-140   | ±1.5µm   | 364g   |
| 40mm   | 177-290   | ±1.5µm   | 330g   |
| 45mm   | 177-178   | ±1.5µm   | 490g   |
| 50mm   | 177-146   | ±1.5µm   | 580g   |
| 60mm   | 177-292   | ±1.5µm   | 1.14kg |
| 62mm   | 177-314   | ±1.5µm   | 1.05kg |
| 70mm   | 177-147   | ±1.5µm   | 0.93kg |
| 75mm   | 177-316   | ±1.5µm   | 1.54kg |
| 80mm   | 177-294   | ±1.5µm   | 1.42kg |
| 87mm   | 177-318   | ±1.5µm   | 1.85kg |
| 90mm   | 177-148   | ±1.5µm   | 1.75kg |
| 100mm  | 177-296   | ±1.5µm   | 2.38kg |
| 125mm  | 177-298   | ±2.5µm   | 5.5kg  |
| 150mm  | 177-300   | ±2.5µm   | 6.1kg  |
| 175mm  | 177-302   | ±2.5µm   | 6.7kg  |
| 200mm  | 177-304   | ±2.5µm   | 10.4kg |
| 225mm  | 177-306   | ±2.5µm   | 11.4kg |
| 250mm  | 177-308   | ±2.5µm   | 12.1kg |
| 275mm  | 177-310   | ±2.5µm   | 17kg   |
| 300mm  | 177-312   | ±2.5µm   | 17.8kg |

| Inch  |           |          |            |
|-------|-----------|----------|------------|
| Size  | Order No. | Accuracy | Mass       |
| .1"   | 177-209   | ±.00004" | .059lbs.   |
| .16"  | 177-206   | ±.00004" | .057lbs.   |
| .24"  | 177-207   | ±.00004" | .055lbs.   |
| .275" | 177-281   | ±.00004" | .055lbs.   |
| .35"  | 177-179   | ±.00004" | .127lbs.   |
| .425" | 177-293   | ±.00004" | .123lbs.   |
| .50"  | 177-180   | ±.00004" | .116lbs.   |
| .60"  | 177-181   | ±.00004" | .162lbs.   |
| .65"  | 177-182   | ±.00004" | .242lbs.   |
| .70"  | 177-183   | ±.00004" | .242lbs.   |
| .80"  | 177-287   | ±.00004" | .220lbs.   |
| 1.0"  | 177-184   | ±.00004" | .440lbs.   |
| 1.2"  | 177-289   | ±.00004" | .836lbs.   |
| 1.4"  | 177-185   | ±.00004" | .770lbs.   |
| 1.6"  | 177-291   | ±.00004" | .682lbs.   |
| 1.8"  | 177-186   | ±.00004" | 1.034lbs.  |
| 2.0"  | 177-187   | ±.00004" | 1.254lbs.  |
| 2.4"  | 177-293   | ±.00004" | 2.420lbs.  |
| 2.5"  | 177-315   | ±.00006" | 2.200lbs.  |
| 2.8"  | 177-188   | ±.00006" | 2.024lbs.  |
| 3.0"  | 177-317   | ±.00006" | 3.300lbs.  |
| 3.2"  | 177-295   | ±.00006" | 3.080lbs.  |
| 3.5"  | 177-319   | ±.00006" | 3.960lbs.  |
| 3.6"  | 177-189   | ±.00006" | 3.740lbs.  |
| 4.0"  | 177-297   | ±.00008" | 5.060lbs.  |
| 5.0"  | 177-299   | ±.00008" | 11.660lbs. |
| 6.0"  | 177-301   | ±.00008" | 12.980lbs. |
| 7.0"  | 177-303   | ±.00010" | 14.740lbs. |
| 8.0"  | 177-305   | ±.00010" | 22.000lbs. |
| 9.0"  | 177-307   | ±.00010" | 23.980lbs. |
| 10.0" | 177-309   | ±.00012" | 26.180lbs. |
| 11.0" | 177-311   | ±.00012" | 35.860lbs. |
| 12.0" | 177-313   | ±.00012" | 37.840lbs. |

#### Ceramic setting rings



177-424    177-429    177-432

### FEATURES

- Used for quick zero adjustment of dial bore gages, Holtest, and inside micrometers.
- Actual inside diameter is marked on each ring.
- Ceramic Setting Rings are also available. No more anticorrosion treatment is required when handling Ceramic Setting Rings normally, resulting in simple maintenance and storage.

### Technical Data

#### Tolerance between the nominal size and the actual diameter:

±0.01mm for Ø1 - 45mm setting rings  
 ±0.02mm for Ø50 - 300mm setting rings  
 ±.0004" for .1" - 1.8" DIA. setting rings  
 ±.0008" for 2" - 12" DIA. setting rings

#### Cylindricity:

1.0µm for Ø1 - 60mm setting rings  
 1.5µm for Ø62 - 90mm setting rings  
 2.0µm for Ø100 - 150mm setting rings  
 2.5µm for Ø175 - 225mm setting rings  
 3.0µm for Ø250 - 300mm setting rings  
 .00004" for .1" - 2.4" DIA. setting rings  
 .00006" for 2.5" - 3.6" DIA. setting rings  
 .00008" for 4" - 6" DIA. setting rings  
 .00010" for 7" - 9" DIA. setting rings  
 .00012" for 10" - 12" DIA. setting rings

### Ceramic Setting Rings

| Metric |           |          |      |
|--------|-----------|----------|------|
| Size   | Order No. | Accuracy | Mass |
| 6mm    | 177-420   | ±1.5µm   | 19g  |
| 8mm    | 177-423   | ±1.5µm   | 45g  |
| 10mm   | 177-424   | ±1.5µm   | 43g  |
| 12mm   | 177-425   | ±1.5µm   | 41g  |
| 16mm   | 177-427   | ±1.5µm   | 82g  |
| 20mm   | 177-429   | ±1.5µm   | 75g  |
| 25mm   | 177-430   | ±1.5µm   | 152g |
| 30mm   | 177-431   | ±1.5µm   | 288g |
| 35mm   | 177-432   | ±1.5µm   | 266g |
| 40mm   | 177-433   | ±1.5µm   | 239g |
| 45mm   | 177-434   | ±1.5µm   | 362g |

| Inch  |           |          |          |
|-------|-----------|----------|----------|
| Size  | Order No. | Accuracy | Mass     |
| .275" | 177-522   | ±.00006" | .042lbs. |
| .35"  | 177-523   | ±.00006" | .097lbs. |
| .425" | 177-524   | ±.00006" | .092lbs. |
| .5"   | 177-525   | ±.00006" | .088lbs. |
| .65"  | 177-527   | ±.00006" | .178lbs. |
| .8"   | 177-529   | ±.00006" | .165lbs. |
| 1"    | 177-530   | ±.00006" | .332lbs. |
| 1.2"  | 177-531   | ±.00006" | .629lbs. |
| 1.4"  | 177-532   | ±.00006" | .577lbs. |
| 1.6"  | 177-533   | ±.00006" | .519lbs. |
| 1.8"  | 177-534   | ±.00006" | .788lbs. |

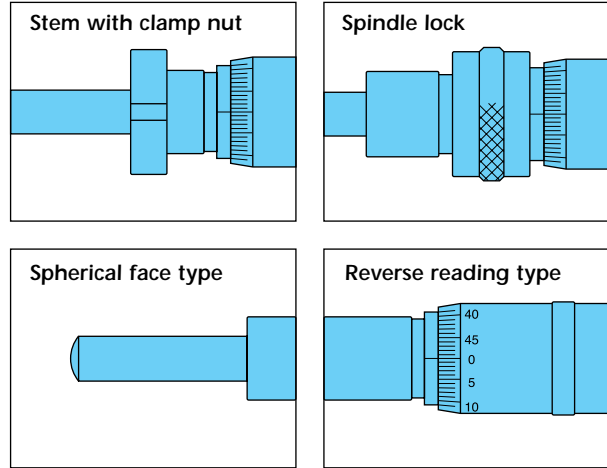


# Micrometer Head Selection Guide

The table below provides an outline of Mitutoyo micrometer heads for each series so you can locate the pages to refer to select the micrometer head most appropriate to your specific application. When selecting consider the following points:

- Dimensions
- Graduation/resolution and accuracy
- With or without spindle lock
- With or without clamping nut
- Flat or spherical measuring face
- Normal or reverse reading
- With or without Ratchet Stop

### Variety of Specifications



### SELECTION TABLE

| Range            |              | Series             | Spindle      | Remarks   | Page |
|------------------|--------------|--------------------|--------------|---|------|
| 0 - 1mm (.02")   | Mechanical   | <b>110</b>         | Non-rotating | Differential screw translator (extra-fine feeding) type     | 143  |
| 0 - 2.5mm (.05") | Mechanical   | <b>110</b>         | Non-rotating | Differential screw translator (extra-fine feeding) type     | 143  |
| 0 - 5mm (.2")    | Mechanical   | <b>148</b>         | Rotating     | —   | 144  |
| 0 - 6.5mm (.25") | Mechanical   | <b>148</b>         | Rotating     | —   | 144  |
|                  |              | <b>148</b>         | Rotating     | Large thimble diameter for easy reading                     | 145  |
|                  |              | <b>148</b>         | Rotating     | Large thimble diameter for easy reading (Fine feeding type) | 145  |
| 0 - 10mm (.4")   | Mechanical   | <b>152</b>         | Rotating     | Fine reading type   | 151  |
| 0 - 13mm (.5")   | Mechanical   | <b>148</b>         | Rotating     | —   | 146  |
|                  |              | <b>148</b>         | Rotating     | Fine feeding type   | 146  |
|                  |              | <b>148</b>         | Rotating     | Zero-adjustable thimble type                                | 147  |
|                  |              | <b>148</b>         | Rotating     | Large thimble diameter for easy reading                     | 145  |
|                  |              | <b>110</b>         | Rotating     | Fine adjustment with non-rotating spindle                   | 143  |
| 0 - 15mm (.5")   | Mechanical   | <b>149</b>         | Rotating     | —   | 148  |
|                  |              | <b>153</b>         | Non-rotating | —   | 153  |
|                  |              | <b>152</b>         | Rotating     | Quick feeding type  | 151  |
| 0 - 25mm (1")    | Digimatic    | <b>164</b>         | Non-rotating | —   | 155  |
|                  |              | <b>350</b>         | Rotating     | Compact type  | 156  |
|                  |              | <b>227</b>         | Non-rotating | with constant and adjustable fine-loading device            | 154  |
|                  | Mechanical   | <b>150</b>         | Rotating     | —   | 149  |
|                  |              | <b>153</b>         | Non-rotating | —   | 153  |
|                  |              | <b>153</b>         | Non-rotating | Ultra-fine reading type                                     | 153  |
|                  |              | <b>151</b>         | Rotating     | Heavy duty type   | 150  |
|                  |              | <b>152</b>         | Rotating     | Quick feeding type  | 151  |
|                  |              | <b>152</b>         | Rotating     | Fine reading type   | 151  |
|                  |              | <b>152</b>         | Non-rotating | for XY-stage  | 152  |
| 0 - 50mm (2")    | Digimatic    | <b>164</b>         | Non-rotating | —   | 155  |
|                  | Mechanical   | <b>151</b>         | Rotating     | Heavy duty type   | 150  |
|                  |              | <b>152</b>         | Rotating     | Quick feeding type  | 151  |
|                  |              | <b>152</b>         | Rotating     | Fine reading type   | 151  |
| <b>197</b>       | Non-rotating | Quick feeding type | 154          |   |      |

# Micrometer Heads

## SERIES 110

Differential Screw Translator  
(Extra-Fine Feeding) Type

### FEATURES

- Differential movements of spindle threads and nuts allow fine spindle feeding (0.05mm per thimble revolution), resulting in high resolution measurements.
- Carbide-tipped measuring face.
- Non-rotating spindle.

### SPECIFICATIONS

#### Metric

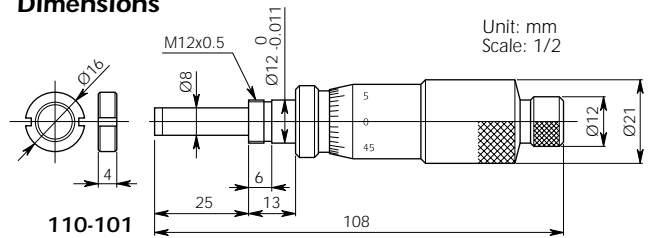
| Range     | Order No.  |                     | Graduation      | Accuracy<br>( ): Accuracy<br>in narrow range | Remarks  |   |                     |
|-----------|------------|---------------------|-----------------|--|----------|---|---------------------|
|           | Plain stem | Stem with clamp nut |                 |  |          |   |                     |
|           |            | w/ Spindle lock     | w/ Spindle lock |  |          |   |                     |
| 0 - 1mm   | —          | —                   | 110-105         | —  | 0.001mm  | $\pm 3\mu\text{m}$ ( $\pm 1.5\mu\text{m}/0.05\text{mm}$ ) | —                   |
|           | —          | —                   | 110-107         | —  | 0.001mm  | $\pm 3\mu\text{m}$ ( $\pm 1.5\mu\text{m}/0.05\text{mm}$ ) | Spherical face type |
|           | —          | —                   | 110-106         | —  | 0.0001mm | $\pm 3\mu\text{m}$ ( $\pm 1.5\mu\text{m}/0.05\text{mm}$ ) | —                   |
|           | —          | —                   | 110-108         | —  | 0.0001mm | $\pm 3\mu\text{m}$ ( $\pm 1.5\mu\text{m}/0.05\text{mm}$ ) | Spherical face type |
| 0 - 2.5mm | —          | —                   | 110-101         | —  | 0.001mm  | $\pm 5\mu\text{m}$ ( $\pm 1.5\mu\text{m}/0.05\text{mm}$ ) | —                   |
|           | —          | —                   | 110-102         | —  | 0.0001mm | $\pm 5\mu\text{m}$ ( $\pm 1.5\mu\text{m}/0.05\text{mm}$ ) | —                   |

#### Inch

| Range    | Order No.  |                     | Graduation      | Accuracy<br>( ): Accuracy<br>in narrow range | Remarks  |   |                     |
|----------|------------|---------------------|-----------------|--|----------|---|---------------------|
|          | Plain stem | Stem with clamp nut |                 |  |          |   |                     |
|          |            | w/ Spindle lock     | w/ Spindle lock |  |          |   |                     |
| 0 - .02" | —          | —                   | 110-115         | —  | .00005"  | $\pm .00012"$ ( $\pm .00006"/.00125"$ ) | —                   |
|          | —          | —                   | 110-117         | —  | .00005"  | $\pm .00012"$ ( $\pm .00006"/.00125"$ ) | Spherical face type |
|          | —          | —                   | 110-116         | —  | .000005" | $\pm .00012"$ ( $\pm .00006"/.00125"$ ) | —                   |
|          | —          | —                   | 110-118         | —  | .000005" | $\pm .00012"$ ( $\pm .00006"/.00125"$ ) | Spherical face type |
| 0 - .05" | —          | —                   | 110-111         | —  | .00005"  | $\pm .0002"$ ( $\pm .00006"/.00125"$ )  | —                   |
|          | —          | —                   | 110-112         | —  | .000005" | $\pm .0002"$ ( $\pm .00006"/.00125"$ )  | —                   |

Note: 0.0001mm (.000005") reading is obtained with vernier.

### Dimensions



# Micrometer Heads

## SERIES 110

with Fine Adjustment

### FEATURES

- Double-thimble mechanism allows coarse and fine spindle feeding to be performed independently.
- Fine adjustment: 0.2mm (.006")
- Fine feeding with non-rotating spindle.

### SPECIFICATIONS

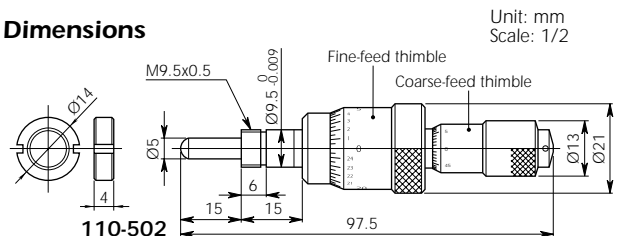
#### Metric

| Range    | Order No.  |                 | Graduation<br>of fine feeding<br>thimble | Accuracy<br>( ): Accuracy<br>in narrow range | Remarks  |  |                     |
|----------|------------|-----------------|--|--|----------|--|---------------------|
|          | Plain stem | Stem with nut   |  |  |          |  |                     |
|          |            | w/ Spindle lock | w/ Spindle lock                          |  |          |  |                     |
| 0 - 13mm | —          | —               | 110-502                                  | —  | 0.0005mm | $\pm 3\mu\text{m}$ ( $\pm 1.5\mu\text{m}/0.025\text{mm}$ ) | Spherical face type |

#### Inch

| Range   | Order No.  |                 | Graduation<br>of fine feeding<br>thimble | Accuracy<br>( ): Accuracy<br>in narrow range | Remarks |                                       |                     |
|---------|------------|-----------------|--|--|---------|---------------------------------------|---------------------|
|         | Plain stem | Stem with nut   |  |  |         |                                       |                     |
|         |            | w/ Spindle lock | w/ Spindle lock                          |  |         |                                       |                     |
| 0 - .5" | —          | —               | 110-504                                  | —  | .00002" | $\pm .00012"$ ( $\pm .00006"/.001"$ ) | Spherical face type |

### Dimensions





# Micrometer Heads

## SERIES 148



### FEATURES

- Miniature micrometer heads for ease of incorporating into machines.

### SPECIFICATIONS

#### Metric

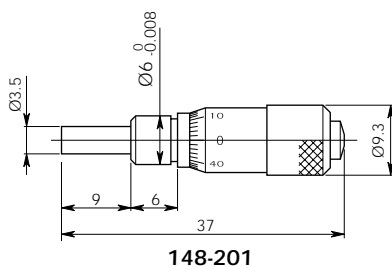
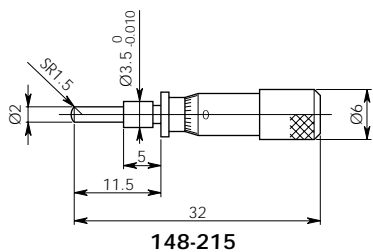
| Range     | Order No.  |                     | Graduation      | Accuracy | Remarks                          |
|-----------|------------|---------------------|-----------------|----------|----------------------------------|
|           | Plain stem | Stem with clamp nut |                 |          |                                  |
|           |            | w/ Spindle lock     | w/ Spindle lock |          |                                  |
| 0 - 5mm   | 148-215    | —                   | 148-216         | —        | 0.02mm ±5µm Spherical face type  |
| 0 - 6.5mm | 148-201    | —                   | 148-203         | —        | 0.01mm ±5µm —                    |
|           | 148-205    | —                   | 148-207         | —        | 0.01mm ±5µm Spherical face type  |
|           | 148-209    | —                   | 148-211         | —        | 0.01mm ±5µm Reverse reading type |

#### Inch

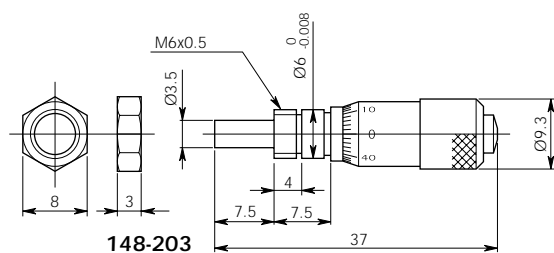
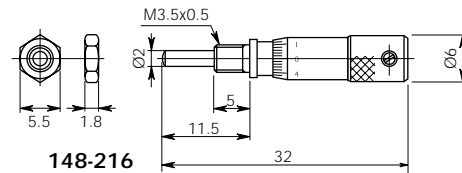
| Range    | Order No.  |                     | Graduation      | Accuracy | Remarks                            |
|----------|------------|---------------------|-----------------|----------|------------------------------------|
|          | Plain stem | Stem with clamp nut |                 |          |                                    |
|          |            | w/ Spindle lock     | w/ Spindle lock |          |                                    |
| 0 - .2"  | 148-217    | —                   | 148-218         | —        | .001" ±.0002" Spherical face type  |
| 0 - .25" | 148-202    | —                   | 148-204         | —        | .001" ±.0002" —                    |
|          | 148-206    | —                   | 148-208         | —        | .001" ±.0002" Spherical face type  |
|          | 148-210    | —                   | 148-212         | —        | .001" ±.0002" Reverse reading type |

### Dimensions

#### Plain stem



#### Stem with clamp nut

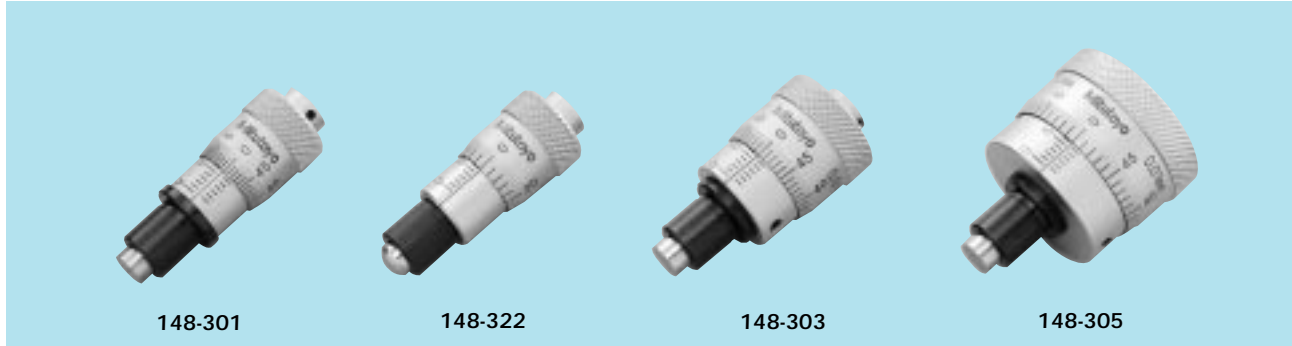


Unit: mm  
Scale: 1/1

## Micrometer Heads

### SERIES 148

Large Thimble Diameter for Easy Reading



### FEATURES

- Easy reading due to the large thimble diameter. (Three types of thimble diameters can be selected.)
- Fine spindle feeding type (thread pitch: 0.25mm) is available.

### SPECIFICATIONS

#### Metric

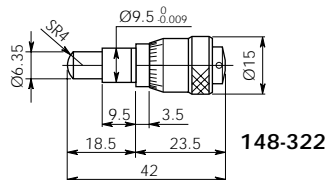
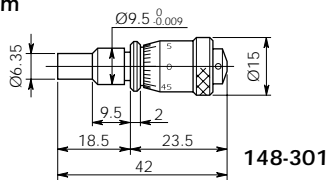
| Range     | Order No.  |                     | Graduation      | Accuracy | Thimble diameter | Remarks |      |                           |
|-----------|------------|---------------------|-----------------|----------|------------------|---------|------|---------------------------|
|           | Plain stem | Stem with clamp nut |                 |          |                  |         |      |                           |
|           |            | w/ Spindle lock     | w/ Spindle lock |          |                  |         |      |                           |
| 0 - 6.5mm | 148-301    | —                   | 148-302         | —        | 0.01mm           | ±2μm    | 15mm | —                         |
|           | 148-322    | —                   | 148-323         | —        | 0.01mm           | ±2μm    | 15mm | Fine spindle feeding type |
|           | 148-303    | —                   | 148-304         | —        | 0.01mm           | ±2μm    | 20mm | —                         |
|           | 148-305    | —                   | 148-306         | —        | 0.01mm           | ±2μm    | 29mm | —                         |
| 0 - 13mm  | 148-307    | —                   | 148-308         | —        | 0.01mm           | ±2μm    | 15mm | —                         |
|           | 148-309    | —                   | 148-310         | —        | 0.01mm           | ±2μm    | 20mm | —                         |
|           | 148-311    | —                   | 148-312         | —        | 0.01mm           | ±2μm    | 29mm | —                         |

#### Inch

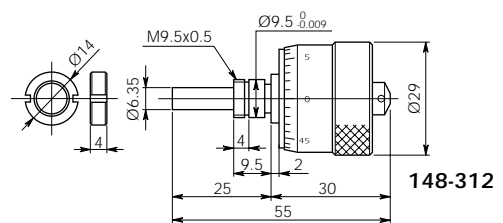
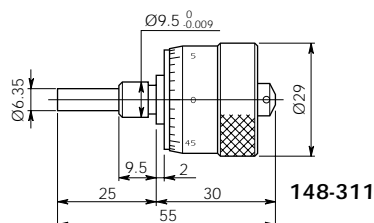
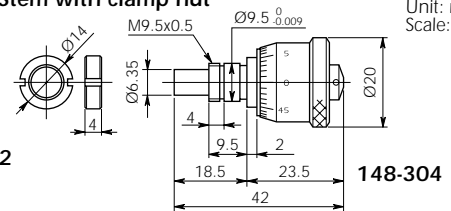
| Range    | Order No.  |                     | Graduation      | Accuracy | Thimble diameter | Remarks |       |   |
|----------|------------|---------------------|-----------------|----------|------------------|---------|-------|---|
|          | Plain stem | Stem with clamp nut |                 |          |                  |         |       |   |
|          |            | w/ Spindle lock     | w/ Spindle lock |          |                  |         |       |   |
| 0 - .25" | 148-351    | —                   | 148-352         | —        | .001"            | ±.0001" | .59"  | — |
|          | 148-353    | —                   | 148-354         | —        | .001"            | ±.0001" | .79"  | — |
|          | 148-355    | —                   | 148-356         | —        | .001"            | ±.0001" | 1.14" | — |
| 0 - .5"  | 148-357    | —                   | 148-358         | —        | .001"            | ±.0001" | .59"  | — |
|          | 148-359    | —                   | 148-360         | —        | .001"            | ±.0001" | .79"  | — |
|          | 148-361    | —                   | 148-362         | —        | .001"            | ±.0001" | 1.14" | — |

### Dimensions

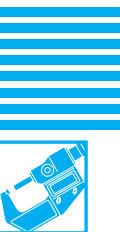
#### Plain stem



#### Stem with clamp nut

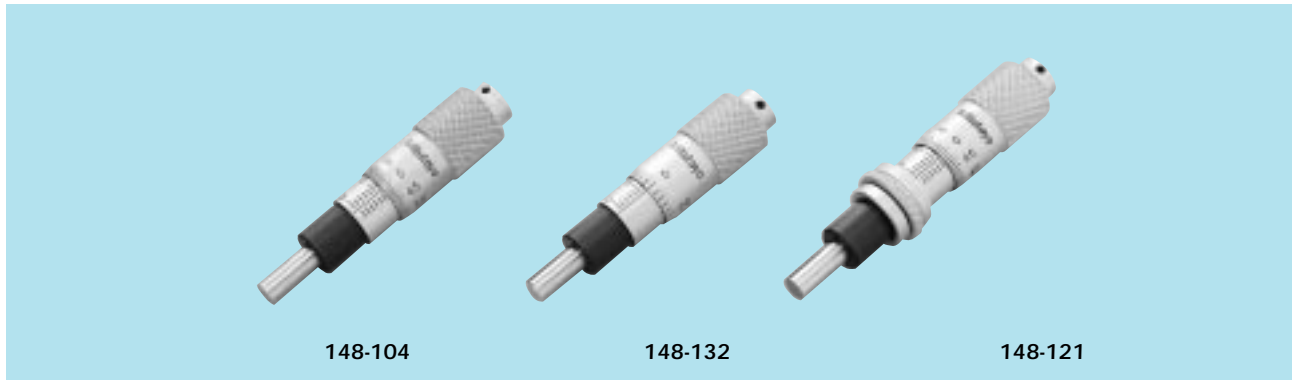


Unit: mm  
Scale: 1/2



# Micrometer Heads

## SERIES 148



### FEATURES

- Ratchet Stop (950700) can be attached.
- Fine spindle feeding type (thread pitch: 0.25mm) is available.

### SPECIFICATIONS

#### Metric

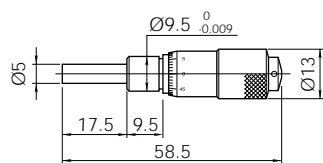
| Range    | Order No.       |                 | Graduation          |                 | Accuracy | Remarks |  |
|----------|-----------------|-----------------|---------------------|-----------------|----------|---------|--|
|          | Plain stem      |                 | Stem with clamp nut |                 |          |         |  |
|          | w/ Spindle lock | w/ Spindle lock | w/ Spindle lock     | w/ Spindle lock |          |         |  |
| 0 - 13mm | 148-104         | 148-121         | 148-103             | 148-120         | 0.01mm   | ±2μm    | —  |
|          | 148-132         | —               | 148-133             | —               | 0.01mm   | ±2μm    | Fine spindle feeding type (Spherical face) |
|          | 148-801         | 148-803         | 148-802             | 148-804         | 0.01mm   | ±2μm    | Spherical face type                        |
|          | 148-821         | 148-823         | 148-822             | 148-824         | 0.01mm   | ±2μm    | Reverse reading type                       |

#### Inch

| Range   | Order No.       |                 | Graduation          |                 | Accuracy | Remarks |                      |
|---------|-----------------|-----------------|---------------------|-----------------|----------|---------|----------------------|
|         | Plain stem      |                 | Stem with clamp nut |                 |          |         |                      |
|         | w/ Spindle lock | w/ Spindle lock | w/ Spindle lock     | w/ Spindle lock |          |         |                      |
| 0 - .5" | 148-112         | 148-123         | 148-111             | 148-122         | .001"    | ±.0001" | —                    |
|         | 148-811         | 148-813         | 148-812             | 148-814         | .001"    | ±.0001" | Spherical face type  |
|         | 148-831         | 148-833         | 148-832             | 148-834         | .001"    | ±.0001" | Reverse reading type |

### Dimensions

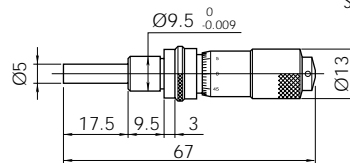
#### Plain stem



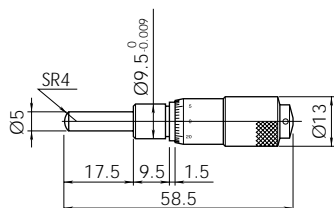
148-104

#### Plain stem, Spindle lock

Unit: mm  
Scale: 1/2

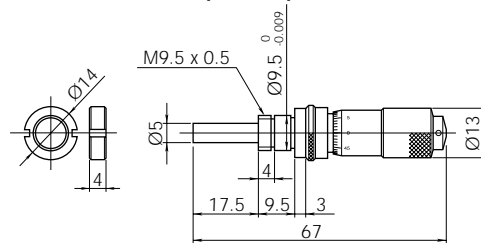


148-121



148-132

#### Stem with clamp nut, Spindle lock

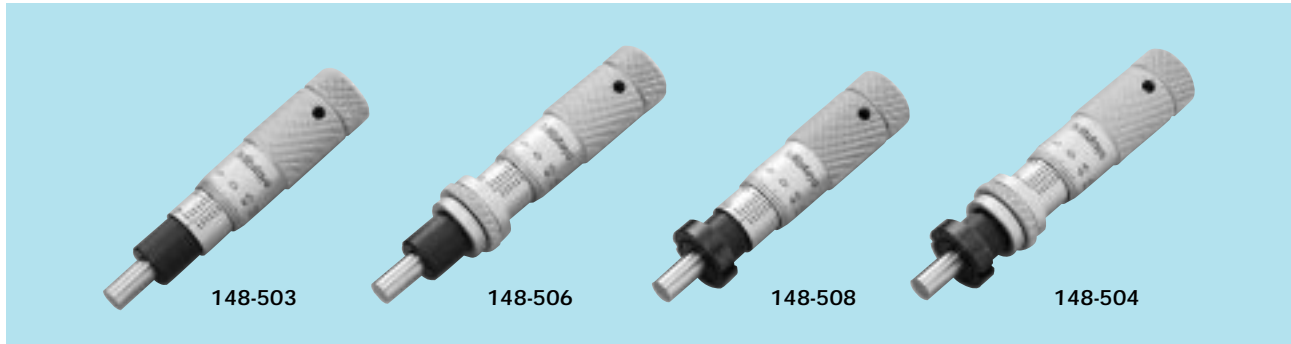


148-120

## Micrometer Heads

### SERIES 148

Zero-Adjustable Thimble Type



### FEATURES

- The thimble can be set to zero at any position by loosening the setscrew.

### SPECIFICATIONS

#### Metric

| Range    | Order No.  |                     | Graduation      |                 | Accuracy | Remarks |                            |
|----------|------------|---------------------|-----------------|-----------------|----------|---------|----------------------------|
|          | Plain stem | Stem with clamp nut |                 |                 |          |         |                            |
|          |            |                     | w/ Spindle lock | w/ Spindle lock |          |         |                            |
| 0 - 13mm | 148-503    | 148-506             | 148-508         | 148-504         | 0.01mm   | ±2μm    | —                          |
|          | 148-513    | —                   | —               | —               | 0.01mm   | ±2μm    | Stainless steel throughout |
|          | 148-853    | —                   | —               | 148-854         | 0.01mm   | ±2μm    | Spherical face type        |
|          | 148-863    | —                   | —               | 148-864         | 0.01mm   | ±2μm    | Reverse reading type       |

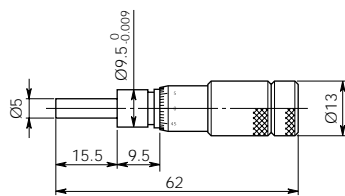
#### Inch

| Range   | Order No.  |                     | Graduation      |                 | Accuracy | Remarks |                            |
|---------|------------|---------------------|-----------------|-----------------|----------|---------|----------------------------|
|         | Plain stem | Stem with clamp nut |                 |                 |          |         |                            |
|         |            |                     | w/ Spindle lock | w/ Spindle lock |          |         |                            |
| 0 - .5" | 148-501    | 148-505             | 148-507         | 148-502         | .001"    | ±.0001" | —                          |
|         | 148-511    | —                   | —               | —               | .001"    | ±.0001" | Stainless steel throughout |
|         | 148-851    | —                   | —               | 148-852         | .001"    | ±.0001" | Spherical face type        |
|         | 148-861    | —                   | —               | 148-862         | .001"    | ±.0001" | Reverse reading type       |

### Dimensions

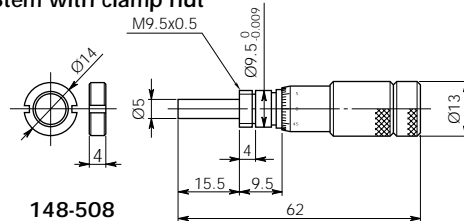
Unit: mm  
Scale: 1/2

#### Plain stem



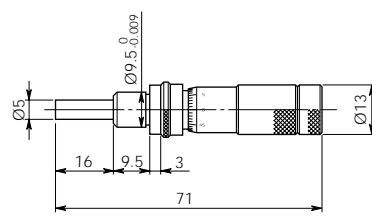
148-503

#### Stem with clamp nut



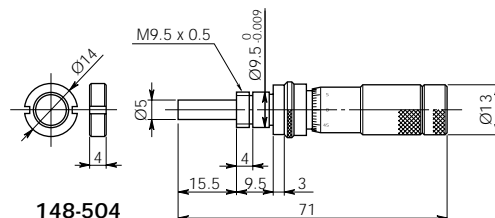
148-508

#### Plain stem, Spindle lock

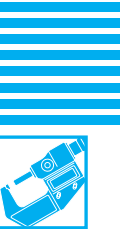


148-506

#### Stem with clamp nut, Spindle lock

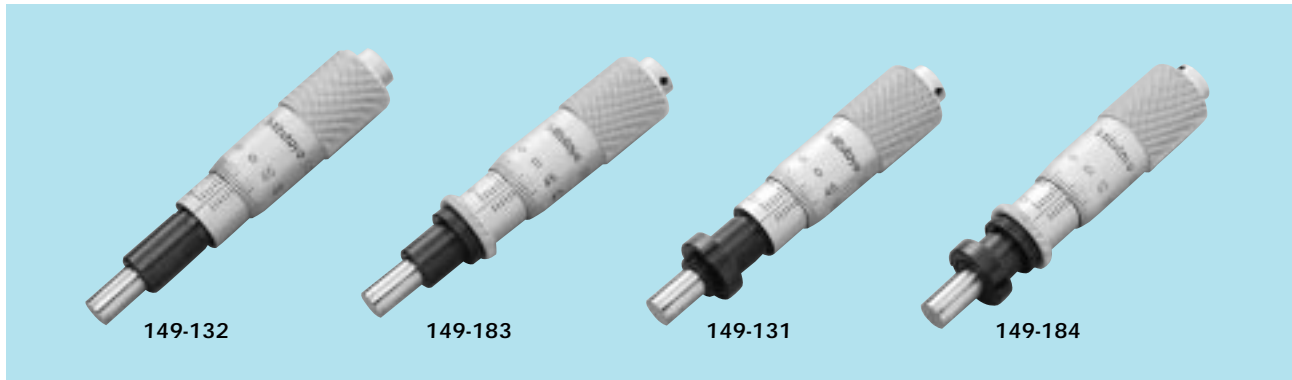


148-504



# Micrometer Heads

## SERIES 149



### FEATURES

- Carbide-tipped measuring face.
- Ratchet Stop (950700) can be attached.

### SPECIFICATIONS

#### Metric

| Range    | Order No.  |                     | Graduation      |                 | Accuracy | Remarks |                      |
|----------|------------|---------------------|-----------------|-----------------|----------|---------|----------------------|
|          | Plain stem | Stem with clamp nut |                 |                 |          |         |                      |
|          |            |                     | w/ Spindle lock | w/ Spindle lock |          |         |                      |
| 0 - 15mm | 149-132    | 149-183             | 149-131         | 149-184         | 0.01mm   | ±2µm    | —                    |
|          | 149-801    | —                   | 149-802         | —               | 0.01mm   | ±2µm    | Spherical face type  |
|          | 149-821    | —                   | 149-822         | —               | 0.01mm   | ±2µm    | Reverse reading type |

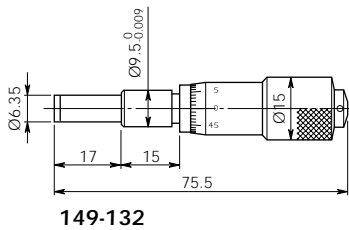
#### Inch

| Range   | Order No.  |                     | Graduation      |                 | Accuracy | Remarks |                      |
|---------|------------|---------------------|-----------------|-----------------|----------|---------|----------------------|
|         | Plain stem | Stem with clamp nut |                 |                 |          |         |                      |
|         |            |                     | w/ Spindle lock | w/ Spindle lock |          |         |                      |
| 0 - .5" | 149-148    | 149-185             | 149-147         | 149-182         | .001"    | ±.0001" | —                    |
|         | —          | 149-181             | —               | —               | .001"    | ±.0001" | with Ratchet stop    |
|         | 149-811    | —                   | 149-812         | —               | .001"    | ±.0001" | Spherical face type  |
|         | 149-831    | —                   | 149-832         | —               | .001"    | ±.0001" | Reverse reading type |

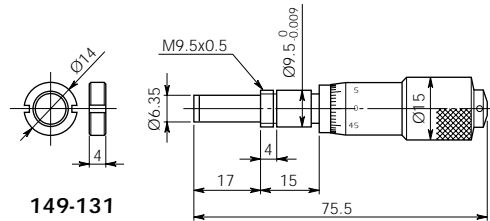
### Dimensions

Unit: mm  
Scale: 1/2

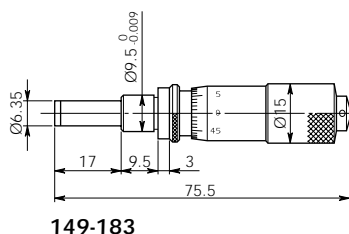
Plain stem



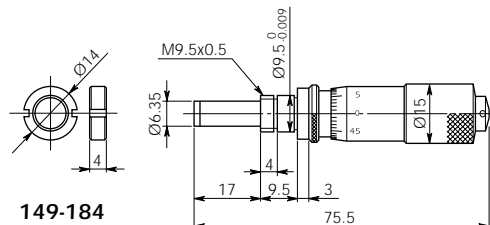
Stem with clamp nut



Plain stem, Spindle lock

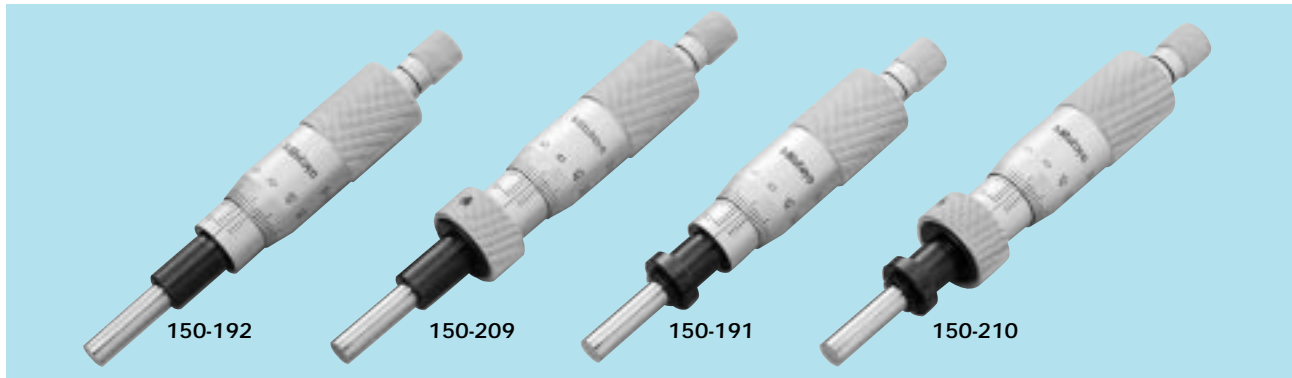


Stem with clamp nut, Spindle lock



## Micrometer Heads

### SERIES 150



### FEATURES

- Ratchet Stop for constant force.
- Long spindle type is available for a variety of applications.
- Carbide-tipped measuring face (except for long spindle type).

### SPECIFICATIONS

#### Metric

| Range    | Order No.       |                     | Graduation |         | Accuracy | Remarks |  |
|----------|-----------------|---------------------|------------|---------|----------|---------|--|
|          | Plain stem      | Stem with clamp nut |            |         |          |         |  |
|          | w/ Spindle lock | w/ Spindle lock     |            |         |          |         |  |
| 0 - 25mm | 150-192         | 150-209             | 150-191    | 150-210 | 0.01mm   | ±2μm    | —  |
|          | 150-196         | 150-211             | 150-195    | 150-212 | 0.01mm   | ±2μm    | without Ratchet stop                     |
|          | 150-219         | —                   | 150-220    | —       | 0.01mm   | ±2μm    | Long spindle type (Spindle length: 65mm) |
|          | 150-801         | —                   | 150-802    | —       | 0.01mm   | ±2μm    | Spherical face type                      |
|          | 150-821         | —                   | 150-822    | —       | 0.01mm   | ±2μm    | Reverse reading type                     |
|          | 150-190         | —                   | 150-189    | —       | 0.001mm  | ±2μm    | —  |

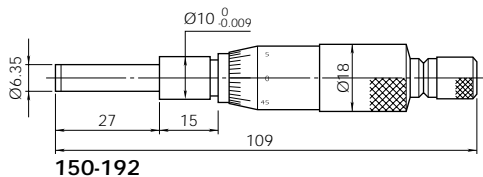
#### Inch

| Range  | Order No.       |                     | Graduation |         | Accuracy | Remarks |   |
|--------|-----------------|---------------------|------------|---------|----------|---------|---|
|        | Plain stem      | Stem with clamp nut |            |         |          |         |   |
|        | w/ Spindle lock | w/ Spindle lock     |            |         |          |         |   |
| 0 - 1" | 150-208         | 150-213             | 150-207    | 150-214 | .001"    | ±.0001" | —   |
|        | —               | 150-217             | —          | 150-218 | .001"    | ±.0001" | without Ratchet stop                      |
|        | 150-221         | —                   | 150-222    | —       | .001"    | ±.0001" | Long spindle type (Spindle length: 2.56") |
|        | 150-811         | —                   | 150-812    | —       | .001"    | ±.0001" | Spherical face type                       |
|        | 150-831         | —                   | 150-832    | —       | .001"    | ±.0001" | Reverse reading type                      |
|        | 150-206         | 150-215             | 150-205    | 150-216 | .0001"   | ±.0001" | —   |

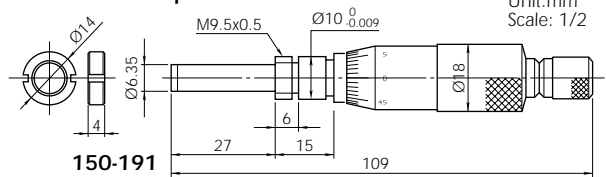
Note: 0.001mm (.0001") reading is obtained with vernier.

### Dimensions

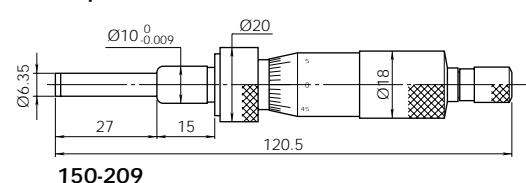
#### Plain stem



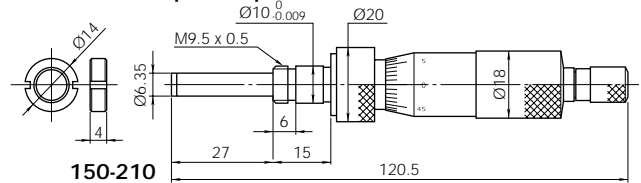
#### Stem with clamp nut



#### Plain stem, Spindle lock

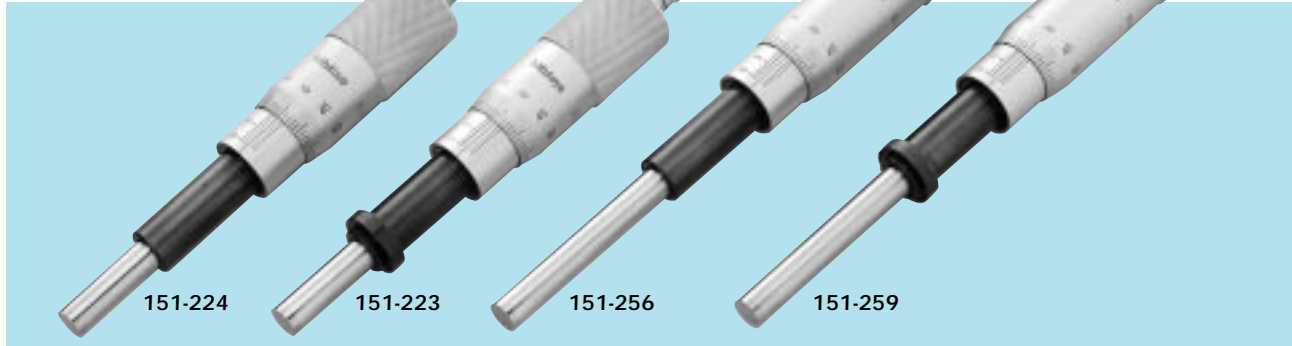


#### Stem with clamp nut, Spindle lock



# Micrometer Heads

SERIES 151  
Heavy Duty Type



## FEATURES

- Diameter of spindle: 8mm (.315")
- Carbide-tipped measuring face.
- Ratchet Stop for constant force.

## SPECIFICATIONS

### Metric

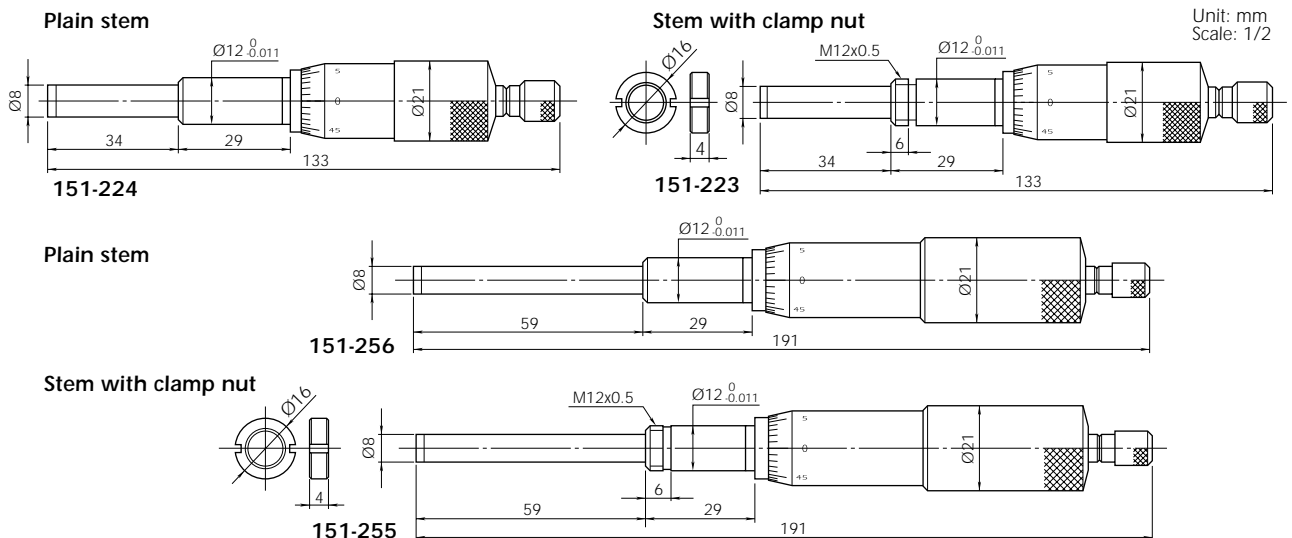
| Range    | Order No.  |                     | Graduation      | Accuracy | Remarks      |                      |                      |
|----------|------------|---------------------|-----------------|----------|--------------|----------------------|----------------------|
|          | Plain stem | Stem with clamp nut |                 |          |              |                      |                      |
|          |            | w/ Spindle lock     | w/ Spindle lock |          |              |                      |                      |
| 0 - 25mm | 151-224    | —                   | 151-223         | —        | 0.01mm ±2µm  | —                    |                      |
|          | —          | 151-225             | —               | 151-226  | —            | 0.01mm ±2µm          | without Ratchet stop |
|          | 151-222    | —                   | 151-221         | —        | 0.001mm ±2µm | —                    |                      |
| 0 - 50mm | 151-256    | —                   | 151-255         | —        | 0.01mm ±4µm  | —                    |                      |
|          | 151-260    | —                   | 151-259         | —        | 0.01mm ±4µm  | without Ratchet stop |                      |

### Inch

| Range  | Order No.  |                     | Graduation      | Accuracy | Remarks        |                |                      |
|--------|------------|---------------------|-----------------|----------|----------------|----------------|----------------------|
|        | Plain stem | Stem with clamp nut |                 |          |                |                |                      |
|        |            | w/ Spindle lock     | w/ Spindle lock |          |                |                |                      |
| 0 - 1" | 151-240    | —                   | 151-239         | —        | .001" ±.0001"  | —              |                      |
|        | —          | 151-241             | —               | 151-242  | —              | .001" ±.0001"  | without Ratchet stop |
|        | 151-238    | —                   | 151-237         | —        | .0001" ±.0001" | —              |                      |
|        | —          | 151-243             | —               | 151-244  | —              | .0001" ±.0001" | without Ratchet stop |
| 0 - 2" | 151-272    | —                   | 151-271         | —        | .001" ±.0002"  | —              |                      |

Note: 0.001mm (.0001") reading is obtained with vernier.

## Dimensions



## Micrometer Heads

### SERIES 152

Quick Feeding Type

#### FEATURES

- Pitch of spindle screw: 1mm (.025")
- Carbide-tipped measuring face.

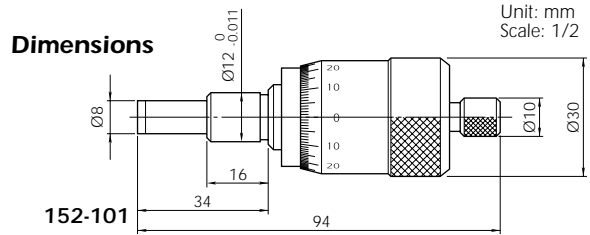
#### SPECIFICATIONS

##### Metric

| Range    | Order No. | Stem with clamp nut |                 | Graduation | Accuracy | Remarks |
|----------|-----------|---------------------|-----------------|------------|----------|---------|
|          |           | Plain stem          | w/ Spindle lock |            |          |         |
| 0 - 15mm | 152-101   | —                   | —               | 0.01mm     | ±2μm     | —       |
| 0 - 25mm | 152-102   | —                   | —               | 0.01mm     | ±2μm     | —       |
| 0 - 50mm | 152-103   | —                   | —               | 0.01mm     | ±4μm     | —       |

##### Inch

| Range   | Order No. | Stem with clamp nut |                 | Graduation | Accuracy | Remarks |
|---------|-----------|---------------------|-----------------|------------|----------|---------|
|         |           | Plain stem          | w/ Spindle lock |            |          |         |
| 0 - .5" | 152-110   | —                   | —               | .001"      | ±.0001"  | —       |
| 0 - 1"  | 152-111   | —                   | —               | .001"      | ±.0001"  | —       |
| 0 - 2"  | 152-112   | —                   | —               | .001"      | ±.0002"  | —       |



## Micrometer Heads

### SERIES 152

Fine Reading Type

#### FEATURES

- The large diameter thimble provides high resolution measurements.
- Carbide-tipped measuring face.
- Bidirectional graduation has black and red figures for easy reading in both directions.

#### SPECIFICATIONS

##### Metric

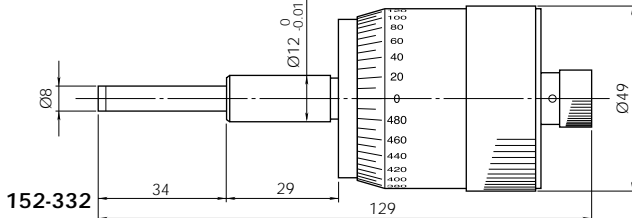
| Range    | Order No. | Stem with clamp nut |                 | Graduation | Accuracy | Remarks                       |
|----------|-----------|---------------------|-----------------|------------|----------|-------------------------------|
|          |           | Plain stem          | w/ Spindle lock |            |          |                               |
| 0 - 10mm | —         | —                   | 152-283         | 0.002mm    | ±2μm     | —                             |
| 0 - 25mm | 152-332   | —                   | —               | 0.002mm    | ±2μm     | —                             |
|          | 152-348   | —                   | —               | 0.002mm    | ±2μm     | with Bidirectional graduation |
| 0 - 50mm | 152-380   | —                   | —               | 0.002mm    | ±4μm     | with Bidirectional graduation |

##### Inch

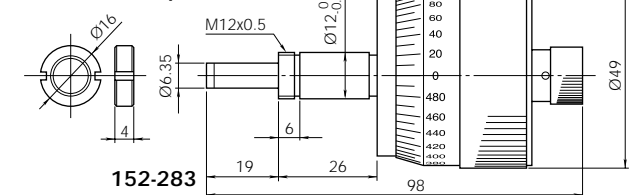
| Range  | Order No. | Stem with clamp nut |                 | Graduation | Accuracy | Remarks                       |
|--------|-----------|---------------------|-----------------|------------|----------|-------------------------------|
|        |           | Plain stem          | w/ Spindle lock |            |          |                               |
| 0 - 1" | 152-372   | —                   | —               | .0001"     | ±.0001"  | with Bidirectional graduation |
| 0 - 2" | 152-388   | —                   | —               | .0001"     | ±.0002"  | with Bidirectional graduation |

#### Dimensions

##### Plain stem



##### Stem with clamp nut





# Micrometer Heads

## SERIES 152

for XY-Stage

### FEATURES

- Non-rotating device is attached to the spindle tip.
- Floating thimble (graduation) can be adjusted with the spindle clamped, allowing zero setting at any spindle position.
- Bidirectional graduation has black and red figures for easy reading in both directions.

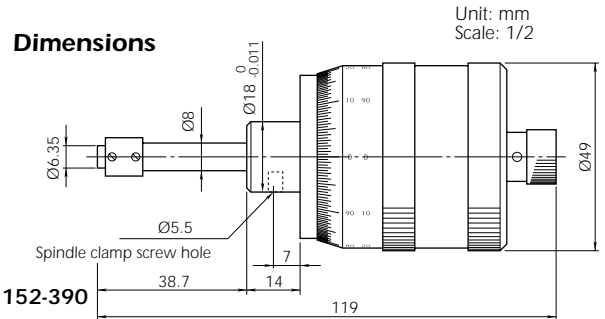
### SPECIFICATIONS

#### Metric

| Range    | Order No.  |                     | Graduation      | Accuracy | Remarks                |
|----------|------------|---------------------|-----------------|----------|------------------------|
|          | Plain stem | Stem with clamp nut |                 |          |                        |
|          |            | w/ Spindle lock     | w/ Spindle lock |          |                        |
| 0 - 25mm | 152-390    | —                   | 0.005mm         | ±2µm     | for X-axis measurement |
|          | 152-389    | —                   | 0.005mm         | ±2µm     | for Y-axis measurement |

#### Inch

| Range  | Order No.  |                     | Graduation      | Accuracy | Remarks                |
|--------|------------|---------------------|-----------------|----------|------------------------|
|        | Plain stem | Stem with clamp nut |                 |          |                        |
|        |            | w/ Spindle lock     | w/ Spindle lock |          |                        |
| 0 - 1" | 152-391    | —                   | .0001"          | ±.0001"  | for X-axis measurement |
|        | 152-392    | —                   | .0001"          | ±.0001"  | for Y-axis measurement |



# Micrometer Heads

## SERIES 152

Zero-Adjustable Type for XY-Stage

### FEATURES

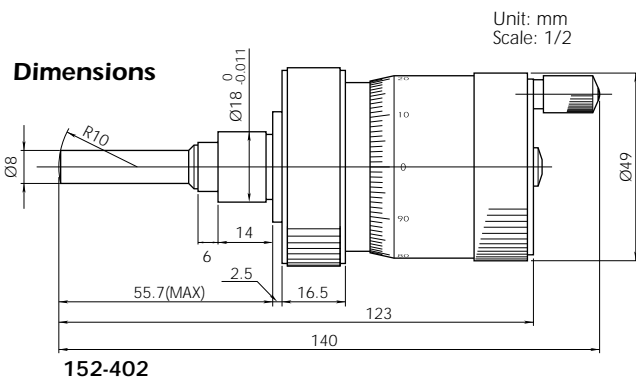
- Adjustable spindle can be moved with the thimble held at any position, allowing easy zero-setting.
- Carbide-tipped spherical measuring face.

### SPECIFICATIONS

#### Metric

| Range    | Order No.  |                     | Graduation      | Accuracy | Remarks                |
|----------|------------|---------------------|-----------------|----------|------------------------|
|          | Plain stem | Stem with clamp nut |                 |          |                        |
|          |            | w/ Spindle lock     | w/ Spindle lock |          |                        |
| 0 - 25mm | 152-402    | —                   | 0.001mm*        | ±2µm     | for X-axis measurement |
|          | 152-401    | —                   | 0.001mm*        | ±2µm     | for Y-axis measurement |

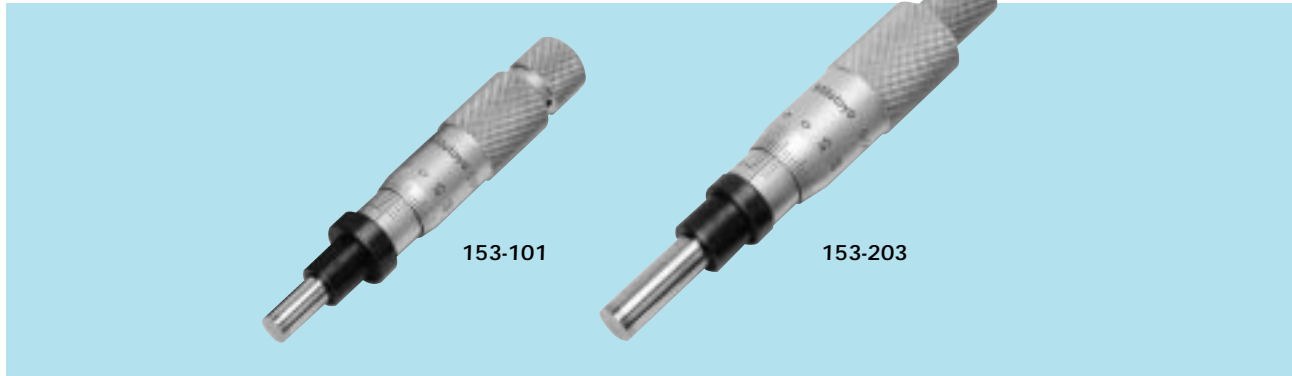
\* 0.001mm reading is obtained with vernier.



## Micrometer Heads

### SERIES 153

#### Non-Rotating Spindle Type



### FEATURES

- Carbide-tipped measuring face.

### SPECIFICATIONS

#### Metric

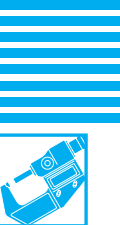
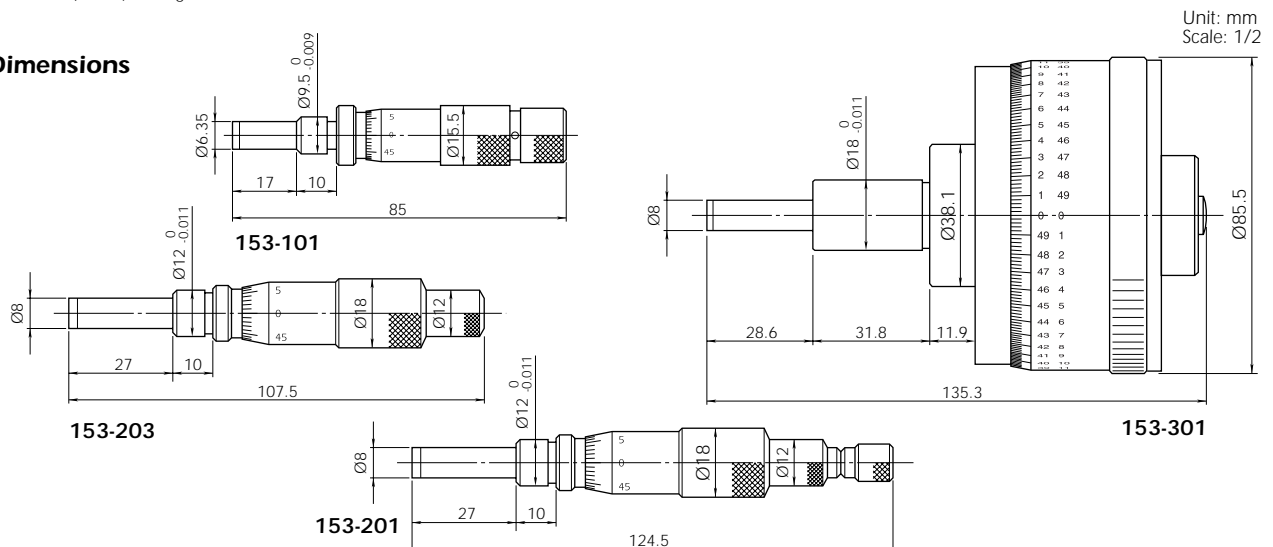
| Range    | Order No. | Stem with clamp nut |                     | Graduation | Accuracy | Remarks            |
|----------|-----------|---------------------|---------------------|------------|----------|--------------------|
|          |           | Plain stem          | Stem with clamp nut |            |          |                    |
|          |           | w/ Spindle lock     | w/ Spindle lock     |            |          |                    |
| 0 - 15mm | 153-101   | —                   | —                   | 0.01mm*    | ±3μm     | —                  |
| 0 - 25mm | 153-203   | —                   | —                   | 0.01mm     | ±3μm     | —                  |
|          | 153-201   | —                   | —                   | 0.01mm     | ±3μm     | with Ratchet stop  |
|          | 153-204   | —                   | —                   | 0.001mm*   | ±3μm     | —                  |
|          | 153-202   | —                   | —                   | 0.001mm*   | ±3μm     | with Ratchet stop  |
|          | 153-301   | —                   | —                   | 0.0005mm   | ±1μm     | High accuracy type |

#### Inch

| Range   | Order No. | Stem with clamp nut |                     | Graduation | Accuracy | Remarks            |
|---------|-----------|---------------------|---------------------|------------|----------|--------------------|
|         |           | Plain stem          | Stem with clamp nut |            |          |                    |
|         |           | w/ Spindle lock     | w/ Spindle lock     |            |          |                    |
| 0 - .5" | 153-108   | —                   | —                   | .0001"*    | ±.00015" | —                  |
| 0 - 1"  | 153-207   | —                   | —                   | .001"      | ±.00015" | —                  |
|         | 153-205   | —                   | —                   | .001"      | ±.00015" | with Ratchet stop  |
|         | 153-208   | —                   | —                   | .0001"*    | ±.00015" | —                  |
|         | 153-206   | —                   | —                   | .0001"*    | ±.00015" | with Ratchet stop  |
|         | 153-302   | —                   | —                   | .00001"    | ±.00005" | High accuracy type |

\* 0.001mm (.0001") reading is obtained with vernier.

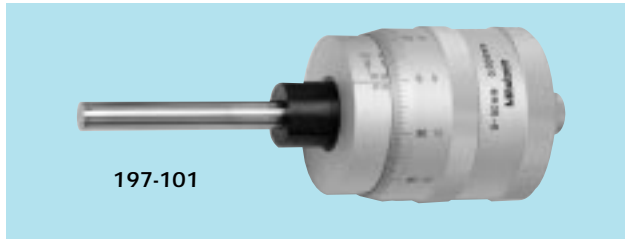
### Dimensions



# Micrometer Heads

## SERIES 197

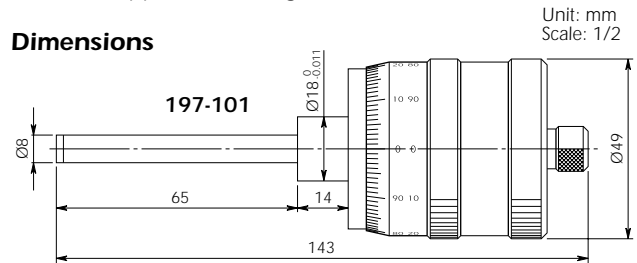
Quick Feeding Type



### FEATURES

- Pitch of spindle screw: 1mm (.025")
- Non-rotating spindle.
- Carbide-tipped measuring face.

### Dimensions



### SPECIFICATIONS

#### Metric

| Range    | Order No.  |                     | Graduation | Accuracy | Remarks                          |
|----------|------------|---------------------|------------|----------|----------------------------------|
|          | Plain stem | Stem with clamp nut |            |          |                                  |
|          |            |                     |            |          |                                  |
| 0 - 50mm | 197-101    | —                   | 0.005mm    | ±5µm     | with Long spindle (length: 65mm) |

#### Inch

| Range  | Order No.  |                     | Graduation | Accuracy | Remarks                           |
|--------|------------|---------------------|------------|----------|-----------------------------------|
|        | Plain stem | Stem with clamp nut |            |          |                                   |
|        |            |                     |            |          |                                   |
| 0 - 2" | 197-201    | —                   | .0002"     | ±.0002"  | with Long spindle (length: 2.56") |

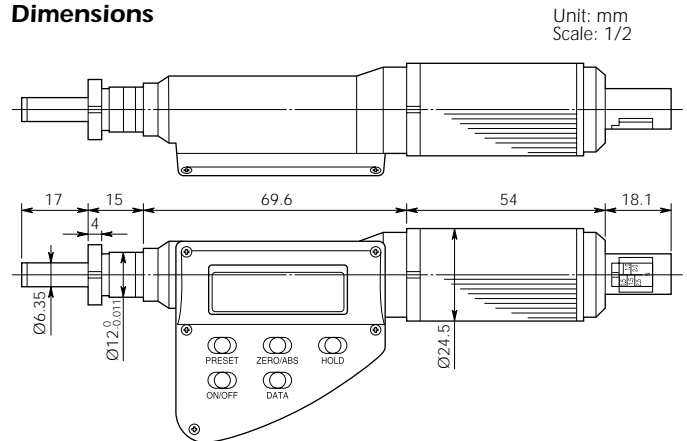
# Digimatic Micrometers

## SERIES 227

with constant & adjustable fine-loading device



### Dimensions



### FEATURES

- Constant and low measuring force mechanism (adjustable: 0.5N - 2.5N or 2N - 10N) in the thimble.
- Non-rotating spindle and the new ratchet friction thimble.
- Speedy spindle feed of 10 mm/.4".
- With absolute linear scale.
- With SPC data output.

### SPECIFICATIONS

#### Metric

| Range    | Order No.  |                     | Resolution | Accuracy | Remarks                     |
|----------|------------|---------------------|------------|----------|-----------------------------|
|          | Plain stem | Stem with clamp nut |            |          |                             |
|          |            |                     |            |          |                             |
| 0 - 15mm | 227-241    | —                   | 0.001mm    | ±2µm     | 0.5N - 2.5N measuring force |
|          | 227-242    | —                   | 0.001mm    | ±2µm     | 2N - 10N measuring force    |

#### Inch/Metric

| Range   | Order No.  |                     | Resolution      | Accuracy | Remarks                     |
|---------|------------|---------------------|-----------------|----------|-----------------------------|
|         | Plain stem | Stem with clamp nut |                 |          |                             |
|         |            |                     |                 |          |                             |
| 0 - .6" | 227-251    | —                   | .00005"/0.001mm | ±.0001"  | 0.5N - 2.5N measuring force |
|         | 227-252    | —                   | .00005"/0.001mm | ±.0001"  | 2N - 10N measuring force    |

## Digimatic Micrometer Heads

### SERIES 164



#### FEATURES

- The Digimatic Micrometer Heads provide the easiest and most efficient means of obtaining precision measurement of linear travel on XY-stages and similar applications.
- Two measuring modes — Absolute and Incremental for efficient measurement.
- Preset capability. This allows the operator to set any desired measurement on the display and recall that measurement with a simple push of a button.
- Non-rotating spindle.
- Carbide-tipped measuring face.
- Battery: SR44 (938882) x 1pc. for 25mm (1") model. SR44 x 2pcs. for 50mm (2") model.

#### OPTIONAL ACCESSORIES

| Order No. | Description    |
|-----------|----------------|
| 937387    | SPC cable (1m) |
| 965013    | SPC cable (2m) |

#### SPECIFICATIONS

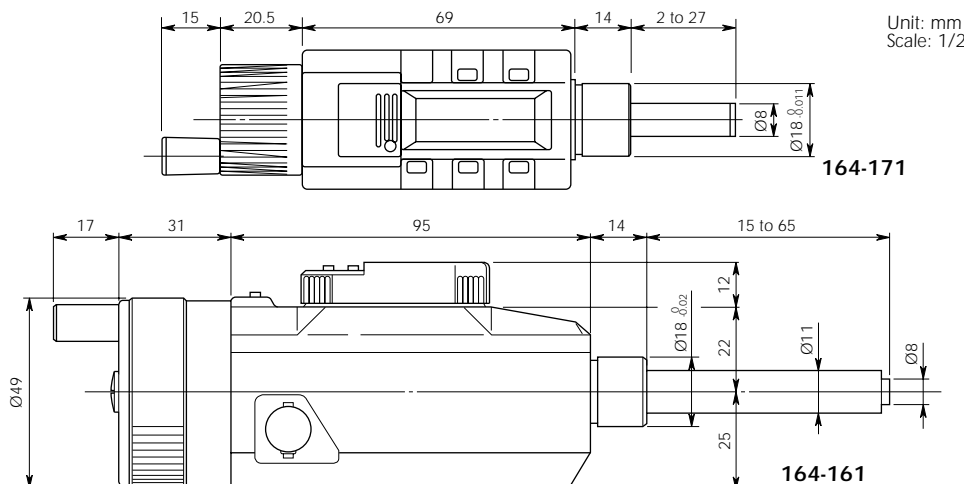
##### Metric

| Range    | Order No.  |                     | Resolution | Accuracy | Stem diameter | Remarks |                 |                         |
|----------|------------|---------------------|------------|----------|---------------|---------|-----------------|-------------------------|
|          | Plain stem | Stem with clamp nut |            |          |               |         |                 |                         |
|          |            | w/ Spindle lock     |            |          |               |         | w/ Spindle lock |                         |
| 0 - 25mm | 164-171    | —                   | —          | —        | 0.001mm       | ±2μm    | 18mm            | —                       |
| 0 - 50mm | 164-161    | —                   | —          | —        | 0.001mm       | ±3μm    | 18mm            | with 330° rotatable LCD |

##### Inch/Metric

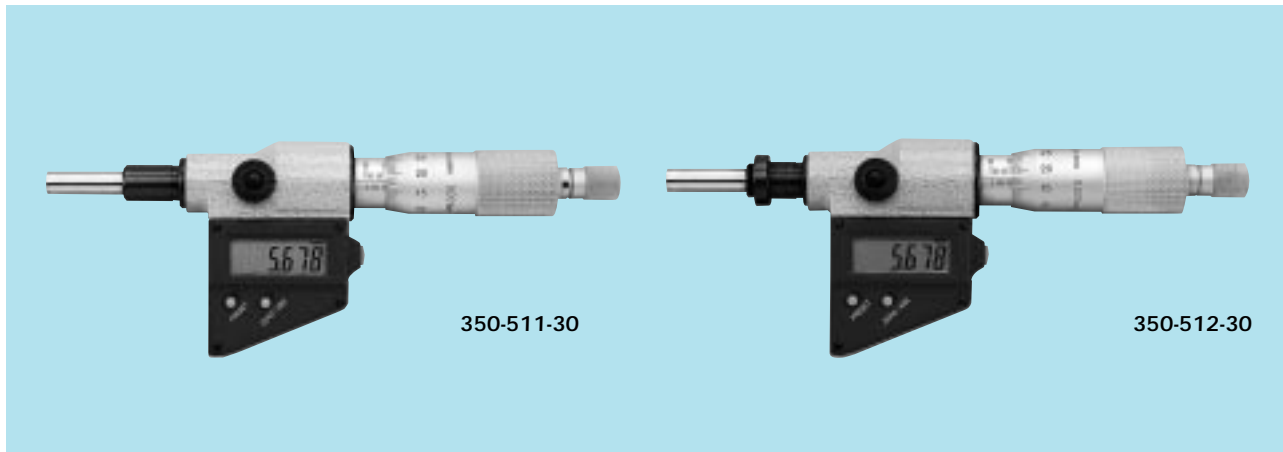
| Range  | Order No.  |                     | Resolution | Accuracy | Stem diameter   | Remarks  |                 |                         |
|--------|------------|---------------------|------------|----------|-----------------|----------|-----------------|-------------------------|
|        | Plain stem | Stem with clamp nut |            |          |                 |          |                 |                         |
|        |            | w/ Spindle lock     |            |          |                 |          | w/ Spindle lock |                         |
| 0 - 1" | 164-172    | —                   | —          | —        | .00005"/0.001mm | ±.0001"  | 18mm            | —                       |
| 0 - 2" | 164-162    | —                   | —          | —        | .00005"/0.001mm | ±.00015" | 18mm            | with 330° rotatable LCD |

#### Dimensions



# Digimatic Micrometer Heads

SERIES 350  
Compact Type



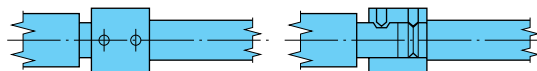
## FEATURES

- Extra large LCD readout with 0.001mm resolution.
- Functions available: Presetting, Inch/mm selection (inch/mm model only), Zero-setting, Data hold/Data output, Error alarm.
- Preset capability. This allows the operator to set any desired measurement on the display and recall that measurement with a simple push of a button.
- Carbide-tipped measuring face.
- With Ratchet Stop for constant force.
- Battery: SR44 (938882) x 1pc.
- Non-rotating device is provided for 350-521-30 (metric) and 350-721-30 (inch/metric).

## TECHNICAL INFORMATION

### Non-rotating device

The non-rotating device provides no radial torsion on the workpiece surface so that workpiece wear and deformation are minimized.



## SPECIFICATIONS

### Metric

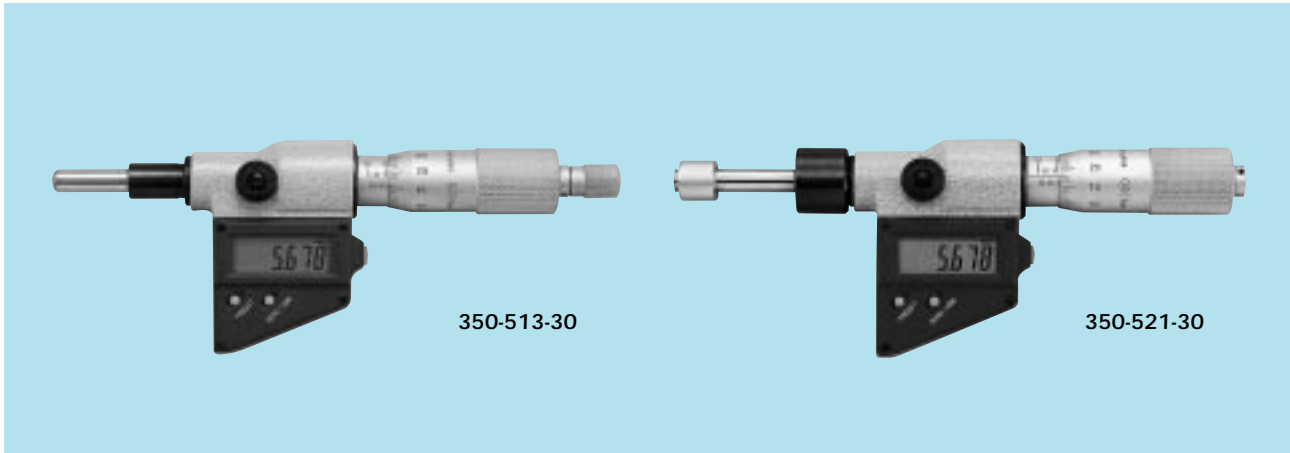
| Range    | Order No.       |                     | Resolution | Accuracy | Stem diameter | Remarks                  |
|----------|-----------------|---------------------|------------|----------|---------------|--------------------------|
|          | Plain stem      | Stem with clamp nut |            |          |               |                          |
|          | w/ Spindle lock | w/ Spindle lock     |            |          |               |                          |
| 0 - 25mm | 350-511-30      | 350-512-30          | 0.001mm    | ±2µm     | 10mm          | —                        |
|          | 350-513-30      | 350-514-30          | 0.001mm    | ±2µm     | 10mm          | Spherical face type      |
|          | 350-541-30      | 350-542-30          | 0.001mm    | ±2µm     | 12mm, 18mm*   | —                        |
|          | 350-543-30      | 350-544-30          | 0.001mm    | ±2µm     | 12mm, 18mm*   | Spherical face type      |
|          | 350-521-30      | —                   | 0.001mm    | ±2µm     | 12mm, 18mm*   | with Non-rotating device |

\*When using a bushing (standard accessory).

### Inch/Metric

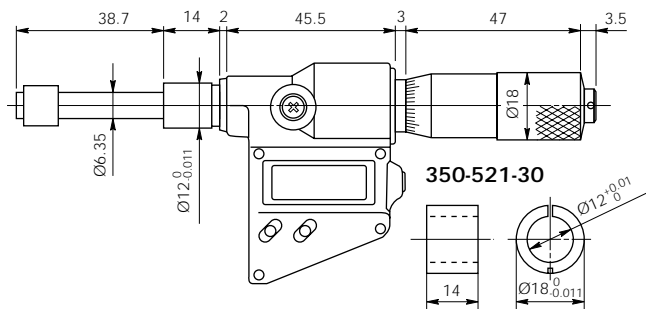
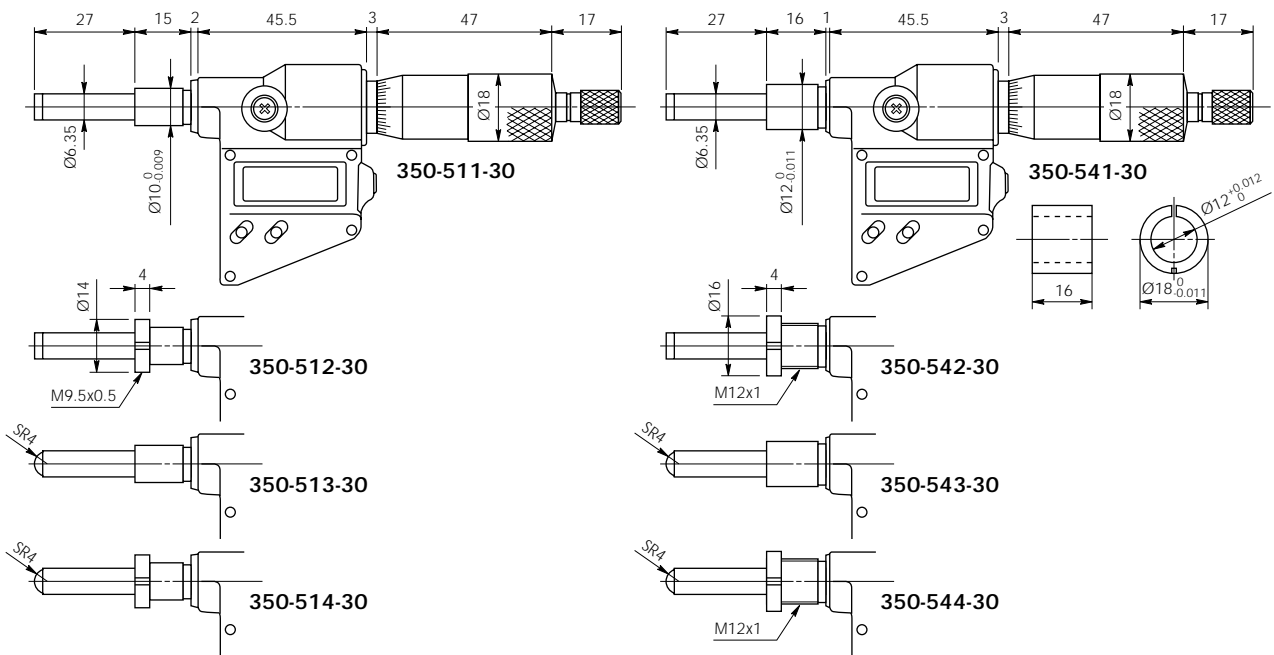
| Range  | Order No.       |                     | Resolution      | Accuracy | Stem diameter | Remarks                  |
|--------|-----------------|---------------------|-----------------|----------|---------------|--------------------------|
|        | Plain stem      | Stem with clamp nut |                 |          |               |                          |
|        | w/ Spindle lock | w/ Spindle lock     |                 |          |               |                          |
| 0 - 1" | 350-711-30      | 350-712-30          | .00005"/0.001mm | ±.0001"  | .375"         | —                        |
|        | 350-713-30      | 350-714-30          | .00005"/0.001mm | ±.0001"  | .375"         | Spherical face type      |
|        | 350-721-30      | —                   | .00005"/0.001mm | ±.0001"  | .5", .709"    | with Non-rotating device |

\*When using a bushing (standard accessory).

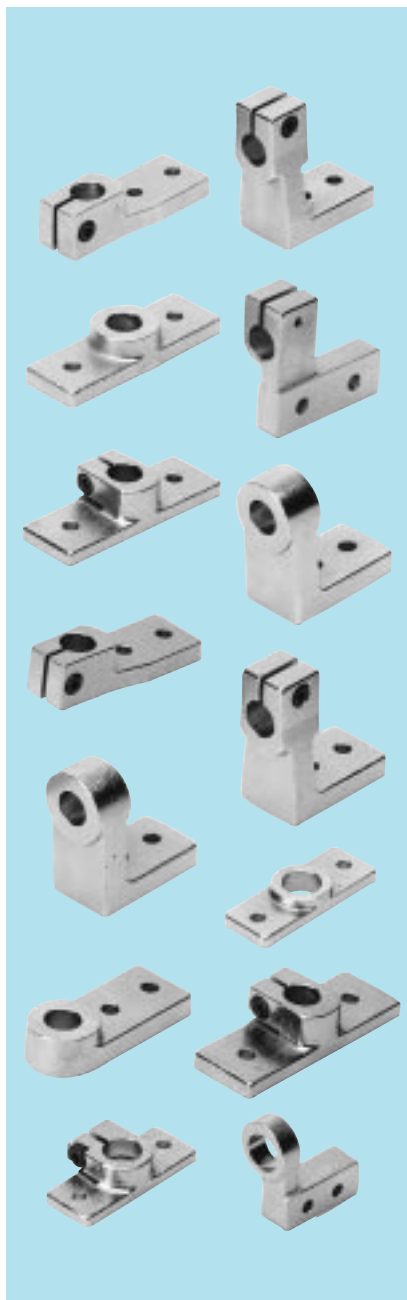


## Dimensions

Unit: mm  
Scale: 1/2

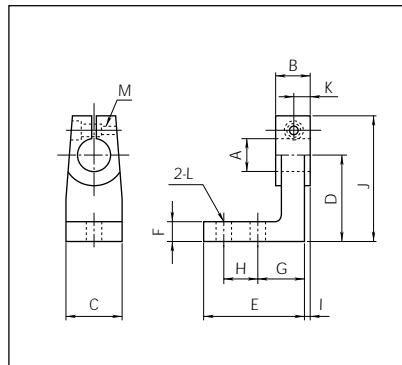


# Fixtures for Micrometer Heads

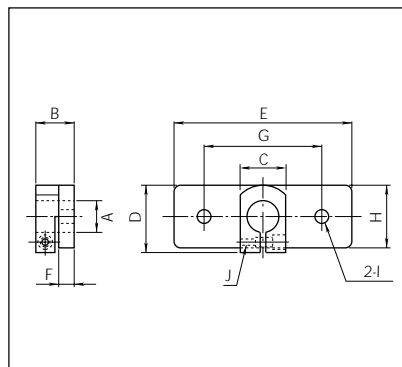


## SPECIFICATIONS

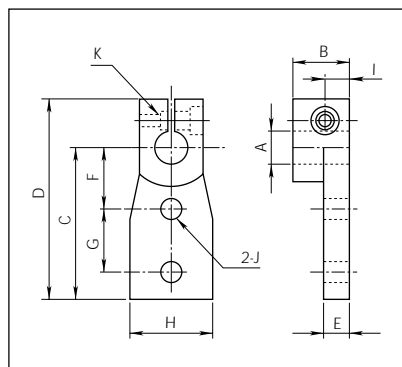
Fixtures for micrometer heads without clamp nut  
(plain stem type micrometer heads)



| Order No.  | 303560   | 303569 | 303579 |
|------------|----------|--------|--------|
| Dimensions | A Ø9.5   | Ø9.5   | Ø10    |
| (Unit: mm) | B 9      | 14.5   | 14.5   |
|            | C 15     | 20     | 20     |
|            | D 20     | 30     | 30     |
|            | E 23     | 35     | 35     |
|            | F 5      | 7      | 7      |
|            | G 11     | 16     | 16     |
|            | H 8      | 12     | 12     |
|            | I 1.5    | 3.25   | 3.25   |
|            | J 32.5   | 42.5   | 42.5   |
|            | K 4.5    | 7.25   | 7.25   |
|            | L Ø3.4   | Ø4.5   | Ø4.5   |
|            | M M3x0.5 | M3x0.5 | M3x0.5 |



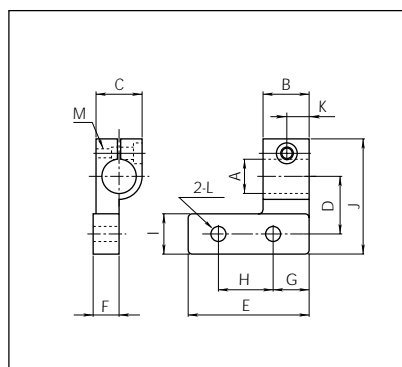
| Order No.  | 303562   | 303571 | 303581 |
|------------|----------|--------|--------|
| Dimensions | A Ø9.5   | Ø9.5   | Ø10    |
| (Unit: mm) | B 9      | 14.5   | 14.5   |
|            | C 15     | 15     | 15     |
|            | D 20     | 22.5   | 22.5   |
|            | E 40     | 60     | 60     |
|            | F 3      | 5      | 5      |
|            | G 30     | 40     | 40     |
|            | H 15     | 20     | 20     |
|            | I Ø3.4   | Ø4.5   | Ø4.5   |
|            | J M3x0.5 | M3x0.5 | M3x0.5 |



| Order No.  | 303564   | 303573 | 303583 |
|------------|----------|--------|--------|
| Dimensions | A Ø9.5   | Ø9.5   | Ø10    |
| (Unit: mm) | B 9      | 14.5   | 14.5   |
|            | C 30     | 40     | 40     |
|            | D 42.5   | 52.5   | 52.5   |
|            | E 4      | 6      | 6      |
|            | F 15     | 18     | 18     |
|            | G 10     | 15     | 15     |
|            | H 15     | 20     | 20     |
|            | I 4.5    | 7.25   | 7.25   |
|            | J Ø3.4   | Ø4.5   | Ø4.5   |
|            | K M3x0.5 | M3x0.5 | M3x0.5 |

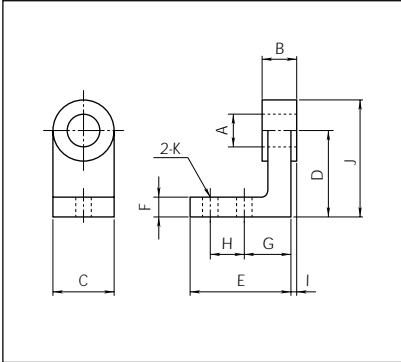
## FEATURES

- The act of fabricating brackets to mount micrometer heads for each particular application can be laborious and costly. Mitutoyo offers various types of fixtures for micrometer heads to meet a wide range of applications. These fixtures are made of nickel-plated cast iron.
- There are two types of fixtures for micrometer heads with or without clamping nut on the stem.

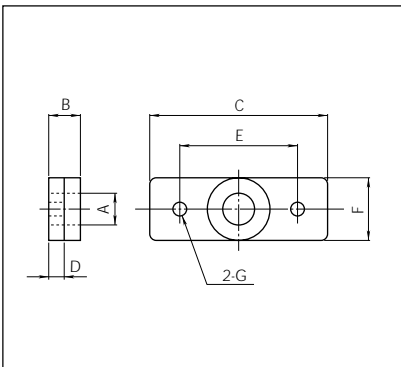


| Order No.  | 303566   | 303575 | 303585 |
|------------|----------|--------|--------|
| Dimensions | A Ø9.5   | Ø9.5   | Ø10    |
| (Unit: mm) | B 9      | 14.5   | 14.5   |
|            | C 15     | 15     | 15     |
|            | D 15     | 20     | 20     |
|            | E 25     | 40     | 40     |
|            | F 8.5    | 8.5    | 8.5    |
|            | G 7.5    | 10     | 10     |
|            | H 10     | 20     | 20     |
|            | I 10     | 15     | 15     |
|            | J 32.5   | 40     | 40     |
|            | K 4.5    | 7.25   | 7.25   |
|            | L Ø3.4   | Ø4.5   | Ø4.5   |
|            | M M3x0.5 | M3x0.5 | M3x0.5 |

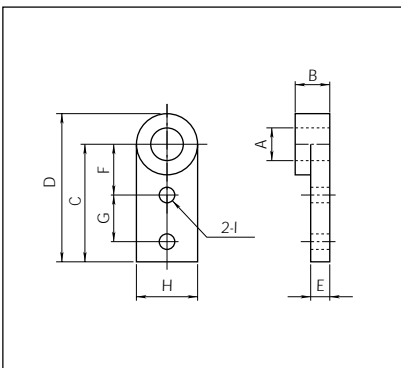
## Fixtures for micrometer heads with clamp nut



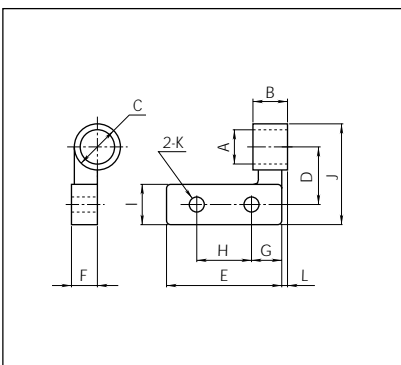
| Order No.  | 303559 | 303568 | 303578 |      |
|------------|--------|--------|--------|------|
| Dimensions | A      | Ø9.5   | Ø9.5   | Ø10  |
| (Unit: mm) | B      | 6      | 11.5   | 11.5 |
|            | C      | 15     | 20     | 20   |
|            | D      | 20     | 30     | 30   |
|            | E      | 24     | 35     | 35   |
|            | F      | 5      | 7      | 7    |
|            | G      | 11     | 16     | 16   |
|            | H      | 8      | 12     | 12   |
|            | I      | 0.5    | 1.75   | 1.75 |
|            | J      | 27.5   | 40     | 40   |
|            | K      | Ø3.4   | Ø4.5   | Ø4.5 |



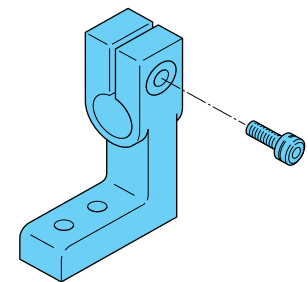
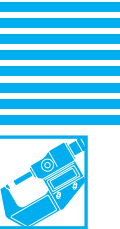
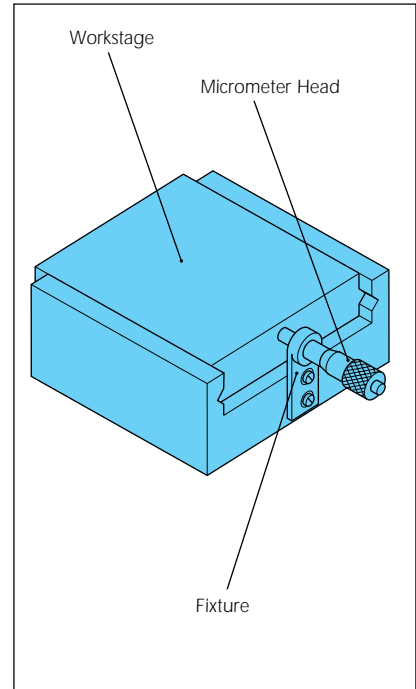
| Order No.  | 303561 | 303570 | 303580 |      |
|------------|--------|--------|--------|------|
| Dimensions | A      | Ø9.5   | Ø9.5   | Ø10  |
| (Unit: mm) | B      | 6      | 11.5   | 11.5 |
|            | C      | 40     | 60     | 60   |
|            | D      | 3.5    | 5.5    | 5.5  |
|            | E      | 30     | 40     | 40   |
|            | F      | 15     | 20     | 20   |
|            | G      | Ø3.4   | Ø4.5   | Ø4.5 |



| Order No.  | 303563 | 303572 | 303582 |      |
|------------|--------|--------|--------|------|
| Dimensions | A      | Ø9.5   | Ø9.5   | Ø10  |
| (Unit: mm) | B      | 6      | 11.5   | 11.5 |
|            | C      | 30     | 40     | 40   |
|            | D      | 37.5   | 50     | 50   |
|            | E      | 4.5    | 6.5    | 6.5  |
|            | F      | 15     | 18     | 18   |
|            | G      | 10     | 15     | 15   |
|            | H      | 15     | 20     | 20   |
|            | I      | Ø3.4   | Ø4.5   | Ø4.5 |



| Order No.  | 303565 | 303574 | 303584 |      |
|------------|--------|--------|--------|------|
| Dimensions | A      | Ø9.5   | Ø9.5   | Ø10  |
| (Unit: mm) | B      | 6      | 11.5   | 11.5 |
|            | C      | Ø15    | Ø15    | Ø15  |
|            | D      | 15     | 20     | 20   |
|            | E      | 25     | 40     | 40   |
|            | F      | 8.5    | 8.5    | 8.5  |
|            | G      | 7.5    | 10     | 10   |
|            | H      | 10     | 20     | 20   |
|            | I      | 10     | 15     | 15   |
|            | J      | 27.5   | 35     | 35   |
|            | K      | Ø3.4   | Ø4.5   | Ø4.5 |
|            | L      | 0.75   | 1.25   | 1.25 |



**Note:** Supplied with a socket head screw (M3x0.5x12mm) for the fixtures to be used with a micrometer head without clamp nut (plain stem type micrometer head).

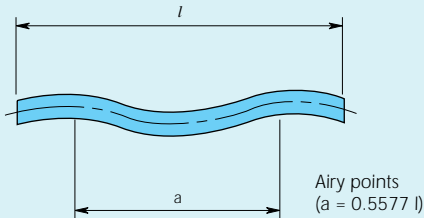


# QUICK GUIDE TO PRECISION MEASUREMENT

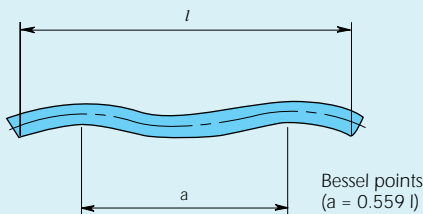
## Micrometer Terminology

### Airy point and Bessel point

Airy points and Bessel points are points for horizontally supporting micrometer standards or tubular inside micrometers to obtain specific flexure conditions.



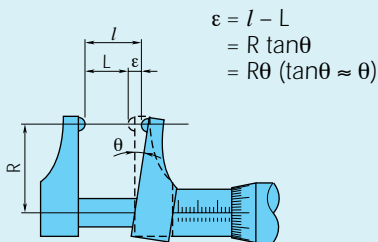
Airy points are used for two-point support, and make the end faces parallel.



Bessel points are used for two-point support, and minimize the change in the overall length.

### Abbe's principle

Abbe's principle states that "the maximum accuracy may be obtained when the standard scale and the workpiece being measured are aligned on the same line of measurement." When the contact points of a micrometer are away from the axis of the graduations, as shown in the example, measurement error ( $\epsilon$ ) will become significant. In this case, a special attention must be paid to the measuring force.



### Hooke's law

Hooke's law shows the relationship between stress and strain. Within the elastic limit, the stress of an elastic solid is directly proportional to the strain applied to it.

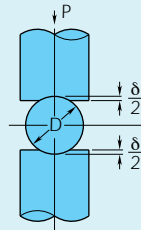
### Hertz's formula

Hertz's formula gives the amount of surface deformation within the elastic limit when two surfaces (spherical, cylindrical, or planar surfaces) are pressed against each other under a certain force. It is an important formula for determining the deformation of a workpiece caused by the measuring force.

When two surfaces contact at a point or along a line, as shown in the figure, and are pressed against each other, the amount of deformation ( $\delta_1$  and  $\delta_2$ ) in each case is given as follows:

(a) Spherical surface and plane (point contact):

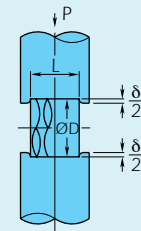
$$\delta_1 = 0.82 \sqrt[3]{\frac{P^2}{D}}$$



A sphere between two planes

(b) Cylindrical surface and plane (line contact):

$$\delta_2 = 0.094 \sqrt[3]{\frac{1}{D}}$$



A cylinder between two planes

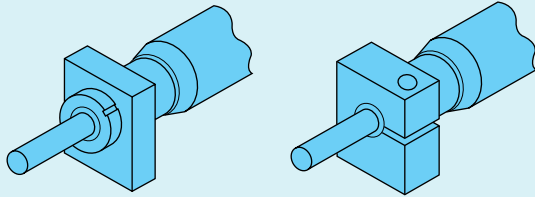
where,  
 Material: Steel  
 Modulus of elasticity:  $E = 1.96 \times 10^5$  (Pa)  
 Amount of deformation:  $\delta$  ( $\mu\text{m}$ )  
 D: Diameter of ball or cylinder (mm)  
 L: Length of cylinder (mm)  
 P: Load (N)

# QUICK GUIDE TO PRECISION MEASUREMENT

## Micrometer Head Terminology

### Plain stem and stem with clamp nut

The micrometer head is usually supported at the stem. Two types of stems — plain stem and stem with clamp nut — are available. The stem with clamp nut allows easy and firm fixing. Although the plain stem must be fixed by an adhesive or a split holder, it has a wide range of applications and allows some adjustment in the direction of spindle displacement after it is mounted.



Stem with clamp nut

Plain stem

### Spindle lock

The micrometer head with a spindle lock prevents the spindle from becoming loose when it is used as a stopper. This type micrometer head is designed so that the spindle position will not change due to the locking operation.

### Non-rotating spindle type micrometer head

The spindle of the non-rotating spindle type micrometer head does not turn when it is displaced in the axial direction. Since this type micrometer head does not produce radial torsion on the workpiece surface, workpiece wear and deformation are minimized.

### Micrometer head with fine adjustment

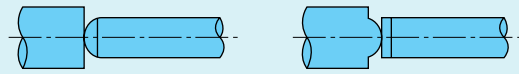
This type micrometer head is used for applications where ultra-fine feed of the spindle is required.

### Quick feeding type micrometer head

One thimble rotation of this type micrometer head displaces the spindle 1mm (0.5mm on usual micrometer heads). The quick feeding type micrometer head allows speedy spindle positioning and eliminates the 0.5mm reading error of the sleeve.

### Spherical face type micrometer head

Flat face type micrometer heads are generally used in measuring applications. For feeding application, the spherical face type micrometer head minimizes feeding errors that may be caused by an inclined micrometer head attachment (Fig. A). The same effect can be attained with the flat face type by attaching a spherical piece such as a carbide ball on the part to be fed by micrometer head (Fig. B). When the micrometer head is used as a stopper, a flat contact between the measuring face and the part to be fed will ensure high durability.

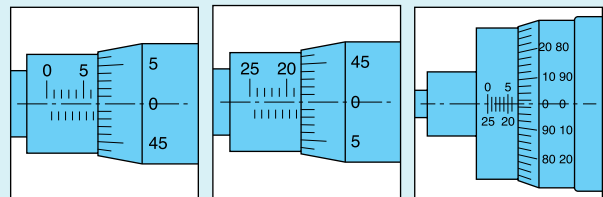


A

B

### Reverse reading type micrometer head

The standard graduations are the same as those of outside micrometers; the readings increase as the spindle retracts. The reverse reading type micrometer head has reverse graduations that are given the opposite direction to the standard graduation. Its readings increase as the spindle extends.



Standard graduations

Reverse graduations

Bidirectional graduations

### Bidirectional graduations

The bidirectional graduations allow reading in both directions. Reading errors are eliminated because graduation values for each direction are colored differently (black and red).

### Outside diameter of thimble

The diameter of the micrometer head thimble affects operability and the ability to make fine adjustments. The smaller the diameter of a thimble, the faster it can be positioned; the larger the diameter, the finer the positioning and reading. Some micrometer heads have a revolving knob on the large-diameter thimble for greater efficiency for positioning applications.

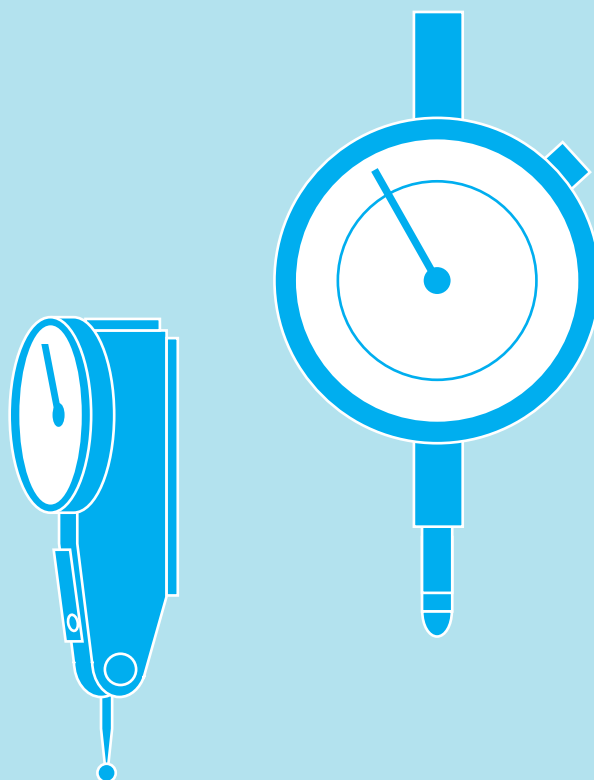
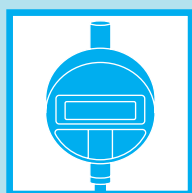




# Digimatic Indicators/ Dial Indicators Pages 164 — 225

## Dial Test Indicators Pages 226 — 235

## Gage Heads Pages 236 — 260



# IDF Series Digimatic Indicators

## SERIES 543

with Back-lit LCD Screen



### FEATURES

- The external power supply eliminates the need to replace batteries for extended continuous operation.
- GO/±NG judgment is performed by setting the upper and lower tolerances. If a judgment result is out of tolerance, the display backlighting changes from green to red, so tolerance judgment can be made at a glance.
- The PRESET button allows a reference point to be set at any spindle position. With the ABSOLUTE Linear Encoder technology, once the measurement reference point has been preset it will not be lost when the power is turned on.
- The ZERO/ABS button allows a display value to be zero-set at any spindle position. Press this button again to restore the absolute (ABS) coordinate.
- The maximum, minimum, or runout value can be displayed during measurement.
- An analog bar indicator has been integrated to handle upper/lower limit approaching and zero approaching. It enhances the ease of operation in the same manner as a dial indicator. The display range of the analog bar can be changed.

### Technical Data

**Display:** LCD

**Functions:** Origin-Set (presetting), Zero-Set, power on/off, inch/mm conversion (inch/mm type only), resolution switching, MAX/MIN value hold, runout measurement, SPC data output, counting direction switching, analog bar range switching, GO/±NG tolerance judgment, measuring condition memory

**Power supply:** 9V DC (via AC adaptor)

**Stem diameter:** 8mm (mm type) or 3/8" (inch/mm type)

**Contact point:** Carbide ball with M2.5x0.45 thread (mm type) or steel ball with #4-48UNF thread (inch/mm type)

**Alarm:** Over-flow error, tolerance limit setting error, counting value composition error

**Dust/Water protection level:** Conforming to IP30

**Operating temperature:** 0°C to 40°C

### OPTIONAL ACCESSORIES

| Order No. | Description                               |
|-----------|---|
| 936937    | SPC cable (1m)                            |
| 965014    | SPC cable (2m)                            |
| 540774    | Spindle lifting cable*                    |
| 101040    | Lug-on-center back (mm type)              |
| 101306    | Lug-on-center back (inch/mm type)         |
| 02ACA571  | Auxiliary spindle spring (for 25mm IDF)** |
| 02ACA773  | Auxiliary spindle spring (for 50mm IDF)** |

\*Lifts the spindle up to 10mm.

\*\*Required when orienting an IDF upside down.

The new multi-function IDF Series ABSOLUTE Digimatic Indicator never forgets its absolute origin throughout the entire service life unless otherwise preset for a different setup or the main power cable is disconnected. The large LCD has several features including greatly improved visibility, green/red backlit screen for easy GO/NG judgment, the analog bar indicator for easy process monitoring such as zero/tolerance zone approaching. Maximum/minimum value hold, runout measurement, and data output functions are also included as standard features of the IDF Series Digimatic Indicator.



## SPECIFICATIONS

### Metric

| Resolution (switchable) | Range | Order No. | Accuracy | Measuring force | Mass | Remarks                        |
|-------------------------|-------|-----------|----------|-----------------|------|--------------------------------|
| 0.001mm/<br>0.01mm      | 25mm  | 543-551   | 0.003mm  | 1.8N or less    | 240g | With 100V AC adaptor           |
|                         |       | 543-551A  | 0.003mm  | 1.8N or less    | 240g | With 120V AC adaptor           |
|                         |       | 543-551D  | 0.003mm  | 1.8N or less    | 240g | With 230V AC adaptor (Germany) |
|                         |       | 543-551E  | 0.003mm  | 1.8N or less    | 240g | With 230V AC adaptor (UK)      |
|                         | 50mm  | 543-553*  | 0.006mm  | 2.3N or less    | 330g | With 100V AC adaptor           |
|                         |       | 543-553A* | 0.006mm  | 2.3N or less    | 330g | With 120V AC adaptor           |
|                         |       | 543-553D* | 0.006mm  | 2.3N or less    | 330g | With 230V AC adaptor (Germany) |
|                         |       | 543-553E* | 0.006mm  | 2.3N or less    | 330g | With 230V AC adaptor (UK)      |

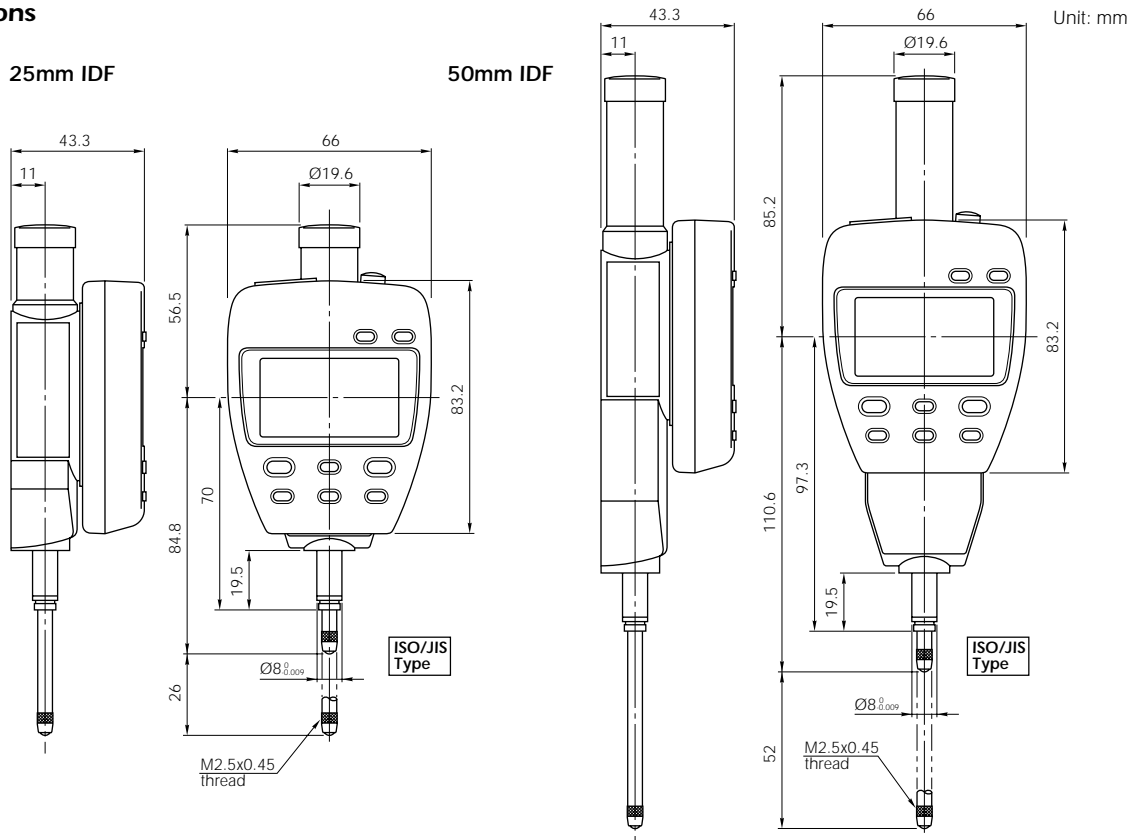
\*A 50mm range type IDF (543-557/A/D/E) is available with a measuring accuracy equal to that of the 25mm range type.

### Inch/Metric

| Resolution (switchable)          | Range       | Order No. | Accuracy | Measuring force | Mass     | Remarks                        |
|----------------------------------|-------------|-----------|----------|-----------------|----------|--------------------------------|
| .00005"/.0001"/<br>.0005"/.001"/ | 1" (25.4mm) | 543-552   | .00012"  | 1.8N or less    | .53 lbs. | With 100V AC adaptor           |
|                                  |             | 543-552A  | .00012"  | 1.8N or less    | .53 lbs. | With 120V AC adaptor           |
|                                  |             | 543-552D  | .00012"  | 1.8N or less    | .53 lbs. | With 230V AC adaptor (Germany) |
|                                  |             | 543-552E  | .00012"  | 1.8N or less    | .53 lbs. | With 230V AC adaptor (UK)      |
| 0.001mm/<br>0.01mm               | 2" (50.8mm) | 543-554*  | .00024"  | 2.3N or less    | .73 lbs. | With 100V AC adaptor           |
|                                  |             | 543-554A* | .00024"  | 2.3N or less    | .73 lbs. | With 120V AC adaptor           |
|                                  |             | 543-554D* | .00024"  | 2.3N or less    | .73 lbs. | With 230V AC adaptor (Germany) |
|                                  |             | 543-554E* | .00024"  | 2.3N or less    | .73 lbs. | With 230V AC adaptor (UK)      |

\*A 2"(50.8mm) range type IDF (543-558/A/D/E) is available with a measuring accuracy equal to that of the 1"(25.4mm) range type.

## Dimensions



Note: Dimensions of the ANSI/AGD (inch/metric) type IDF indicator partly differ from those of the ISO/JIS (metric) type IDF.



# IDC Series Digimatic Indicators

## SERIES 543

Standard Type with Multiple Functions

# ABSOLUTE



543-252



543-452B



543-462B

Mitutoyo's new IDC Series Digimatic Indicator presents error-free digital readings in measurements. Its unique ABSOLUTE Linear Encoder keeps track of the origin point once set over the entire battery life, allowing the large LCD screen to display the actual spindle position from the origin point at power-on. Whenever turned on, the operator can take measurements with no need for preliminary absolute positioning.

### FEATURES

- As compact as standard Series 2 dial indicators.
- Large, easy-to-read LCD.
- ZERO/ABS key: Allows the display to be Zero-Set at any spindle position for comparison measurements. This switch will also allow return to the absolute coordinate and display of the true position from the origin point.
- GO/±NG judgment can be performed by setting upper and lower tolerance limits. The judgment result (GO/±NG) can be displayed in full-size characters.
- The positive/negative count resulting from the spindle's up/down movement can be toggled.
- Unlimited response speed eliminates spindle over-speed errors.
- The IDC indicator face can be rotated 330° to an appropriate angle for easy reading.
- The measurement data can be output to an external data processor using the optional SPC cable.

### Technical Data

**Display:** LCD

**Functions:** Origin-Set (preset), Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, counting direction switching, GO/±NG judgment

**Battery:** SR44 (1 pc.) (938882)

**Battery life:** Approx. 5000 hours in continuous use

**Stem diameter:** 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

**Contact point:** Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)

**Alarm:** Low battery voltage, scale contamination, over-flow error, tolerance limit setting error

**Dust/Water protection level:** Conforming to IP42

**Operating temperature:** 0°C to 40°C

### OPTIONAL ACCESSORIES

| Order No. | Description                                |
|-----------|--|
| 905338    | SPC cable (1m)                             |
| 905409    | SPC cable (2m)                             |
| 902011    | Spindle lifting lever (ISO/JIS type)*      |
| 902794    | Spindle lifting lever (ANSI/AGD type)*     |
| 540774    | Spindle lifting cable                      |
| 101040    | Lug-on-center back (ISO/JIS type)**        |
| 101306    | Lug-on-center back (ANSI/AGD type)**       |
| 02ACA571  | Auxiliary spindle spring (for 25mm IDC)*** |
| 02ACA773  | Auxiliary spindle spring (for 50mm IDC)*** |

\*Can be used on 12mm (.5") IDC only.

\*\*Can be used on 25mm (1") IDC or 50mm (2") IDC.

\*\*\*Required when orienting an IDC upside down.

## SPECIFICATIONS

### Metric

| Resolution | Range | Order No.  |           | Accuracy     | Measuring force | Mass         | Remarks      |
|------------|-------|------------|-----------|--------------|-----------------|--------------|--------------|
|            |       | Back w/lug | Flat-back |              |                 |              |              |
| 0.001mm    | 12mm  | 543-250    | 543-250B  | 0.003mm      | 1.5N or less    | 160g         | ISO/JIS type |
|            | 25mm  | —          | 543-450B  | 0.003mm      | 1.8N or less    | 190g         | ISO/JIS type |
|            | 50mm  | —          | 543-460B  | 0.006mm      | 2.3N or less    | 280g         | ISO/JIS type |
| 0.01mm     | 12mm  | 543-290    | 543-290B  | 0.005mm      | 1.5N or less    | 160g         | ISO/JIS type |
|            |       | 543-270    | 543-270B  | 0.02mm       | 0.9N or less    | 160g         | ISO/JIS type |
|            | 25mm  | —          | 543-457B  | 0.005mm      | 1.8N or less    | 190g         | ISO/JIS type |
|            |       | —          | 543-454B  | 0.03mm       | 1.8N or less    | 190g         | ISO/JIS type |
| 50mm       | —     | 543-464B   | 0.04mm    | 2.3N or less | 280g            | ISO/JIS type |              |

Note: A 0.01mm reading type IDC is available with a measuring accuracy equal to that of the 0.001mm reading type.

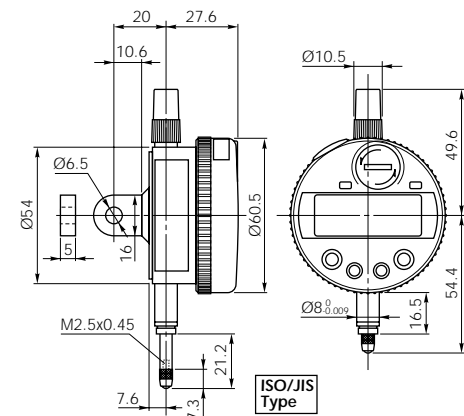
### Inch / Metric

| Resolution      | Range        | Order No.   |           | Accuracy     | Measuring force | Mass          | Remarks       |
|-----------------|--------------|-------------|-----------|--------------|-----------------|---------------|---------------|
|                 |              | Back w/lug  | Flat-back |              |                 |               |               |
| .00005"/0.001mm | .5" (12.7mm) | 543-251     | 543-251B  | .00012"      | 1.5N or less    | .35 lbs.      | ISO/JIS type  |
|                 |              | 543-252     | 543-252B  | .00012"      | 1.5N or less    | .35 lbs.      | ANSI/AGD type |
|                 | 1" (25.4mm)  | —           | 543-451B  | .00012"      | 1.8N or less    | .42 lbs.      | ISO/JIS type  |
|                 |              | —           | 543-452B  | .00012"      | 1.8N or less    | .42 lbs.      | ANSI/AGD type |
|                 |              | 2" (50.8mm) | —         | 543-461B     | .00025"         | 2.3N or less  | .62 lbs.      |
| —               | 543-462B     |             | .00025"   | 2.3N or less | .62 lbs.        | ANSI/AGD type |               |
| .0001"/0.001mm  | .5" (12.7mm) | 543-253     | 543-253B  | .00012"      | 1.5N or less    | .35 lbs.      | ANSI/AGD type |
|                 | 1" (25.4mm)  | —           | 543-453B  | .00012"      | 1.8N or less    | .42 lbs.      | ANSI/AGD type |
|                 | 2" (50.8mm)  | —           | 543-463B  | .00025"      | 2.3N or less    | .62 lbs.      | ANSI/AGD type |
| .0005"/0.01mm   | .5" (12.7mm) | 543-291     | 543-291B  | .0002"       | 1.5N or less    | .35 lbs.      | ISO/JIS type  |
|                 |              | 543-292     | 543-292B  | .0002"       | 1.5N or less    | .35 lbs.      | ANSI/AGD type |
|                 |              | 543-271     | 543-271B  | .0008"       | 0.9N or less    | .35 lbs.      | ISO/JIS type  |
|                 |              | 543-272     | 543-272B  | .0008"       | 0.9N or less    | .35 lbs.      | ANSI/AGD type |
|                 |              | 1" (25.4mm) | —         | 543-458B     | .0002"          | 1.8N or less  | .42 lbs.      |
|                 | —            |             | 543-459B  | .0002"       | 1.8N or less    | .42 lbs.      | ANSI/AGD type |
|                 | —            |             | 543-455B  | .0012"       | 1.8N or less    | .42 lbs.      | ISO/JIS type  |
|                 | —            |             | 543-456B  | .0012"       | 1.8N or less    | .42 lbs.      | ANSI/AGD type |
|                 | 2" (50.8mm)  |             | —         | 543-465B     | .0016"          | 2.3N or less  | .62 lbs.      |
|                 |              | —           | 543-466B  | .0016"       | 2.3N or less    | .62 lbs.      | ANSI/AGD type |

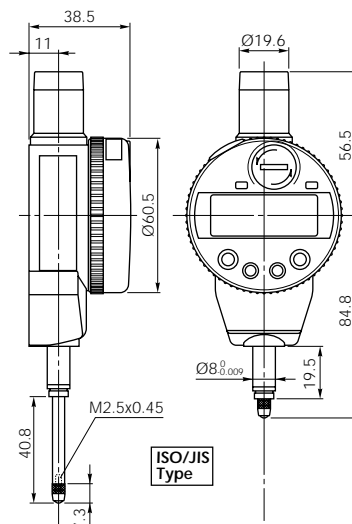
Note: A .0005"/0.01mm reading type IDC is available with a measuring accuracy equal to that of the .00005"/0.001mm reading type.

## Dimensions

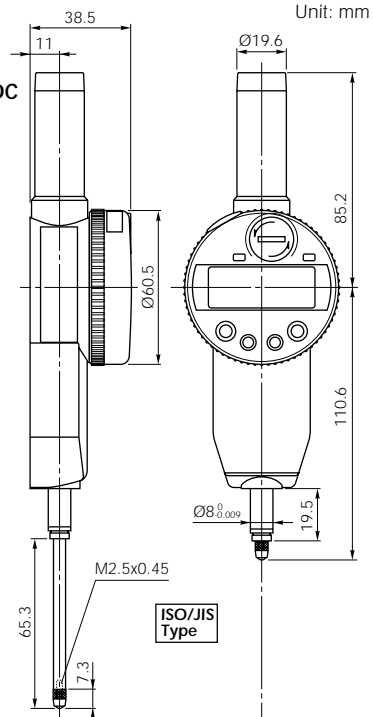
### 12mm IDC



### 25mm IDC



### 50mm IDC



Unit: mm

Note 1: The lug is not provided for the Flat-back type.  
 Note 2: Dimensions of the ANSI/AGD type IDC indicator partly differ from those of the ISO/JIS type IDC.





# IDC Series Digimatic Indicators

## SERIES 543

Dust-proof Type and Low Measuring Force Type



### FEATURES

- The IP53 protection level structure of the dust-proof type IDC allows the indicator to resist dust and contaminants for safe operation in harsh machine shop environments.
- The low measuring force type IDC indicators are specially designed for elastic workpieces such as plastic parts.

### Technical Data

**Display:** LCD

**Functions:** Origin-Set (preset), Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, counting direction switching, GO/±NG judgment

**Battery:** SR44 (1 pc.) (938882)

**Battery life:** Approx. 5000 hours in continuous use

**Stem diameter:** 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

**Contact point:** Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)

**Alarm:** Low battery voltage, scale contamination, over-flow error, tolerance limit setting error

**Operating temperature:** 0°C to 40°C

### OPTIONAL ACCESSORIES

| Order No. | Description                            |
|-----------|--|
| 905338    | SPC cable (1m)                         |
| 905409    | SPC cable (2m)                         |
| 902011    | Spindle lifting lever (ISO/JIS type)*  |
| 902794    | Spindle lifting lever (ANSI/AGD type)* |
| 540774    | Spindle lifting cable                  |

\*Can not be used on the dust-proof type IDC.

### SPECIFICATIONS

#### Dust-proof Type IDC Series Digimatic Indicators

##### Metric

| Resolution | Range | Order No.  |           | Accuracy | Measuring force | Mass | Remarks      |
|------------|-------|------------|-----------|----------|-----------------|------|--------------|
|            |       | Back w/lug | Flat-back |          |                 |      |              |
| 0.001mm    | 12mm  | 543-257    | 543-257B  | 0.003mm  | 2.0N or less    | 160g | ISO/JIS type |
| 0.01mm     | 12mm  | 543-277    | 543-277B  | 0.02mm   | 2.0N or less    | 160g | ISO/JIS type |

##### Inch/Metric

| Resolution      | Range        | Order No.  |           | Accuracy | Measuring force | Mass     | Remarks       |
|-----------------|--------------|------------|-----------|----------|-----------------|----------|---------------|
|                 |              | Back w/lug | Flat-back |          |                 |          |               |
| .00005"/0.001mm | .5" (12.7mm) | 543-258    | 543-258B  | .00012"  | 2.0N or less    | .35 lbs. | ISO/JIS type  |
|                 |              | 543-259    | 543-259B  | .00012"  | 2.0N or less    | .35 lbs. | ANSI/AGD type |
| .0005"/0.01mm   | .5" (12.7mm) | 543-278    | 543-278B  | .0008"   | 2.0N or less    | .35 lbs. | ISO/JIS type  |
|                 |              | 543-279    | 543-279B  | .0008"   | 2.0N or less    | .35 lbs. | ANSI/AGD type |

#### Low Measuring Force Type IDC Series Digimatic Indicators

##### Metric

| Resolution | Range | Order No.  |           | Accuracy | Measuring force | Mass | Remarks      |
|------------|-------|------------|-----------|----------|-----------------|------|--------------|
|            |       | Back w/lug | Flat-back |          |                 |      |              |
| 0.001mm    | 12mm  | 543-254    | 543-254B  | 0.003mm  | 0.4N - 0.7N     | 160g | ISO/JIS type |
| 0.01mm     | 12mm  | 543-274    | 543-274B  | 0.02mm   | 0.2N - 0.5N     | 160g | ISO/JIS type |

##### Inch/Metric

| Resolution      | Range        | Order No.  |           | Accuracy | Measuring force | Mass     | Remarks       |
|-----------------|--------------|------------|-----------|----------|-----------------|----------|---------------|
|                 |              | Back w/lug | Flat-back |          |                 |          |               |
| .00005"/0.001mm | .5" (12.7mm) | 543-255    | 543-255B  | .00012"  | 0.4N - 0.7N     | .35 lbs. | ISO/JIS type  |
|                 |              | 543-256    | 543-256B  | .00012"  | 0.4N - 0.7N     | .35 lbs. | ANSI/AGD type |
| .0005"/0.01mm   | .5" (12.7mm) | 543-275    | 543-275B  | .0008"   | 0.2N - 0.5N     | .35 lbs. | ISO/JIS type  |
|                 |              | 543-276    | 543-276B  | .0008"   | 0.2N - 0.5N     | .35 lbs. | ANSI/AGD type |

## IDC Series Digimatic Indicators

### SERIES 543

with Max./Min. Value Holding Function



With max./min. value holding function model of the IDC Series Digimatic Indicators.

#### FEATURES

- The maximum, minimum, or runout value can be displayed during measurement

Maximum value holding



- GO/±NG judgment is performed by setting the upper and lower tolerances for max., min. and runout values.
- High speed sampling ratio of 50 times/s.

#### SPECIFICATIONS

##### Metric

| Resolution | Range | Order No.  |           | Accuracy | Measuring force | Mass | Remarks      |
|------------|-------|------------|-----------|----------|-----------------|------|--------------|
|            |       | Back w/lug | Flat-back |          |                 |      |              |
| 0.001mm    | 12mm  | 543-260    | —         | 0.003mm  | 1.5N or less    | 160g | ISO/JIS type |

##### Inch/Metric

| Resolution      | Range        | Order No.  |           | Accuracy | Measuring force | Mass     | Remarks       |
|-----------------|--------------|------------|-----------|----------|-----------------|----------|---------------|
|                 |              | Back w/lug | Flat-back |          |                 |          |               |
| .00005"/0.001mm | .5" (12.7mm) | 543-261    | —         | .00012"  | 1.5N or less    | .35 lbs. | ISO/JIS type  |
|                 |              | 543-262    | —         | .00012"  | 1.5N or less    | .35 lbs. | ANSI/AGD type |
| .0001"/0.001mm  | .5" (12.7mm) | 543-263    | —         | .00012"  | 1.5N or less    | .35 lbs. | ANSI/AGD type |

#### Technical Data

**Display:** LCD

**Functions:** Origin-Set (preset), Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, counting direction switching, GO/±NG judgment, max./min./runout value holding

**Battery:** SR44 (1 pc.) (938882)

**Battery life:** Approx. 5000 hours in continuous use

**Stem diameter:** 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

**Contact point:** Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)

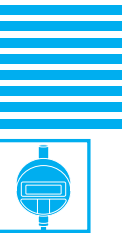
**Alarm:** Low battery voltage, scale contamination, over-flow error, tolerance limit setting error

**Dust/Water protection level:** Conforming to IP42

**Operating temperature:** 0°C to 40°C

#### OPTIONAL ACCESSORIES

| Order No. | Description                           |
|-----------|---------------------------------------|
| 905338    | SPC cable (1m)                        |
| 905409    | SPC cable (2m)                        |
| 902011    | Spindle lifting lever (ISO/JIS type)  |
| 902794    | Spindle lifting lever (ANSI/AGD type) |
| 540774    | Spindle lifting cable                 |



# IDC Series Digimatic Indicators

## SERIES 543

with Green/Red LED and GO/±NG Signal Output Function



### FEATURES

- With the max./min. value holding function, the signal IDC can output the signal of the GO/±NG judgment result against the peak values set. Substitute for the mechanical/electrical contact, the judgment is carried out by calculating the measurement data obtained. This provides high reliability with no deterioration of the contact point and volume adjustment.
- Employing the absolute linear encoder, the Signal IDC always displays the spindle "Absolute Position" from the origin at power-on. Also unlimited response speed eliminates over-speed errors.
- The signal can be output to an external device like a sequencer through the NPN open-collector.
- The GO/±NG judgment result is also indicated by the green/red LED and the "<, O, >" signs on LCD.
- The Signal IDC achieves the IP54 protection level to resist dust and contaminants for safe operation in harsh machine shop environments.

### Technical Data

**Display:** LCD

**Functions:**

- Signal output: -NG/OK/+NG (judgement result only), NPN open-collector, 30mA/24V max. output current/voltage
- Remote control: Hold-preset, Preset-recall, Zero-Set
- Other functions: Origin-Set, Zero-Set, power on/off, inch/mm conversion (inch/mm type only), counting direction switching, GO/±NG judgment, max./min./runout value holding

**Signal cable length:** 4m

**Power supply:** DC12 - 24V±10%

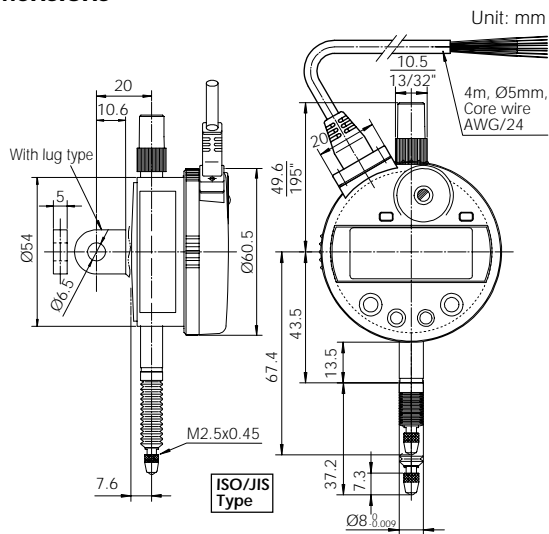
**Stem diameter:** 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

**Contact point:** Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)

**Dust/Water protection level:** Conforming to IP54

**Operation temperature:** 0°C to 40°C

### Dimensions



Note 1: The lug is not provided for the Flat-back type.  
Note 2: Dimensions of the ANSI/AGD type IDS indicator partly differ from those of the ISO/JIS type IDS.

### OPTIONAL ACCESSORIES

| Order No. | Description                           |
|-----------|---------------------------------------|
| 540774    | Spindle lifting cable                 |
| 902011    | Spindle lifting lever (ISO/JIS type)  |
| 902794    | Spindle lifting lever (ANSI/AGD type) |
| 125317    | Rubber boot                           |

### SPECIFICATIONS

#### Metric

| Resolution | Range  | Order No.  |           | Accuracy | Measuring force | Mass | Remarks      |
|------------|--------|------------|-----------|----------|-----------------|------|--------------|
|            |        | Back w/lug | Flat-back |          |                 |      |              |
| 0.001mm    | 12.7mm | 543-280    | 543-280B  | 0.003mm  | 2.0N or less    | 345g | ISO/JIS type |

#### Inch/Metric

| Resolution      | Range        | Order No.  |           | Accuracy | Measuring force | Mass     | Remarks       |
|-----------------|--------------|------------|-----------|----------|-----------------|----------|---------------|
|                 |              | Back w/lug | Flat-back |          |                 |          |               |
| .00005"/0.001mm | .5" (12.7mm) | 543-281    | 543-281B  | .00012"  | 2.0N or less    | .76 lbs. | ISO/JIS type  |
|                 |              | 543-282    | 543-282B  | .00012"  | 2.0N or less    | .76 lbs. | ANSI/AGD type |
| .0001"/0.001mm  | .5" (12.7mm) | 543-283    | 543-283B  | .00012"  | 2.0N or less    | .76 lbs. | ANSI/AGD type |

# IDS Series Digimatic Indicators

## SERIES 543

with Economical Design



The IDS Series Digimatic Indicator offers simple, error-free digital readings in a basic and economical package.

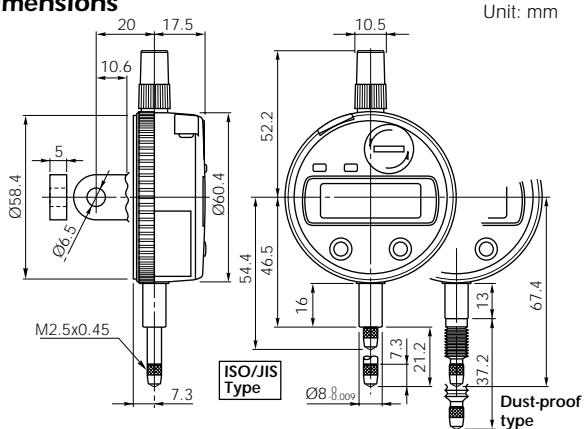
### FEATURES

- As compact as standard Series 2 dial indicators.
- The IDS indicates the absolute position of the spindle from the origin point at power-on, allowing to start measurements.
- After the initial zero-setting with the ORIGIN button, the repeated absolute positioning is no longer necessary over the entire battery life.
- Measurement error due to spindle over-speed is eliminated with the ABSOLUTE Encoder.

### Technical Data

**Display:** LCD  
**Functions:** Origin-Set, power on/off, counting direction switching, inch/mm conversion (inch/mm type only), SPC data output  
**Battery:** SR44 (1 pc.) (938882)  
**Battery life:** Approx. 20000 hours in continuous use  
**Stem diameter:** 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)  
**Contact point:** Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)  
**Dust/Water protection level:** Conforming to IP42  
**Alarm:** Low battery voltage, scale contamination  
**Operating temperature:** 0°C to 40°C

### Dimensions



Note 1: The lug is not provided for the Flat-back type.  
 Note 2: Dimensions of the ANSI/AGD type IDS indicator partly differ from those of the ISO/JIS type IDS.

### OPTIONAL ACCESSORIES

| Order No. | Description                             |
|-----------|---|
| 905338    | SPC cable (1m)                          |
| 905409    | SPC cable (2m)                          |
| 903424    | Spindle lifting lever (ISO/JIS type)    |
| 903425    | Spindle lifting lever (ANSI/AGD type)   |
| 540774    | Spindle lifting cable                   |
| 125317    | Spare rubber boot (for dust-proof type) |
| 02ACB420  | Lug-on-center back (ISO/JIS type)       |
| 02ACB430  | Lug-on-center back (ANSI/AGD type)      |
| 02ACB440  | Flat back                               |
| 02ACB610  | Back with post                          |
| 02ACB630  | Adjustable back (ISO/JIS type)          |
| 02ACB620  | Adjustable back (ANSI/AGD type)         |
| 02ACB640  | Back with offset lug                    |
| 02ACB650  | Magnetic back                           |
| 02ACB670  | Back with screw mount (ISO/JIS type)    |
| 02ACB660  | Back with screw mount (ANSI/AGD type)   |
| 02ACB680  | Back with adjustable bracket            |

### SPECIFICATIONS

#### Metric

| Resolution | Range | Order No.  |           | Accuracy | Measuring force | Mass | Remarks                  |
|------------|-------|------------|-----------|----------|-----------------|------|--------------------------|
|            |       | Back w/lug | Flat-back |          |                 |      |                          |
| 0.001mm    | 12mm  | 543-690    | 543-690B  | 0.003mm  | 2.0N or less    | 150g | ISO/JIS type             |
|            | 12mm  | 543-694    | 543-694B  |          |                 |      | ISO/JIS type, Dust-proof |
| 0.01mm     | 12mm  | 543-681    | 543-681B  | 0.02mm   | 2.0N or less    | 120g | ISO/JIS type             |

#### Inch/Metric

| Resolution      | Range        | Order No.  |           | Accuracy | Measuring force | Mass     | Remarks                   |
|-----------------|--------------|------------|-----------|----------|-----------------|----------|---------------------------|
|                 |              | Back w/lug | Flat-back |          |                 |          |                           |
| .00005"/0.001mm | .5" (12.7mm) | 543-691    | 543-691B  | .00012"  | 2.0N or less    | .33 lbs. | ISO/JIS type              |
|                 |              | 543-695    | 543-695B  |          |                 |          | ISO/JIS type, Dust-proof  |
|                 | .5" (12.7mm) | 543-692    | 543-692B  | .00012"  | 2.0N or less    | .33 lbs. | ANSI/AGD type             |
|                 |              | 543-696    | 543-696B  |          |                 |          | ANSI/AGD type, Dust-proof |
| .0001"/0.001mm  | .5" (12.7mm) | 543-693    | 543-693B  | .00012"  | 2.0N or less    | .33 lbs. | ANSI/AGD type             |
| .0005"/0.01mm   | .5" (12.7mm) | 543-682    | 543-682B  | .0008"   | 2.0N or less    | .26 lbs. | ISO/JIS type              |
|                 |              | 543-683    | 543-683B  |          |                 |          | ANSI/AGD type             |

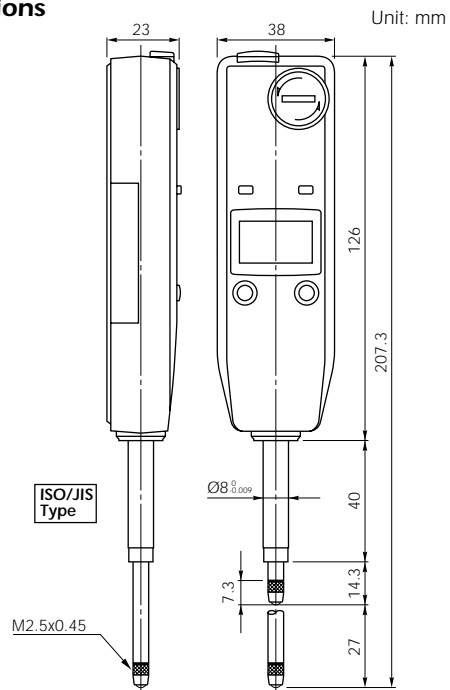
# IDU Series Digimatic Indicators

## SERIES 575

with Slim and Economical Design



### Dimensions



Note : Dimensions of the ANSI/AGD type IDU indicator partly differ from those of the ISO/JIS type IDU.

### FEATURES

- Slim type digital indicator with low price.
- Large LCD and simple key operation.
- The IDU displays the absolute position of the spindle from the origin point at power-on.
- After the initial origin setting, the IDU no longer needs absolute positioning over the entire battery life; the origin is remembered even after power-off.
- Ideal for installation into measuring devices because of its compact design and long battery life.
- The ABSOLUTE Encoder eliminates spindle over-speed error and prevents electrical noise interference errors.
- SPC data output.

### Technical Data

- Display:** LCD
- Functions:** Origin-Set, power on/off, inch/mm conversion (inch/mm type only), counting direction switching, SPC data output
- Battery:** SR44 (1 pc.) (938882)
- Battery life:** Approx. 20000 hours in continuous use
- Stem diameter:** 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
- Contact point:** Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)
- Dust/Water protection level:** Conforming to IP42
- Alarm:** Low battery voltage, scale contamination
- Operating temperature:** 0°C to 40°C

### OPTIONAL ACCESSORIES

| Order No. | Description            |
|-----------|------------------------|
| 905338    | SPC cable (1m)         |
| 905409    | SPC cable (2m)         |
| 540774    | Spindle lifting cable* |

\*Lifts the spindle up to 10mm.

### SPECIFICATIONS

#### Metric

| Resolution | Range | Order No.  |           | Accuracy | Measuring force | Mass | Remarks      |
|------------|-------|------------|-----------|----------|-----------------|------|--------------|
|            |       | Back w/lug | Flat-back |          |                 |      |              |
| 0.01mm     | 25mm  | —          | 575-121   | 0.02mm   | 1.8N or less    | 140g | ISO/JIS type |

#### Inch/Metric

| Resolution    | Range       | Order No.  |           | Accuracy | Measuring force | Mass     | Remarks       |
|---------------|-------------|------------|-----------|----------|-----------------|----------|---------------|
|               |             | Back w/lug | Flat-back |          |                 |          |               |
| .0005"/0.01mm | 1" (25.4mm) | —          | 575-122   | .0008"   | 1.8N or less    | .31 lbs. | ISO/JIS type  |
|               |             | —          | 575-123   | .0008"   | 1.8N or less    | .31 lbs. | ANSI/AGD type |

## LGD, LGD-M Linear Gages

### SERIES 575

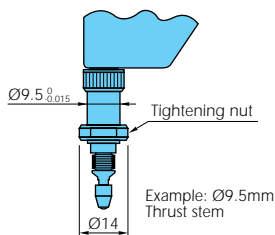
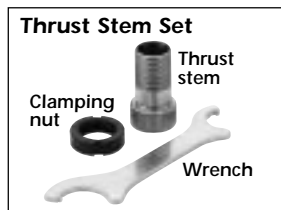
with Continuous Position Tracking



The LGD is Mitutoyo's new, ultra-compact ABS Linear Gage designed to fit into very tight spaces. It keeps track of its origin point once set. A Digimatic Display Unit or EV Counter must also be ordered for readout. (See page 28 or 246.)

#### FEATURES

- Length of SPC cable: 2m (permanently fixed)
- Digimatic Power Supply Unit is required for setting the origin point.
- Special linear2 ball bearings are used for the spindle guide to ensure a long service life (except for LGD-M).
- Optional thrust stem and tightening nut facilitate setup of the LGD linear gage in holes of the plate.



#### SPECIFICATIONS

##### Metric

| Resolution | Range | Order No. | Accuracy | IP protection level | Measuring force | Remarks                 |   |
|------------|-------|-----------|----------|---------------------|-----------------|-------------------------|---|
| 0.01mm     | 10mm  | 575-321   | 0.02mm   | IP66                | 1.2N or less    | —                       |   |
|            |       | 575-324   | 0.02mm   | IP54                | 1.2N or less    | With pneumatic cylinder |   |
|            |       | 575-325   | 0.015mm  | IP66                | 2.0N or less    | LGD-M                   |   |
|            | 25mm  | 575-322   | 0.02mm   | IP66                | 4.6N or less    | —                       |   |
|            |       | 50mm      | 575-323  | 0.03mm              | IP66            | 5.7N or less            | — |

##### Inch

| Resolution | Range | Order No. | Accuracy | IP protection level | Measuring force | IP protection level     |   |
|------------|-------|-----------|----------|---------------------|-----------------|-------------------------|---|
| .0005"     | .4"   | 575-331   | .001"    | IP66                | 1.2N or less    | —                       |   |
|            |       | 575-334   | .001"    | IP54                | 1.2N or less    | With pneumatic cylinder |   |
|            |       | 575-335   | .0006"   | IP66                | 2.0N or less    | LGD-M                   |   |
|            | 1"    | 575-332   | .001"    | IP66                | 4.6N or less    | —                       |   |
|            |       | 2"        | 575-333  | .0012"              | IP66            | 5.7N or less            | — |

The models with long signal cable (3m/118", 5m/197", 7m/276") are available.

#### Digimatic Power Supply Unit

##### 965275■

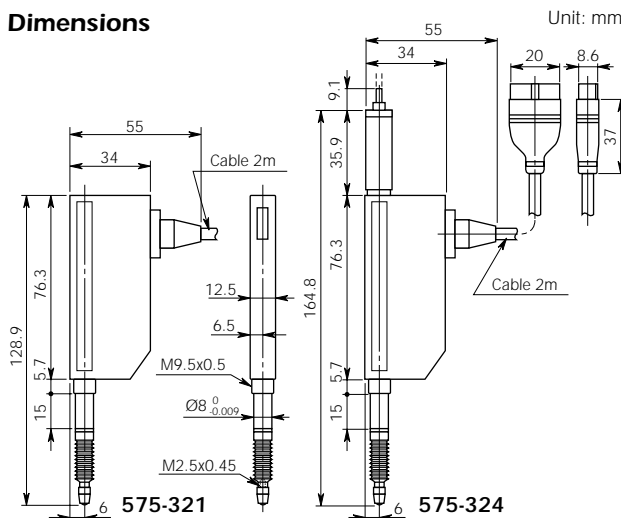
(To denote your AC line voltage fill the blank of order number with the following suffixes. **A** for 120V, **D** for 220V, **E** for 240/220V. No suffix is required for 100V.)

Optional Accessories:

- 936937 SPC cable (1m)
- 965014 SPC cable (2m)
- 937179T Foot switch



#### Dimensions



Note 1: 25mm and 50mm LGD Linear Gages have a stem of Ø15mm (Tol. +0/-0.018).

#### OPTIONAL ACCESSORIES

| Order No. | Description                               |
|-----------|---|
| 238772    | Spare rubber boot (for 10mm LGD)          |
| 02ACA376  | Spare rubber boot (for LGD-M)             |
| 962504    | Spare rubber boot (for 25mm LGD)          |
| 962505    | Spare rubber boot (for 50mm LGD)          |
| 02ADC730  | Ø9.5mm Thrust stem set (for 10mm LGD)     |
| 02ADC740  | Ø18mm Thrust stem set (for 25mm/50mm LGD) |
| 02ADF640  | Cable extension adapter                   |
| 936937    | Extension cable (1m)                      |
| 965014    | Extension cable (2m)                      |



# LGS Linear Gages

## SERIES 575

Compact and Economical Design



575-301

The LGS is Mitutoyo's new, compact Linear Gage designed to fit into tight spaces. Two versions are available offering either positive or negative readings as the spindle retracts. A Digimatic Display Unit or EV Counter must also be ordered for readout. (See page 28 or 246.)

### FEATURES

- Powered by the display unit connected via the permanently fixed SPC cable (2m).
- Maximum response speed: 1600mm/s

### OPTIONAL ACCESSORIES

| Order No. | Description             |
|-----------|-------------------------|
| 903594    | Air Drive Unit (metric) |
| 903598    | Air Drive Unit (inch)   |
| 02ADF640  | Cable extension adapter |
| 936937    | Extension cable (1m)    |
| 965014    | Extension cable (2m)    |

### SPECIFICATIONS

#### Metric

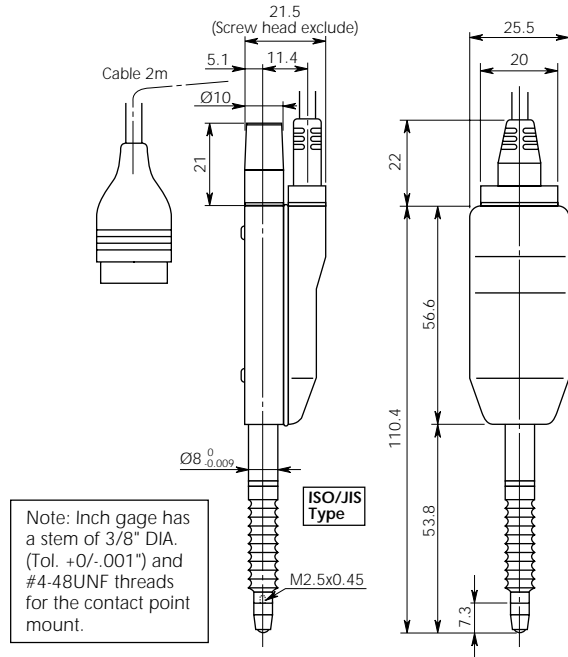
| Resolution | Range | Order No. | Accuracy | IP protection level | Measuring force | Remarks                          |
|------------|-------|-----------|----------|---------------------|-----------------|----------------------------------|
| 0.01mm     | 12mm  | 575-301   | 0.02mm   | IP66                | 1.96N or less   | ISO/JIS type                     |
|            |       | 575-302   | 0.02mm   | IP66                | 1.96N or less   | ISO/JIS type, Minus reading type |

#### Inch

| Resolution | Range | Order No. | Accuracy | IP protection level | Measuring force | Remarks                           |
|------------|-------|-----------|----------|---------------------|-----------------|-----------------------------------|
| .0005"     | .5"   | 575-311   | .001"    | IP66                | 1.96N or less   | ANSI/AGD type                     |
|            |       | 575-312   | .001"    | IP66                | 1.96N or less   | ANSI/AGD type, Minus reading type |

### Dimensions

Unit: mm



### • Digimatic Display Units (See page 28.)

Single-Function Type

Multi-Function Type

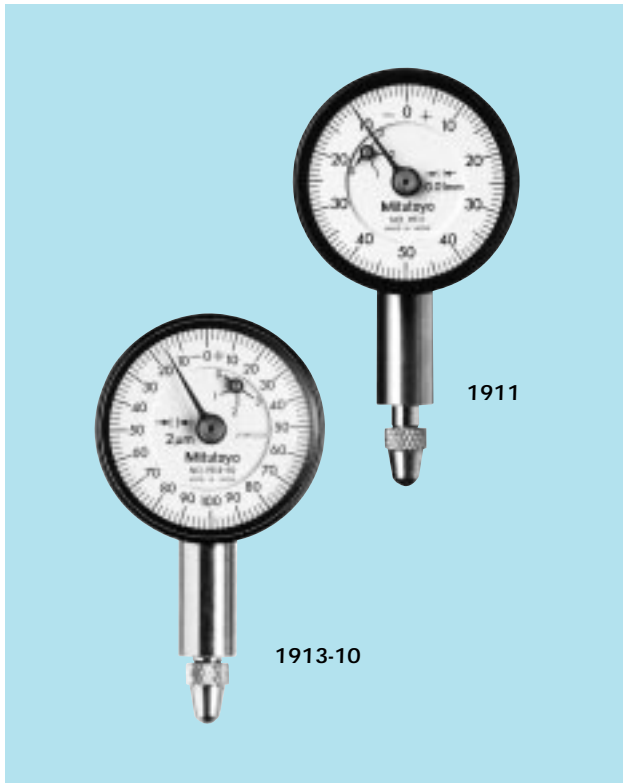
| Function           | Single-function | Multi-function |
|--------------------|-----------------|----------------|
| Zero Setting       | ○               | ○              |
| -/+ switching      | —               | ○              |
| Inch/mm conversion | △               | △              |
| Presetting         | —               | ○              |
| SPC output         | ○               | ○              |
| GO/±NG judgment    | —               | ○              |
| GO/±NG output      | —               | ○              |

○: Available, △: Available on the inch/mm type only

### • EV Counter (See page 233.)

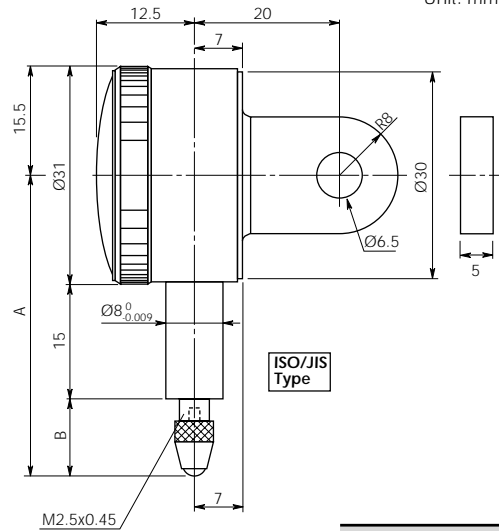
## Dial Indicators

### SERIES 0



### Dimensions

Unit: mm



| Order No. | A  | B    |
|-----------|----|------|
| 1911      | 42 | 11.5 |
| 1913-10   | 40 | 9.5  |

Mitutoyo's Series 0 dial indicators are miniature gages that are perfect for those applications where limited space prevents use of a larger-faced model.

### FEATURES

- Face diameter: 31mm
- With revolution counter.

Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.  
 Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

### SPECIFICATIONS

#### Metric ISO/JIS

| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|--------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |              |          |                 |         |
| 0.01mm     | 2.5mm | 1911      | 1911B     | 1mm                  | 0-50-0       | ±12µm    | 1.4N or less    | ☑       |
| 0.002mm    | 0.5mm | 1913-10   | 1913B-10  | 0.2mm                | 0-100-0      | ±8µm     | 1.5N or less    | ☑       |

#### Inch ANSI/AGD

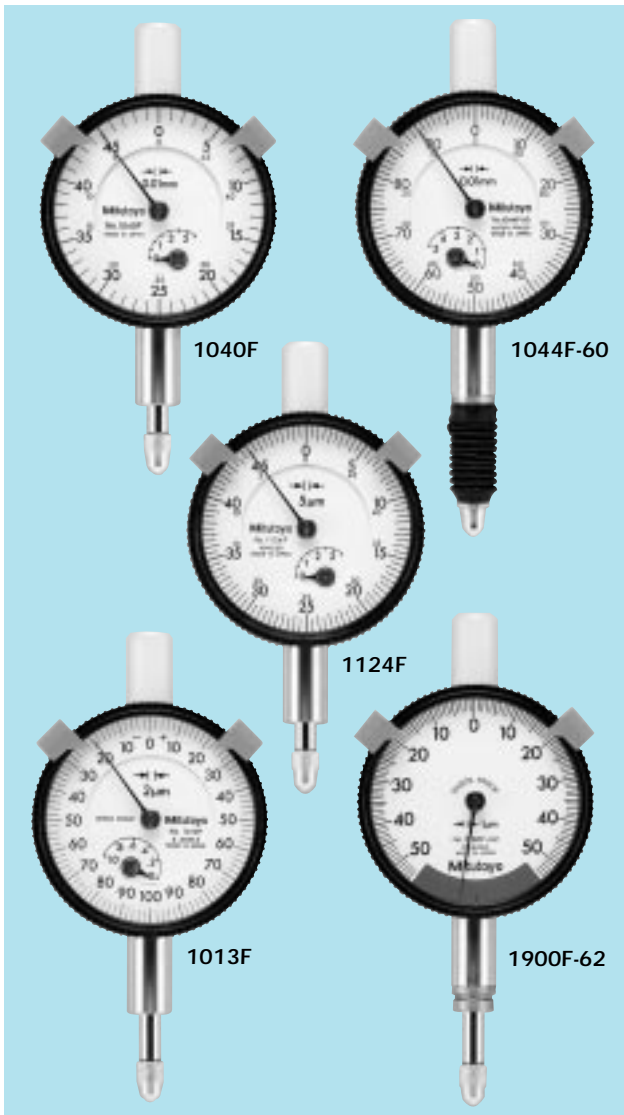
| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|--------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |              |          |                 |         |
| .001"      | .1"   | 1921      | 1921B     | .04"                 | 0-20-0       | ±.001"   | 1.4N or less    | ☑       |
| .0005"     | .05"  | 1923      | 1923B     | .02"                 | 0-10-0       | ±.0005"  | 1.4N or less    | ☑       |
| .0001"     | .01"  | 1927-10   | 1927B-10  | .004"                | 0-2-0        | ±.0001"  | 1.4N or less    | ☑       |
|            | .025" | 1925-10   | 1925B-10  | .01"                 | 0-5-0        | ±.0001"  | 1.4N or less    | ☑       |

|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
| Low Force                   |                 |                 |                 |                       |

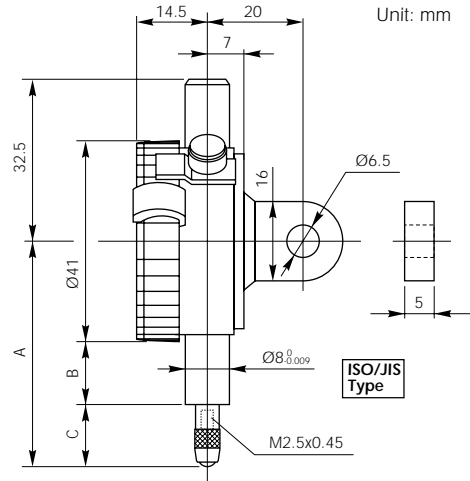


# Dial Indicators

## SERIES 1



### Dimensions



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.

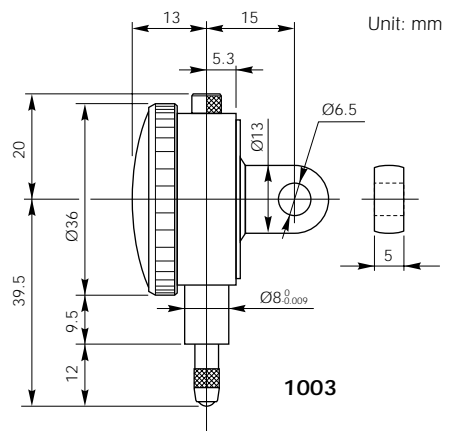
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

| Order No. | A     | B    | C    |
|-----------|-------|------|------|
| 1929F     | 47.5  | 13   | 14   |
| 1929F-60  | 55.5  | 11.5 | 23.5 |
| 1929F-62  | 437.5 | 13   | 14   |
| 1040F     | 46    | 13   | 12.5 |
| 1041F     | 46    | 13   | 12.5 |
| 1044F     | 47.5  | 13   | 14   |
| 1044F-10  | 47.5  | 13   | 14   |
| 1044F-60  | 57    | 11.5 | 25   |
| 1045F     | 47.5  | 13   | 14   |
| 1024F     | 46    | 13   | 12.5 |
| 1125F     | 46    | 13   | 12.5 |
| 1013F     | 49    | 13   | 15.5 |
| 1900F     | 53.5  | 16   | 17   |
| 1900F-60  | 54.5  | 11.5 | 22.5 |
| 1900F-62  | 53.5  | 16   | 17   |
| 1109F     | 49    | 13   | 15.5 |

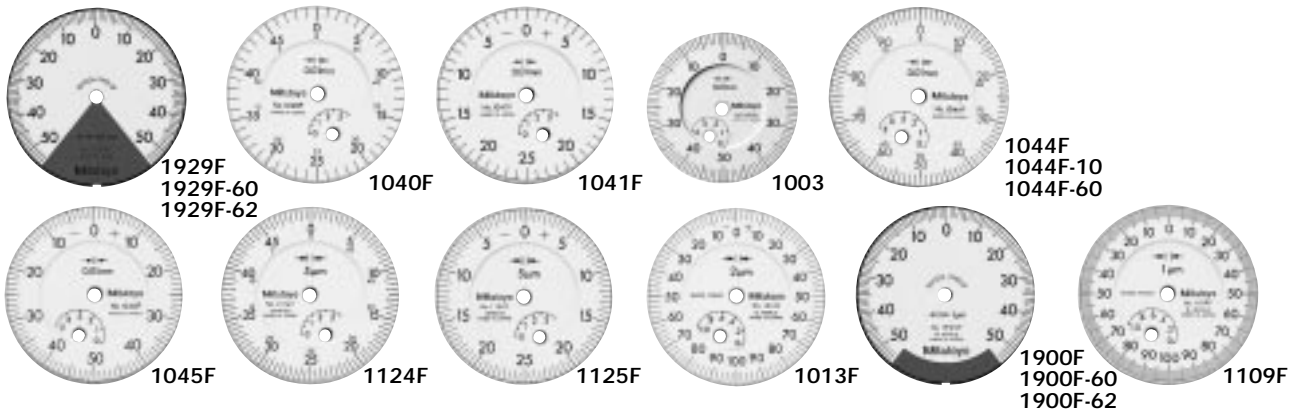
Mitutoyo's Series 1 dial indicators offer the accuracy and durability for shop applications demanding highly accurate measurements where space is limited. The spindle is made of hardened stainless steel for durability, while the rack gear is machine ground for a tighter fit and increased accuracy.

### FEATURES

- Spindle is made of hardened stainless steel.
- Gears fit tight for dependable accuracy.
- Face diameter: 41mm



|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
|                             |                 |                 | Low Force       |                       |



## SPECIFICATIONS

### Metric ISO/JIS

| Graduation | Range | Order No. |           | Range per revolution | Dial reading  | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|---------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |               |          |                 |         |
| 0.01mm     | 1mm   | 1929F     | 1929FB    | —                    | 50-0-50       | ±11μm    | 1.4N or less    |         |
|            |       | 1929F-60  | 1929FB-60 | —                    | 50-0-50       | ±11μm    | 1.4N or less    |         |
|            |       | 1929F-62  | 1929FB-62 | —                    | 50-0-50       | ±11μm    | 1.4N or less    |         |
|            | 3.5mm | 1040F     | 1040FB    | 0.5mm                | 0-50 (50-0)   | ±13μm    | 1.4N or less    |         |
|            |       | 1041F     | 1041FB    | 0.5mm                | 0-25-0        | ±13μm    | 1.4N or less    |         |
|            | 4mm   | 1003      | 1003B     | 1mm                  | 0-50-0        | ±13μm    | 1.4N or less    |         |
|            | 5mm   | 1044F     | 1044FB    | 1mm                  | 0-100 (100-0) | ±13μm    | 1.4N or less    |         |
|            |       | 1044F-10  | 1044FB-10 | 1mm                  | 0-100 (100-0) | ±13μm    | 0.4N or less    |         |
|            |       | 1044F-60  | 1044FB-60 | 1mm                  | 0-100 (100-0) | ±13μm    | 2.0N or less    |         |
|            |       | 1045F     | 1045FB    | 1mm                  | 0-50-0        | ±13μm    | 1.4N or less    |         |
| 0.005mm    | 3.5mm | 1124F     | 1124FB    | 0.5mm                | 0-50 (50-0)   | ±13μm    | 1.4N or less    |         |
| 0.002mm    | 1mm   | 1013F     | 1013FB    | 0.2mm                | 0-100-0       | ±10μm    | 1.5N or less    |         |
| 0.001mm    | 0.1mm | 1900F     | 1900FB    | —                    | 50-0-50       | ±6μm     | 1.5N or less    |         |
|            |       | 1900F-60  | 1900FB-60 | —                    | 50-0-50       | ±6μm     | 1.5N or less    |         |
|            |       | 1900F-62  | 1900FB-62 | —                    | 50-0-50       | ±6μm     | 1.5N or less    |         |
|            | 1mm   | 1109F     | 1109FB    | 0.2mm                | 0-100-0       | ±7μm     | 1.5N or less    |         |

### Inch ANSI/AGD

| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy     | Measuring force | Remarks      |
|------------|-------|-----------|-----------|----------------------|--------------|--------------|-----------------|--------------|
|            |       | Lug-back  | Flat-back |                      |              |              |                 |              |
| .001"      | .075" | 1580-10   | —         | .03"                 | 0-30         | ±.0005"      | 1.4N or less    |              |
|            |       | 1581-10   | —         | .03"                 | 0-15-0       | ±.0005"      | 1.4N or less    |              |
|            | .125" | 1780      | —         | .05"                 | 0-50         | ±.001"       | 1.4N or less    |              |
|            |       | 1781      | —         | .05"                 | 0-25-0       | ±.001"       | 1.4N or less    |              |
|            | .25"  | 1410      | 1410B     | .1"                  | 0-100        | ±.001"       | 1.4N or less    |              |
|            |       | 1411      | 1411B     | .1"                  | 0-50-0       | ±.001"       | 1.4N or less    |              |
| .0005"     | .04"  | 1909-62   | 1909B-62  | —                    | 20-0-20      | ±.0005"      | 1.4N or less    |              |
|            |       | 1570-10   | —         | .03"                 | 0-30         | ±.0005"      | 1.5N or less    |              |
|            | .075" | 1571-10   | —         | .03"                 | 0-15-0       | ±.0005"      | 1.5N or less    |              |
|            |       | 1670      | —         | .04"                 | 0-40         | ±.0005"      | 1.4N or less    |              |
|            | .1"   | 1671      | —         | .04"                 | 0-20-0       | ±.0005"      | 1.4N or less    |              |
|            |       | .125"     | 1506      | 1506B                | .05"         | 0-50         | ±.0005"         | 1.4N or less |
| 1507       | 1507B |           | .05"      | 0-25-0               | ±.0005"      | 1.4N or less |                 |              |
| .00025"    | .05"  | 1470      | —         | .02"                 | 0-20         | ±.0005"      | 1.4N or less    |              |
|            |       | 1471      | —         | .02"                 | 0-10-0       | ±.0005"      | 1.4N or less    |              |
| .0001"     | .006" | 1910-72   | 1910B-72  | —                    | 3-0-3        | ±.0001"      | 1.4N or less    |              |
|            |       | 1802-10   | 1802B-10  | .01"                 | 0-10         | ±.0002"      | 1.5N or less    |              |
|            | .025" | 1803-10   | 1803B-10  | .01"                 | 0-5-0        | ±.0002"      | 1.5N or less    |              |

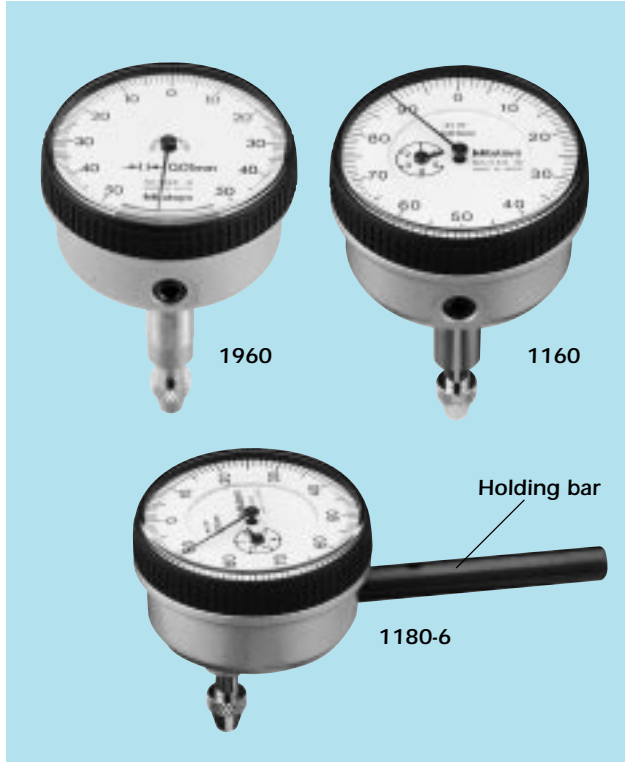
|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
|                             |                 |                 | Low Force       |                       |



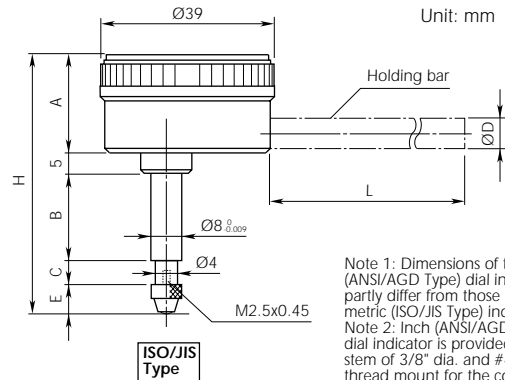
# Dial Indicators

## SERIES 1

### Back Plunger Type



### Dimensions



| Order No. | A    | B    | C   | D    | E   | H    | L  |
|-----------|------|------|-----|------|-----|------|----|
| 1960      | 21.5 | 23.7 | 4.5 | —    | 8.3 | 63   | —  |
| 1160      | 21.5 | 20   | 5.5 | —    | 8.3 | 60.3 | —  |
| 1162      | 21.5 | 20   | 5.5 | —    | 8.3 | 60.3 | —  |
| 1180-6    | 21.5 | 4.5  | 5.5 | 6    | 8.3 | 44.8 | 42 |
| 1180-7    | 21.5 | 4.5  | 5.5 | 6.35 | 8.3 | 44.8 | 42 |
| 1180-8    | 21.5 | 4.5  | 5.5 | 8    | 8.3 | 44.8 | 42 |

### OPTIONAL ACCESSORIES

| Order No. | Description                           |
|-----------|---------------------------------------|
| 136567    | Ø6mm holding bar (Length: 81mm)       |
| 21AAA166  | Ø6mm holding bar (Length: 42mm)       |
| 136568    | Ø8mm holding bar (Length: 81mm)       |
| 21AAA168  | Ø8mm holding bar (Length: 42mm)       |
| 124625    | .25" DIA. holding bar (Length: 3.19") |
| 21AAA167  | .25" DIA. holding bar (Length: 1.65") |

With its plunger on the back, Mitutoyo's back plunger dial indicator offers the flexibility of measuring in unusual set-ups. They are built to the same exacting standards that Mitutoyo requires for all its dial indicators.

### SPECIFICATIONS

#### Metric ISO/JIS

| Graduation | Range | Order No. | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks                        |
|------------|-------|-----------|----------------------|--------------|----------|-----------------|--------------------------------|
| 0.01mm     | 1mm   | 1960      | —                    | 50-0-50      | ±14µm    | 1.4N or less    | ☑ ☑                            |
|            |       | 1160      | 1mm                  | 0-100        | ±16µm    | 1.4N or less    | ☑                              |
|            | 5mm   | 1162      | 1mm                  | 100-0        | ±16µm    | 1.4N or less    | ☑ ☑                            |
|            |       | 1180-6    | 1mm                  | 0-100        | ±16µm    | 1.4N or less    | ☑ (with Ø6mm holding bar)      |
|            |       | 1180-7    | 1mm                  | 0-100        | ±16µm    | 1.4N or less    | ☑ (with .25" DIA. holding bar) |
|            |       | 1180-8    | 1mm                  | 0-100        | ±16µm    | 1.4N or less    | ☑ (with Ø8mm holding bar)      |

#### Inch ANSI/AGD

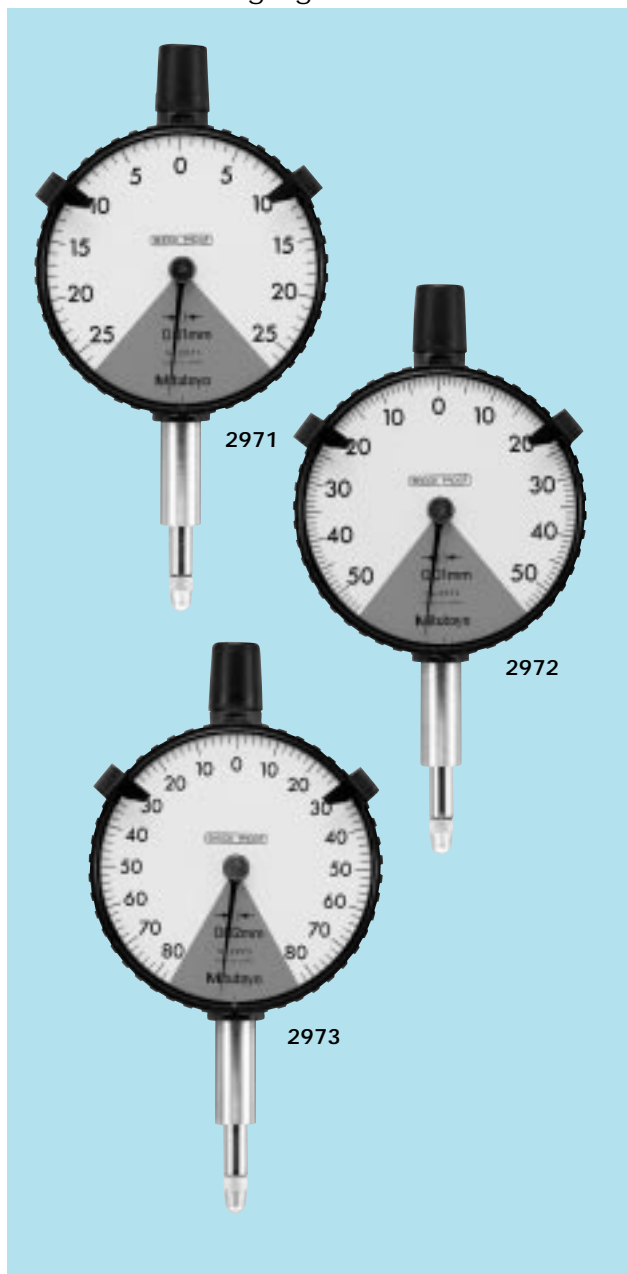
| Graduation | Range | Order No. | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks                        |   |
|------------|-------|-----------|----------------------|--------------|----------|-----------------|--------------------------------|---|
| .001"      | .04"  | 1961      | —                    | 20-0-20      | ±.001"   | 1.4N or less    | ☑ ☑                            |   |
|            |       | 1156      | .1"                  | 0-100        | ±.001"   | 2.1N or less    | ☑ (with .25" DIA. holding bar) |   |
|            | .1"   | 1157      | .1"                  | 0-50-0       | ±.001"   | 2.1N or less    | ☑ (with .25" DIA. holding bar) |   |
|            |       | .2"       | 1166                 | .05"         | 0-50     | ±.001"          | 1.4N or less                   | ☑ |
|            |       |           | 1167                 | .05"         | 0-25-0   | ±.001"          | 1.4N or less                   | ☑ |
|            |       | 1168      | .05"                 | 50-0         | ±.001"   | 1.4N or less    | ☑ ☑                            |   |

|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
| Low Force                   |                 |                 |                 |                       |

# One-Revolution Dial Indicator

## SERIES 2

for Error-free Gaging on the Production Site

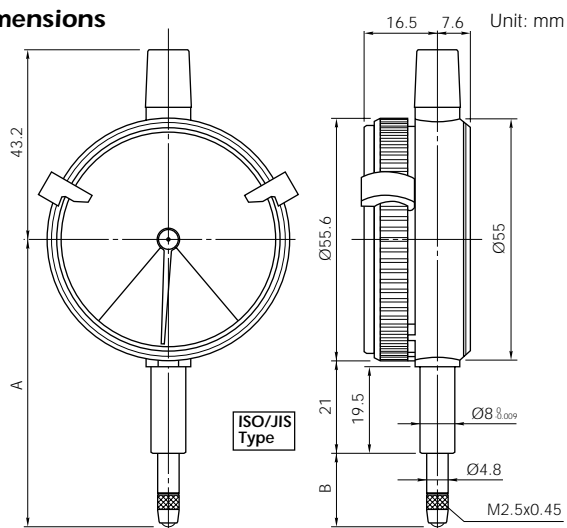


Unlike many other dial indicators, the one-revolution dial indicator literally shows the entire spindle travel or range as one sweep of the hand, eliminating the possibility of reading errors due to miscounting the multiple revolutions. With one-revolution dial indicators, "within tolerance" and "out-of-tolerance" can never be misinterpreted.

### FEATURES

- An unique shock-proof mechanism is incorporated, providing improved immunity to shock due to sudden spindle retraction caused by high impact.
- The crystal is hard coated for durability and scratch resistance.
- Approximately 40% lighter than the conventional dial indicator.
- Provided with an improved resistance to shop floor contaminants such as water and dust.
- Due to the spindle bushing being offset from the stem, spindle movement will not be hindered or jammed when clamping along the stem.
- A pair of limit hands are provided for quick and easy tolerance judgment (GO/±NG).

### Dimensions



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.  
 Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

| Order No. | A    | B    |
|-----------|------|------|
| 2971      | 65.6 | 16.8 |
| 2972      | 66.0 | 17.2 |
| 2973      | 66.3 | 17.5 |

### SPECIFICATIONS

#### Metric ISO/JIS

| Graduation | Range | Order No.  |           | Dial reading | Accuracy | Spindle travel | Mass | Remarks |
|------------|-------|------------|-----------|--------------|----------|----------------|------|---------|
|            |       | Back w/lug | Flat-back |              |          |                |      |         |
| 0.01mm     | 0.5mm | —          | 2971      | 25-0-25      | ±10µm    | 3.5mm          | 75g  | ☑ ☑ ☑   |
|            | 1mm   | —          | 2972      | 50-0-50      | ±12µm    | 3.5mm          | 75g  |         |
| 0.02mm     | 1.6mm | —          | 2973      | 80-0-80      | ±16µm    | 3.5mm          | 75g  | ☑ ☑ ☑   |

#### Inch ANSI/AGD

| Graduation | Range | Order No.  |           | Dial reading | Accuracy | Spindle travel | Mass     | Remarks |
|------------|-------|------------|-----------|--------------|----------|----------------|----------|---------|
|            |       | Back w/lug | Flat-back |              |          |                |          |         |
| .0005"     | .02"  | —          | 2976      | 10-0-10      | ±.0005"  | .14"           | .17 lbs. | ☑ ☑ ☑   |
|            | .04"  | —          | 2977      | 20-0-20      | ±.0005"  | .14"           | .17 lbs. |         |
| .001"      | .06"  | —          | 2978      | 30-0-30      | ±.001"   | .14"           | .17 lbs. | ☑ ☑ ☑   |

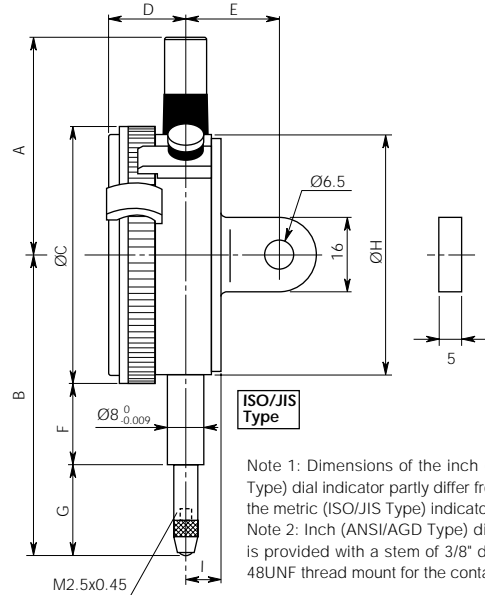
# Dial Indicators

## SERIES 2



### Dimensions

Unit: mm

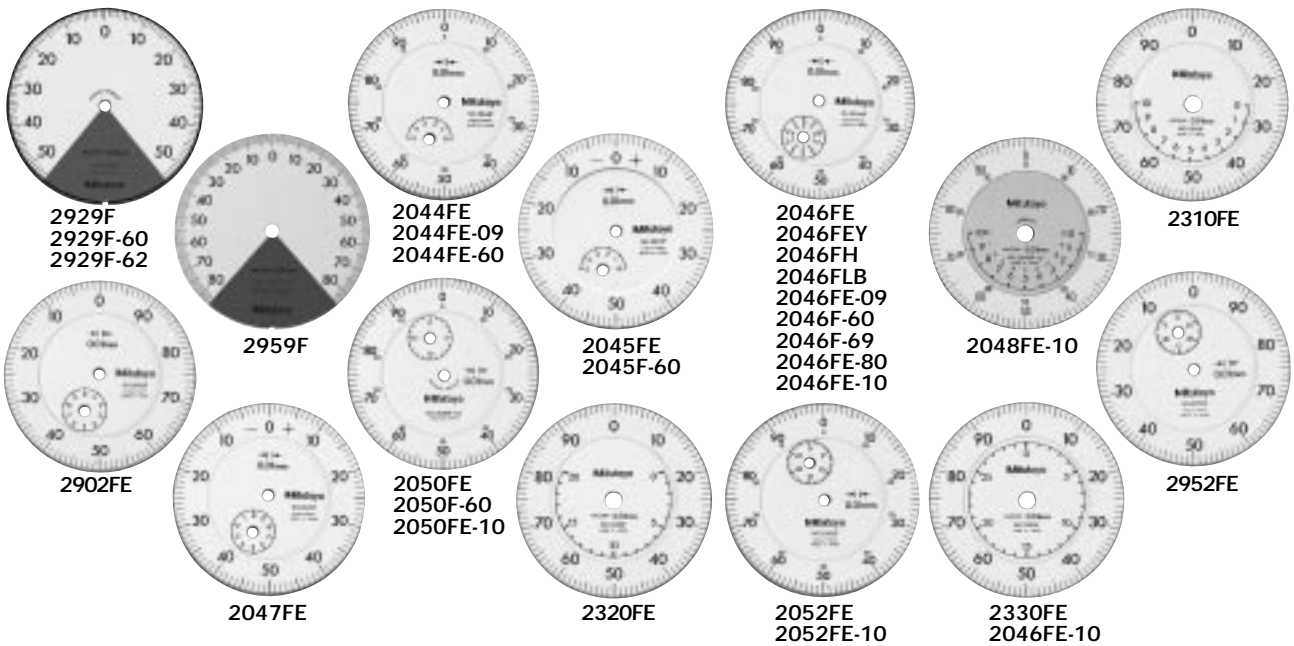


Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.  
 Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

| Order No. | A    | B    | C    | D    | E  | F    | G    | H  | I   |
|-----------|------|------|------|------|----|------|------|----|-----|
| 2929F     | 46.8 | 64.8 | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2929F-62  | 46.8 | 64.8 | 55.6 | 16   | 20 | 21   | 16   | 52 | 8   |
| 2929F-60  | 46.8 | 65.8 | 55.6 | 16   | 20 | 16.5 | 21.5 | 52 | 8   |
| 2959F     | 47   | 64.8 | 55.6 | 17   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2044FE    | 46.8 | 64.8 | 55.6 | 16.5 | 20 | 17.5 | 19.5 | 52 | 8   |
| 2044FE-09 | 46.8 | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2044F-60  | 46.8 | 66   | 55.6 | 16   | 20 | 13   | 25   | 52 | 8   |
| 2045FE    | 46.8 | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2045F-60  | 46.8 | 66   | 55.6 | 16   | 20 | 13   | 25   | 52 | 8   |
| 2046FE    | 46.8 | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2046FH    | 46.8 | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2046FLB   | 46.8 | 84.8 | 55.6 | 16   | —  | 37.5 | 19.5 | 52 | 8   |
| 2046FE-09 | 46.8 | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2046F-60  | 46.8 | 69.5 | 55.6 | 16   | 20 | 13   | 28.7 | 52 | 8   |
| 2046F-69  | 46.8 | 69.5 | 55.6 | 16   | 20 | 13   | 28.7 | 52 | 8   |
| 2046FE-80 | 59   | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2046E-10  | 49   | 65   | 58   | 15   | 20 | 16.5 | 19.5 | 52 | 8   |
| 2048E-10  | 47   | 65   | 58   | 15   | 20 | 16.5 | 19.5 | 52 | 8   |
| 2310FE    | 46.8 | 65   | 55.6 | 16.5 | 20 | 17.5 | 19.5 | 52 | 8   |
| 2902FE    | 46.8 | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2047FE    | 46.8 | 65   | 55.6 | 16   | 20 | 17.5 | 19.5 | 52 | 8   |
| 2050FE    | 40   | 75   | 55.6 | 16   | 20 | 17.5 | 29.8 | 52 | 8   |
| 2050F-60  | 57.8 | 86   | 55.6 | 16   | 20 | 13   | 44   | 52 | 8   |
| 2050E-10  | 37   | 75   | 58   | 15   | 20 | 16.5 | 30   | 52 | 8   |
| 2320FE    | 40   | 75   | 55.6 | 16.5 | 20 | 17.5 | 29.8 | 52 | 8   |
| 2052FE    | 40   | 88.3 | 55.6 | 16.5 | 20 | 17.5 | 43   | 52 | 7.6 |
| 2052E-10  | 37   | 88.5 | 58   | 15   | 20 | 16.5 | 43   | 52 | 8   |
| 2330FE    | 40   | 88.3 | 55.6 | 17   | 20 | 17.5 | 43   | 52 | 7.6 |
| 2952FE    | 40   | 88.3 | 55.6 | 16.5 | 20 | 17.5 | 43   | 52 | 7.6 |

Series 2 dial indicators are Mitutoyo's most popular, and have the widest application. Especially the "one revolution" dial indicator is developed for in-process measuring. This indicator features a hand that makes only one revolution throughout the entire spindle range. This prevents costly measuring errors made with indicators whose hands make as many as 2 - 1/2 revolutions.

- High Precision Type
- Reverse Reading
- Balanced Dial
- Continuous Dial
- One Revolution
- Damper at Lowest Rest Point
- Shockproof
- Adjustable Hand
- Waterproof
- Doubled Scale Spacing
- Coaxial Revolution Counter
- Peak Retaining
- Long Stem
- Dustproof
- Jeweled
- Low Force



### SPECIFICATIONS

**Metric** ISO/JIS

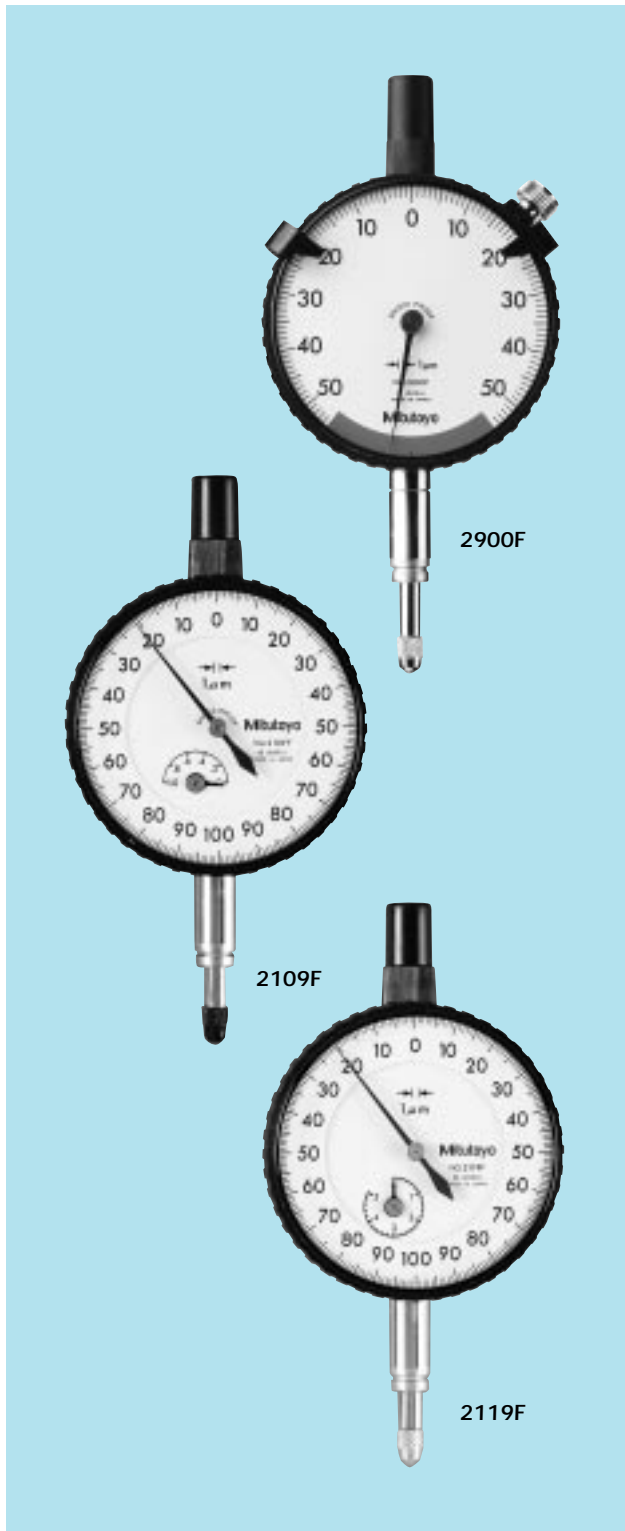
| Graduation | Range     | Order No.  |            | Range per revolution | Dial reading  | Accuracy      | Measuring force | Remarks      |  |
|------------|-----------|------------|------------|----------------------|---------------|---------------|-----------------|--------------|--|
|            |           | Lug-back   | Flat-back  |                      |               |               |                 |              |  |
| 0.01mm     | 1mm       | 2929F      | 2929FB     | —                    | 50-0-50       | ±10µm         | 1.4N or less    |              |  |
|            |           | 2929F-60   | 2929FB-60  | —                    | 50-0-50       | ±10µm         | 1.4N or less    |              |  |
|            |           | 2929F-62   | 2929FB-62  | —                    | 50-0-50       | ±10µm         | 1.4N or less    |              |  |
|            | 1.6mm     | 2959F      | 2959FB     | —                    | 80-0-80       | ±14µm         | 1.4N or less    |              |  |
|            | 5mm       | 2044FE     | 2044FEB    | 1mm                  | 0-100 (100-0) | ±12µm         | 1.4N or less    |              |  |
|            |           | 2044FE-09  | 2044FEB-09 | 1mm                  | 0-100 (100-0) | ±13µm         | 1.4N or less    |              |  |
|            |           | 2044F-60   | 2044FB-60  | 1mm                  | 0-100 (100-0) | ±12µm         | 1.4N or less    |              |  |
|            |           | 2045FE     | 2045FEB    | 1mm                  | 0-50-0        | ±12µm         | 1.4N or less    |              |  |
|            |           | 2045F-60   | 2045FB-60  | 1mm                  | 0-50-0        | ±12µm         | 1.4N or less    |              |  |
|            |           | 10mm       | 2046FE     | 2046FEB              | 1mm           | 0-100 (100-0) | ±13µm           | 1.4N or less |  |
|            |           |            | 2046FEY    | 2046FEYB             | 1mm           | 0-100 (100-0) | ±13µm           | 1.4N or less |  |
|            |           |            | 2046FH     | 2046FHB              | 1mm           | 0-100 (100-0) | ±8µm            | 1.4N or less |  |
|            |           |            | —          | 2046FLB              | 1mm           | 0-100 (100-0) | ±13µm           | 1.4N or less |  |
|            |           |            | 2046FE-09  | 2046FEB-09           | 1mm           | 0-100 (100-0) | ±15µm           | 1.4N or less |  |
|            | 2046F-60  |            | 2046FB-60  | 1mm                  | 0-100 (100-0) | ±13µm         | 2.5N or less    |              |  |
|            | 2046F-69  |            | 2046FB-69  | 1mm                  | 0-100 (100-0) | ±15µm         | 2.5N or less    |              |  |
|            | 2046FE-80 |            | 2046FEB-80 | 1mm                  | 0-100 (100-0) | ±15µm         | 5.0N            |              |  |
|            | 20mm      | 30mm       | 2046FE-10  | 2046FEB-10           | 1mm           | 0-100 (100-0) | ±15µm           | 0.8N or less |  |
|            |           |            | 2048FE-10  | 2048FEB-10           | 1mm           | 0-100 (100-0) | ±15µm           | 1.4N or less |  |
|            |           | 2310FE     | 2310FEB    | 1mm                  | 0-100         | ±15µm         | 1.4N or less    |              |  |
| 2902FE     |           | 2902FEB    | 1mm        | 100-0                | ±13µm         | 1.4N or less  |                 |              |  |
| 2047FE     |           | 2047FEB    | 1mm        | 0-50-0               | ±13µm         | 1.4N or less  |                 |              |  |
| 2050FE     |           | 2050FEB    | 1mm        | 0-100 (100-0)        | ±20µm         | 2.0N or less  |                 |              |  |
| 2050F-60   |           | 2050FB-60  | 1mm        | 0-100 (100-0)        | ±20µm         | 2.2N or less  |                 |              |  |
| 2050FE-10  |           | 2050FEB-10 | 1mm        | 0-100 (100-0)        | ±20µm         | 2.0N or less  |                 |              |  |
| 2320FE     |           | 2320FEB    | 1mm        | 0-100                | ±20µm         | 2.0N or less  |                 |              |  |
| 30mm       |           | 2052FE     | 2052FEB    | 1mm                  | 0-100 (100-0) | ±25µm         | 2.5N or less    |              |  |
|            | 2052FE-10 | 2052FEB-10 | 1mm        | 0-100 (100-0)        | ±25µm         | 2.2N or less  |                 |              |  |
|            | 2330FE    | 2330FEB    | 1mm        | 0-100                | ±25µm         | 2.5N or less  |                 |              |  |
|            | 2952FE    | 2952FEB    | 1mm        | 100-0                | ±25µm         | 2.5N or less  |                 |              |  |

|                            |                 |                 |                 |                       |
|----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type        | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damped Hand                | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
| Low Force                  |                 |                 |                 |                       |



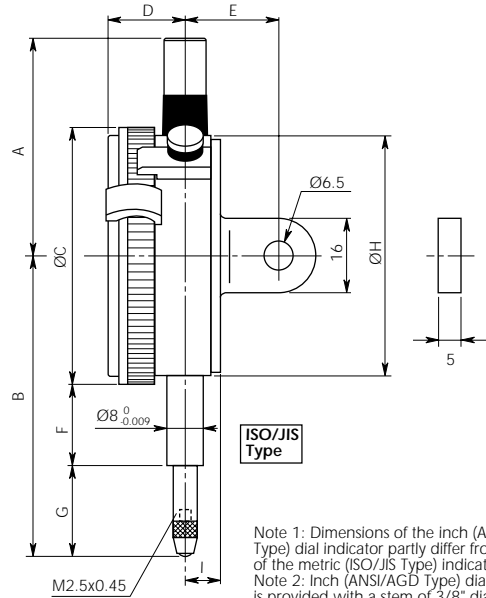
# Dial Indicators

## SERIES 2



### Dimensions

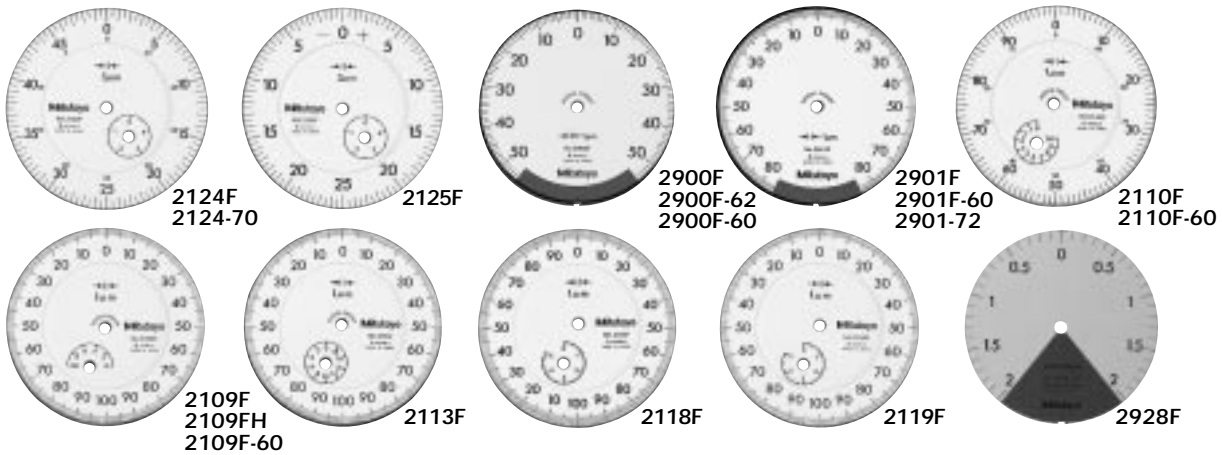
Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.  
 Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

| Order No. | A    | B    | C    | D    | E  | F    | G    | H  | I |
|-----------|------|------|------|------|----|------|------|----|---|
| 2124F     | 46.8 | 60   | 55.6 | 16.5 | 20 | 17.5 | 15   | 52 | 8 |
| 2124-70   | 45.5 | 67   | 58   | 18   | 20 | 14   | 24   | 54 | 9 |
| 2125F     | 46.8 | 60   | 55.6 | 16.5 | 20 | 17.5 | 15   | 52 | 8 |
| 2900F     | 46.8 | 65.8 | 55.6 | 16.5 | 20 | 21   | 17   | 52 | 8 |
| 2900F-62  | 46.8 | 65.8 | 55.6 | 16.5 | 20 | 21   | 17   | 52 | 8 |
| 2900F-60  | 46.8 | 66.8 | 55.6 | 16.5 | 20 | 16.5 | 22.5 | 52 | 8 |
| 2901F     | 46.8 | 65.8 | 55.6 | 16.5 | 20 | 21   | 17   | 52 | 8 |
| 2901-72   | 42   | 66   | 58   | 18   | 20 | 20   | 17   | 54 | 9 |
| 2110F     | 46.8 | 66.5 | 55.6 | 16.5 | 20 | 17.5 | 21.2 | 52 | 8 |
| 2110F-60  | 46.8 | 67.5 | 55.6 | 16.5 | 20 | 13   | 26.7 | 52 | 8 |
| 2109F     | 46.8 | 60.3 | 55.6 | 16.5 | 20 | 17.5 | 15   | 52 | 8 |
| 2109FH    | 46.8 | 60.3 | 55.6 | 16.5 | 20 | 17.5 | 15   | 52 | 8 |
| 2109FLB   | 46.8 | 80   | 55.6 | 16.5 | —  | 37.2 | 15   | 52 | 8 |
| 2109F-60  | 46.8 | 65.2 | 55.6 | 16.5 | 20 | 13   | 24.5 | 52 | 8 |
| 2113F     | 46.8 | 60.8 | 55.6 | 16.5 | 20 | 17.5 | 15.5 | 52 | 8 |
| 2118F     | 46.8 | 60   | 55.6 | 16.5 | 20 | 17.5 | 15   | 52 | 8 |
| 2119F     | 46.8 | 60   | 55.6 | 16.5 | 20 | 17.5 | 15   | 52 | 8 |
| 2928-62   | 46   | 68   | 58   | 18   | 20 | 20   | 19   | 54 | 9 |

|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
| Low Force                   |                 |                 |                 |                       |



## SPECIFICATIONS

### Metric ISO/JIS

| Graduation | Range    | Order No. |           | Range per revolution | Dial reading  | Accuracy     | Measuring force | Remarks |
|------------|----------|-----------|-----------|----------------------|---------------|--------------|-----------------|---------|
|            |          | Lug-back  | Flat-back |                      |               |              |                 |         |
| 0.005mm    | 5mm      | 2124F     | 2124FB    | 0.5mm                | 0-50 (50-0)   | ±12µm        | 1.5N or less    |         |
|            |          | 2124-70   | 2124B-70  | 0.5mm                | 0-50 (50-0)   | ±15µm        | 1.5N or less    |         |
| 0.001mm    | 0.1mm    | 2900F     | 2900FB    | —                    | 50-0-50       | ±3.5µm       | 1.4N or less    |         |
|            |          | 2900F-60  | 2900FB-60 | —                    | 50-0-50       | ±3.5µm       | 1.4N or less    |         |
|            |          | 2900F-62  | 2900FB-62 | —                    | 50-0-50       | ±3.5µm       | 1.4N or less    |         |
|            | 0.16mm   | 2901F     | 2901FB    | —                    | 80-0-80       | ±5µm         | 1.4N or less    |         |
|            |          | 2901F-60  | 2901FB-60 | —                    | 80-0-80       | ±5µm         | 1.5N or less    |         |
|            |          | 2901-72   | 2901B-72  | —                    | 80-0-80       | ±5µm         | 1.5N or less    |         |
|            | 1mm      | 2110F     | 2110FB    | 0.1mm                | 0-100 (100-0) | ±5µm         | 1.5N or less    |         |
|            |          | 2110F-60  | 2110FB-60 | 0.1mm                | 0-100 (100-0) | ±5µm         | 1.5N or less    |         |
|            |          | 2109F     | 2109FB    | 0.2mm                | 0-100-0       | ±5µm         | 1.5N or less    |         |
|            |          | 2109FH    | 2109FHB   | 0.2mm                | 0-100-0       | ±3µm         | 1.5N or less    |         |
| —          |          | 2109FLB   | 0.2mm     | 0-100-0              | ±5µm          | 1.5N or less |                 |         |
| 2mm        | 2109F-60 | 2109FB-60 | 0.2mm     | 0-100-0              | ±5µm          | 2.0N or less |                 |         |
|            | 2113F    | 2113FB    | 0.2mm     | 0-100-0              | ±7µm          | 1.5N or less |                 |         |
| 5mm        | 2118F    | 2118FB    | 0.2mm     | 0-100-100            | ±10µm         | 1.5N or less |                 |         |
|            | 2119F    | 2119FB    | 0.2mm     | 0-100-0              | ±10µm         | 1.5N or less |                 |         |
|            | 2928F    | 2928FB    | —         | 2-0-2                | ±40µm         | 1.4N or less |                 |         |

### Inch ANSI/AGD

| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|--------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |              |          |                 |         |
| .01"       | 1"    | 2204F     | 2204FB    | 1"                   | 0-1000       | ±.005"   | 2.0N or less    |         |
| .001"      | .08"  | 2945-40   | 2945B-40  | —                    | 40-0-40      | ±.001"   | 1.4N or less    |         |
|            |       | 2908-62   | 2908B-62  | —                    | 40-0-40      | ±.001"   | 1.4N or less    |         |
|            | .125" | 2780F     | 2780FB    | .05"                 | 0-50         | ±.001"   | 1.5N or less    |         |
|            |       | 2781F     | 2781FB    | .05"                 | 0-25-0       | ±.001"   | 1.5N or less    |         |
|            | .25"  | 2410F     | 2410FB    | .1"                  | 0-100        | ±.001"   | 1.5N or less    |         |
|            |       | 2410F-10  | 2410FB-10 | .1"                  | 0-100        | ±.001"   | 1.5N or less    |         |
|            |       | 2410F-60  | 2410FB-60 | .1"                  | 0-100        | ±.001"   | 1.5N or less    |         |
|            |       | 2919F-10  | 2919FB-10 | .1"                  | 0-100        | ±.001"   | 1.5N or less    |         |
|            |       | 2411F     | 2411FB    | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |         |
|            |       | 2411F-10  | 2411FB-10 | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |         |
|            |       | 2411F-60  | 2411FB-60 | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |         |
|            |       | 2920F-10  | 2920FB-10 | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |         |

|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
|                             |                 |                 | Low Force       |                       |



SPECIFICATIONS

Inch ANSI/AGD

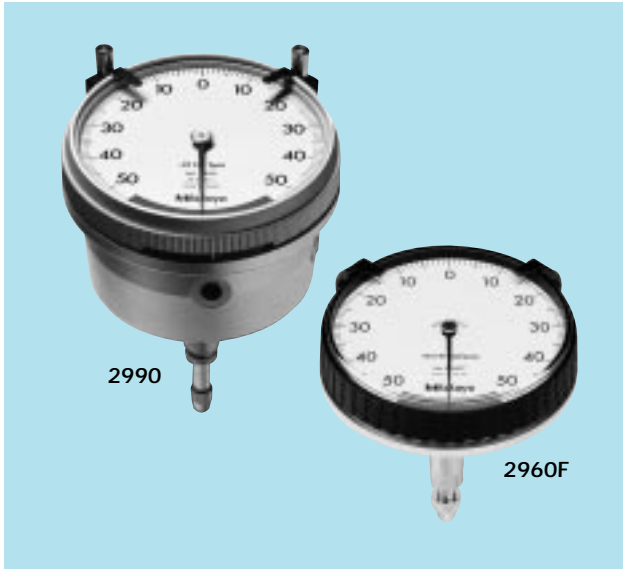
| Graduation | Range    | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks      |  |
|------------|----------|-----------|-----------|----------------------|--------------|----------|-----------------|--------------|--|
|            |          | Lug-back  | Flat-back |                      |              |          |                 |              |  |
| .001"      | .4"      | 2412F     | 2412FB    | .1"                  | 0-100        | ±.001"   | 1.5N or less    |              |  |
|            |          | 2412-80   | —         | .1"                  | 0-100        | ±.001"   | 5.0N or less    |              |  |
|            |          | 2903F     | 2903FB    | .1"                  | 100-0        | ±.001"   | 1.5N or less    |              |  |
|            |          | 2413F     | 2413FB    | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |              |  |
|            | .5"      | 2414F     | —         | .1"                  | 0-100        | ±.001"   | 1.5N or less    |              |  |
|            |          | 2414F-10  | 2414FB-10 | .1"                  | 0-100        | ±.001"   | 1.5N or less    |              |  |
|            |          | 2915F-10  | 2915FB-10 | .1"                  | 0-100        | ±.001"   | 1.5N or less    |              |  |
|            |          | 2415F     | 2415FB    | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |              |  |
|            |          | 2415F-10  | 2415FB-10 | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |              |  |
|            |          | 2415F-60  | 2415FB-60 | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |              |  |
|            |          | 2918F-10  | 2918FB-10 | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    |              |  |
|            |          | 1"        | 2416F     | 2416FB               | .1"          | 0-100    | ±.002"          | 2.0N or less |  |
|            |          |           | 2416F-10  | 2416FB-10            | .1"          | 0-100    | ±.002"          | 2.0N or less |  |
|            |          |           | 2904F     | 2904FB               | .1"          | 100-0    | ±.002"          | 2.0N or less |  |
|            | 2417F    |           | 2417FB    | .1"                  | 0-50-0       | ±.002"   | 2.0N or less    |              |  |
|            | .0005"   | .04"      | 2424-10   | 2424B-10             | .1"          | 0-100    | ±.003"          | 2.5N or less |  |
|            |          |           | 2909-62   | 2909B-62             | —            | 20-0-20  | ±.0005"         | 1.4N or less |  |
|            |          | .075"     | 2570F     | 2570FB               | .03"         | 0-30     | ±.0005"         | 1.5N or less |  |
|            |          |           | 2570F-60  | 2570FB-60            | .03"         | 0-30     | ±.0005"         | 1.5N or less |  |
|            |          |           | 2571F     | 2571FB               | .03"         | 0-15-0   | ±.0005"         | 1.5N or less |  |
| 2571F-60   |          |           | 2571FB-60 | .03"                 | 0-15-0       | ±.0005"  | 1.5N or less    |              |  |
| .1"        |          | 2670F     | 2670FB    | .04"                 | 0-40         | ±.0005"  | 1.5N or less    |              |  |
|            |          | 2670F-10  | 2670FB-10 | .04"                 | 0-40         | ±.0005"  | 1.5N or less    |              |  |
|            |          | 2671F     | 2671FB    | .04"                 | 0-20-0       | ±.0005"  | 1.5N or less    |              |  |
| .125"      |          | 2506F     | 2506FB    | .05"                 | 0-50         | ±.0005"  | 1.5N or less    |              |  |
|            |          | 2906F     | 2906FB    | .05"                 | 50-0         | ±.0005"  | 1.5N or less    |              |  |
|            |          | 2507F     | 2507FB    | .05"                 | 0-25-0       | ±.0005"  | 1.5N or less    |              |  |
|            |          | 2922F     | 2922FB    | .05"                 | 0-25-0       | ±.0005"  | 1.5N or less    |              |  |
| .4"        |          | 2675-08   | 2675B-08  | .04"                 | 0-20-0       | ±.001"   | 1.5N or less    |              |  |
|            |          | 2514F     | 2514FB    | .05"                 | 0-50         | ±.002"   | 1.5N or less    |              |  |
| .5"        |          | 2776F     | 2776FB    | .05"                 | 0-50         | ±.003"   | 1.5N or less    |              |  |
|            |          | .00025"   | 2470-50   | —                    | .02"         | 0-20     | ±.0005"         | 1.5N or less |  |
| 2471-50    |          |           | —         | .02"                 | 0-10-0       | ±.0005"  | 1.5N or less    |              |  |
| .0001"     |          | .008"     | 2947F-10  | 2947FB-10            | —            | 4-0-4    | ±.0001"         | 1.5N or less |  |
|            |          |           | 2910-72   | 2910B-72             | —            | 4-0-4    | ±.0001"         | 1.4N or less |  |
|            | .02"     | 2938F-10  | 2938FB-10 | .008"                | 0-8          | ±.0001"  | 1.5N or less    |              |  |
|            |          | 2937F-10  | 2937FB-10 | .008"                | 0-4-0        | ±.0001"  | 1.5N or less    |              |  |
|            |          | .025"     | 2802F-10  | 2802FB-10            | .01"         | 0-10     | ±.0002"         | 1.5N or less |  |
|            | 2802F-60 |           | 2802FB-60 | .01"                 | 0-10         | ±.0002"  | 1.5N or less    |              |  |
|            | 2803F-10 |           | 2803FB-10 | .01"                 | 0-5-0        | ±.0002"  | 1.5N or less    |              |  |
|            | 2803-70  |           | —         | .01"                 | 0-5-0        | ±.0002"  | 1.5N or less    |              |  |
|            | .05"     | 2804F-10  | 2804FB-10 | .01"                 | 0-10         | ±.0002"  | 1.5N or less    |              |  |
|            |          | 2905F-10  | 2905FB-10 | .01"                 | 10-0         | ±.0002"  | 1.5N or less    |              |  |
|            |          | 2805F-10  | 2805FB-10 | .01"                 | 0-5-0        | ±.0002"  | 1.5N or less    |              |  |
|            |          | 2805-80   | —         | .01"                 | 0-5-0        | ±.0002"  | 5.0N or less    |              |  |
|            |          | 2923F-10  | 2923FB-10 | .01"                 | 0-5-0        | ±.0002"  | 1.5N or less    |              |  |
|            | .25"     | 2356-50   | —         | .01"                 | 0-10         | ±.0002"  | 1.5N or less    |              |  |
|            |          | 2358-50   | —         | .01"                 | 0-10         | ±.0002"  | 1.5N or less    |              |  |

- High Precision Type
- Reverse Reading
- Balanced Dial
- Continuous Dial
- One Revolution
- Damper at Lowest Rest Point
- Shockproof
- Adjustable Hand
- Waterproof
- Doubled Scale Spacing
- Coaxial Revolution Counter
- Peak Retaining
- Long Stem
- Dustproof
- Jeweled
- Low Force

# Dial Indicators

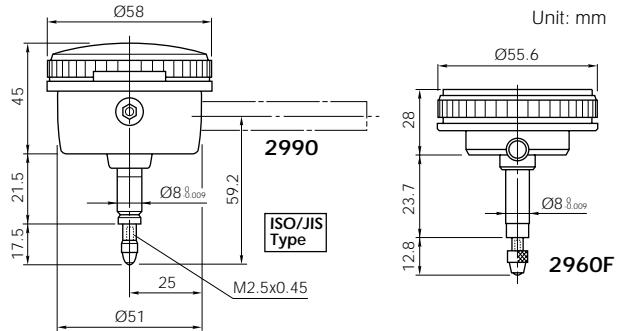
## SERIES 2

### Back Plunger Type



Mitutoyo's back plunger type dial indicators are built with the measuring spindles on the back of the units. This type of indicator offers the same precision and durability as all other Mitutoyo dial indicators, and operates very effectively with optional holding bars (See page 178).

### Dimensions



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.  
 Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

### SPECIFICATIONS

#### Metric ISO/JIS

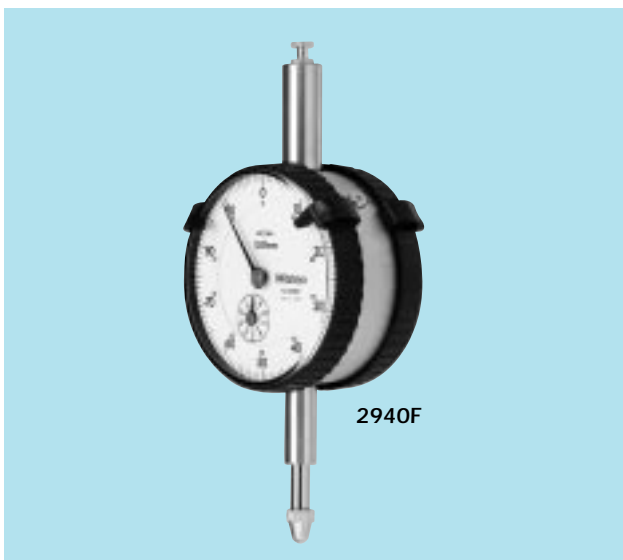
| Graduation | Range | Order No. | Dial reading | Accuracy | Spindle travel | Measuring force | Mass | Remarks |
|------------|-------|-----------|--------------|----------|----------------|-----------------|------|---------|
| 0.001mm    | 0.1mm | 2990      | 50-0-50      | ±6.5µm   | 4mm            | 1.5N or less    | 220g | ☑ ☑ ☑   |
| 0.01mm     | 1mm   | 2960F     | 50-0-50      | ±14µm    | 4.5mm          | 1.4N or less    | 115g | ☑ ☑ ☑   |

#### Inch ANSI/AGD

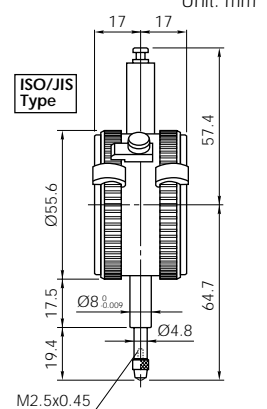
| Graduation | Range | Order No. | Dial reading | Accuracy | Spindle travel | Measuring force | Mass     | Remarks |
|------------|-------|-----------|--------------|----------|----------------|-----------------|----------|---------|
| .0001"     | .008" | 2991      | 4-0-4        | .0002"   | .15"           | 1.5N or less    | .24 lbs. | ☑ ☑ ☑   |
| .0005"     | .04"  | 2961      | 20-0-20      | ±.0005"  | .12"           | 1.4N or less    | .48 lbs. | ☑ ☑ ☑   |

# Double-Face Dial Indicator

## SERIES 2



### Dimensions



### FEATURES

- Specially designed dial indicator that allows the inspector to read measurements from both back and front sides.
- Dial reading: 0-100
- Measuring force: 3.0N or less

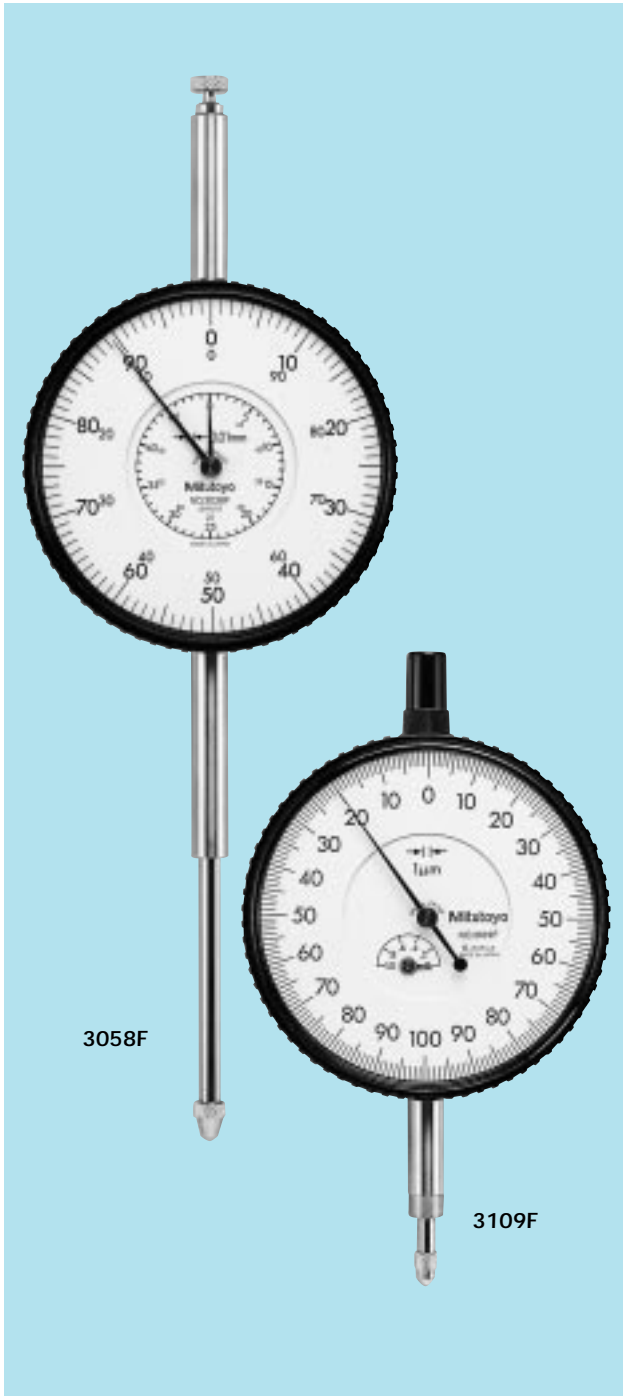
### SPECIFICATIONS

#### Metric ISO/JIS

| Graduation | Range | Order No. | Accuracy | Mass |
|------------|-------|-----------|----------|------|
| 0.01mm     | 10mm  | 2940F     | ±15µm    | 260g |

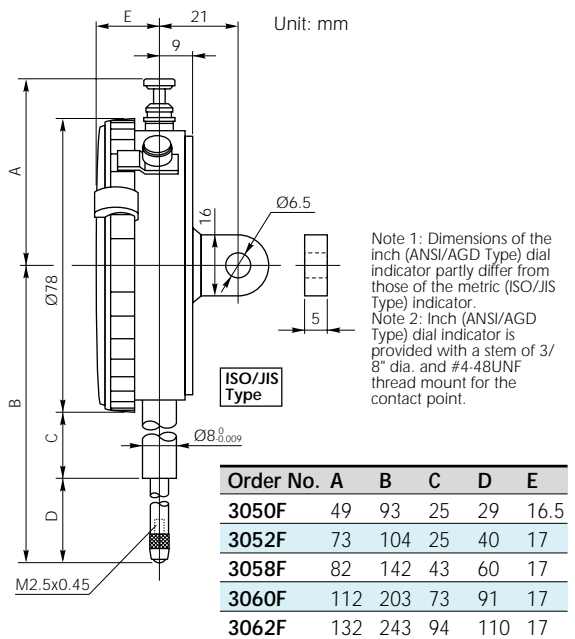
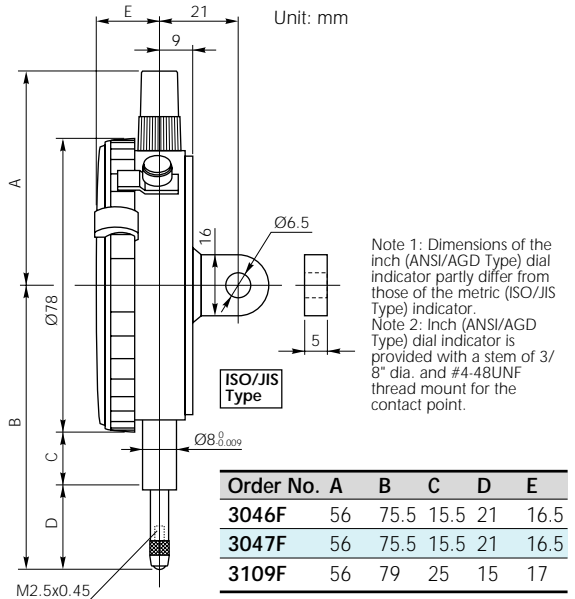
# Dial Indicators

## SERIES 3



Mitutoyo's Series 3 dial indicators are recommended for larger gaging distance or those applications where a larger dial face is required for improved dial visibility and readability. They offer excellent accuracy and repeatability over longer measuring distances for operations such as turning and drilling.

### Dimensions



|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
|                             | Low Force       |                 |                 |                       |



3046F



3047F



3050F



3052F



3058F



3060F



3062F



3109F

## SPECIFICATIONS

### Metric ISO/JIS

| Graduation | Range | Order No. |           | Range per revolution | Dial reading  | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|---------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |               |          |                 |         |
| 0.01mm     | 10mm  | 3046F     | 3046FB    | 1mm                  | 0-100 (100-0) | ±15μm    | 1.4N or less    |         |
|            |       | 3047F     | 3047FB    | 1mm                  | 0-50-0        | ±15μm    | 1.4N or less    |         |
|            | 20mm  | 3050F     | 3050FB    | 1mm                  | 0-100 (100-0) | ±20μm    | 2.0N or less    |         |
|            | 30mm  | 3052F     | 3052FB    | 1mm                  | 0-100 (100-0) | ±25μm    | 2.5N or less    |         |
|            | 50mm  | 3058F*    | 3058FB*   | 1mm                  | 0-100 (100-0) | ±35μm    | 3.0N or less    |         |
|            | 80mm  | 3060F*    | 3060FB*   | 1mm                  | 0-100 (100-0) | ±45μm    | 3.0N or less    |         |
|            | 100mm | 3062F*    | 3062FB*   | 1mm                  | 0-100 (100-0) | ±50μm    | 3.2N or less    |         |
| 0.001mm    | 1mm   | 3109F     | 3109FB    | 0.2mm                | 0-100-0       | ±6μm     | 1.5N or less    |         |

\*Use the gage in a vertical position only.

### Inch ANSI/AGD

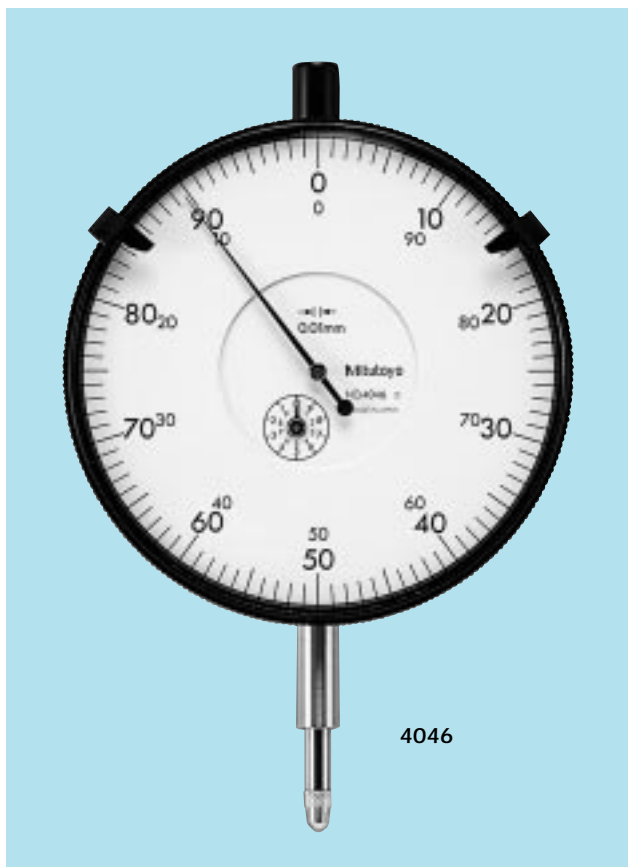
| Graduation | Range  | Order No. |           | Range per revolution | Dial reading  | Accuracy | Measuring force | Remarks      |  |
|------------|--------|-----------|-----------|----------------------|---------------|----------|-----------------|--------------|--|
|            |        | Lug-back  | Flat-back |                      |               |          |                 |              |  |
| .001"      | .125"  | 3780      | —         | .05"                 | 0-50          | ±.001"   | 1.5N or less    |              |  |
|            |        | 3781      | —         | .05"                 | 0-25-0        | ±.001"   | 1.5N or less    |              |  |
|            | .25"   | 3410      | 3410B     | .1"                  | 0-100         | ±.001"   | 1.5N or less    |              |  |
|            |        | 3411      | 3411B     | .1"                  | 0-50-0        | ±.001"   | 1.5N or less    |              |  |
|            | .4"    | 3412      | 3412B     | .1"                  | 0-100         | ±.001"   | 1.5N or less    |              |  |
|            |        | 3413      | 3413B     | .1"                  | 0-50-0        | ±.001"   | 1.5N or less    |              |  |
|            | 1"     | 3416      | 3416B     | .1"                  | 0-100         | ±.002"   | 2.0N or less    |              |  |
|            |        | 3417      | 3417B     | .1"                  | 0-50-0        | ±.002"   | 2.0N or less    |              |  |
|            | 2"     | 3424-10   | 3424B-10  | .1"                  | 0-100 (100-0) | ±.003"   | 2.5N or less    |              |  |
|            | 3"     | 3426-10   | 3426B-10  | .1"                  | 0-100 (100-0) | ±.005"   | 3.0N or less    |              |  |
|            | 4"     | 3428-10   | 3428B-10  | .1"                  | 0-100 (100-0) | ±.005"   | 4.0N or less    |              |  |
|            | .0005" | .075"     | 3570      | —                    | .03"          | 0-30     | ±.0005"         | 1.5N or less |  |
|            |        |           | 3571      | —                    | .03"          | 0-15-0   | ±.0005"         | 1.5N or less |  |
|            | .0001" | .025"     | 3802-10   | —                    | .01"          | 0-10     | ±.0002"         | 1.5N or less |  |
| 3803-10    |        |           | —         | .01"                 | 0-5-0         | ±.0002"  | 1.5N or less    |              |  |

|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damped at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
| Low Force                   |                 |                 |                 |                       |

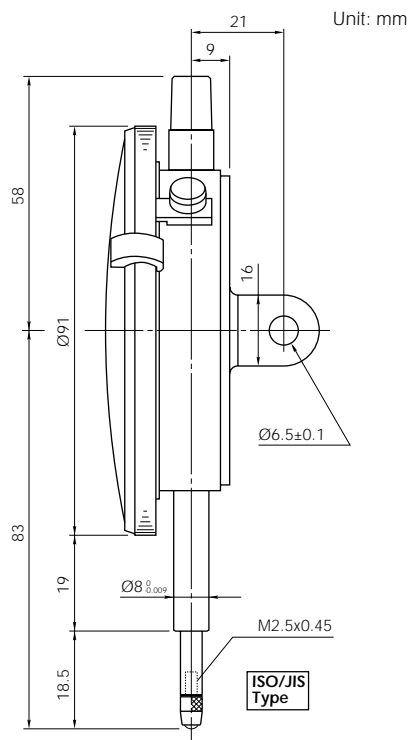


# Dial Indicators

## SERIES 4



### Dimensions



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.  
 Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

Mitutoyo's Series 4 dial indicators give users the advantage of an accurate and durable gaging device that includes easy readability. Their large dial faces make them perfect for applications where reduced lighting or distance makes reading difficult.

### SPECIFICATIONS

#### Metric ISO/JIS

| Graduation | Range | Order No. |           | Range per revolution | Dial reading  | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|---------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |               |          |                 |         |
| 0.01mm     | 10mm  | 4046      | 4046B     | 1mm                  | 0-100 (100-0) | ±15µm    | 1.4N or less    | ☑       |

#### Inch ANSI/AGD

| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|--------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |              |          |                 |         |
| .001"      | .25"  | 4410      | —         | .1"                  | 0-100        | ±.001"   | 1.5N or less    | ☑       |
|            |       | 4411      | —         | .1"                  | 0-50-0       | ±.001"   | 1.5N or less    | ☑       |
|            | 3"    | 4887      | —         | .1"                  | 0-100        | ±.005"   | 2.5N or less    | ☑ ☑ ☑ ☑ |
| .0005"     | .075" | 4570      | —         | .03"                 | 0-30         | ±.0005"  | 1.5N or less    | ☑ ☑     |
|            |       | 4571      | —         | .03"                 | 0-15-0       | ±.0005"  | 1.5N or less    | ☑ ☑     |
| .0001"     | .025" | 4802-10   | —         | .01"                 | 0-10         | ±.0002"  | 1.5N or less    | ☑ ☑ ☑   |
|            |       | 4803-10   | —         | .01"                 | 0-5-0        | ±.0002"  | 1.5N or less    | ☑ ☑ ☑   |

|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
| Low Force                   |                 |                 |                 |                       |

## ANSI/AGD Type Metric Dial Indicators

with 3/8" DIA. Stem and #4-48UNF-Thread Contact Point Mount

### SPECIFICATIONS

#### Metric <sup>ANSI/AGD</sup> Series 1

| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|--------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |              |          |                 |         |
| 0.01mm     | 2.5mm | 1230-01   | —         | 1mm                  | 0-100        | ±10µm    | 1.5N or less    |         |
|            |       | 1231-01   | —         | 1mm                  | 0-50-0       | ±10µm    | 1.5N or less    |         |
|            | 5mm   | 1044-01   | —         | 1mm                  | 0-100        | 12µm     | 1.4N or less    |         |
|            |       | 1045-01   | —         | 1mm                  | 0-50-0       | 12µm     | 1.4N or less    |         |
| 0.002mm    | 0.5mm | 1010-11   | —         | 0.2mm                | 0-20         | 5µm      | 1.5N or less    |         |
|            |       | 1011-11   | —         | 0.2mm                | 0-10-0       | 5µm      | 1.5N or less    |         |

#### Metric <sup>ANSI/AGD</sup> Series 2

| Graduation | Range  | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks      |
|------------|--------|-----------|-----------|----------------------|--------------|----------|-----------------|--------------|
|            |        | Lug-back  | Flat-back |                      |              |          |                 |              |
| 0.01mm     | 2.5mm  | 2230F-01  | 2230FB-01 | 1mm                  | 0-100        | ±10µm    | 1.4N or less    |              |
|            |        | 2231F-01  | 2231FB-01 | 1mm                  | 0-50-0       | ±10µm    | 1.4N or less    |              |
|            | 5mm    | 2044F-61  | 2044FB-61 | 1mm                  | 0-100        | 10µm     | 1.4N or less    |              |
|            |        | 2045-61   | —         | 1mm                  | 0-50-0       | 10µm     | 1.4N or less    |              |
|            | 10mm   | 2046F-01  | 2046FB-01 | 1mm                  | 0-100        | 15µm     | 1.4N or less    |              |
|            |        |           | 2046F-11  | 2046FB-11            | 1mm          | 0-100    | 15µm            | 1.4N or less |
|            |        | 2048F-01  | 2048FB-01 | 1mm                  | 0-100        | 15µm     | 1.4N or less    |              |
|            |        |           | 2048F-11  | 2048FB-11            | 1mm          | 0-100    | 15µm            | 1.4N or less |
|            |        | 2047F-01  | 2047FB-01 | 1mm                  | 0-50-0       | 15µm     | 1.4N or less    |              |
|            |        |           | 2047F-11  | 2047FB-11            | 1mm          | 0-50-0   | 15µm            | 1.4N or less |
|            | 20mm   | 2050F-01  | 2050FB-01 | 1mm                  | 0-100        | 20µm     | 2.0N or less    |              |
|            |        | 2050F-11  | 2050FB-11 | 1mm                  | 0-100        | 20µm     | 2.0N or less    |              |
|            | 25mm   | 2056F-01  | 2056FB-01 | 1mm                  | 0-100        | 30µm     | 2.0N or less    |              |
|            |        | 2120-71   | —         | 0.5mm                | 0-50         | ±5µm     | 1.5N or less    |              |
| 0.005mm    | 1.25mm | 2121-71   | —         | 0.5mm                | 0-25-0       | ±5µm     | 1.5N or less    |              |
|            |        | 2010F-11  | 2010FB-11 | 0.2mm                | 0-20         | 5µm      | 1.5N or less    |              |
| 0.002mm    | 0.5mm  | 2010F-61  | 2010FB-61 | 0.2mm                | 0-20         | 5µm      | 1.5N or less    |              |
|            |        | 2011F-11  | 2011FB-11 | 0.2mm                | 0-10-0       | 5µm      | 1.5N or less    |              |
|            |        | 2011F-61  | 2011FB-61 | 0.2mm                | 0-10-0       | 5µm      | 1.5N or less    |              |
|            |        | 2109F-11  | 2109FB-11 | 0.2mm                | 0-10-0       | 3µm      | 1.5N or less    |              |
| 0.001mm    | 0.1mm  | 2900-73   | —         | —                    | 50-0-50      | ±1µm     | 1.5N or less    |              |
|            | 1mm    | 2109F-11  | 2109FB-11 | 0.2mm                | 0-10-0       | 3µm      | 1.5N or less    |              |
|            | 5mm    | 2119-51   | —         | 0.2mm                | 0-10-0       | 8µm      | 1.5N or less    |              |

#### Metric <sup>ANSI/AGD</sup> Series 3

| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|--------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |              |          |                 |         |
| 0.01mm     | 2.5mm | 3230-01   | —         | 1mm                  | 0-100        | ±10µm    | 1.4N or less    |         |
|            |       | 3231-01   | —         | 1mm                  | 0-50-0       | ±10µm    | 1.4N or less    |         |
|            | 30mm  | 3052-01   | —         | 1mm                  | 0-100        | 30µm     | 2.2N or less    |         |
|            |       | 3052-11   | —         | 1mm                  | 0-100        | 30µm     | 2.2N or less    |         |
|            | 50mm  | 3058-01   | —         | 1mm                  | 0-100        | 50µm     | 2.5N or less    |         |
|            |       | 3058-11   | —         | 1mm                  | 0-100        | 50µm     | 2.5N or less    |         |
| 0.002mm    | 0.5mm | 3010-11   | —         | 0.2mm                | 0-20         | 5µm      | 1.5N or less    |         |
|            |       | 3011-11   | —         | 0.2mm                | 0-10-0       | 5µm      | 1.5N or less    |         |

#### Metric <sup>ANSI/AGD</sup> Series 4

| Graduation | Range | Order No. |           | Range per revolution | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|-----------|-----------|----------------------|--------------|----------|-----------------|---------|
|            |       | Lug-back  | Flat-back |                      |              |          |                 |         |
| 0.01mm     | 2.5mm | 4230-01   | —         | 1mm                  | 0-100        | ±10µm    | 1.2N or less    |         |
|            |       | 4231-01   | —         | 1mm                  | 0-50-0       | ±10µm    | 1.2N or less    |         |

|                             |                 |                 |                 |                       |
|-----------------------------|-----------------|-----------------|-----------------|-----------------------|
| High Precision Type         | Reverse Reading | Balanced Dial   | Continuous Dial | One Revolution        |
| Damper at Lowest Rest Point | Shockproof      | Adjustable Hand | Waterproof      | Doubled Scale Spacing |
| Coaxial Revolution Counter  | Peak Retaining  | Long Stem       | Dustproof       | Jeweled               |
|                             |                 |                 |                 | Low Force             |

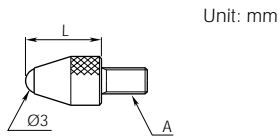


# Contact Points

for Digimatic and Dial Indicators, and Linear Gages

## SPECIFICATIONS

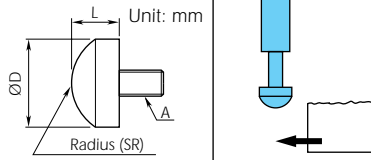
### Ø3mm Ball Points



| L    | Material | Order No. | A         |
|------|----------|-----------|-----------|
| 7.3  | Carbide  | 901312    | M2.5x0.45 |
|      |          | 901454    | #4-48UNF  |
|      | Steel    | 900030    | M2.5x0.45 |
|      | Plastic  | 901994    | M2.5x0.45 |
|      |          | 902018    | #4-48UNF  |
|      | Ruby     | 120047    | M2.5x0.45 |
| 8.3* | Carbide  | 902119    | M2.5x0.45 |
|      | Steel    | 900986    | M2.5x0.45 |
| 15   | Carbide  | 120049    | M2.5x0.45 |
|      | Ruby     | 120051    | M2.5x0.45 |
| 20   | Carbide  | 137391    | M2.5x0.45 |
|      | Ruby     | 137392    | M2.5x0.45 |
| 25   | Carbide  | 120053    | M2.5x0.45 |
|      | Ruby     | 120055    | M2.5x0.45 |

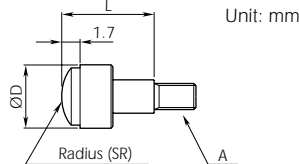
\*For waterproof dial indicators

### Spherical Points



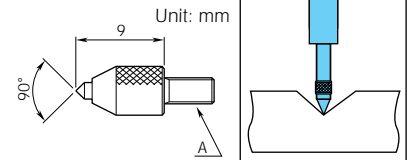
| D    | L    | SR | Order No. | A         |
|------|------|----|-----------|-----------|
| 10   | 5    | 7  | 101119    | M2.5x0.45 |
| 12.7 | 3.18 | 7  | 101205    | #4-48UNF  |
| 9.53 | 2.38 | 9  | 101204    | #4-48UNF  |

### Spherical Points (Carbide)

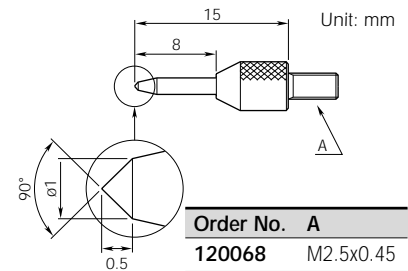


| D    | L  | SR | Order No. | A         |
|------|----|----|-----------|-----------|
| 5.2  | 5  | 5  | 120058    | M2.5x0.45 |
| 7.5  | 10 | 7  | 120059    | M2.5x0.45 |
| 10.5 | 10 | 10 | 120060    | M2.5x0.45 |

### 90° Conical Points (Carbide)

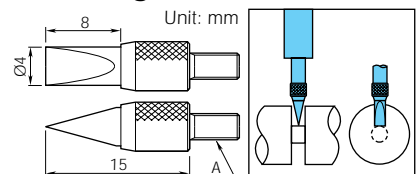


| Order No. | A         |
|-----------|-----------|
| 120057    | M2.5x0.45 |



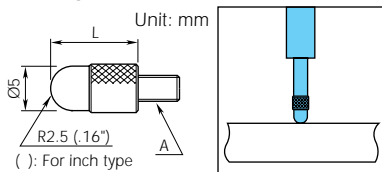
| Order No. | A         |
|-----------|-----------|
| 120068    | M2.5x0.45 |

### Knife Edge Point (Carbide)



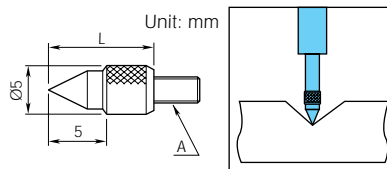
| Order No. | A         |
|-----------|-----------|
| 120067    | M2.5x0.45 |

### Shell Type Points



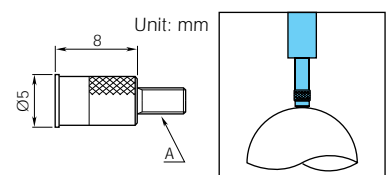
| L     | Order No. | A         |
|-------|-----------|-----------|
| 3.97  | 101184    | #4-48UNF  |
| 5     | 101386    | M2.5x0.45 |
| 10    | 101118    | M2.5x0.45 |
| 12.7  | 101185    | #4-48UNF  |
| 15    | 137393    | M2.5x0.45 |
| 19.05 | 101186    | #4-48UNF  |
| 20    | 101387    | M2.5x0.45 |
| 25    | 101388    | M2.5x0.45 |
| 25.4  | 101187    | #4-48UNF  |

### 60° Conical Points



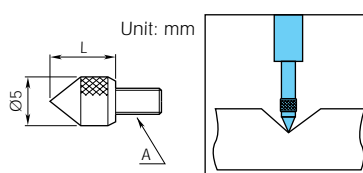
| L    | Order No. | A         |
|------|-----------|-----------|
| 10   | 101120    | M2.5x0.45 |
| 12.7 | 101190    | #4-48UNF  |

### Flat Points



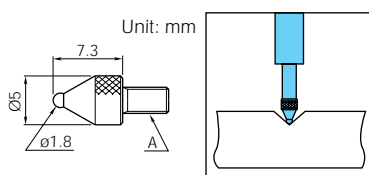
| Order No. | A         |
|-----------|-----------|
| 131365    | M2.5x0.45 |
| 133017    | #4-48UNF  |

### 90° Conical Points

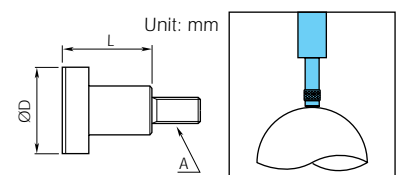


| L    | Order No. | A         |
|------|-----------|-----------|
| 5    | 101385    | M2.5x0.45 |
| 7.14 | 101191    | #4-48UNF  |

### Ø1.8mm Ball Point

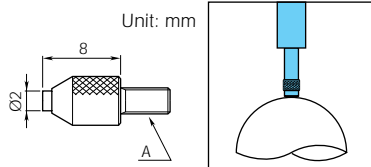


| Order No. | A         |
|-----------|-----------|
| 101122    | M2.5x0.45 |

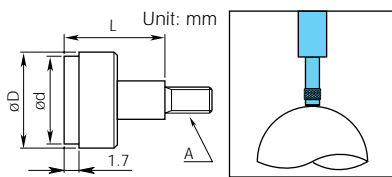


| D    | L    | Order No. | A         |
|------|------|-----------|-----------|
| 10   | 10   | 101117    | M2.5x0.45 |
| 12.7 | 9.53 | 101188    | #4-48UNF  |
| 9.53 | 9.53 | 101189    | #4-48UNF  |

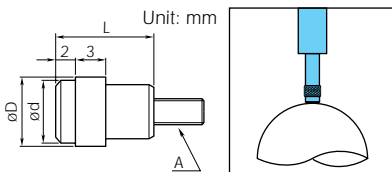
## Flat Points (Carbide)



| Order No. | A         |
|-----------|-----------|
| 120056    | M2.5x0.45 |

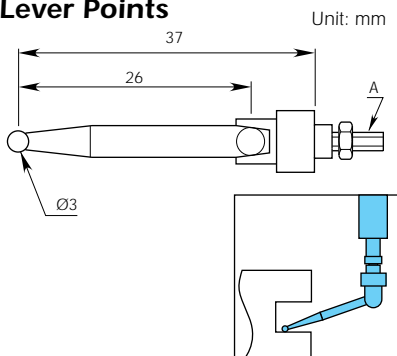


| D    | d   | L  | Order No. | A         |
|------|-----|----|-----------|-----------|
| 5.2  | 4.3 | 5  | 120041    | M2.5x0.45 |
| 7    | 6.5 | 10 | 120042    | M2.5x0.45 |
| 10.5 | 9.5 | 10 | 120043    | M2.5x0.45 |



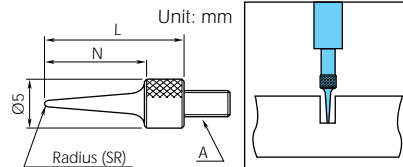
| D | d   | L  | Order No. | A         |
|---|-----|----|-----------|-----------|
| 7 | 6.5 | 10 | 137255    | M2.5x0.45 |
| 9 | 8   | 10 | 137399    | M2.5x0.45 |

## Lever Points



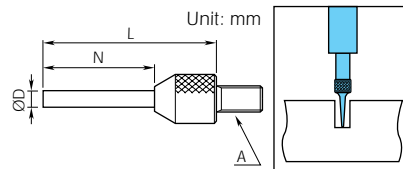
| Order No. | A         |
|-----------|-----------|
| 900391    | M2.5x0.45 |
| 900393    | #4-48UNF  |

## Needle Points



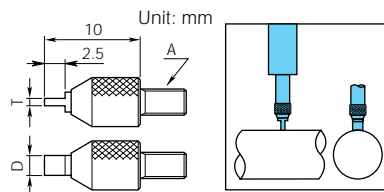
| N  | L  | SR  | Order No. | A         |
|----|----|-----|-----------|-----------|
| 11 | 15 | 0.4 | 101121    | M2.5x0.45 |
| 13 | 17 | 0.2 | 137413    | M2.5x0.45 |

## Needle Points (Carbide)



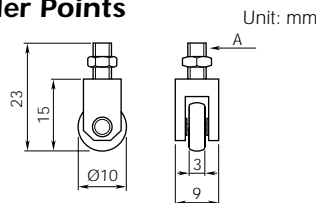
| D    | N   | L  | Order No. | A         |
|------|-----|----|-----------|-----------|
| 0.45 | 2.5 | 10 | 120066    | M2.5x0.45 |
| 1    | 2.5 | 10 | 120065    | M2.5x0.45 |
| 1.5  | 13  | 20 | 120064    | M2.5x0.45 |
| 2    | 8   | 15 | 137257    | M2.5x0.45 |

## Blade Points (Carbide)



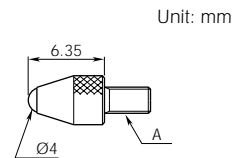
| T   | W | Order No. | A         |
|-----|---|-----------|-----------|
| 0.4 | 2 | 120061    | M2.5x0.45 |
| 0.6 | 2 | 120062    | M2.5x0.45 |
| 1   | 4 | 120063    | M2.5x0.45 |

## Roller Points



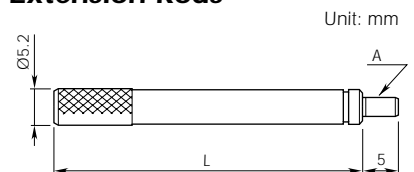
| Order No. | A         |
|-----------|-----------|
| 901954    | M2.5x0.45 |
| 901991    | #4-48UNF  |

## Ø4mm Ball Point



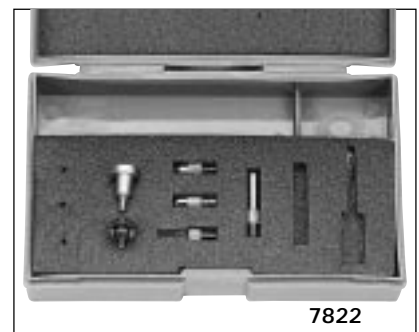
| Order No. | A        |
|-----------|----------|
| 900032    | #4-48UNF |

## Extension Rods



| L     | Order No. | A         |
|-------|-----------|-----------|
| 10    | 303611    | M2.5x0.45 |
| 20    | 303612    | M2.5x0.45 |
| 25.4  | 301655    | #4-48UNF  |
| 30    | 303613    | M2.5x0.45 |
| 50.8  | 301657    | #4-48UNF  |
| 100   | 303614    | M2.5x0.45 |
| 101.6 | 301659    | #4-48UNF  |

## Interchangeable Contact Point Set (M2.5x0.45)



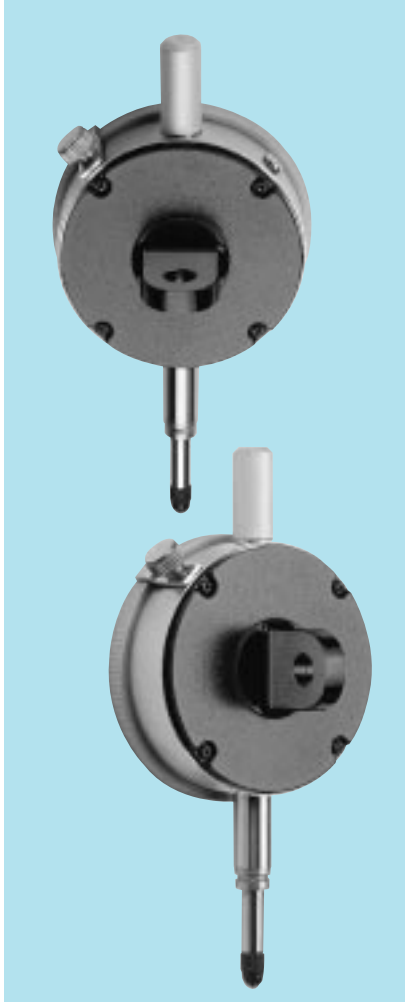
| Order No. | Components                 |
|-----------|----------------------------|
| 7822      | Flat Point (131365, Ø5mm)  |
|           | Flat Point (101117, Ø10mm) |
|           | Needle Point (101121)      |
|           | Spherical Point (101119)   |
|           | Shell Type Point (101118)  |
|           | Shell Type Point (101387)  |





# Backs

for Digimatic and Dial Indicators

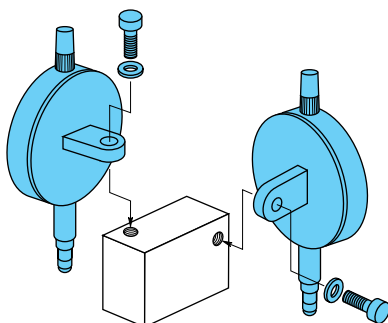


There are two ways to support Digimatic and dial indicators; by either holding the stem or the lug on the back of the indicator. The back of the indicator may need to be replaced for special applications. A wide variety of backs are available for Mitutoyo Digimatic and dial indicators.




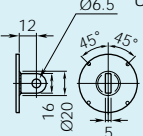

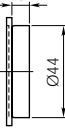

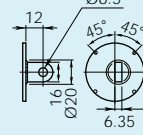

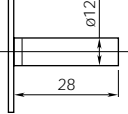

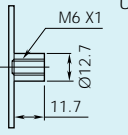

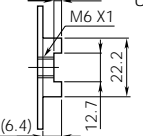

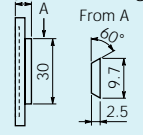

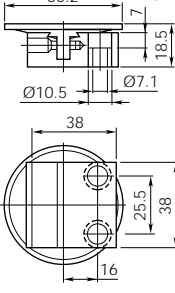
## FEATURES

- The lug can be orientated in 90° increments.

## Application



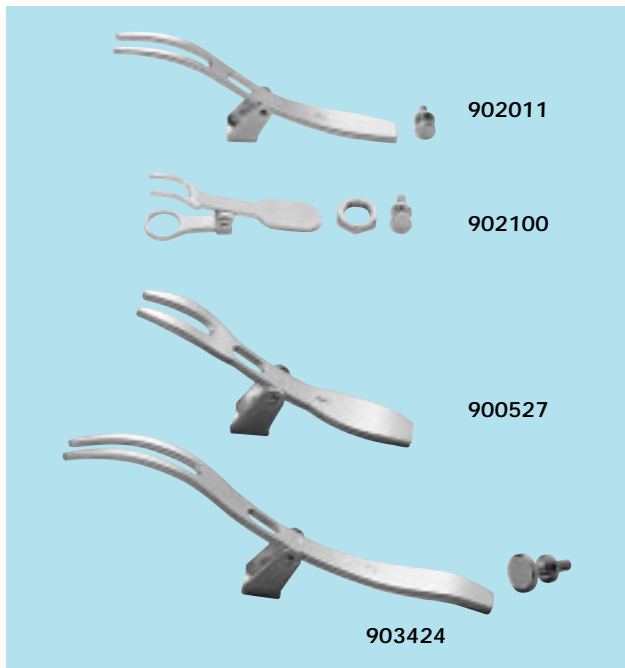
## SPECIFICATIONS

| Description  | Order No.  |  |  |
|--|--|--|--|
|  | Series 1<br>(Ø41mm)                                      | Series 2<br>(Ø55.6mm)                                    | Series 3, 4<br>(Ø77, 91mm)                               |
| Flat Back<br>  Unit: mm                        | <b>101211</b><br>(a=2.2)                                 | <b>101039</b><br>(a=2.5)                                 | <b>100836</b><br>(a=3.0)                                 |
| Lug-on-Center Back<br>  Unit: mm               | <b>101210</b><br>(metric)<br><b>101307</b><br>(inch)     | <b>101040</b><br>(metric)<br><b>101306</b><br>(inch)     | <b>100691</b><br>(metric)<br><b>100797</b><br>(inch)     |
| Magnetic Back<br>  Unit: mm                    | —  | <b>900928</b>  | <b>900929</b>  |
| Back with Offset Lug<br>  Unit: mm           | —  | <b>101167</b>  | <b>100837</b>  |
| Back with Post<br>  Unit: mm               | <b>193172</b>  | <b>101169</b>  | <b>100839</b>  |
| Back with Screw Mount<br>  Unit: mm        | <b>193173</b><br>(M6x1)<br><b>193174</b><br>(#1/4-28UNF) | <b>136023</b><br>(M6x1)<br><b>101170</b><br>(#1/4-28UNF) | <b>136024</b><br>(M6x1)<br><b>100840</b><br>(#1/4-28UNF) |
| Adjustable Back<br>  Unit: mm              | <b>136025</b><br>(M6x1)<br><b>129721</b><br>(#1/4-28UNF) | <b>136026</b><br>(M6x1)<br><b>101168</b><br>(#1/4-28UNF) | <b>136027</b><br>(M6x1)<br><b>100838</b><br>(#1/4-28UNF) |
| Back with Dovetail<br>  Unit: mm           | —  | <b>900008</b>  | —  |
| Back with Adjustable Bracket<br>  Unit: mm | —  | <b>901963</b>  | —  |

## Accessories

for Digimatic and Dial Indicators

### Spindle Lifting Levers



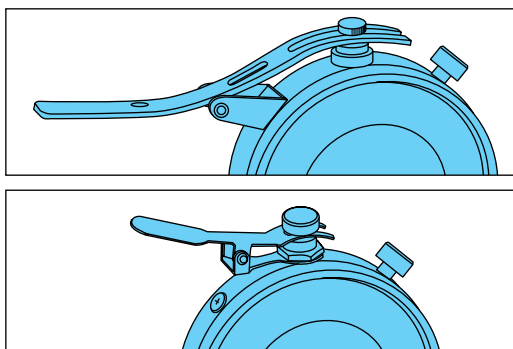
#### FEATURES

- The Spindle Lifting Lever is attached to the top end of the spindle for improved inspection efficiency when using a dial indicator mounted on a stand.

#### SPECIFICATIONS

| Order No.                                     | Applicable dial indicators  |
|---|---|
| <b>21BZA205</b><br>(Lifting range: Up to 5mm) | Series 1: 1040F, 1041F, 1044F, 1044F-10, 1045F, 1124F, 1125F, 1013F, 1109F, 1900F, 1929F                  |
| <b>902011</b><br>(Lifting range: Up to 10mm), | Series 2: 2929F, 2959F, 2044FE, 2044FE-09, 2045FE, 2046FE, 2046FH, 2046FLB, 2046FE-09, 2046FE-10, 2310FE, |
| <b>902100</b><br>(Lifting range: Up to 10mm)  | 2902FE, 2047FE, 2124F, 2125F, 2900F, 2901F, 2110F, 2109F, 2109FH, 2109FLB, 2113F, 2118F, 2119F, 2928F     |
| <b>903424</b><br>(Lifting range: Up to 25mm)  | Series 2: 2048FE-10, 2050FE, 2050FE-10, 2320FE<br>Series 3: 3046F, 3047F, 3109F<br>Series 4: 4046         |

#### Application



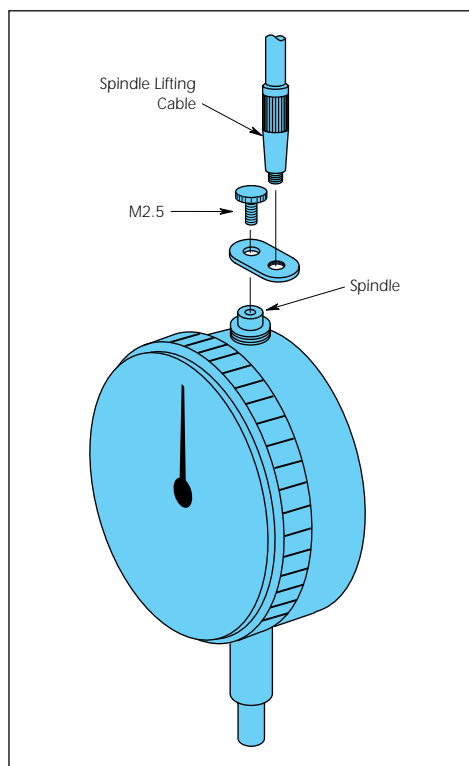
### Spindle Lifting Cable



#### SPECIFICATIONS

| Order No. | Lifting range | Remarks             |
|-----------|---------------|---------------------|
| 901975    | Up to 10mm    | Cable length: 300mm |

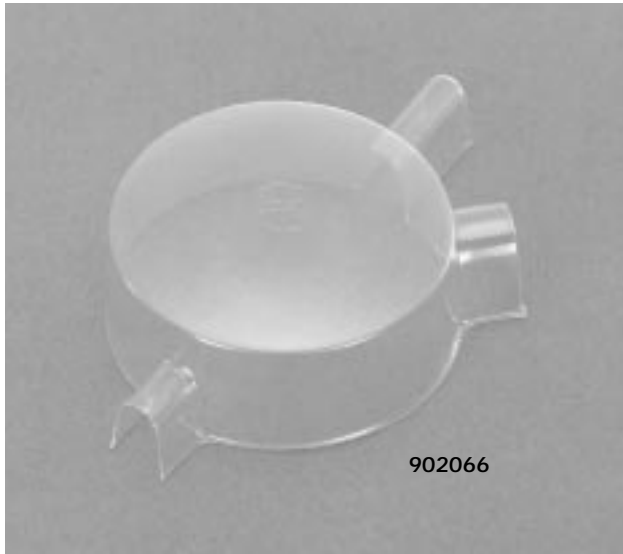
#### Application



## Accessories

for Digimatic and Dial Indicators

### Protective Covers



Clear plastic protective covers are available that surround and protect the dial indicators from oils, dust, and flying particles.

### Colored Caps



8 colors of spindle caps are available for dial indicators with a range of 10mm or less.

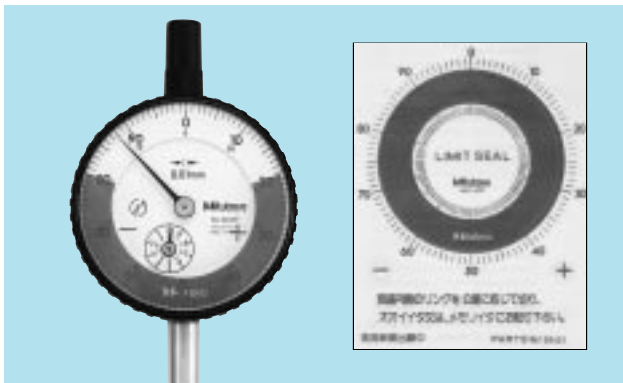
### SPECIFICATIONS

| Application                     | Order No.     | Remarks           |
|---------------------------------|---------------|-------------------|
| Metric Series 2 Dial Indicators | <b>902066</b> | 10 pieces per set |
| Inch Series 2 Dial Indicators   | <b>902065</b> | 10 pieces per set |

### SPECIFICATIONS

| Color  | Order No.      |                 |
|--------|----------------|-----------------|
|        | Standard       | Water-resistant |
| Black  | <b>193051</b>  | <b>193595</b>   |
| White  | <b>193051W</b> | <b>193595W</b>  |
| Red    | <b>193051R</b> | <b>193595R</b>  |
| Green  | <b>193051G</b> | <b>193595G</b>  |
| Blue   | <b>193051B</b> | <b>193595B</b>  |
| Yellow | <b>193051Y</b> | <b>193595Y</b>  |
| Orange | <b>193051D</b> | <b>193595D</b>  |
| Pink   | <b>193051P</b> | <b>193595P</b>  |

### Limit Stickers



### FEATURES

- Stuck on the dial face or crystal of a dial indicator to indicate tolerance limits.

### SPECIFICATIONS

| Color  | Order No.     | Remarks             |
|--------|---------------|---------------------|
| Red    | <b>136420</b> | 10 stickers per set |
| Green  | <b>136421</b> | 10 stickers per set |
| Yellow | <b>136422</b> | 10 stickers per set |

## Dial Indicator Repair Tool Kit



7823

Mitutoyo offers a tool set designed to let you perform simple repairs to your Mitutoyo dial indicator, and a device that lets you reset the indicator crystals.

### FEATURES

- To free a jammed bezel: Apply Molykote with a brush (8) around the entire groove of the bezel.
- To oil a bearing: Use brush (9) to apply lubricating oil (2) to the pinion shaft.
- To remove the long hand: Use hand remover (15) to lift out without damaging the bearing.

- To remove the short hand: Use nippers (13).
- To adjust the bearing position: Use the bearing adjuster (18) to force the bearing into position.
- To remove the pin or drive it into position: Use the pin remover (16) and hammer (10) on the V-groove of the spindle rest (11).
- To drive the long or short hand into position: Use the pinion rest (19) and pin rest (12) to hold the pin and pinion, then drive with hammer (10) and punch (17) into the center position.

### SPECIFICATIONS

| Order No. | Assortment of tools (1) - (20)                                   |
|-----------|--|
| 7823      | (1) Molykote (lubricant) (901171)                                |
|           | (2) Lubricating oil (901172)                                     |
|           | (3) Screwdriver (Phillips) (901173)                              |
|           | (4) Screwdriver (Phillips/flat blade) (901174)                   |
|           | (5) Tweezers (129729)  |
|           | (6) Pin-vise (901175)  |
|           | (7) Brush (901176)   |
|           | (8) Brush (901177)   |
|           | (9) Brush (901177)   |
|           | (10) Hammer (901178)   |
|           | (11) Spindle rest (129730)                                       |
|           | (12) Pin rest (129731)   |
|           | (13) Nippers (901179)  |
|           | (14) Pliers (901180)   |
|           | (15) Hand remover (901181)                                       |
|           | (16) Pin remover (129732)  |
|           | (17) Punch (129733)  |
|           | (18) Bearing adjuster (129734)                                   |
|           | (19) Pinion rest (129735)  |
|           | (20) Reamer $\varnothing 1$ (129736), $\varnothing 0.6$ (193702) |
|           | (21) Case (901182)   |

## Dial Indicator Crystal Setter



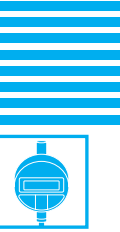
7000

### FEATURES

- Used for fitting a crystal on dial indicators, dial test indicators, and dial calipers.

### SPECIFICATIONS

| Order No. | Remarks                              |
|-----------|--------------------------------------|
| 7000      | With 8 sizes of crystal setting pads |



## UDT-2 Dial Gage Tester

SERIES 170



170-102M-2

The UDT-2 Dial Gage Tester consists of a specially designed 25mm micrometer head, with a large disc, and rigid holding fixtures. With graduations in 0.001mm on the micrometer head, the UDT-2 is highly recommended to calibrate 1mm, 5mm, 10mm, and 20mm range, 0.01mm reading, dial indicators and dial test indicators.

### FEATURES

- Clamping stem diameter— **170-102M-2**: 6mm and 8mm, **170-101E**: .25" and .375"
- With the optional stand (**951498**), inspection of Dial Bore Gages becomes possible to perform.



### SPECIFICATIONS

#### Metric

| Order No.  | Graduation | Range  | Accuracy |
|------------|------------|--------|----------|
| 170-102M-2 | 0.001mm    | 0-25mm | ±2µm     |

#### Inch

| Order No. | Graduation | Range | Accuracy |
|-----------|------------|-------|----------|
| 170-101E  | .0001"     | 0-1"  | ±.0001"  |

### OPTIONAL ACCESSORY

| Order No. | Description                         |
|-----------|-------------------------------------|
| 951498    | Stand for Dial Bore Gage inspection |

## Calibration Tester

SERIES 521



521-103

The Calibration Tester is specially designed to calibrate measuring accuracy of short range dial indicators, dial test indicators, and other electronic comparison gage heads.

### FEATURES

- Universal bracket accepts any dial indicator, dial test indicator, lever head of Mu-Checker without any additional accessory.
- Clamping capacity: Ø4mm - Ø10mm
- Dual color-indexed directional graduations to facilitate measurements.



### SPECIFICATIONS

#### Metric

| Order No. | Graduation | Range | Accuracy |
|-----------|------------|-------|----------|
| 521-103   | 0.0002mm   | 0-1mm | ±0.2µm   |
| 521-105   | 0.0002mm   | 0-5mm | ±0.8µm   |

#### Inch

| Order No. | Graduation | Range  | Accuracy |
|-----------|------------|--------|----------|
| 521-104   | .00001"    | 0-.05" | ±.00001" |
| 521-106   | .00001"    | 0-.2"  | ±.00003" |

## i-Checker

### SERIES 170



Personal computer (optional)

The i-Checker is specially designed to calibrate measuring accuracy of dial indicators, dial test indicators, and other electronic comparison gage heads with a stroke of up to 100mm (4").

#### FEATURES

- $\pm(0.2+L/100)\mu\text{m}^*$  indication accuracy  
\* When inspecting in vertical posture.
- Directly inspects an indicator with a stroke of up to 100mm (4"). The dial test indicator, bore gage and lever-type inductive head can be inspected with optional accessories.
- Adjustment of the measurement position is very easily accomplished because of semi-automatic measurement and full automatic measurement functions.
- Creates and prints out the simple inspection certificate.
- Saves inspection result as CSV file for reusable inspection result by any kind of software.

#### SPECIFICATIONS

| Model No.   | i-Checker  |
|---|--|
| Order No.   | 170-302 □ (w ø8 bush)<br>170-303 □ (w ø3/8" bush)<br>170-302-01 □ (w ø8 bush, calibration certificate)<br>170-303-01 □ (w ø3/8" bush, calibration certificate) |
| Measuring Range                                   | 100mm/4"   |
| Resolution  | 0.02 $\mu\text{m}$ /1.24 $\mu\text{in}$  |
| Accuracy  | vertical position $\pm(0.2+L/100)\mu\text{m}$ L = Arbitrary length<br>lateral position $\pm(0.3+2L/100)\mu\text{m}$ L = Arbitrary length                       |
| Drive method                                      | Motor drive  |
| Measuring Unit                                    | Reflective-type metal linear encoder   |
| Thermal expansion coefficient of measurement mode | (8 $\pm$ 1)X10 <sup>-4</sup> /K  |
| Measurement method                                | Semiautomatic measurement<br>Fully automatic measurement <sup>*1</sup><br>Digimatic Indicator with RS-232C output <sup>*2</sup>                                |
| Dimensions (W x D x H)                            | 184 x 225 x 532mm (7.24" x 8.86" x 20.94")   |
| Operating temperature range                       | 20°C $\pm$ 3°C   |
| Power supply                                      | 100VAC to 240VAC $\pm$ 10%, 50/60Hz  |
| Mass  | 20kg/44lbs   |

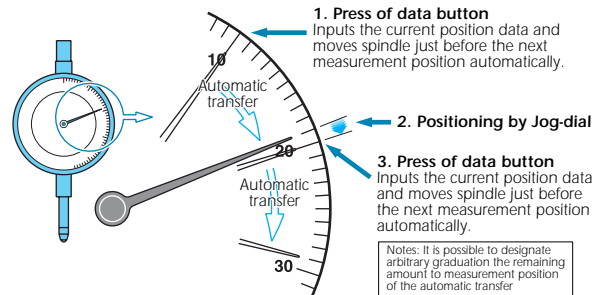
Note: To denote your AC line voltage fill the blank of order number with the following suffixes (e.g. 170-302A). A for 120V, D for 220V, E for 240/220V. No suffix is required for 100V.

<sup>\*1</sup>Automatic measurement requires the indicator's connection cable. Additionally some form of indicator, along with a connecting machine (the optional accessory for indicator as a Digimatic power-supply unit on EF counter) will be needed.

<sup>\*2</sup>The indicator that can be measured via RS-232C is the one equipped with the function to receive the "send data" request command form from the main unit and can output the counter value to the main unit.

#### Inspect your analog indicator semi-automatically!

- The pointer of the analog indicator is positioned just before the measuring point automatically via Mitutoyo's Semi-automatic Measurement function. After that, inspection begins simply by adjusting the pointer position with the jog-dial. Because of this function, measurement time is reduced and user fatigue is practically eliminated. Additionally all functions necessary for inspection are combined in the control box so that the operator need not rely on excessive eye movement to adjust the pointer.



#### Fully automatic inspection of digital indicator

- The Automatic Measurement function, in tandem with a digital indicator makes the spindle move so that measurement data is acquired automatically. Therefore, manual adjustment to the measurement position is needless and the efficiency of every inspection is enhanced.



#### Create and printout a simplified inspection certificate

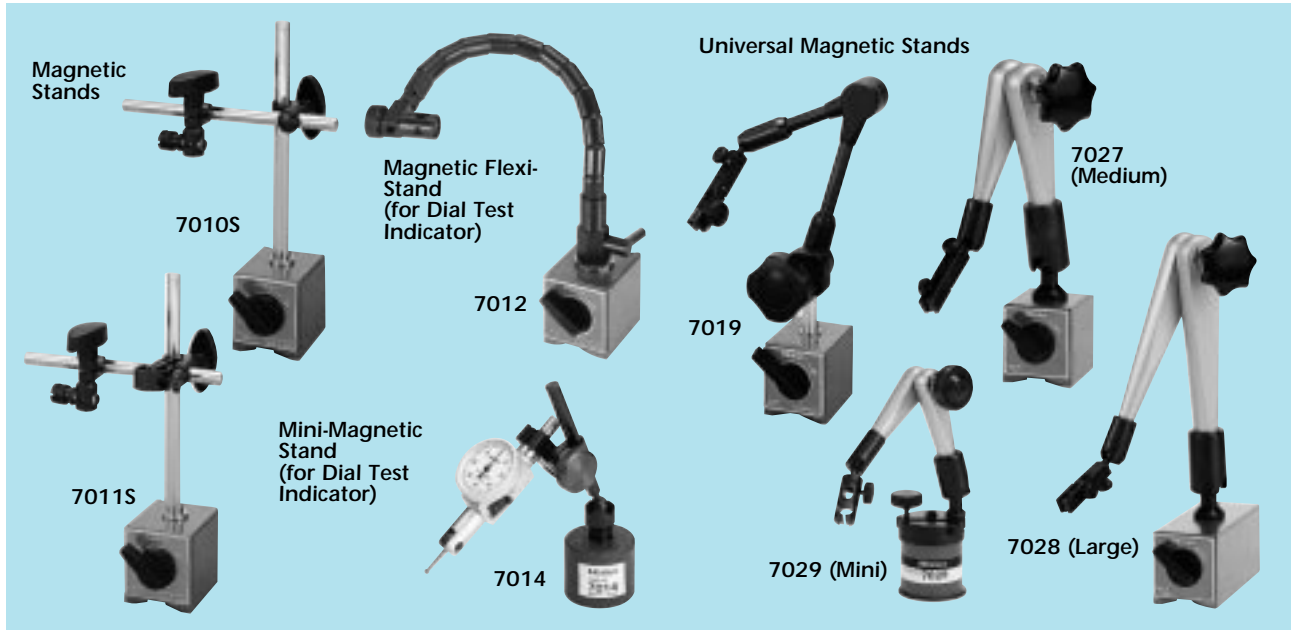
- It is possible to create, edit and print out your own inspection certificate. Further more, that data can be saved as a CSV file.

#### OPTIONAL ACCESSORIES

| Order No. | Description                             |
|-----------|---|
| 02ASK000  | Test indicator attachment set (ø6 stem) |
| 02ASK180  | Test indicator attachment set (ø8 stem) |
| 02ASK370  | Test indicator holder (ø6 stem)         |
| 02ASK380  | Test indicator holder (ø8 stem)         |
| 02ASK110  | Bore gage accessories (1 set)           |
| 902803    | ø6 dovetail grooved stem                |
| 902804    | ø8 dovetail grooved stem                |
| 02ASK040  | Stem bush ø6                            |
| 02ASJ856  | Stem bush ø8                            |
| 02ASK150  | Stem bush ø8, short                     |
| 02ASK050  | Bush ø9.5 (Requires 02ASK070)           |
| 02ASK060  | Stem bush ø12                           |
| 02ASK070  | Stem bush ø15                           |
| 02ASK080  | Stem bush ø20                           |
| 02ASK090  | Stem bush 3/8"                          |
| 02ASK130  | Stem bush case                          |
| 02ASK730  | Reflector                               |
| 937179T   | Foot switch                             |

# Magnetic Stands

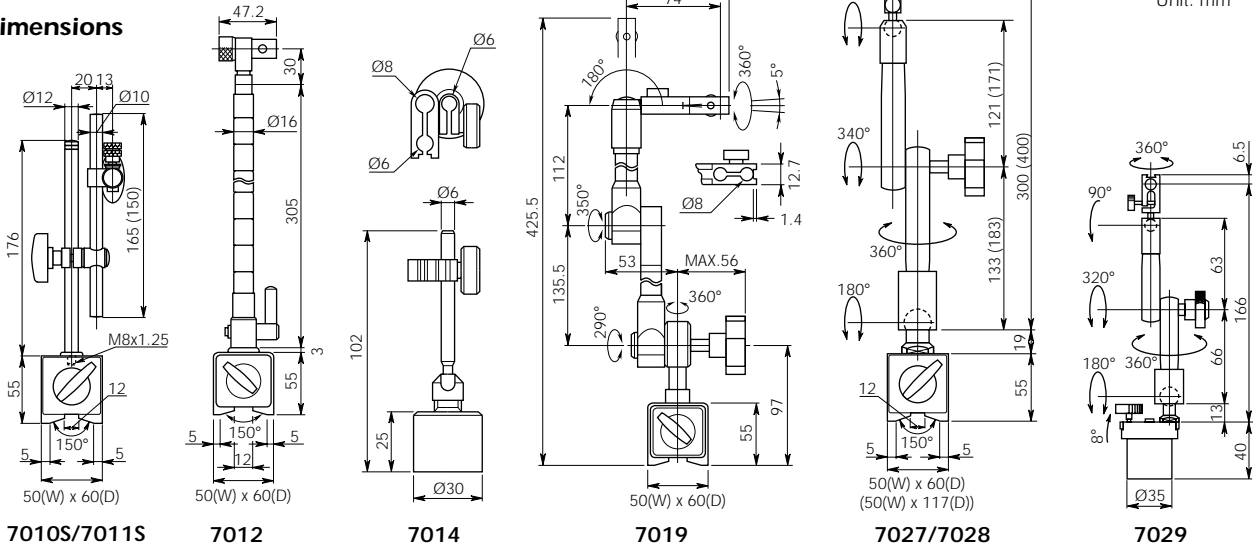
## SERIES 7



Mitutoyo's Magnetic Stands accept all dial indicators and dial test indicators. The ON-OFF switch offers instant mounting and dismounting without any adverse effect to the indicators or workpiece surface.



### Dimensions



Unit: mm

### SPECIFICATIONS

| Order No. | Description              | Applicable holding stem | Dovetail groove* | Mass  | Remarks                      |
|-----------|--------------------------|-------------------------|------------------|-------|------------------------------|
| 7010S     | Magnetic stand           | Ø8mm, Ø4.5mm, 3/8" DIA. | —                | 1.4kg | —                            |
| 7011S     | Magnetic stand           | Ø8mm, Ø4.5mm, 3/8" DIA. | —                | 1.4kg | With fine adjustment         |
| 7012      | Magnetic flexi-stand     | Ø8mm, Ø6mm, 3/8" DIA.   | —                | 1.6kg | For Dial Test Indicator      |
| 7014      | Mini magnetic stand      | Ø8mm, Ø6mm              | Provided         | 0.2kg | Without ON-OFF switch        |
| 7019      | Universal magnetic stand | Ø8mm, 3/8" DIA.         | Provided         | 1.8kg | With hydraulic position lock |
| 7027      | Universal magnetic stand | Ø8mm                    | Provided         | 1.7kg | With hydraulic position lock |
| 7028      | Universal magnetic stand | Ø8mm                    | Provided         | 2.8kg | With hydraulic position lock |
| 7029      | Universal magnetic stand | Ø8mm                    | Provided         | 0.5kg | Without ON-OFF switch        |

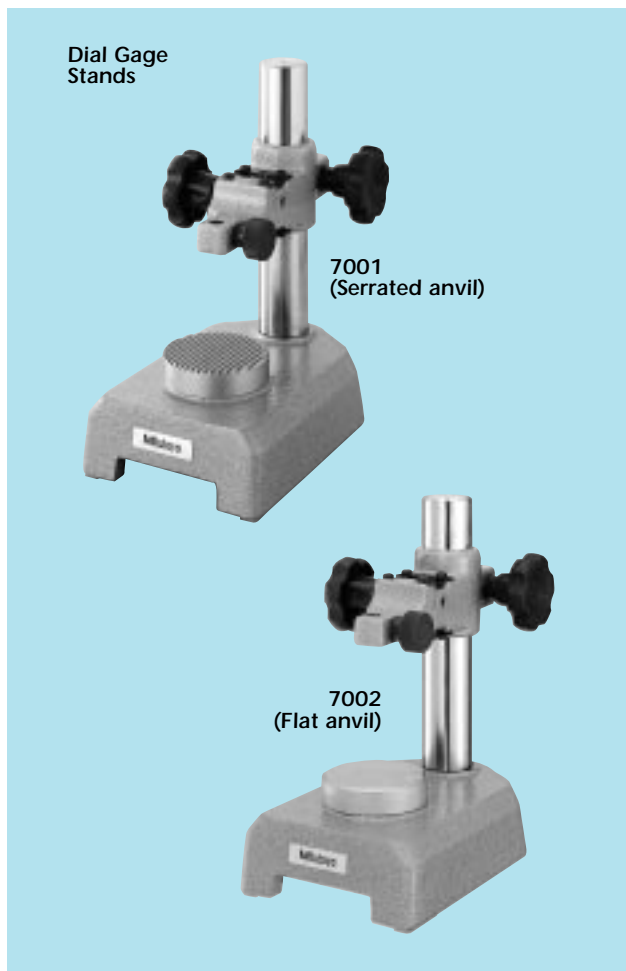
\*Used for clamping a Dial Test Indicator

## Dial Gage Stands

SERIES 7

## Transfer Stands

SERIES 519



These Dial Gage Stands and Transfer Stands are designed for comparison measurements of height using a dial indicator or Digimatic Indicator.

### FEATURES

- Vertical travel of the gage holder — Dial Gage Stand: 100mm (4"), Transfer Stand: 335mm (13.19")
- Fine-adjustment of 1mm available for zero-setting of the indicator.
- With an interchangeable anvil. Domed anvil (**101463**) is optional.

### SPECIFICATIONS

#### Dial Gage Stands

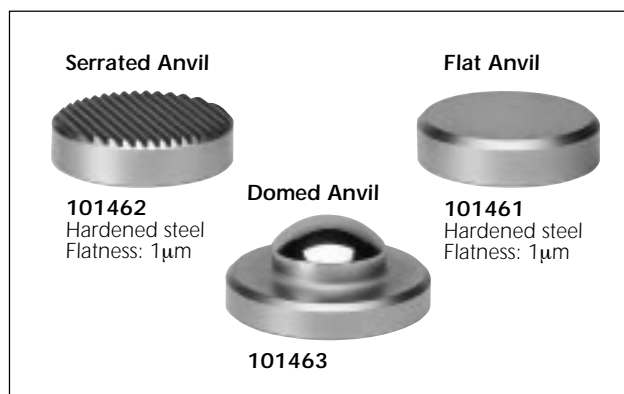
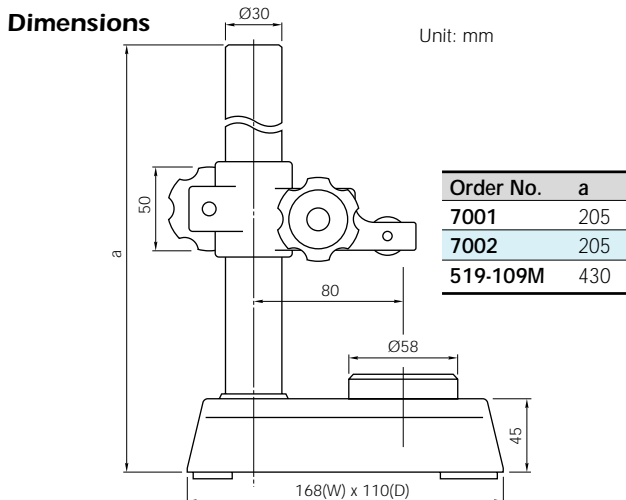
| Metric <small>ISO/JIS</small> |                         |      |                                    |
|-------------------------------|-------------------------|------|------------------------------------|
| Order No.                     | Applicable holding stem | Mass | Remarks                            |
| 7001                          | Ø8mm                    | 4kg  | w/Serrated anvil ( <b>101462</b> ) |
| 7002                          | Ø8mm                    | 4kg  | w/Flat anvil ( <b>101461</b> )     |

| Inch <small>ANSI/AGD</small> |                         |          |                                    |
|------------------------------|-------------------------|----------|------------------------------------|
| Order No.                    | Applicable holding stem | Mass     | Remarks                            |
| 7003                         | 3/8" DIA.               | 8.8 lbs. | w/Serrated anvil ( <b>101462</b> ) |
| 7004                         | 3/8" DIA.               | 8.8 lbs. | w/Flat anvil ( <b>101461</b> )     |

#### Transfer Stands

| Metric <small>ISO/JIS</small> |                         |       |                                    |
|-------------------------------|-------------------------|-------|------------------------------------|
| Order No.                     | Applicable holding stem | Mass  | Remarks                            |
| 519-109M                      | Ø8mm                    | 7.5kg | w/Serrated anvil ( <b>101462</b> ) |

| Inch <small>ANSI/AGD</small> |                         |       |                                    |
|------------------------------|-------------------------|-------|------------------------------------|
| Order No.                    | Applicable holding stem | Mass  | Remarks                            |
| 519-109E                     | 3/8" DIA.               | 7.5kg | w/Serrated anvil ( <b>101462</b> ) |



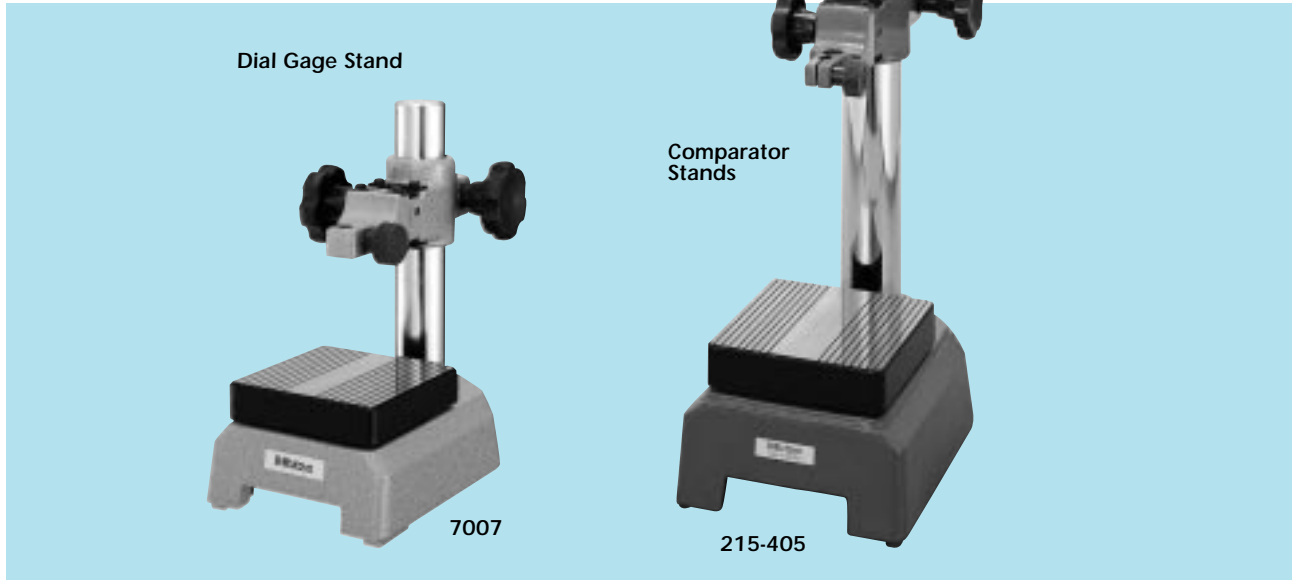


# Dial Gage Stands

SERIES 7

# Comparator Stands

SERIES 215



Dial Gage Stand

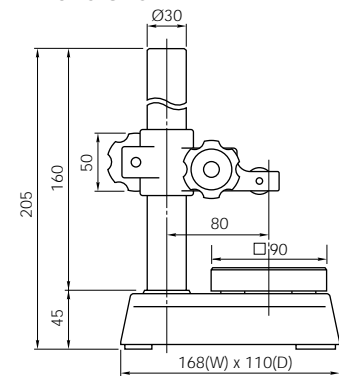
Comparator Stands

7007

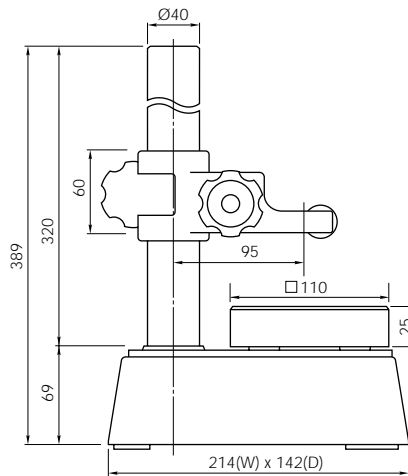
215-405

These Dial Gage Stand and Comparator Stands consist of a very stable, cast-iron base and an upright column with a mounting bracket that features fine adjustment. The grid type anvil prevents the workpiece from sticking to it.

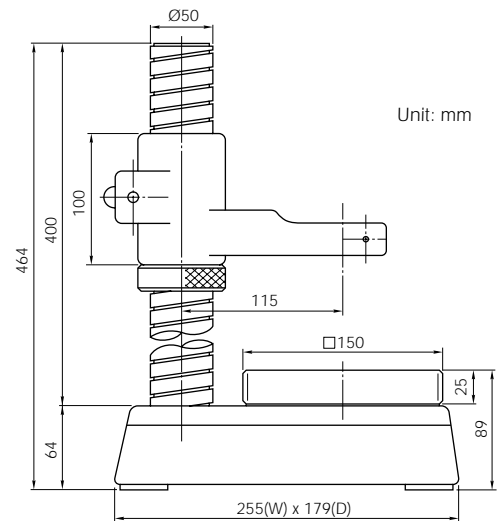
### Dimensions



7007



215-405



215-504 (Ø8mm)  
215-505 (Ø20mm)

### SPECIFICATIONS

#### Dial Gage Stands

**Metric** ISO/JIS

| Order No. | Vertical travel of stem holder | Applicable holding stem | Mass |
|-----------|--------------------------------|-------------------------|------|
| 7007      | 110mm*                         | Ø8mm                    | 6kg  |

\*With fine adjustment of 1mm

**Inch** ANSI/AGD

| Order No. | Vertical travel of stem holder | Applicable holding stem | Mass      |
|-----------|--------------------------------|-------------------------|-----------|
| 7008      | 4.33**                         | 3/8" DIA.               | 13.2 lbs. |

\*With fine adjustment of .04"

#### Comparator Stands

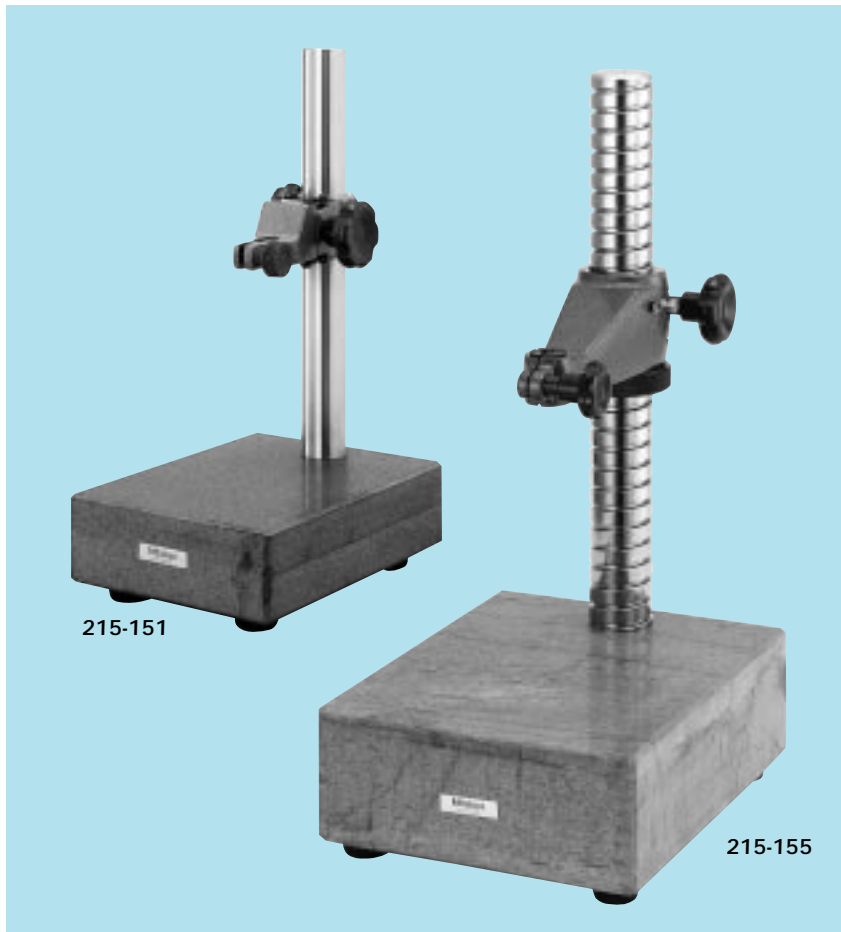
| Order No. | Vertical travel of stem holder | Applicable holding stem | Mass |
|-----------|--------------------------------|-------------------------|------|
| 215-405   | 200mm*                         | Ø8mm                    | 11kg |
| 215-504   | 260mm**                        | Ø8mm                    | 17kg |
| 215-505   | 260mm**                        | Ø8mm, Ø20mm             | 17kg |

\*With fine adjustment of 1mm

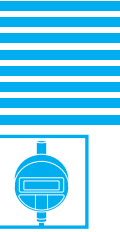
\*\*Fine adjustment available over the entire travel

## Granite Comparator Stands

### SERIES 215



Mitutoyo's Granite Comparator Stands are basic building-blocks for the assembly of special-purpose, precision measuring equipment. By mounting precision measuring instruments such as Digimatic indicators, Mu-Checker Cartridge Heads, and Linear Gages onto the stands, it is possible to satisfy all manner of measuring assignment. The rigid granite base is free from burrs, pileups, rust, and deterioration over time.



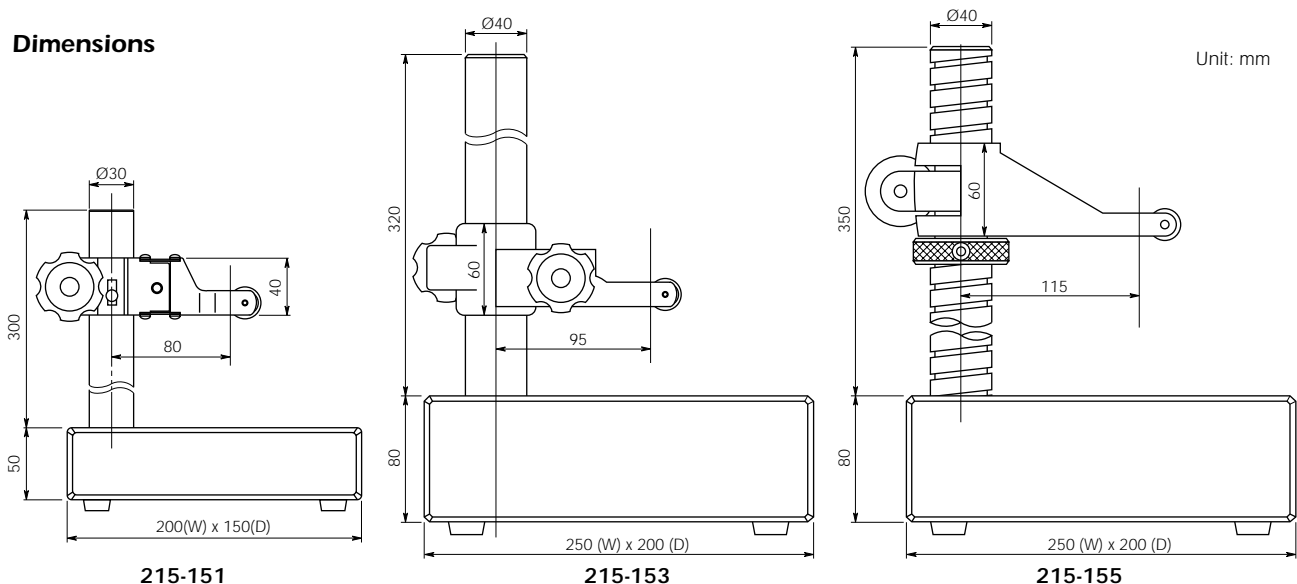
### SPECIFICATIONS

#### Granite Comparator Stands

| Order No. | Granite base size (WxDxH) | Vertical travel of gage holder | Applicable holding stem | Mass | Remarks                                     |
|-----------|---------------------------|--------------------------------|-------------------------|------|---|
| 215-151   | 150x200x50mm              | 260mm                          | Ø8mm                    | 7kg  | With fine adjustment of 1mm                 |
| 215-153   | 200x250x80mm              | 250mm                          | Ø8mm                    | 16kg | With fine adjustment of 1mm                 |
| 215-155   | 200x250x80mm              | 270mm                          | Ø8mm, Ø20mm             | 15kg | With fine adjustment over the entire travel |

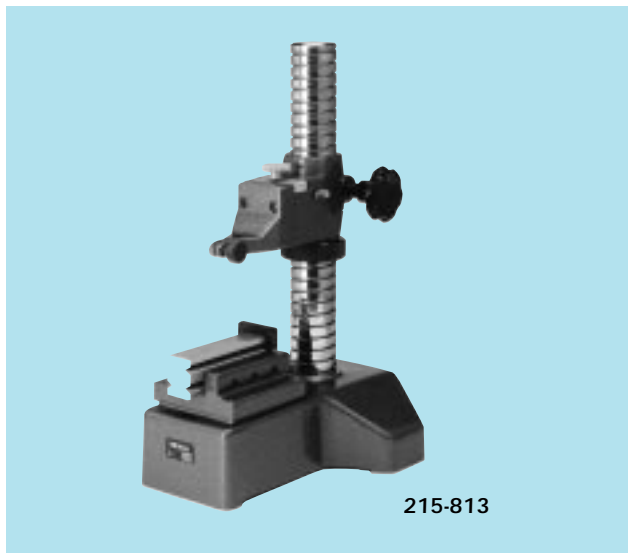
### Dimensions

Unit: mm



# Heavy Duty Comparator Stands

SERIES 215



215-813

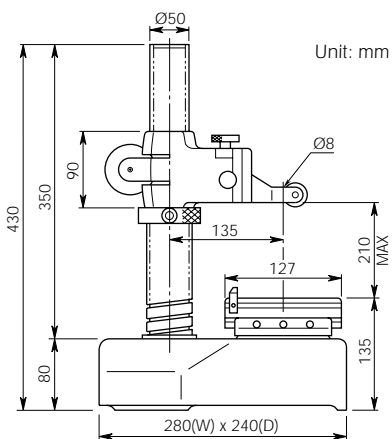
The Heavy Duty Comparator Stand has rigid construction and fine adjustments, which makes the stand suitable as a gaging stand for dial indicators, Linear Gages, and probes of Mu-Checkers. Its serrated anvil (**070673**) prevents the workpiece from sticking to it.

### SPECIFICATIONS

| Order No. | Vertical travel of gage holder | Applicable holding stem | Mass |
|-----------|--------------------------------|-------------------------|------|
| 215-813   | 210mm*                         | Ø8mm                    | 22kg |
| 215-804   | 210mm*                         | 3/8" DIA.               | 22kg |

\*With fine adjustment of 10mm

### Dimensions



### OPTIONAL ACCESSORIES

| Large Anvil                                 | Ball Anvil                            | Unit: mm |
|---|---------------------------------------|----------|
| <p>990015<br/>Size: 100x100mm, Serrated</p> | <p>990018<br/>Ball diameter: 3/8"</p> |          |

# Upright Gages

SERIES 547, 7



547-033

Standard accessory

**ABSOLUTE**

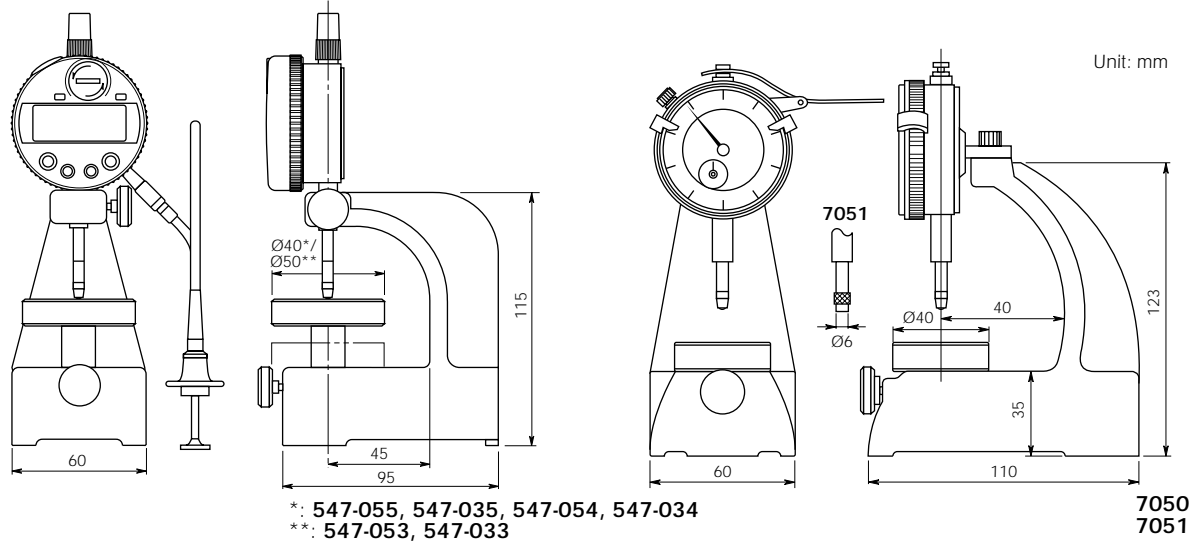


7050

### FEATURES

- The Digimatic Upright Gage offers multiple functions including GO/±NG judgment, and SPC data output.
- Compact and inexpensive gaging unit that consists of a dial indicator and a stand.
- Suitable for inspecting small parts on the shop floor.
- Anvil size: 40/50mm in diameter.
- Contact point: ø3mm carbide (metric)  
ø6mm flat point (**7051**)  
.118" DIA. ball (inch)

## Dimensions



## SPECIFICATIONS

### Digimatic Upright Gages

#### Metric

| Resolution | Max. workpiece height | Order No. | Measuring range | Accuracy | Mass  | Remarks                  |
|------------|-----------------------|-----------|-----------------|----------|-------|--------------------------|
| 0.001mm    | 30mm                  | 547-053   | 12mm            | ±0.003mm | 1.7kg | With Ø50mm ceramic anvil |
|            |                       | 547-055   | 12mm            | ±0.003mm | 1.7kg | With Ø40mm anvil         |
| 0.01mm     | 30mm                  | 547-054   | 12mm            | ±0.02mm  | 1.7kg | With Ø40mm anvil         |

#### Inch/Metric

| Resolution      | Max. workpiece height | Order No. | Measuring range | Accuracy | Mass      | Remarks                       |
|-----------------|-----------------------|-----------|-----------------|----------|-----------|-------------------------------|
| .00005"/0.001mm | 1.2" (30mm)           | 547-033   | .5" (12.7mm)    | ±.00015" | 2.64 lbs. | With 1.97" DIA. ceramic anvil |
|                 |                       | 547-035   | .5" (12.7mm)    | ±.00015" | 2.64 lbs. | With 1.57" DIA. anvil         |
| .0005"/0.01mm   | 1.2" (30mm)           | 547-034   | .5" (12.7mm)    | ±.001"   | 2.64 lbs. | With 1.57" DIA. anvil         |

### Dial Upright Gages

#### Metric

| Graduation | Max. workpiece height | Order No. | Range of dial indicator | Accuracy of dial indicator | Mass  | Remarks                  |
|------------|-----------------------|-----------|-------------------------|----------------------------|-------|--------------------------|
| 0.001mm    | 25mm                  | 7053      | 1mm                     | 0.003mm                    | 1.2kg | With Ø40mm ceramic anvil |
| 0.01mm     | 20mm                  | 7050      | 10mm                    | 0.012mm                    | 1.2kg | With Ø40mm ceramic anvil |
|            |                       | 7051      | 10mm                    | 0.012mm                    | 1.6kg | With Ø40mm ceramic anvil |
|            |                       | 7052      | 10mm                    | 0.012mm                    | 1.6kg | With Ø40mm ceramic anvil |

#### Inch

| Graduation | Max. workpiece height | Order No. | Range of dial indicator | Accuracy of dial indicator | Mass      | Remarks                       |
|------------|-----------------------|-----------|-------------------------|----------------------------|-----------|-------------------------------|
| .001"      | 1"                    | 7056      | 1"                      | ±.002"                     | 2.64 lbs. | With 1.97" DIA. ceramic anvil |

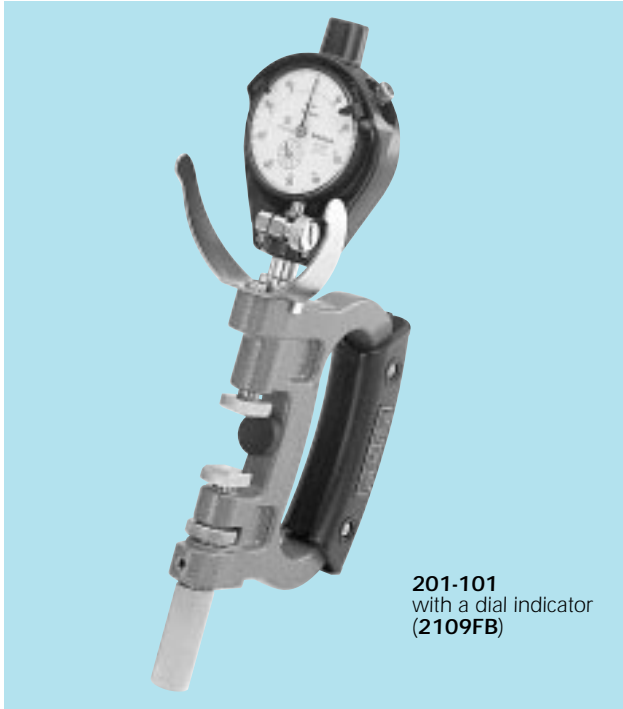
## OPTIONAL ACCESSORY

| Order No. | Description                  |
|-----------|------------------------------|
| 902190    | Large diameter anvil (Ø80mm) |
| 903526    | Ceramic anvil (Ø50mm)        |



# Dial Snap Gages

## SERIES 201



**201-101**  
with a dial indicator  
(2109FB)

### FEATURES

- Designed for quick GO/NO-GO judgment of diameters of cylinders and shafts in machining processes.
- Dial indicator is optional.
- Anvil retracting range: 2mm (.08")
- Wide (13.5x12mm), flat carbide anvils.
- Both front edges of the anvil are chamfered for easy insertion.

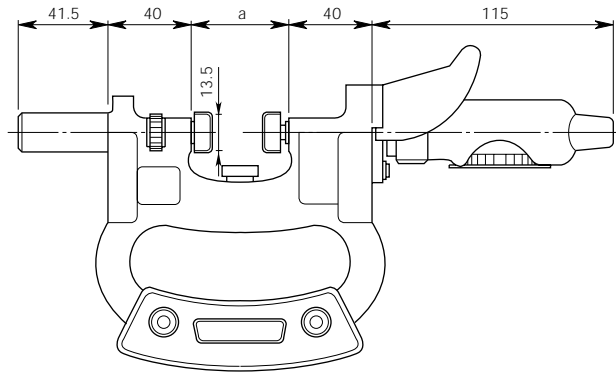
### SPECIFICATIONS

#### Metric

| Range       | Order No.      | Measuring force | Recommended dial indicator (Optional) |
|-------------|----------------|-----------------|---------------------------------------|
| 0 - 25mm    | <b>201-101</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 25 - 50mm   | <b>201-102</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 50 - 75mm   | <b>201-103</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 75 - 100mm  | <b>201-104</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 100 - 125mm | <b>201-105</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 125 - 150mm | <b>201-106</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 150 - 175mm | <b>201-107</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 175 - 200mm | <b>201-108</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 200 - 225mm | <b>201-109</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 225 - 250mm | <b>201-110</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 250 - 275mm | <b>201-111</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |
| 275 - 300mm | <b>201-112</b> | 12 to 18N       | <b>2109FB</b> (0.001mm)               |

### Dimensions

Unit: mm



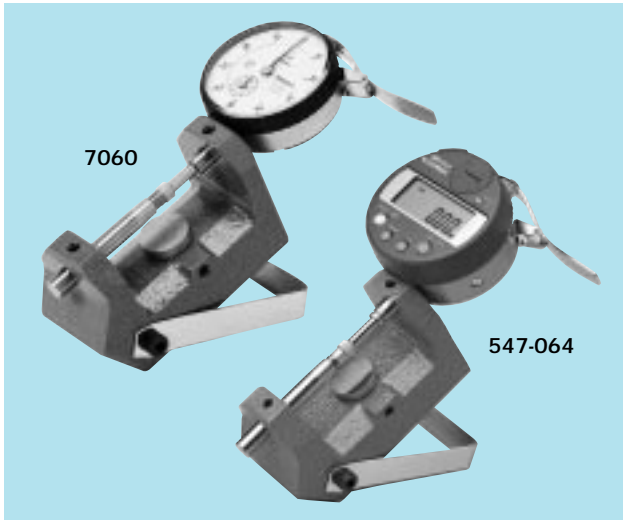
| Range       | a   | b   |
|-------------|-----|-----|
| 0 - 25mm    | 42  | 14  |
| 25 - 50mm   | 67  | 22  |
| 50 - 75mm   | 93  | 37  |
| 75 - 100mm  | 118 | 51  |
| 100 - 125mm | 144 | 67  |
| 125 - 150mm | 169 | 80  |
| 150 - 175mm | 194 | 93  |
| 175 - 200mm | 220 | 100 |
| 200 - 225mm | 245 | 111 |
| 225 - 250mm | 271 | 125 |
| 250 - 275mm | 296 | 140 |
| 275 - 300mm | 321 | 153 |

#### Inch

| Range     | Order No.      | Measuring force | Recommended dial indicator (Optional) |
|-----------|----------------|-----------------|---------------------------------------|
| 0 - 1"    | <b>201-151</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 1" - 2"   | <b>201-152</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 2" - 3"   | <b>201-153</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 3" - 4"   | <b>201-154</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 4" - 5"   | <b>201-155</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 5" - 6"   | <b>201-156</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 6" - 7"   | <b>201-157</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 7" - 8"   | <b>201-158</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 8" - 9"   | <b>201-159</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 9" - 10"  | <b>201-160</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 10" - 11" | <b>201-161</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |
| 11" - 12" | <b>201-162</b> | 12 to 18N       | <b>2803B-10</b> (.0001")              |

# Dial Bench Gage

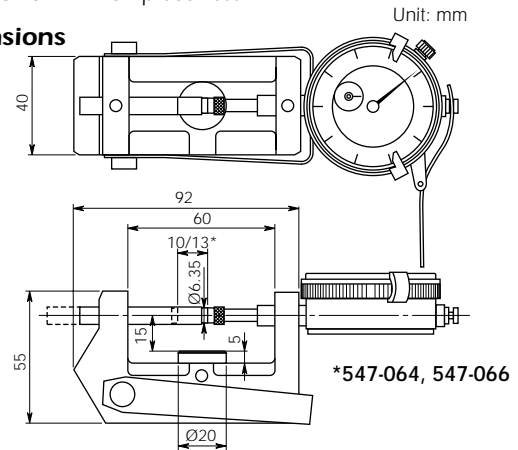
SERIES 547, 7



## FEATURES

- Compact and inexpensive gaging unit that consists of a dial indicator and a bench stand.
- Suitable for inspecting small parts on the shop floor.
- With Ø20mm workpiece rest.

## Dimensions



## SPECIFICATIONS

### Digimatic Bench Gages

#### Metric

| Resolution | Max. workpiece height | Order No. | Measuring range | Accuracy | Mass  | Remarks                        |
|------------|-----------------------|-----------|-----------------|----------|-------|--------------------------------|
| 0.01mm     | 25mm                  | 547-064   | 12mm            | ±0.02mm  | 1.0kg | With Ø6.3mm flat contact point |

#### Inch/Metric

| Resolution    | Max. workpiece height | Order No. | Measuring range | Accuracy | Mass     | Remarks                            |
|---------------|-----------------------|-----------|-----------------|----------|----------|------------------------------------|
| .0005"/0.01mm | 1" (25mm)             | 547-066   | .5" (12.7mm)    | ±.001"   | 2.2 lbs. | With .248" DIA. flat contact point |

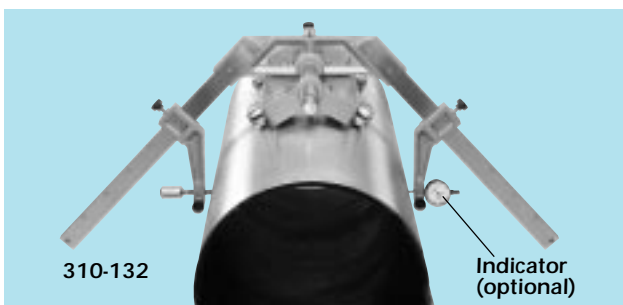
### Dial Bench Gage

#### Metric

| Graduation | Max. workpiece height | Order No. | Measuring range | Accuracy | Mass   | Remarks                        |
|------------|-----------------------|-----------|-----------------|----------|--------|--------------------------------|
| 0.01mm     | 20mm                  | 7060      | 10mm            | 0.012mm  | 0.95kg | With Ø6.3mm flat contact point |

# Roll Calipers

SERIES 310



## FEATURES

- The Roll Calipers is the most widely used instrument for checking the diameter and crown of rollers which have a great influence on many products such as metal, rubber and paper.
- Performs fast and accurate comparison measurements of roller diameter with the roller mounted on the machine tool.
- Various types of detectors (dial indicator, Digimatic indicator, Mu-Checker gage head, etc.) can be attached according to the required accuracy and workpiece size.

## SPECIFICATIONS

#### Metric

| Range          | Order No. | Mass  |
|----------------|-----------|-------|
| Ø500 - Ø1400mm | 310-131   | 30kg  |
| Ø400 - Ø1050mm | 310-132   | 20kg  |
| Ø275 - Ø825mm  | 310-133   | 9kg   |
| Ø200 - Ø600mm  | 310-134   | 7kg   |
| Ø100 - Ø450mm  | 310-135   | 4.5kg |

#### Inch

| Range      | Order No. | Mass      |
|------------|-----------|-----------|
| Ø20 - Ø56" | 310-141   | 66 lbs.   |
| Ø16 - Ø42" | 310-142   | 44 lbs.   |
| Ø11 - Ø32" | 310-143   | 19.8 lbs. |
| Ø8 - Ø24"  | 310-144   | 15.4 lbs. |
| Ø4 - Ø17"  | 310-145   | 9.9 lbs.  |



# IDC Series Digimatic Indicators

## SERIES 543

Calculation Type



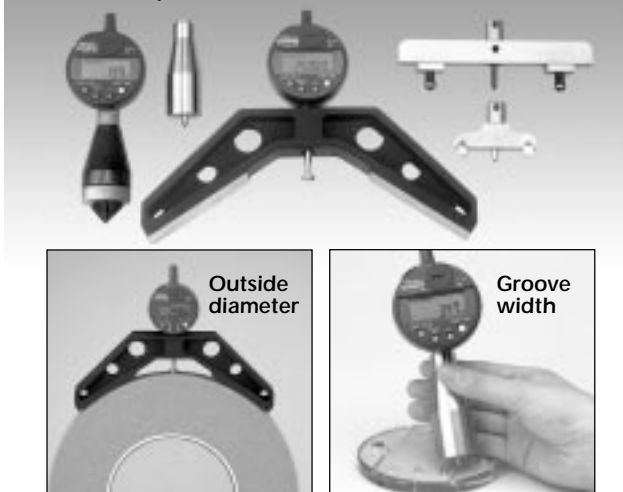
543-285B

A conventional Digimatic indicator simply displays a spindle displacement, but the Calculation-Type Digimatic indicator incorporates an internal calculation function in place of spindle displacement. With fixtures, measurements such as feeler, inside diameter and radius of curvature measurement can easily be obtained without the hassle of conversion tables or equivalents.

### FEATURES

- The Absolute Digimatic indicator performs internal calculations using the formula  $Ax+B+Cx^{-1}$  (assuming spindle displacement as  $x$ ) while the specified coefficients A, B and, C can be set with respect to the purpose of measurement or dimensions of the fixtures. This unique features allows you to read your measurements directly, without fumbling for conversions.

#### Fixture examples



- Various fixtures suited for individual workpieces can be prepared.
- Measuring accuracy is subject to fixture accuracy.

### Metric

| Resolution     | Range | Order No. (Flat-back) | Accuracy |
|----------------|-------|-----------------------|----------|
| 0.0002mm - 1mm | 12mm  | 543-285B              | 0.003mm  |

### Inch/Metric

| Resolution                   | Range | Order No. (Flat-back) | Accuracy |
|------------------------------|-------|-----------------------|----------|
| 0.0002mm - 1mm/ .5" (12.7mm) |       | 543-286B              | .00012"  |
| .00001" - .05"               |       | 543-287B              | .00012"  |

### Technical Data

Display: LCD

Functions: Origin-Set (preset), Zero-Set, power on/off, calculation, inch/mm conversion (inch/mm type only), SPC data output, counting direction switching, GO/±NG judgment

Battery: SR44 (1 pc.) (938882)

Battery life: Approx. 5000 hours in continuous use

Stem diameter: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

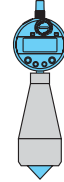
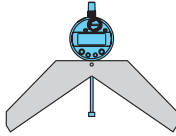
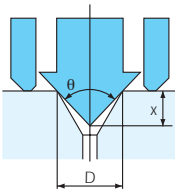
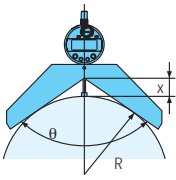
Contact point: Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)

Alarm: Low battery voltage, scale contamination, over-flow error, tolerance limit setting error

Operating temperature: 0°C to 40°C

### OPTIONAL ACCESSORIES

| Order No. | Description                          |
|-----------|--------------------------------------|
| 905338    | SPC cable (1m)                       |
| 905409    | SPC cable (2m)                       |
| 902011    | Spindle lifting lever (ISO/JIS type) |
| 540774    | Spindle lifting cable                |

|                                   |   |   |
|-----------------------------------|---|---|
| Fixture                           |  |  |
| Contact point                     | Cone  | —   |
| Dimension X: Spindle displacement |  |  |
| Measurement item                  | D= Diameter/Feeler/<br>Groove width<br>H= Countersink depth                           | 2R=Outside diameter   |
| Calculation formula               | D=Ax  | R=Ax  |
| Arithmetic Coefficient            | A   | $-2 \tan \frac{\theta}{2}$  |
|                                   | B   | 0   |
|                                   | C   | 0   |

## Absolute Digimatic Bore Gage

SERIES 511

with Max./Min. Value Holding Function



**ABSOLUTE**

511-521

This absolute Digimatic bore gages are exclusively designed for ID measurement.

### FEATURES

- The minimum value holding function provides the easy of detection of hole diameter.
- Up to three sets of master value and upper/lower tolerance value can be memorized.



### SPECIFICATIONS

#### Metric

| Resolution | Range      | Order No. | Probe depth | Mass |
|------------|------------|-----------|-------------|------|
| 0.001mm    | 45 - 100mm | 511-501   | 150mm       | 500g |

#### Inch/Metric

| Resolution | Range    | Order No. | Probe depth | Mass      |
|------------|----------|-----------|-------------|-----------|
| 0.001mm    | 1.8 - 4" | 511-521   | 6"          | 1.10 lbs. |

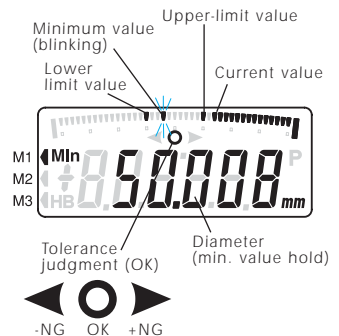
### Technical Data

- Display:** LCD
- Functions:** Origin-Set (preset), Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, GO/±NG tolerance judgment
- Battery:** SR44 (1 pc.) (938882)
- Battery life:** Approx. 9 months for normal use
- Alarm:** Low battery voltage, scale contamination, over-flow error, tolerance limit setting error
- Dust/Water protection level:** Conforming to IP53
- Operating temperature:** 0°C to 40°C

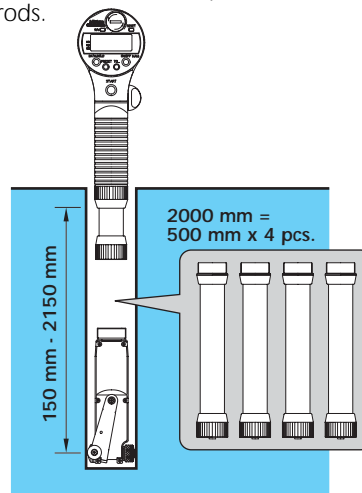
### OPTIONAL ACCESSORIES

| Order No.   | Description                              |
|-------------|--|
| 21DZA089:   | Extension rod 250 mm/(10")               |
| 21DZA081:   | Extension rod 500 mm/(20")               |
| 516-118-10: | Origin setup rectangular gauge block set |
| 516-119-10: | Origin setup square gauge block set      |
| 905338:     | SPC cable (1m)                           |
| 905409:     | SPC cable (2m)                           |

- An analog bar indicator is integrated to enhance the intuition in reading.
- GO/±NG judgment is performed by setting the upper and lower tolerances.



- Up to four rods can be used (500 mm (20") extension rod). The unit is also compatible with 250 mm (10") extension rods.





# IDC Series Digimatic Indicators

## SERIES 543

Exclusively Designed for Bore Gages



543-266B

**ABSOLUTE**

This IDC Series Digimatic Indicators are exclusively designed for ID measurement.

### FEATURES

- The minimum value holding function provides the easy of detection of hole diameter.

Minimum value holding for easy measurement



- An analog bar indicator is integrated to enhance the intuition in reading.
- GO/±NG judgment is performed by setting the upper and lower tolerances.
- Up to three sets of master value and upper/lower tolerance value can be memorized.

### SPECIFICATIONS

#### Metric

| Resolution | Range | Order No. (Flat-back) | Accuracy |
|------------|-------|-----------------------|----------|
| 0.001mm    | 12mm  | 543-264B              | 0.003mm  |

#### Inch / Metric

| Resolution      | Range        | Order No. (Flat-back) | Accuracy |
|-----------------|--------------|-----------------------|----------|
| .00005"/0.001mm | .5" (12.7mm) | 543-265B              | .00012"  |

### Technical Data

**Display:** LCD

**Functions:** Origin-Set (preset), Zero-Set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, counting direction switching, GO/±NG tolerance judgment

**Battery:** SR44 (1 pc.) (938882)

**Battery life:** Approx. 5000 hours in continuous use

**Stem diameter:** 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

**Contact point:** Carbide ball with M2.5x0.45 thread (ISO/JIS type) or steel ball with #4-48UNF thread (ANSI/AGD type)

**Alarm:** Low battery voltage, scale contamination, over-flow error, tolerance limit setting error

**Dust/Water protection level:** Conforming to IP42

**Operating temperature:** 0°C to 40°C

### OPTIONAL ACCESSORIES

| Order No. | Description    |
|-----------|----------------|
| 905338    | SPC cable (1m) |
| 905409    | SPC cable (2m) |



Installed on bore gage probe (526-160)

Installed on bore gage probe (511-127)

### BORE GAGE PROBES (Optional)

| Range         | Order No. |
|---------------|-----------|
| 0.95 - 1.55mm | 526-170   |
| 1.5 - 4.0mm   | 526-160   |
| 3.7 - 7.3mm   | 526-150   |
| 7.0 - 10.0mm  | 526-101   |
| 10 - 18mm     | 526-102   |
| 18 - 35mm     | 511-126   |
| 35 - 60mm     | 511-127   |
| 50 - 150mm    | 511-132   |



## Bore Gages

### SERIES 526

for Extra Small Holes



These Bore Gages measure diameters of small holes. The radial displacement of split-ball contact is converted to axial displacement of measuring rod, which is shown on the dial indicator.

#### FEATURES

- Optional stand (215-120M) is available for efficient measurement of multiple small holes.



#### SPECIFICATIONS

##### Bore Gages with Standard Dial Indicator

###### Metric

| Graduation | Range         | Order No. | Probe depth  | Mass |
|------------|---------------|-----------|--------------|------|
| 0.001mm    | 0.95 - 1.55mm | 526-172*  | 11.5mm       | 326g |
|            | 1.5 - 4mm     | 526-162*  | 17.5, 22.5mm | 385g |
|            | 3.7 - 7.3mm   | 526-152*  | 32mm         | 338g |
|            | 7 - 10mm      | 526-124   | 56mm         | 300g |
|            | 10 - 18mm     | 526-125   | 62mm         | 366g |
| 0.01mm     | 0.95 - 1.55mm | 526-173*  | 11.5mm       | 326g |
|            | 1.5 - 4mm     | 526-163*  | 17.5, 22.5mm | 385g |
|            | 3.7 - 7.3mm   | 526-153*  | 32mm         | 338g |
|            | 7 - 10mm      | 526-126   | 56mm         | 300g |
|            | 10 - 18mm     | 526-127   | 62mm         | 366g |

###### Inch

| Graduation | Range         | Order No. | Probe depth | Mass     |
|------------|---------------|-----------|-------------|----------|
| .0001"     | .037" - .061" | 526-176*  | .45"        | .72 lbs. |
|            | .06" - .155"  | 526-166*  | .68", .88"  | .85 lbs. |
|            | .145" - .29"  | 526-156*  | 1.25"       | .74 lbs. |
|            | .3" - .4"     | 526-122   | 2.2"        | .69 lbs. |
|            | .4" - .7"     | 526-123   | 2.4"        | .84 lbs. |
| .0005"     | .3" - .4"     | 526-119   | 2.2"        | .69 lbs. |
|            | .4" - .7"     | 526-120   | 2.4"        | .84 lbs. |

\*Provided with Setting Rings for each probe size.

##### Bore Gages with High Accuracy Dial Indicator (Hicator-II)

###### Metric

| Graduation | Range         | Order No. | Probe depth  | Mass |
|------------|---------------|-----------|--------------|------|
| 0.001mm    | 0.95 - 1.55mm | 526-171   | 11.5mm       | 237g |
|            | 1.5 - 4mm     | 526-161   | 17.5, 22.5mm | 249g |
|            | 3.7 - 7.3mm   | 526-151   | 32mm         | 261g |
|            | 7 - 10mm      | 526-140   | 56mm         | 331g |
|            | 10 - 18mm     | 526-141   | 62mm         | 466g |



## Bore Gages

SERIES 511  
for Small Holes



511-211

511-204

### FEATURES

- Its interchangeable anvils are made of alloyed steel.
- The dial indicator is fully protected by a rugged cover.

### SPECIFICATIONS

#### Metric

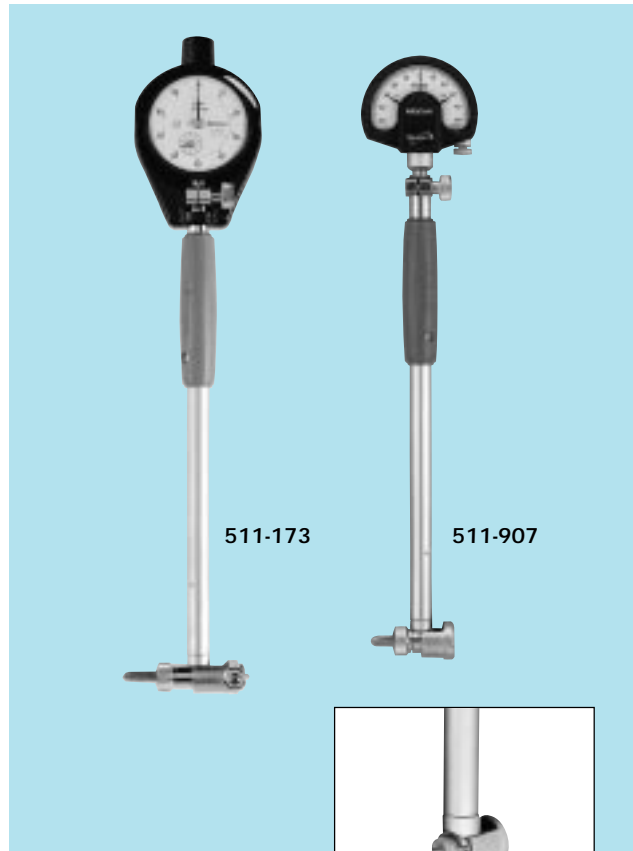
| Graduation | Range       | Order No. | Probe depth | Mass |
|------------|-------------|-----------|-------------|------|
| 0.001mm    | 6 - 10mm    | 511-210   | 47mm        | 255g |
|            | 10 - 18.5mm | 511-203   | 100mm       | 268g |
| 0.01mm     | 6 - 10mm    | 511-211   | 47mm        | 255g |
|            | 10 - 18.5mm | 511-204   | 100mm       | 268g |

#### Inch

| Graduation | Range      | Order No. | Probe depth | Mass     |
|------------|------------|-----------|-------------|----------|
| .0001"     | .24" - .4" | 511-212   | 2"          | .57 lbs. |
|            | .4" - .74" | 511-206   | 4"          | .61 lbs. |
| .0005"     | .24" - .4" | 511-213   | 2"          | .57 lbs. |
|            | .4" - .74" | 511-207   | 4"          | .61 lbs. |

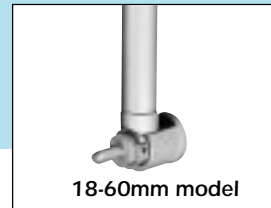
## Bore Gages

SERIES 511

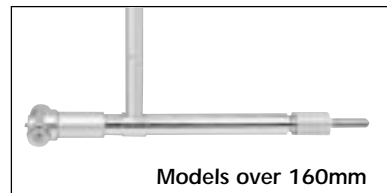


511-173

511-907



18-60mm model



Models over 160mm

Mitutoyo offers a complete selection of Bore Gages, all of them with interchangeable anvils and necessary accessories to perform close tolerance I.D. measurements. Some of larger Bore Gages are equipped with a unique self-centering device which facilitates accurate measurement of the bore.

### FEATURES

- Most popular Bore Gages.
- Carbide-tipped contact points for durability.
- The dial indicator is fully protected by a rugged cover.
- Optional extension rods can be attached for measuring deep holes.
- Economy Bore Gage Sets are also available.

## SPECIFICATIONS

### Bore Gages with Standard Dial Indicator

#### Metric

| Graduation | Range       | Order No. | Probe depth | Mass  |
|------------|-------------|-----------|-------------|-------|
| 0.001mm    | 18 - 35mm   | 511-167   | 100mm       | 332g  |
|            | 35 - 60mm   | 511-168   | 150mm       | 426g  |
|            | 50 - 100mm  | 511-169   | 150mm       | 509g  |
|            | 50 - 150mm  | 511-170   | 150mm       | 544g  |
|            | 100 - 160mm | 511-178   | 150mm       | 610g  |
|            | 160 - 250mm | 511-179   | 250mm       | 1060g |
| 0.01mm     | 250 - 400mm | 511-180   | 250mm       | 1330g |
|            | 18 - 35mm   | 511-171   | 100mm       | 332g  |
|            | 35 - 60mm   | 511-172   | 150mm       | 426g  |
|            | 50 - 100mm  | 511-173   | 150mm       | 509g  |
|            | 50 - 150mm  | 511-174   | 150mm       | 544g  |
|            | 100 - 160mm | 511-175   | 150mm       | 610g  |
|            | 160 - 250mm | 511-176   | 250mm       | 1060g |
|            | 250 - 400mm | 511-177   | 250mm       | 1330g |

#### Inch

| Graduation | Range       | Order No. | Probe depth | Mass      |
|------------|-------------|-----------|-------------|-----------|
| .0001"     | .7" - 1.4"  | 511-163   | 4"          | .76 lbs.  |
|            | 1.4" - 2.5" | 511-164   | 6"          | .91 lbs.  |
|            | 2" - 4"     | 511-165   | 6"          | 1.10 lbs. |
|            | 2" - 6"     | 511-166   | 6"          | 1.17 lbs. |
|            | 4" - 6.5"   | 511-187   | 6"          | 1.38 lbs. |
|            | 6.5" - 10"  | 511-188   | 10"         | 2.38 lbs. |
| .0005"     | 10" - 16"   | 511-189   | 10"         | 3.04 lbs. |
|            | .7" - 1.4"  | 511-159   | 4"          | .76 lbs.  |
|            | 1.4" - 2.5" | 511-160   | 6"          | .91 lbs.  |
|            | 2" - 4"     | 511-161   | 6"          | 1.10 lbs. |
|            | 2" - 6"     | 511-162   | 6"          | 1.17 lbs. |
|            | 4" - 6.5"   | 511-184   | 6"          | 1.38 lbs. |
|            | 6.5" - 10"  | 511-185   | 10"         | 2.38 lbs. |
|            | 10" - 16"   | 511-186   | 10"         | 3.04 lbs. |

### Bore Gage Sets with Standard Dial Indicator

#### Metric

| Graduation | Range      | Order No. | Number of probes | Mass |
|------------|------------|-----------|------------------|------|
| 0.001mm    | 18 - 150mm | 511-902   | 3                | 954g |
| 0.01mm     | 18 - 150mm | 511-901   | 3                | 954g |

#### Inch

| Graduation | Range    | Order No. | Number of probes | Mass      |
|------------|----------|-----------|------------------|-----------|
| .0001"     | .7" - 6" | 511-912   | 3                | 2.10 lbs. |
| .0005"     | .7" - 6" | 511-911   | 3                | 2.10 lbs. |

### Bore Gage Sets with High Accuracy Dial Indicator (Hicator-II)

#### Metric

| Graduation | Range      | Order No. | Number of probes | Mass |
|------------|------------|-----------|------------------|------|
| 0.001mm    | 18 - 150mm | 511-907   | 3                | 829g |

## OPTIONAL ACCESSORIES

| Order No. | Description  |
|-----------|--|
| 953549    | 125mm Extension Rod for 18-35mm (.7"-1.4") models    |
| 953552    | 125mm Extension Rod for 35-160mm (1.4"-6.5") models  |
| 953557    | 125mm Extension Rod for 160-400mm (6.5"-16") models  |
| 953550    | 250mm Extension Rod for 18-35mm (.7"-1.4") models    |
| 953553    | 250mm Extension Rod for 35-160mm (1.4"-6.5") models  |
| 952361    | 250mm Extension Rod for 160-400mm (6.5"-16") models  |
| 953551    | 500mm Extension Rod for 18-35mm (.7"-1.4") models    |
| 953554    | 500mm Extension Rod for 35-160mm (1.4"-6.5") models  |
| 953558    | 500mm Extension Rod for 160-400mm (6.5"-16") models  |
| 953555    | 750mm Extension Rod for 35-160mm (1.4"-6.5") models  |
| 953559    | 750mm Extension Rod for 160-400mm (6.5"-16") models  |
| 953556    | 1000mm Extension Rod for 35-160mm (1.4"-6.5") models |
| 953560    | 1000mm Extension Rod for 160-400mm (6.5"-16") models |



Extension Rod



## Bore Gages

SERIES 511  
Short Leg Type



511-461

511-463

### FEATURES

- Compact and lightweight because of the short length below the grip.
- Carbide-tipped contact point for durability.

### SPECIFICATIONS

#### Metric

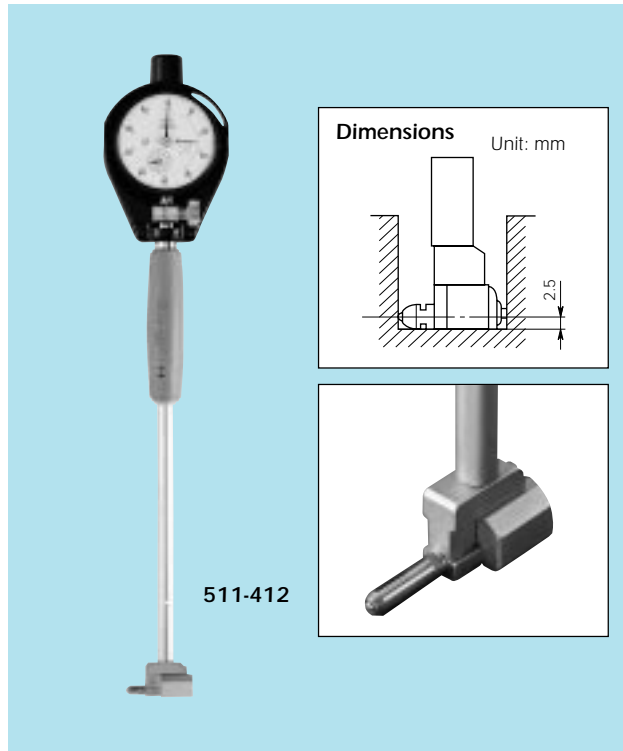
| Graduation | Range      | Order No. | Probe depth | Mass |
|------------|------------|-----------|-------------|------|
| 0.001mm    | 18 - 35mm  | 511-471   | 50mm        | 315g |
|            | 35 - 60mm  | 511-472   | 50mm        | 386g |
|            | 50 - 100mm | 511-473   | 50mm        | 469g |
|            | 50 - 150mm | 511-474   | 50mm        | 504g |
| 0.01mm     | 18 - 35mm  | 511-461   | 50mm        | 315g |
|            | 35 - 60mm  | 511-462   | 50mm        | 386g |
|            | 50 - 100mm | 511-463   | 50mm        | 469g |
|            | 50 - 150mm | 511-464   | 50mm        | 504g |

#### Inch

| Graduation | Range       | Order No. | Probe depth | Mass      |
|------------|-------------|-----------|-------------|-----------|
| .0001"     | .7" - 1.4"  | 511-491   | 2"          | .67 lbs.  |
|            | 1.4" - 2.5" | 511-492   | 2"          | .82 lbs.  |
|            | 2" - 4"     | 511-493   | 2"          | 1.02 lbs. |
|            | 2" - 6"     | 511-494   | 2"          | 1.08 lbs. |
|            | 4" - 6.5"   | 511-495   | 2"          | 1.29 lbs. |
| .0005"     | .7" - 1.4"  | 511-481   | 2"          | .67 lbs.  |
|            | 1.4" - 2.5" | 511-482   | 2"          | .82 lbs.  |
|            | 2" - 4"     | 511-483   | 2"          | 1.02 lbs. |
|            | 2" - 6"     | 511-484   | 2"          | 1.08 lbs. |
|            | 4" - 6.5"   | 511-485   | 2"          | 1.29 lbs. |

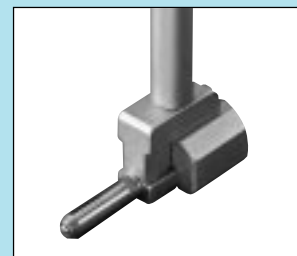
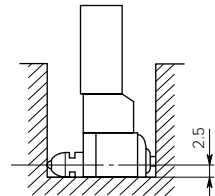
## Bore Gages

SERIES 511  
for Blind Holes



511-412

Dimensions Unit: mm



### FEATURES

- Can measure ID at position close to the bottom of blind holes.

### SPECIFICATIONS

#### Metric

| Graduation | Range      | Order No. | Probe depth | Mass |
|------------|------------|-----------|-------------|------|
| 0.001mm    | 15 - 35mm  | 511-421   | 150mm       | 740g |
|            | 35 - 60mm  | 511-422   | 150mm       | 765g |
|            | 50 - 100mm | 511-423   | 150mm       | 800g |
|            | 50 - 150mm | 511-424   | 150mm       | 820g |
| 0.01mm     | 15 - 35mm  | 511-411   | 150mm       | 740g |
|            | 35 - 60mm  | 511-412   | 150mm       | 765g |
|            | 50 - 100mm | 511-413   | 150mm       | 800g |
|            | 50 - 150mm | 511-414   | 150mm       | 820g |

#### Inch

| Graduation | Range       | Order No. | Probe depth | Mass      |
|------------|-------------|-----------|-------------|-----------|
| .0001"     | .6" - 1.4"  | 511-441   | 6"          | 1.63 lbs. |
|            | 1.4" - 2.4" | 511-442   | 6"          | 1.68 lbs. |
|            | 2" - 4"     | 511-443   | 6"          | 1.76 lbs. |
|            | 2" - 6"     | 511-444   | 6"          | 1.80 lbs. |
|            | 2" - 6"     | 511-444   | 6"          | 1.80 lbs. |
| .0005"     | .6" - 1.4"  | 511-431   | 6"          | 1.63 lbs. |
|            | 1.4" - 2.4" | 511-432   | 6"          | 1.68 lbs. |
|            | 2" - 4"     | 511-433   | 6"          | 1.76 lbs. |
|            | 2" - 6"     | 511-434   | 6"          | 1.80 lbs. |

## Bore Gages

### SERIES 511

with Micrometer Head



511-334

511-314

### SPECIFICATIONS

#### Metric

| Graduation | Range       | Order No. | Probe depth | Mass  |
|------------|-------------|-----------|-------------|-------|
| 0.001mm    | 35 - 60mm   | 511-343   | 150mm       | 400g  |
|            | 60 - 100mm  | 511-333   | 150mm       | 455g  |
|            | 100 - 160mm | 511-311   | 150mm       | 575g  |
|            | 150 - 250mm | 511-313   | 250mm       | 930g  |
|            | 250 - 400mm | 511-315   | 250mm       | 1200g |
|            | 400 - 600mm | 511-317   | 250mm       | 1500g |
|            | 600 - 800mm | 511-327   | 250mm       | 1900g |
| 0.01mm     | 35 - 60mm   | 511-344   | 150mm       | 400g  |
|            | 60 - 100mm  | 511-334   | 150mm       | 455g  |
|            | 100 - 160mm | 511-312   | 150mm       | 575g  |
|            | 150 - 250mm | 511-314   | 250mm       | 930g  |
|            | 250 - 400mm | 511-316   | 250mm       | 1200g |
|            | 400 - 600mm | 511-318   | 250mm       | 1500g |
|            | 600 - 800mm | 511-328   | 250mm       | 1900g |

#### Inch

| Graduation | Range       | Order No. | Probe depth | Mass      |
|------------|-------------|-----------|-------------|-----------|
| .0001"     | 1.4" - 2.5" | 511-346   | 6"          | .91 lbs.  |
|            | 2.4" - 4"   | 511-336   | 6"          | .98 lbs.  |
|            | 4" - 6.4"   | 511-326   | 6"          | 1.54 lbs. |
|            | 6" - 10"    | 511-320   | 10"         | 2.05 lbs. |
|            | 10" - 16"   | 511-322   | 10"         | 2.31 lbs. |
|            | 16" - 24"   | 511-324   | 10"         | 3.30 lbs. |
|            | 24" - 32"   | 511-330   | 10"         | 4.18 lbs. |
| .0005"     | 1.4" - 2.5" | 511-345   | 6"          | .91 lbs.  |
|            | 2.4" - 4"   | 511-335   | 6"          | .98 lbs.  |
|            | 4" - 6.4"   | 511-325   | 6"          | 1.54 lbs. |
|            | 6" - 10"    | 511-319   | 10"         | 2.05 lbs. |
|            | 10" - 16"   | 511-321   | 10"         | 2.31 lbs. |
|            | 16" - 24"   | 511-323   | 10"         | 3.30 lbs. |
|            | 24" - 32"   | 511-329   | 10"         | 4.18 lbs. |

### FEATURES

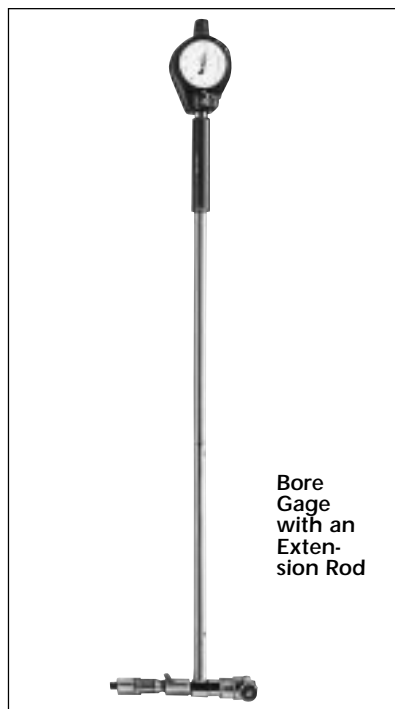
- Interchangeable anvil is attached to a micrometer head for accurate dimensional setting.
- Wide measuring range with sub-anvils.
- Carbide ball contact point for durability.
- Extension rods (optional) can be attached for measuring deep holes.
- Optional Setting Rings offer the best method of zero-setting Bore Gages.



Setting Ring  
(See page 217.)

### OPTIONAL ACCESSORIES

| Order No. | Description  |
|-----------|--|
| 953549    | 125mm Extension Rod for 35-60mm (1.4"-2.5") models   |
| 953552    | 125mm Extension Rod for 60-160mm (2.4"-6.4") models  |
| 953557    | 125mm Extension Rod for 150-800mm (6"-32") models    |
| 953550    | 250mm Extension Rod for 35-60mm (1.4"-2.5") models   |
| 953553    | 250mm Extension Rod for 60-160mm (2.4"-6.4") models  |
| 952361    | 250mm Extension Rod for 150-800mm (6"-32") models    |
| 953551    | 500mm Extension Rod for 35-60mm (1.4"-2.5") models   |
| 953554    | 500mm Extension Rod for 60-160mm (2.4"-6.4") models  |
| 953558    | 500mm Extension Rod for 150-800mm (6"-32") models    |
| 953555    | 750mm Extension Rod for 60-160mm (2.4"-6.4") models  |
| 953559    | 750mm Extension Rod for 150-800mm (6"-32") models    |
| 953556    | 1000mm Extension Rod for 60-160mm (2.4"-6.4") models |
| 953560    | 1000mm Extension Rod for 150-800mm (6"-32") models   |



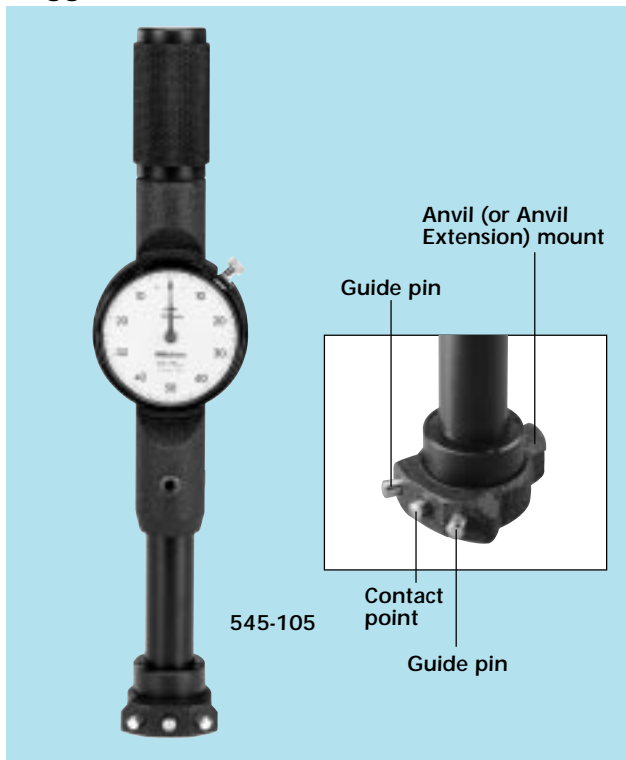
Bore Gage with an Extension Rod



# Dial Bore Gages

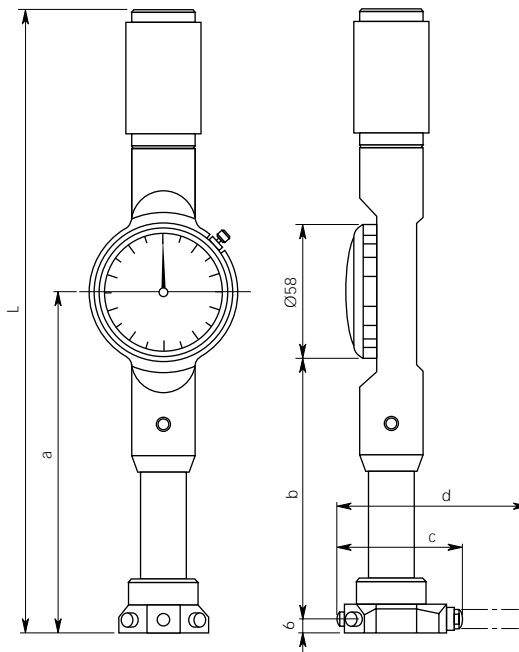
## SERIES 545

Rugged, Production-Line Tools



### Dimensions

Unit: mm



| Range      | L   | a   | b   | c  | d   |
|------------|-----|-----|-----|----|-----|
| 35 - 50mm  | 240 | 123 | 88  | 35 | 50  |
| 50 - 75mm  | 265 | 148 | 113 | 50 | 75  |
| 75 - 150mm | 305 | 188 | 153 | 75 | 150 |

### FEATURES

- Carbide-tipped contact point for excellent durability.
- Wide range of measurements with interchangeable Anvil Extensions (screw-in type).
- Carbide-tipped anvil is optional (901484).
- Two guide pins ensure high repeatability of measurements.
- Easy zero adjustment because the Dial Bore Gage can stand upright.
- Optional interchangeable rods provide a variety of probe depths.

### SPECIFICATIONS

#### Metric

| Graduation | Range      | Order No. | Probe depth | Mass |
|------------|------------|-----------|-------------|------|
| 0.001mm    | 35 - 50mm  | 545-114   | 85mm        | 480g |
|            | 50 - 75mm  | 545-115   | 115mm       | 540g |
|            | 75 - 150mm | 545-116   | 150mm       | 650g |
| 0.01mm     | 35 - 50mm  | 545-104   | 85mm        | 480g |
|            | 50 - 75mm  | 545-105   | 115mm       | 540g |
|            | 75 - 150mm | 545-106   | 150mm       | 650g |

#### Inch

| Graduation | Range           | Order No. | Probe depth | Mass      |
|------------|-----------------|-----------|-------------|-----------|
| .0001"     | 1.475" - 2.075" | 545-134   | 3.5"        | 1.06 lbs. |
|            | 1.975" - 3.075" | 545-135   | 4.5"        | 1.19 lbs. |
|            | 2.975" - 6.075" | 545-136   | 6"          | 1.43 lbs. |
| .0005"     | 1.475" - 2.075" | 545-124   | 3.5"        | 1.06 lbs. |
|            | 1.975" - 3.075" | 545-125   | 4.5"        | 1.19 lbs. |
|            | 2.975" - 6.075" | 545-126   | 6"          | 1.43 lbs. |

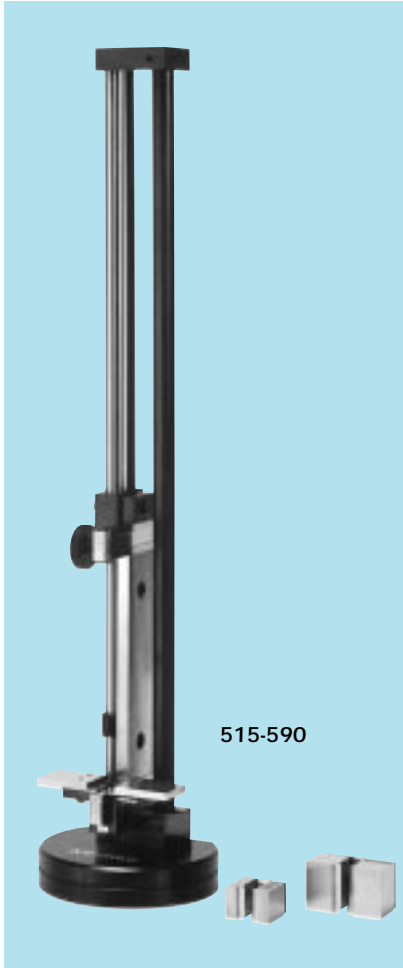
### OPTIONAL ACCESSORIES

| Order No. | Description                              |
|-----------|--|
| 901484    | Carbide-tipped Anvil                     |
| 901529    | Interchangeable Rod (Probe depth: 85mm)  |
| 901530    | Interchangeable Rod (Probe depth: 115mm) |
| 901940    | Interchangeable Rod (Probe depth: 150mm) |
| 901531    | Interchangeable Rod (Probe depth: 265mm) |
| 901532    | Interchangeable Rod (Probe depth: 315mm) |
| 901533    | Interchangeable Rod (Probe depth: 390mm) |



## Bore Gage Zero Checker

SERIES 515



The Bore Gage Zero Checker allows easy zero adjustment of dial bore gages with ranges of 18mm (.7") through 400mm (16") using gauge blocks.

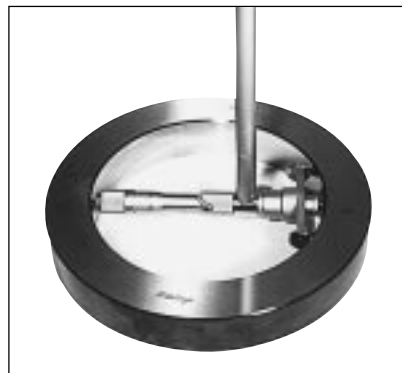
### SPECIFICATIONS

| Order No. | Applicable range       |
|-----------|------------------------|
| 515-590   | 18 - 400mm (.7" - 16") |



## Setting Rings

SERIES 177



### FEATURES

- Used for quick zero adjustment of dial bore gages.
- See page 141 for smaller sizes of Setting Rings than 6mm (.24").
- Ceramic Setting Rings are also available.

### Technical Data

**Tolerance between the nominal size and the actual diameter:**

- ±0.01mm for Ø6 - 45mm setting rings
- ±0.02mm for Ø50 - 300mm setting rings
- ±.0004" for .24" - 1.8" DIA. setting rings
- ±.0008" for 2" - 12" DIA. setting rings

**Cylindricity:**

- 1.0µm for Ø6 - 60mm setting rings
- 1.5µm for Ø62 - 90mm setting rings
- 2.0µm for Ø100 - 150mm setting rings
- 2.5µm for Ø175 - 225mm setting rings
- 3.0µm for Ø250 - 300mm setting rings
- .00004" for .24" - 2.4" DIA. setting rings
- .00006" for 2.5" - 3.6" DIA. setting rings
- .00008" for 4" - 6" DIA. setting rings
- .00010" for 7" - 9" DIA. setting rings
- .00012" for 10" - 12" DIA. setting rings

### SPECIFICATION

| Metric |           |          |        |
|--------|-----------|----------|--------|
| Size   | Order No. | Accuracy | Mass   |
| 6mm    | 177-267   | ±1.5µm   | 30g    |
| 6.5mm  | 177-271   | ±1.5µm   | 30g    |
| 7mm    | 177-275   | ±1.5µm   | 30g    |
| 8mm    | 177-125   | ±1.5µm   | 60g    |
| 10mm   | 177-126   | ±1.5µm   | 58g    |
| 12mm   | 177-284   | ±1.5µm   | 62g    |
| 14mm   | 177-132   | ±1.5µm   | 110g   |
| 16mm   | 177-177   | ±1.5µm   | 110g   |
| 17mm   | 177-133   | ±1.5µm   | 190g   |
| 20mm   | 177-286   | ±1.5µm   | 110g   |
| 25mm   | 177-139   | ±1.5µm   | 204g   |
| 30mm   | 177-288   | ±1.5µm   | 400g   |
| 35mm   | 177-140   | ±1.5µm   | 364g   |
| 40mm   | 177-290   | ±1.5µm   | 330g   |
| 45mm   | 177-178   | ±1.5µm   | 490g   |
| 50mm   | 177-146   | ±1.5µm   | 580g   |
| 60mm   | 177-292   | ±1.5µm   | 1.14kg |
| 62mm   | 177-314   | ±1.5µm   | 1.05kg |
| 70mm   | 177-147   | ±1.5µm   | 0.93kg |
| 75mm   | 177-316   | ±1.5µm   | 1.54kg |
| 80mm   | 177-294   | ±1.5µm   | 1.42kg |
| 87mm   | 177-318   | ±1.5µm   | 1.85kg |
| 90mm   | 177-148   | ±1.5µm   | 1.75kg |
| 100mm  | 177-296   | ±1.5µm   | 2.38kg |
| 125mm  | 177-298   | ±2.5µm   | 5.5kg  |
| 150mm  | 177-300   | ±2.5µm   | 6.1kg  |
| 175mm  | 177-302   | ±2.5µm   | 6.7kg  |
| 200mm  | 177-304   | ±2.5µm   | 10.4kg |
| 225mm  | 177-306   | ±2.5µm   | 11.4kg |
| 250mm  | 177-308   | ±2.5µm   | 12.1kg |
| 275mm  | 177-310   | ±2.5µm   | 17kg   |
| 300mm  | 177-312   | ±2.5µm   | 17.8kg |

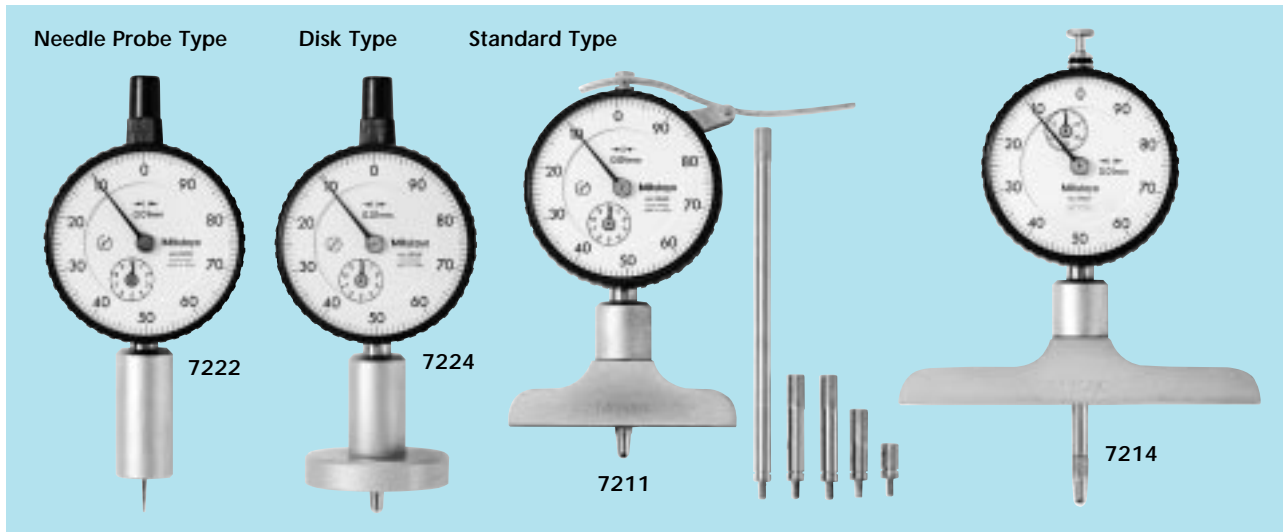
| Inch  |           |          |            |
|-------|-----------|----------|------------|
| Size  | Order No. | Accuracy | Mass       |
| .24"  | 177-207   | ±.00006" | .055lbs.   |
| .275" | 177-281   | ±.00006" | .055lbs.   |
| .35"  | 177-179   | ±.00006" | .127lbs.   |
| .425" | 177-293   | ±.00006" | .123lbs.   |
| .50"  | 177-180   | ±.00006" | .116lbs.   |
| .60"  | 177-181   | ±.00006" | .162lbs.   |
| .65"  | 177-182   | ±.00006" | .242lbs.   |
| .70"  | 177-183   | ±.00006" | .242lbs.   |
| .80"  | 177-287   | ±.00006" | .220lbs.   |
| 1.0"  | 177-184   | ±.00006" | .440lbs.   |
| 1.2"  | 177-289   | ±.00006" | .836lbs.   |
| 1.4"  | 177-185   | ±.00006" | .770lbs.   |
| 1.6"  | 177-291   | ±.00006" | .682lbs.   |
| 1.8"  | 177-186   | ±.00006" | 1.034lbs.  |
| 2.0"  | 177-187   | ±.00006" | 1.254lbs.  |
| 2.4"  | 177-293   | ±.00006" | 2.420lbs.  |
| 2.5"  | 177-315   | ±.00006" | 2.200lbs.  |
| 2.8"  | 177-188   | ±.00006" | 2.024lbs.  |
| 3.0"  | 177-317   | ±.00006" | 3.300lbs.  |
| 3.2"  | 177-295   | ±.00006" | 3.080lbs.  |
| 3.5"  | 177-319   | ±.00006" | 3.960lbs.  |
| 3.6"  | 177-189   | ±.00006" | 3.740lbs.  |
| 4.0"  | 177-297   | ±.00006" | 5.060lbs.  |
| 5.0"  | 177-299   | ±.00010" | 11.660lbs. |
| 6.0"  | 177-301   | ±.00010" | 12.980lbs. |
| 7.0"  | 177-303   | ±.00010" | 14.740lbs. |
| 8.0"  | 177-305   | ±.00010" | 22.000lbs. |
| 9.0"  | 177-307   | ±.00010" | 23.980lbs. |
| 10.0" | 177-309   | ±.00010" | 26.180lbs. |
| 11.0" | 177-311   | ±.00010" | 35.860lbs. |
| 12.0" | 177-313   | ±.00010" | 37.840lbs. |





# Dial Depth Gages

## SERIES 7



### FEATURES

- Wide probing range is available with the supplied extension rod.
- Contact point is made of alloyed steel.
- Bottom surface of the base is hardened, ground and lapped for highest degree of flatness.

### SPECIFICATIONS

#### Metric

| Graduation | Range       | Order No.          | Spindle stroke | Mass | Remarks                     |
|------------|-------------|--------------------|----------------|------|-----------------------------|
| 0.01mm     | 0 - 10mm    | 7210 <sup>†</sup>  | 10mm           | 205g | w/Angular base (40x16mm)    |
|            |             | 7222 <sup>†</sup>  | 10mm           | 164g | w/Disk base (Ø16mm)         |
|            |             | 7223               | 10mm           | 184g | w/Disk base (Ø25mm)         |
|            |             | 7224               | 10mm           | 234g | w/Disk base (Ø40mm)         |
|            | 0 - 200mm** | 7211               | 10mm           | 294g | w/Angular base (63.5x16mm)  |
|            |             | 7212               | 10mm           | 344g | w/Angular base (101.6x16mm) |
|            |             | 7220 <sup>††</sup> | 10mm           | 374g | w/Angular base (100x18mm)   |
|            |             | 7221 <sup>††</sup> | 10mm           | 494g | w/Angular base (150x18mm)   |
|            | 0 - 210mm** | 7213               | 30mm           | 294g | w/Angular base (63.5x16mm)  |
|            |             | 7214               | 30mm           | 344g | w/Angular base (101.6x16mm) |

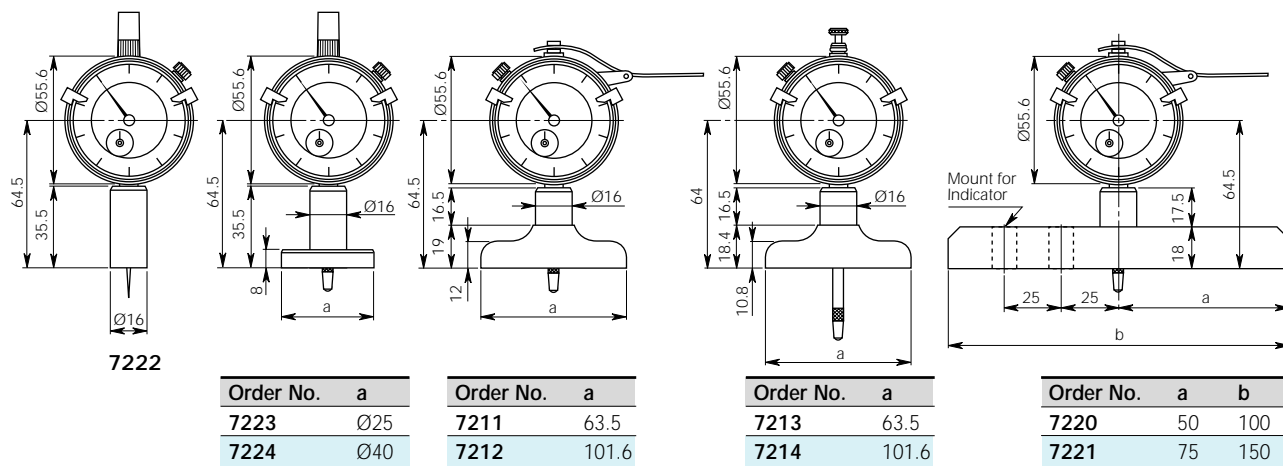
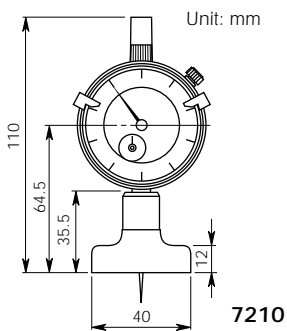
\* Available with extension rods  
<sup>†</sup> With needle probe  
<sup>††</sup> A constant (25mm) pitch probing is possible due to the indicator mounts on the base

#### Inch

| Graduation | Range               | Order No. | Spindle stroke | Mass     | Remarks                    |
|------------|---------------------|-----------|----------------|----------|----------------------------|
| .001"      | 0 - 8" <sup>*</sup> | 7217      | 1"             | .65 lbs. | w/Angular base (2.5"x.63") |
|            |                     | 7218      | 1"             | .76 lbs. | w/Angular base (4"x.63")   |

\* Available with extension rods

### Dimensions



| Order No. | a   |
|-----------|-----|
| 7223      | Ø25 |
| 7224      | Ø40 |

| Order No. | a     |
|-----------|-------|
| 7211      | 63.5  |
| 7212      | 101.6 |

| Order No. | a     |
|-----------|-------|
| 7213      | 63.5  |
| 7214      | 101.6 |

| Order No. | a  | b   |
|-----------|----|-----|
| 7220      | 50 | 100 |
| 7221      | 75 | 150 |

## Dial Depth Gages

SERIES 7  
Back Plunger Type



### SPECIFICATIONS

#### Metric

| Graduation | Range     | Order No. | Spindle stroke | Mass | Remarks                    |
|------------|-----------|-----------|----------------|------|----------------------------|
| 0.01mm     | 0 - 200mm | 7231      | 5mm            | 240g | w/Angular base (63.5x16mm) |

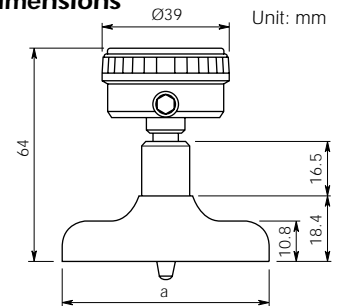
#### Inch

| Graduation | Range  | Order No. | Spindle stroke | Mass     | Remarks                    |
|------------|--------|-----------|----------------|----------|----------------------------|
| .001"      | 0 - 8" | 7237      | .2"            | .53 lbs. | w/Angular base (2.5"x.63") |

### FEATURES

- Designed with a back plunger type dial indicator for upward facing readings.
- With the supplied extension rods, depths up to 200mm can be measured.
- Either a standard or larger base can be selected for measuring requirements.

### Dimensions



| Order No. | a     |
|-----------|-------|
| 7231      | 63.5  |
| 7232      | 101.6 |

## Digimatic Depth Gages

SERIES 547

**ABSOLUTE**



### SPECIFICATIONS

#### Metric

| Resolution | Range     | Order No. | Spindle stroke | Mass | Remarks                     |
|------------|-----------|-----------|----------------|------|-----------------------------|
| 0.001mm    | 0 - 200mm | 547-251   | 12mm           | 295g | w/Angular base (63.5x16mm)  |
|            |           | 547-252   | 12mm           | 345g | w/Angular base (101.6x16mm) |
| 0.01mm     | 0 - 200mm | 547-211   | 12mm           | 280g | w/Angular base (63.5x16mm)  |
|            |           | 547-212   | 12mm           | 330g | w/Angular base (101.6x16mm) |

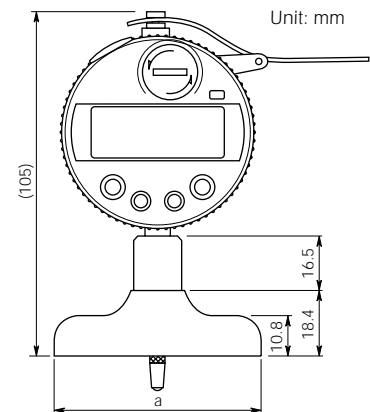
#### Inch/Metric

| Resolution | Range       | Order No. | Spindle stroke | Mass     | Remarks                    |
|------------|-------------|-----------|----------------|----------|----------------------------|
| .00005"/   | 0 - 8"      | 547-257   | .5"            | .62 lbs. | w/Angular base (2.5"x.63") |
| 0.001mm    | (0 - 200mm) | 547-258   | .5"            | .73 lbs. | w/Angular base (4"x.63")   |
| .0005"/    | 0 - 8"      | 547-217   | .5"            | .62 lbs. | w/Angular base (2.5"x.63") |
| 0.01mm     | (0 - 200mm) | 547-218   | .5"            | .73 lbs. | w/Angular base (4"x.63")   |

### FEATURES

- Uses IDC Series Digimatic Indicator. This offers many special functions including presetting, GO/±NG judgment, and SPC data output.
- With the supplied extension rods, depths up to 200mm can be measured.

### Dimensions



| Order No. | a     |
|-----------|-------|
| 547-251   | 63.5  |
| 547-252   | 101.6 |
| 547-211   | 63.5  |
| 547-212   | 101.6 |

### OPTIONAL ACCESSORIES

| Order No. | Description    |
|-----------|----------------|
| 905338    | SPC cable (1m) |
| 905409    | SPC cable (2m) |



# Digimatic Thickness Gages

## SERIES 547

with Multiple Functions Including SPC Data Output



### SPECIFICATIONS

#### Digimatic Thickness Gages (IDC Type)

##### Metric

| LCD resolution | Range    | Order No.      | Mass | Remarks (Applications)           |
|----------------|----------|----------------|------|----------------------------------|
| 0.001mm        | 0 - 12mm | <b>547-401</b> | 280g | For paper (film, wire) thickness |
| 0.01mm         | 0 - 10mm | <b>547-301</b> | 220g | Type A: Standard type            |
|                |          | <b>547-321</b> | 390g | Type B: Deep throat type         |
|                |          | <b>547-313</b> | 240g | Type C: For lens thickness       |
|                |          | <b>547-315</b> | 230g | Type D: For groove thickness     |
|                |          | <b>547-360</b> | 210g | Type E: For tube thickness       |

##### Inch/Metric

| LCD resolution      | Range                  | Order No.      | Mass     | Remarks (Applications)           |
|---------------------|------------------------|----------------|----------|----------------------------------|
| .00005"/<br>0.001mm | 0 - .47"<br>(0 - 12mm) | <b>547-400</b> | .62 lbs. | For paper (film, wire) thickness |
| .0005"/<br>0.01mm   | 0 - .4"<br>(0 - 10mm)  | <b>547-300</b> | .48 lbs. | Type A: Standard type            |
|                     |                        | <b>547-320</b> | .86 lbs. | Type B: Deep throat type         |
|                     |                        | <b>547-312</b> | .53 lbs. | Type C: For lens thickness       |
|                     |                        | <b>547-316</b> | .51 lbs. | Type D: For groove thickness     |
|                     |                        | <b>547-361</b> | .46 lbs. | Type E: For tube thickness       |

#### Digimatic Thickness Gages (IDS Type)

##### Inch/Metric

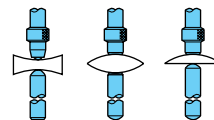
| LCD resolution | Range                  | Order No.      | Mass     | Remarks (Applications)       |
|----------------|------------------------|----------------|----------|------------------------------|
| 0.01mm         | 0 - .47"<br>(0 - 12mm) | <b>547-500</b> | .44 lbs. | Type A: Standard type        |
|                |                        | <b>547-520</b> | .81 lbs. | Type B: Deep throat type     |
|                |                        | <b>547-512</b> | .48 lbs. | Type C: For lens thickness   |
|                |                        | <b>547-516</b> | .46 lbs. | Type D: For groove thickness |
|                |                        | <b>547-561</b> | .42 lbs. | Type E: For tube thickness   |

The Digimatic Thickness Gages incorporate Mitutoyo's popular IDC and IDS Series Digimatic Indicators to provide error-free LCD readings as well as data output for SPC analysis.

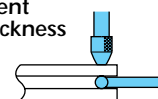
### FEATURES

- Wide range of applications with various types of measuring faces (on the spindle and anvil).
- **547-401 (547-400)** is ideally suited for measuring thicknesses of paper, film, wire, sheet metal and similar materials.

#### Measurements of lens thickness (Type C)



#### Measurement of tube thickness (Type E)

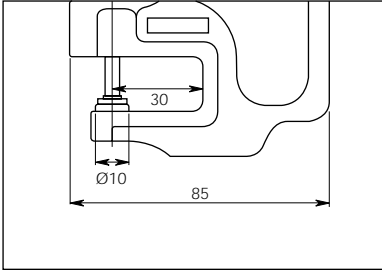


### OPTIONAL ACCESSORIES

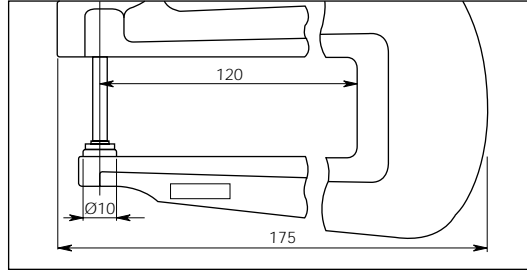
| Order No.     | Description    |
|---------------|----------------|
| <b>905338</b> | SPC cable (1m) |
| <b>905409</b> | SPC cable (2m) |

### Dimensions

Standard (Type A)

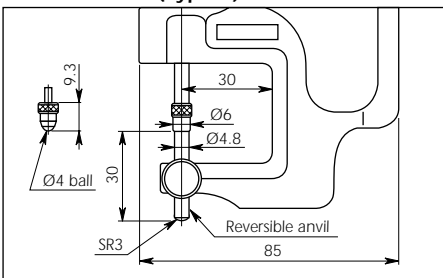


Deep throat (Type B)

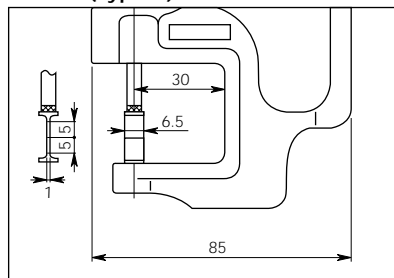


Unit: mm

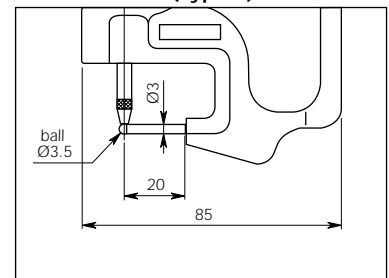
Lens thickness (Type C)



Groove (Type D)

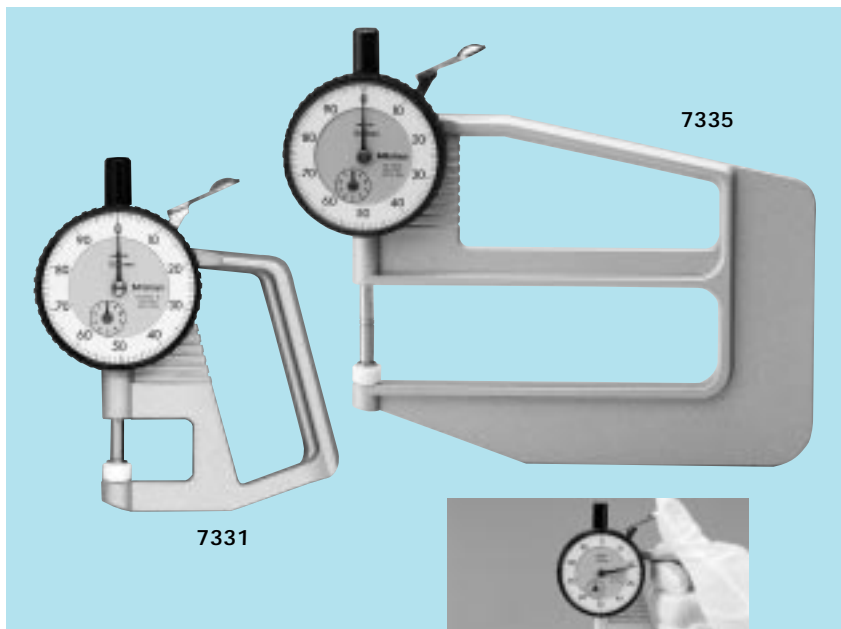


Tube thickness (Type E)



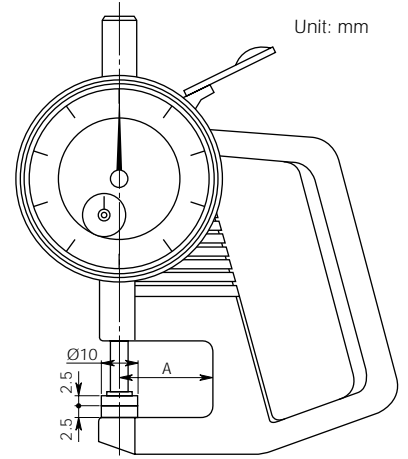
## Light-Weight Dial Thickness Gages

### SERIES 7



The Digimatic Thickness Gages incorporate Mitutoyo's popular IDC and IDS Series Digimatic Indicators to provide error-free LCD readings as well as data output for SPC analysis.

### Dimensions



Unit: mm

### SPECIFICATIONS

#### Metric

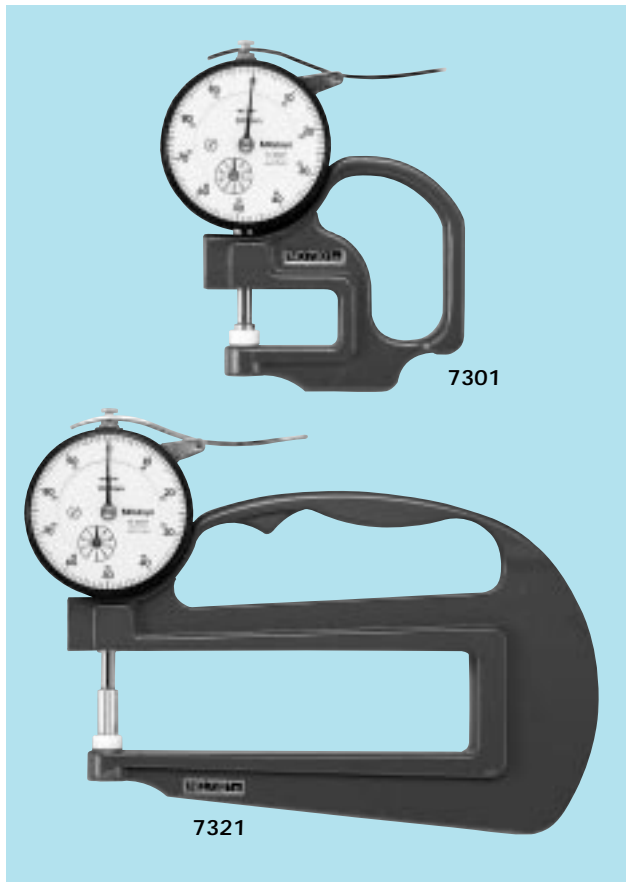
| Graduation | Range    | Order No. | Mass | Remarks       |
|------------|----------|-----------|------|---------------|
| 0.01mm     | 0 - 10mm | 7331      | 140g | Standard type |

| Order No. | A  |
|-----------|----|
| 7331      | 25 |



# Dial Thickness Gages

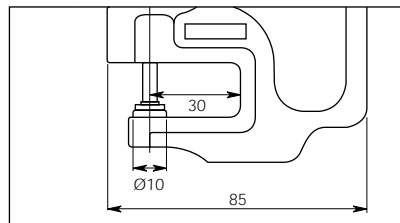
## SERIES 7



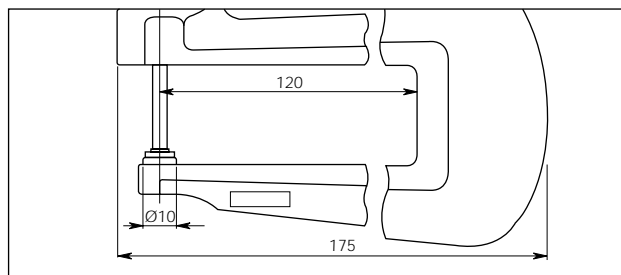
### Dimensions

Standard (Type A)

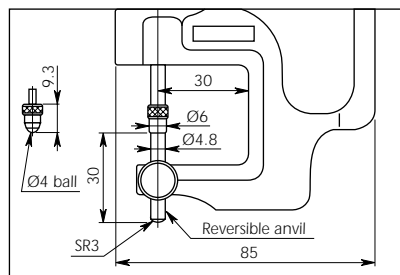
Unit: mm



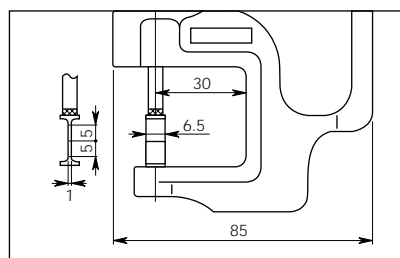
Deep throat (Type B)



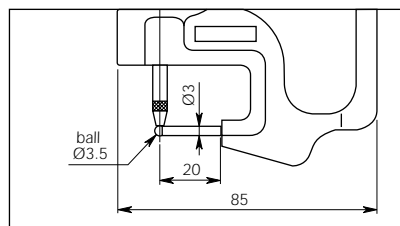
Lens thickness (Type C)



Groove (Type D)



Tube thickness (Type E)



The Dial Thickness Gages offer a quick and efficient means of inspection with their convenient grip handle, thumb trigger and spring-loaded spindle. The various models cover a wide range of applications.

### SPECIFICATIONS

#### Metric

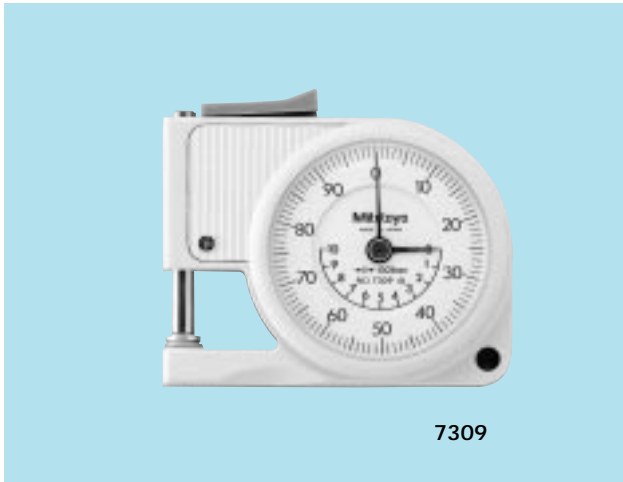
| Graduation | Range    | Order No. | Mass                     | Remarks (Applications)       |
|------------|----------|-----------|--------------------------|------------------------------|
| 0.001mm    | 0 - 1mm  | 7327      | 230g                     | Type A: Standard type        |
| 0.01mm     | 0 - 10mm | 7301      | 212g                     | Type A: Standard type        |
|            |          | 7321      | 371g                     | Type B: Deep throat type     |
|            |          | 7313      | 224g                     | Type C: For lens thickness   |
|            |          | 7315      | 217g                     | Type D: For groove thickness |
|            |          | 7360      | 199g                     | Type E: For tube thickness   |
|            |          | 0 - 20mm  | 7305                     | 217g                         |
| 7323       | 371g     |           | Type B: Deep throat type |                              |

#### Inch

| Graduation | Range    | Order No. | Mass     | Remarks (Applications)           |
|------------|----------|-----------|----------|----------------------------------|
| .0001"     | 0 - .05" | 7326      | .5 lbs.  | For paper (film, wire) thickness |
| .001"      | 0 - .4"  | 7300      | .47 lbs. | Type A: Standard type            |
|            |          | 7320      | .82 lbs. | Type B: Deep throat type         |
|            |          | 7304      | .48 lbs. | Type A: Standard type            |

## Pocket Thickness Gage

SERIES 7



7309

A very compact thickness gage is designed for carrying convenience and is ideally suited for quick inspection of paper, leather, wire, plastic, sheet metal and similar materials. The spindle is pre-loaded to provide a constant measuring force (2N or less).

### FEATURES

- Measuring faces are hardened, ground and lapped for accuracy.
- Easy adjustment for zero point.

### SPECIFICATIONS

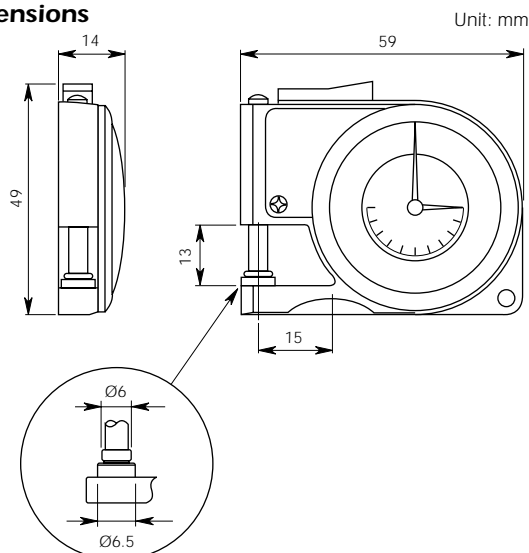
#### Metric

| Graduation | Range    | Order No. | Accuracy | Mass |
|------------|----------|-----------|----------|------|
| 0.01mm     | 0 - 10mm | 7309      | ±20µm    | 80g  |

#### Inch

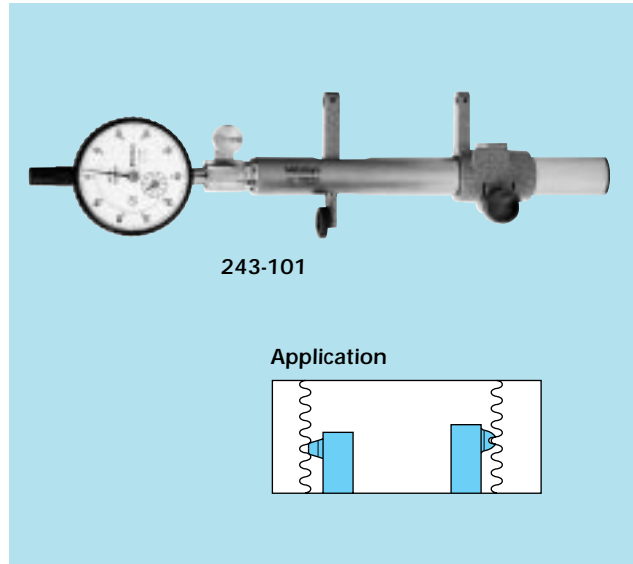
| Graduation | Range   | Order No. | Accuracy | Mass     |
|------------|---------|-----------|----------|----------|
| .001"      | 0 - .4" | 7308      | ±.001"   | .18 lbs. |

### Dimensions



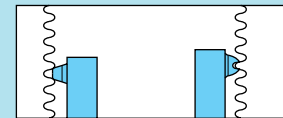
## Female Screw Thread Comparators

SERIES 243



243-101

### Application



### FEATURES

- Quick inspection of pitch diameters of female screw threads can be done by using interchangeable inserts (optional).
- Adjustable measuring jaws for a wide range of I.D. comparison measurements.



### SPECIFICATIONS

#### Metric

| Graduation | Range      | Order No. | Probe depth | Mass |
|------------|------------|-----------|-------------|------|
| 0.01mm     | 25 - 100mm | 243-101   | 20mm        | 530g |
|            | 25 - 200mm | 243-102   | 25mm        | 700g |
|            | 25 - 300mm | 243-103   | 30mm        | 870g |

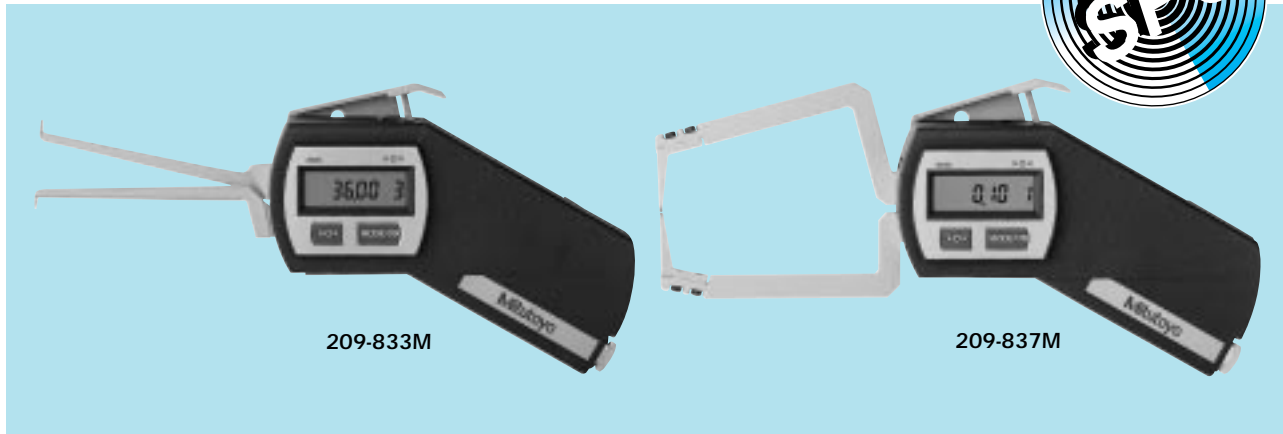
### Interchangeable Inserts Sets (Optional)

| Applications    | Order No. | Assortment of inserts (pair)     |
|-----------------|-----------|----------------------------------|
| Metric screw    | 243-800   | 0.4 - 0.5mm/64 - 48TPI (243-801) |
|                 |           | 0.6 - 0.9mm/44 - 28TPI (243-802) |
|                 |           | 1 - 1.75mm/24 - 14TPI (243-803)  |
|                 |           | 2 - 3mm/13 - 9TPI (243-804)      |
|                 |           | 3.5 - 5mm/8 - 5TPI (243-805)     |
| Unified screw   | 243-810   | 5.5 - 7mm/4.5 - 3.5TPI (243-806) |
|                 |           | 60 - 48TPI (243-811)             |
|                 |           | 48 - 40TPI (243-812)             |
|                 |           | 40 - 32TPI (243-813)             |
|                 |           | 32 - 24TPI (243-814)             |
|                 |           | 24 - 18TPI (243-815)             |
|                 |           | 18 - 14TPI (243-816)             |
| Whitworth screw | 243-810   | 14 - 10TPI (243-817)             |
|                 |           | 10 - 7TPI (243-818)              |
|                 |           | 7 - 4.5TPI (243-819)             |
|                 |           | 4.5 - 3.5TPI (243-820)           |

# Digimatic Caliper Gages

## SERIES 209

Internal, External, and Tube Thickness Types



### SPECIFICATIONS

#### Digimatic Caliper Gages (Internal Type)

##### Metric

| LCD resolution | Range      | Order No. | Accuracy | Mass | Remarks            |
|----------------|------------|-----------|----------|------|--------------------|
| 0.005mm        | 5 - 17.5mm | 209-832M  | ±0.02mm  | 340g | Ball contact point |
| 0.01mm         | 10 - 35mm  | 209-833M  | ±0.03mm  | 350g | Ball contact point |
|                | 30 - 55mm  | 209-834M  | ±0.03mm  | 350g | Ball contact point |
|                | 50 - 75mm  | 209-835M  | ±0.03mm  | 360g | Ball contact point |
|                | 70 - 95mm  | 209-836M  | ±0.03mm  | 360g | Ball contact point |

#### Digimatic Caliper Gages (External Type)

##### Metric

| LCD resolution | Range      | Order No. | Accuracy | Mass | Remarks               |
|----------------|------------|-----------|----------|------|-----------------------|
| 0.01mm         | 0.3 - 25mm | 209-837M  | ±0.02mm  | 360g | Ball contact point    |
|                |            | 209-838M  | ±0.02mm  | 360g | Rounded contact point |

#### Digimatic Caliper Gages (Tube Thickness Type)

##### Metric

| LCD resolution | Range        | Order No. | Accuracy | Mass | Remarks |
|----------------|--------------|-----------|----------|------|---------|
| 0.005mm        | 0.2 - 12.5mm | 209-868M  | ±0.02mm  | 340g | —       |

Versatile ID or OD measuring gages for holes diameters, groove thickness, tube thickness, and hard-to-reach dimensions. The Digimatic Caliper Gages provide error-free LCD readings as well as data output for SPC analysis.

#### Technical Data

**Display:** 7-digit LCD (Character height: 7mm)

**Functions:** Zero-Set, presetting, data hold, MAX/MIN measurement, SPC data output, auto sleep

**Quantizing error:** ±1 count

**Measuring force:** 1.5N or less

**Battery:** CR-123A or DL-123A (1 pc.)

**Battery life:** Approx. 350 hours

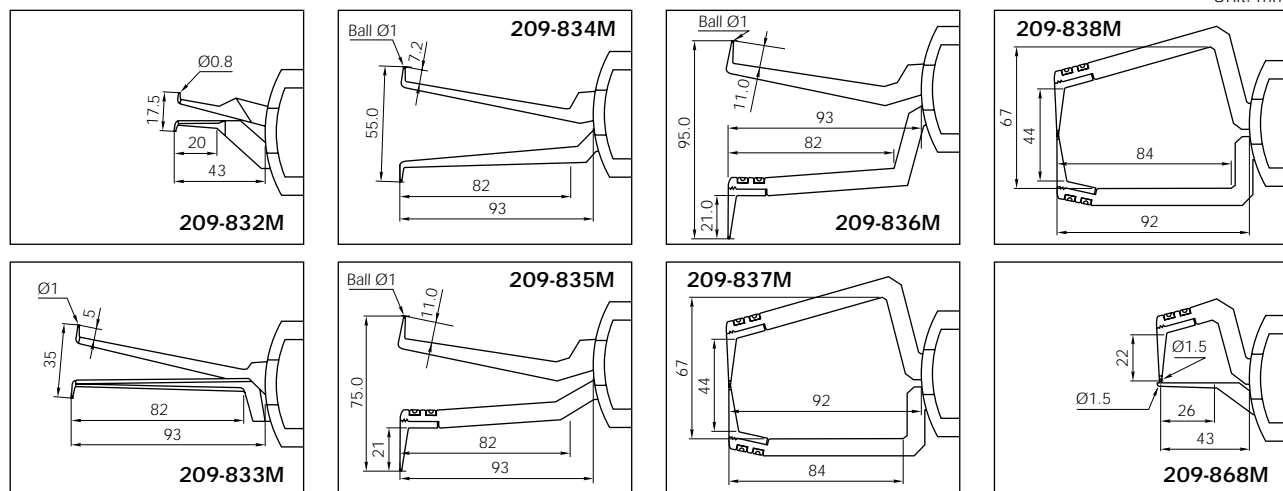
**Operating temperature:** 10°C to 30°C

#### OPTIONAL ACCESSORY

| Order No. | Description    |
|-----------|----------------|
| 011055    | SPC cable (2m) |

#### Dimensions

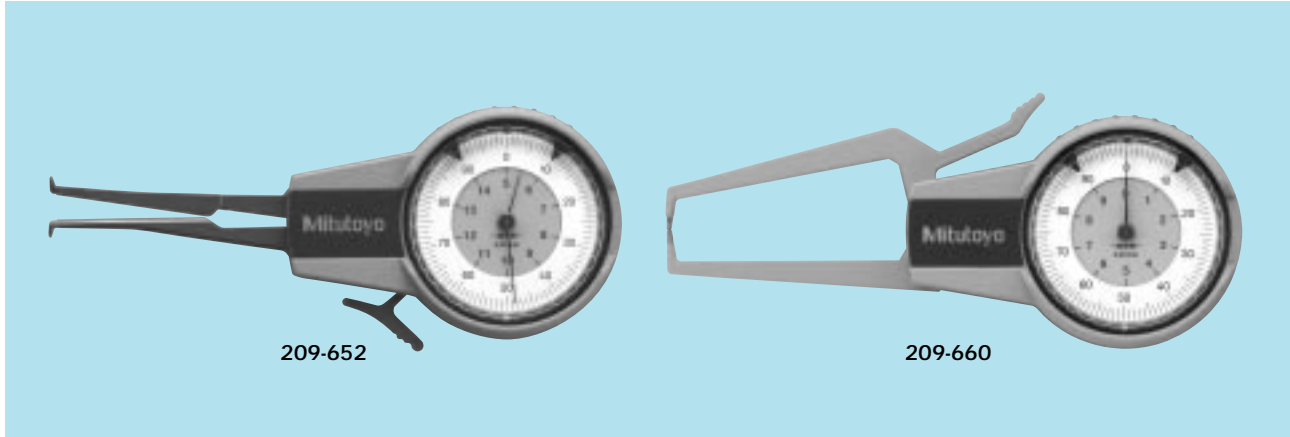
Unit: mm



## Dial Caliper Gages

### SERIES 209

Internal, External, and Tube Thickness Types



### SPECIFICATIONS

#### Dial Caliper Gages (Internal Type)

##### Metric

| Graduation | Range       | OrderNo. | Accuracy | Mass | Remarks                |
|------------|-------------|----------|----------|------|------------------------|
| 0.005mm    | 2.5 - 7.5mm | 209-650  | ±0.01mm  | 120g | Rounded contact points |
|            | 5 - 10mm    | 209-651  | ±0.01mm  | 120g | Ball contact points    |
| 0.01mm     | 5 - 15mm    | 209-652  | ±0.02mm  | 80g  | Rounded contact points |
|            | 10 - 20mm   | 209-653  | ±0.02mm  | 140g | Ball contact points    |
|            | 20 - 30mm   | 209-654  | ±0.02mm  | 140g | Ball contact points    |
|            | 30 - 40mm   | 209-655  | ±0.02mm  | 140g | Ball contact points    |
|            | 40 - 50mm   | 209-656  | ±0.02mm  | 140g | Ball contact points    |

Versatile ID or OD measuring gages for holes diameters, groove thickness, tube thickness, and hard-to-reach dimensions.

#### Dial Caliper Gages (External Type)

##### Metric

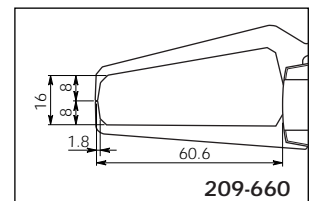
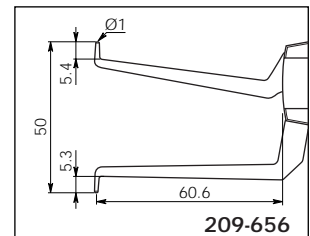
| Graduation | Range    | OrderNo. | Accuracy | Mass | Remarks                |
|------------|----------|----------|----------|------|------------------------|
| 0.01mm     | 0 - 10mm | 209-660  | ±0.02mm  | 140g | Rounded contact points |

#### Dial Caliper Gages (Tube Thickness Type)

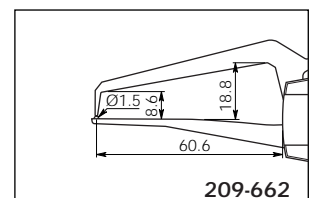
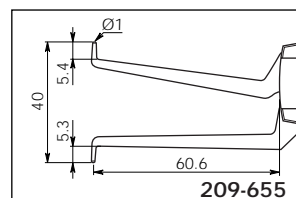
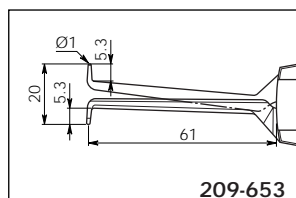
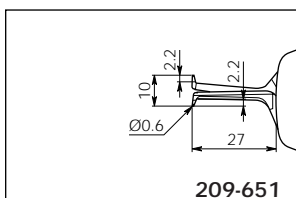
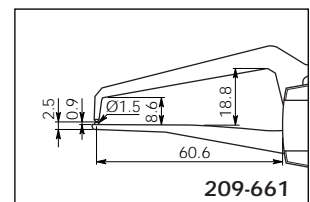
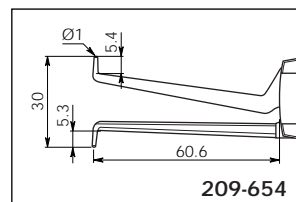
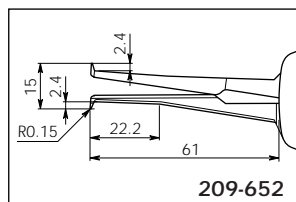
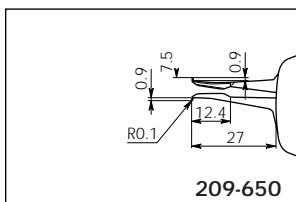
##### Metric

| Graduation | Range    | OrderNo. | Accuracy | Mass | Remarks                     |
|------------|----------|----------|----------|------|-----------------------------|
| 0.01mm     | 0 - 10mm | 209-661  | ±0.02mm  | 140g | Ball contact points         |
|            |          | 209-662  | ±0.02mm  | 140g | Ball/rounded contact points |

Unit: mm



### Dimensions

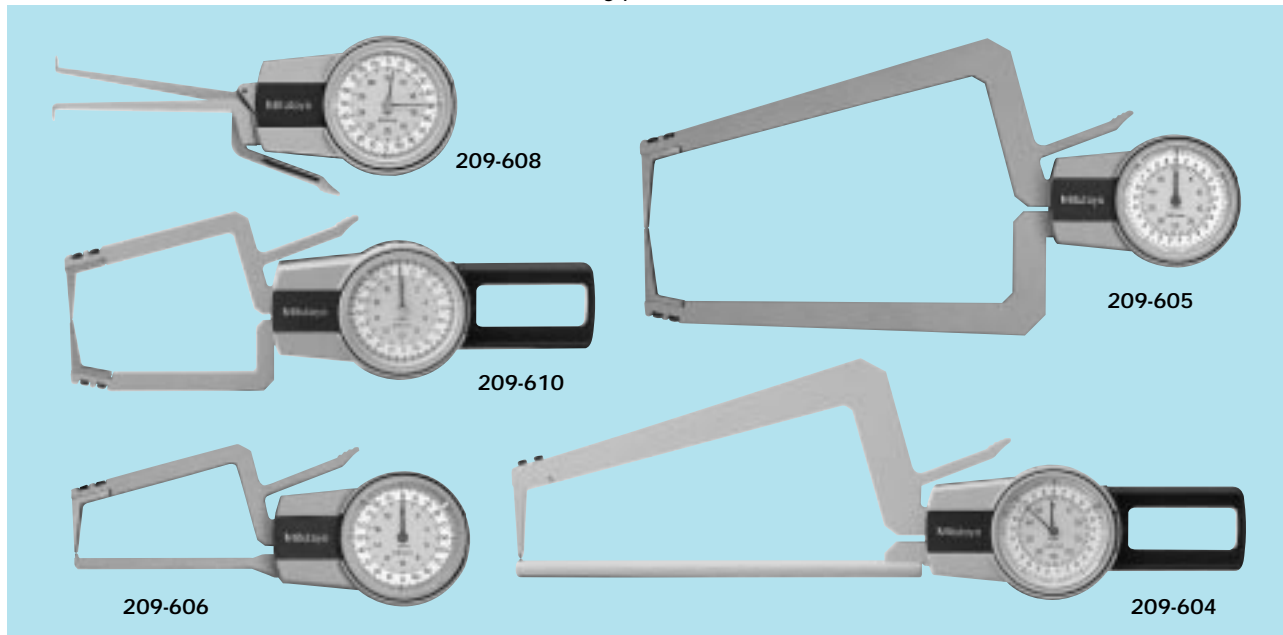




# Dial Caliper Gages

## SERIES 209

Internal, External, and Tube Thickness Types



### SPECIFICATIONS

#### Dial Caliper Gages (Internal Type)

##### Metric

| Graduation | Range      | OrderNo. | Accuracy | Mass | Throatdepth |
|------------|------------|----------|----------|------|-------------|
| 0.01mm     | 10 - 30mm  | 209-608  | ±0.03mm  | 200g | 80mm        |
|            | 20 - 40mm  | 209-609  | ±0.03mm  | 200g | 80mm        |
|            | 30 - 50mm  | 209-600  | ±0.03mm  | 200g | 80mm        |
|            | 40 - 60mm  | 209-884  | ±0.03mm  | 200g | 80mm        |
|            | 50 - 70mm  | 209-885  | ±0.03mm  | 200g | 80mm        |
|            | 60 - 80mm  | 209-886  | ±0.03mm  | 200g | 80mm        |
|            | 70 - 90mm  | 209-887  | ±0.03mm  | 200g | 80mm        |
|            | 80 - 100mm | 209-888  | ±0.03mm  | 200g | 80mm        |
| 0.05mm     | 16 - 65mm  | 209-896  | ±0.05mm  | 300g | 175mm       |
|            | 40 - 90mm  | 209-897  | ±0.05mm  | 300g | 175mm       |
|            | 70 - 120mm | 209-898  | ±0.05mm  | 300g | 175mm       |

#### Dial Caliper Gages (External Type)

##### Metric

| Graduation | Range    | OrderNo.  | Accuracy | Mass | Throatdepth |
|------------|----------|-----------|----------|------|-------------|
| 0.01mm     | 0 - 20mm | 209-601*  | ±0.03mm  | 200g | 80mm        |
|            |          | 209-605** | ±0.03mm  | 200g | 80mm        |
| 0.05mm     | 0 - 50mm | 209-602*  | ±0.05mm  | 290g | 170mm       |
|            |          | 209-610** | ±0.05mm  | 310g | 170mm       |

\*With ball contact points

\*\*With rounded contact points

#### Dial Caliper Gages (Tube Thickness Type)

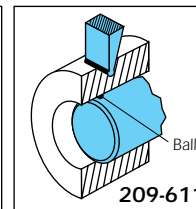
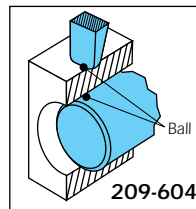
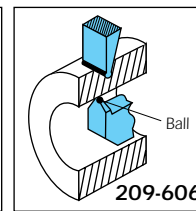
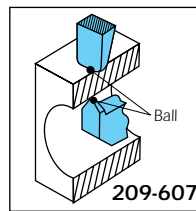
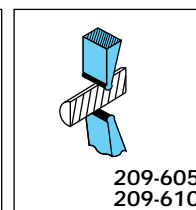
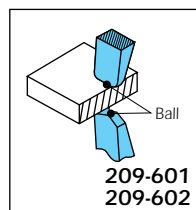
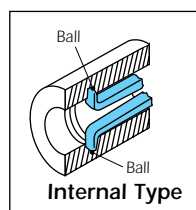
##### Metric

| Graduation | Range    | OrderNo.  | Accuracy | Mass | Throatdepth |
|------------|----------|-----------|----------|------|-------------|
| 0.01mm     | 0 - 20mm | 209-607*  | ±0.03mm  | 200g | 80mm        |
|            |          | 209-606** | ±0.03mm  | 200g | 80mm        |
| 0.05mm     | 0 - 50mm | 209-604*  | ±0.05mm  | 310g | 170mm       |
|            |          | 209-611** | ±0.05mm  | 290g | 170mm       |

\*With ball contact points

\*\*With rounded contact points

Versatile ID or OD measuring gages for holes diameters, groove thickness, tube thickness, and hard-to-reach dimensions.

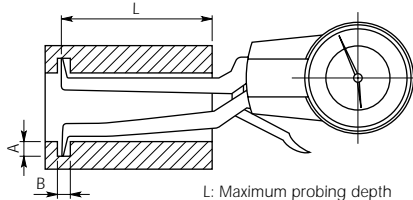


## Dial Caliper Gages

### SERIES 209 Internal Type

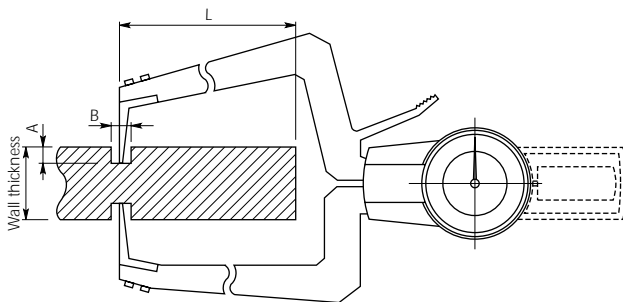
#### Dimensions

Unit: mm



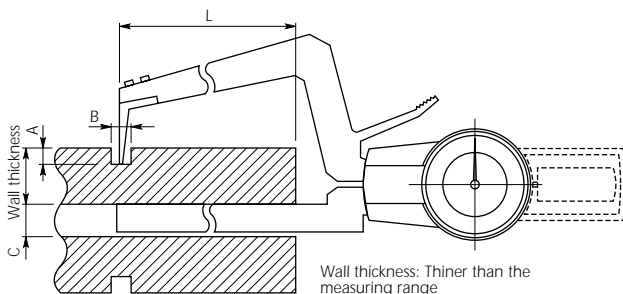
L: Maximum probing depth

| Order No. | L   | A   | B   |
|-----------|-----|-----|-----|
| 209-608   | 80  | 4.5 | 2.0 |
| 209-609   | 80  | 6.5 | 2.5 |
| 209-600   | 80  | 6.5 | 2.5 |
| 209-884   | 80  | 9.5 | 3.0 |
| 209-885   | 80  | 9.5 | 3.0 |
| 209-886   | 80  | 9.5 | 3.0 |
| 209-887   | 80  | 9.5 | 3.0 |
| 209-888   | 80  | 9.5 | 3.0 |
| 209-896   | 175 | 4.5 | 3.0 |
| 209-897   | 175 | 9.5 | 3.0 |
| 209-898   | 175 | 9.5 | 3.0 |



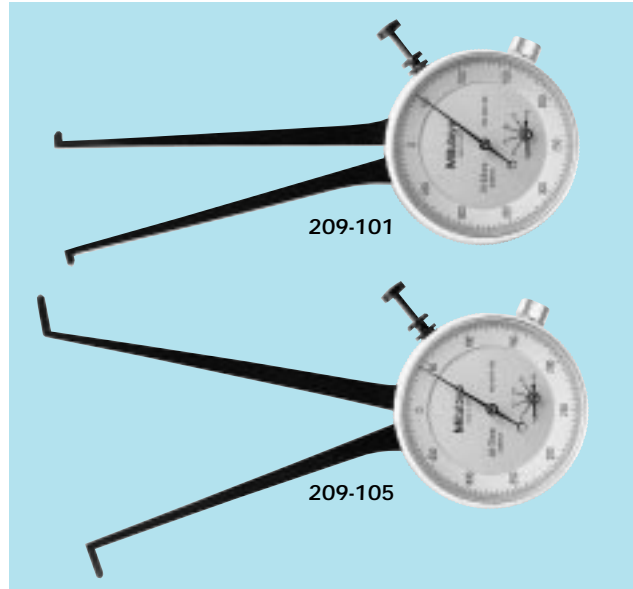
Wall thickness: Thinner than the measuring range  
L: Maximum probing depth

| Order No. | L   | A  | B |
|-----------|-----|----|---|
| 209-601   | 80  | 10 | 5 |
| 209-605   | 80  | 10 | 5 |
| 209-602   | 170 | 20 | 7 |
| 209-610   | 170 | 20 | 7 |



Wall thickness: Thinner than the measuring range  
L: Maximum probing depth

| Order No. | L   | A  | B | C  |
|-----------|-----|----|---|----|
| 209-607   | 80  | 10 | 5 | 10 |
| 209-606   | 80  | 10 | 5 | 10 |
| 209-604   | 170 | 20 | 7 | 12 |
| 209-611   | 170 | 20 | 7 | 12 |



These Dial Caliper Gages are used only as comparison gages, and should be used along with a Setting Ring or a micrometer. The caliper is spring loaded and makes point contact at constant measuring pressure.

#### SPECIFICATIONS

##### Metric

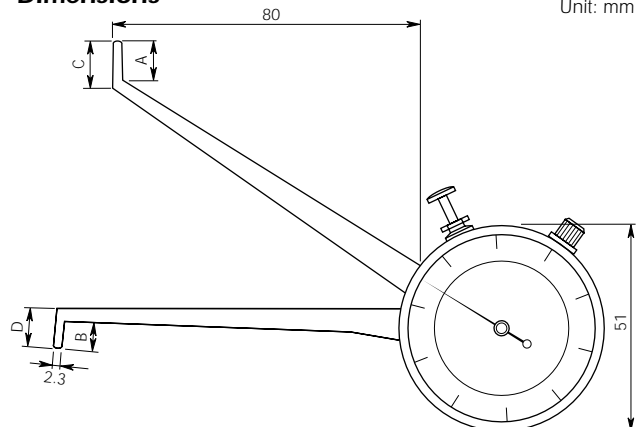
| Graduation | Range     | Order No. | Mass | Throat depth |
|------------|-----------|-----------|------|--------------|
| 0.025mm    | 10 - 35mm | 209-101   | 82g  | 80mm         |
|            | 30 - 55mm | 209-103   | 82g  | 80mm         |
|            | 50 - 75mm | 209-105   | 82g  | 80mm         |

##### Inch

| Graduation | Range       | Order No. | Mass     | Throat depth |
|------------|-------------|-----------|----------|--------------|
| .001"      | .4" - 1.4"  | 209-111   | .18 lbs. | 3.15"        |
|            | 1.2" - 2.2" | 209-113   | .18 lbs. | 3.15"        |
|            | 2" - 3"     | 209-115   | .18 lbs. | 3.15"        |

#### Dimensions

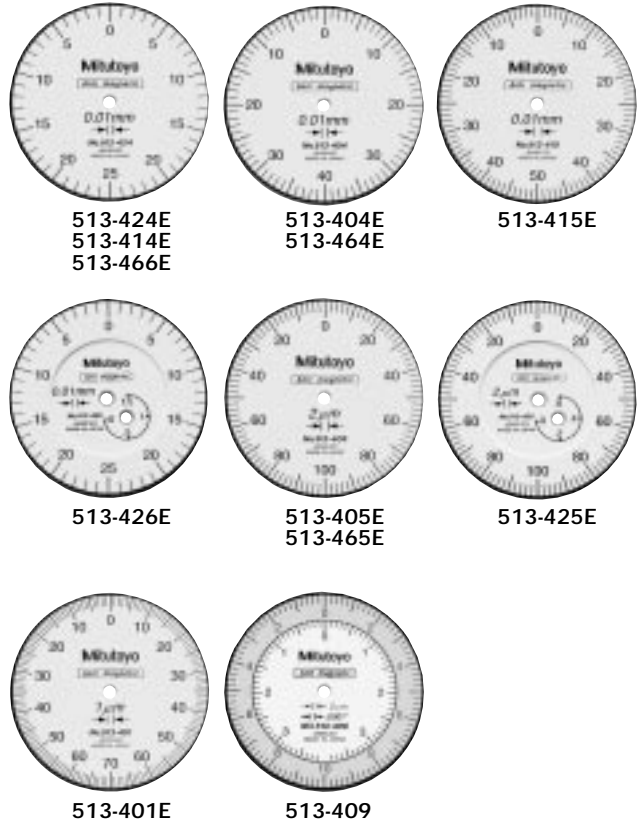
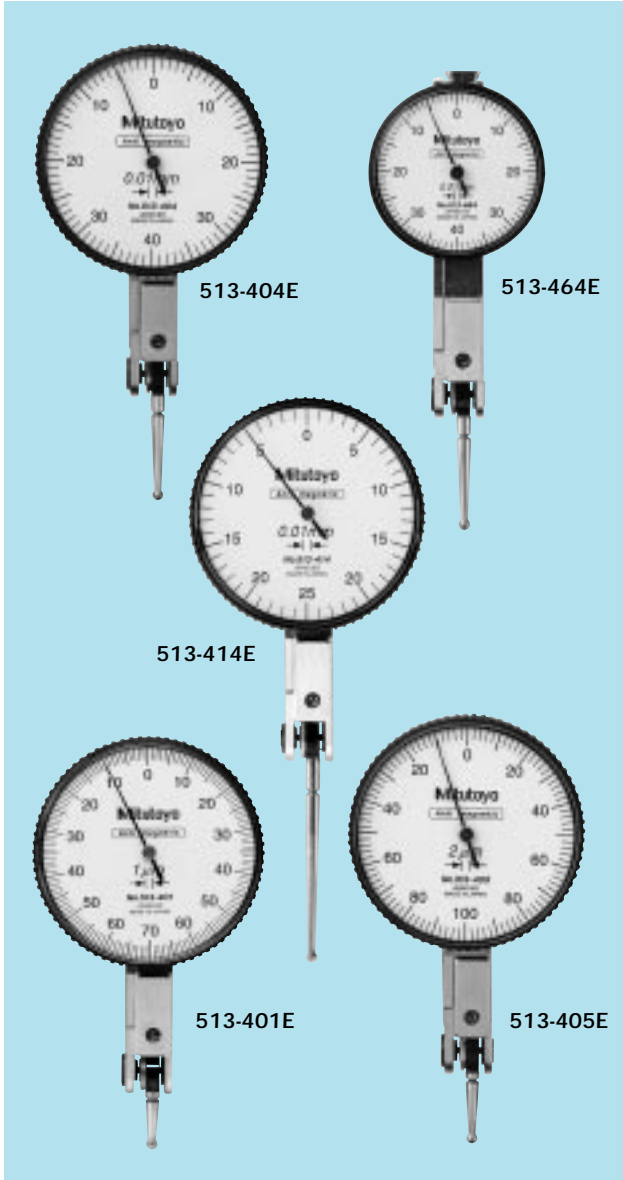
Unit: mm



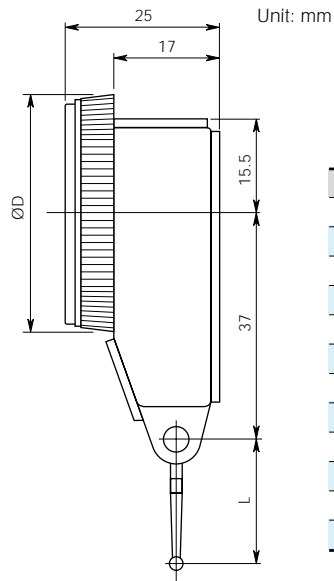
# Dial Test Indicators

## SERIES 513

### Horizontal Type



### Dimensions



| Order No. | D  | L    |
|-----------|----|------|
| 513-424E  | 39 | 22.3 |
| 513-414E  | 39 | 36.8 |
| 513-466E  | 28 | 22.3 |
| 513-404E  | 39 | 20.9 |
| 513-464E  | 28 | 20.9 |
| 513-415E  | 39 | 44.5 |
| 513-426E  | 39 | 22.3 |
| 513-405E  | 39 | 14.7 |
| 513-465E  | 28 | 14.7 |
| 513-425E  | 39 | 14.7 |
| 513-401E  | 39 | 12.8 |
| 513-409   | 39 | 14.7 |

### FEATURES

































- Performs easy and accurate measurement of narrow or recessed areas, plus inside and outside diameters that dial indicators cannot access.
- No-clutch structure for automatic reversal of measuring direction.
- Resistant to water and dust thanks to the one-piece bezel and "crystal" design with O-ring.
- The glare-free flat crystal face has a scratch-resistant coating.
- High-sensitivity and quick-response because of jeweled bearings.
- A carbide contact point is provided as standard.

High Precision Type
 Doubled Scale Spacing
 Long Contact Point
 Revolution Counter














Compact Type
 Dustproof
 Jeweled
 Anti-Magnetic
 Waterproof

## SPECIFICATIONS



### Metric

| Graduation | Range  | Order No.  |           |          | Dial reading | Accuracy | Measuring force | Remarks   |
|------------|--------|------------|-----------|----------|--------------|----------|-----------------|---|
|            |        | Basic unit | Basic set | Full set |              |          |                 |   |
| 0.01mm     | 0.5mm  | 513-424E   | 513-424A  | 513-424T | 0-25-0       | 5μm      | 0.3N or less    |      |
|            |        | 513-414E   | 513-414A  | 513-414T | 0-25-0       | 10μm     | 0.2N or less    |     |
|            |        | 513-466E   | —         | —        | 0-25-0       | 5μm      | 0.3N or less    |     |
|            | 0.8mm  | 513-404E   | 513-404A  | 513-404T | 0-40-0       | 8μm      | 0.3N or less    |     |
|            |        | 513-464E   | —         | —        | 0-40-0       | 8μm      | 0.3N or less    |      |
|            | 1mm    | 513-415E   | 513-415A  | 513-415T | 0-50-0       | 10μm     | 0.2N or less    |      |
| 0.002mm    | 0.2mm  | 513-405E   | 513-405A  | 513-405T | 0-100-0      | 3μm      | 0.3N or less    |     |
|            |        | 513-465E   | —         | —        | 0-100-0      | 3μm      | 0.3N or less    |     |
|            | 0.6mm  | 513-425E   | 513-425A  | —        | 0-100-0      | 6μm      | 0.4N or less    |     |
| 0.001mm    | 0.14mm | 513-401E   | —         | —        | 0-70-0       | 3μm      | 0.3N or less    |      |



### Inch

| Graduation | Range | Order No.  |          | Dial reading | Accuracy | Measuring force | Remarks   |
|------------|-------|------------|----------|--------------|----------|-----------------|---|
|            |       | Basic unit | Full set |              |          |                 |   |
| .0005"     | .03"  | 513-402    | 513-402T | 0-15-0       | ±.0005"  | 0.3N or less    |     |
|            |       | 513-412    | 513-412T | 0-15-0       | ±.0005"  | 0.2N or less    |    |
|            |       | 513-462    | —        | 0-15-0       | ±.0005"  | 0.3N or less    |    |
| .0001"     | .008" | 513-403    | 513-403T | 0-4-0        | ±.0001"  | 0.3N or less    |     |
|            |       | 513-463    | —        | 0-4-0        | ±.0001"  | 0.3N or less    |    |

### Metric / Inch

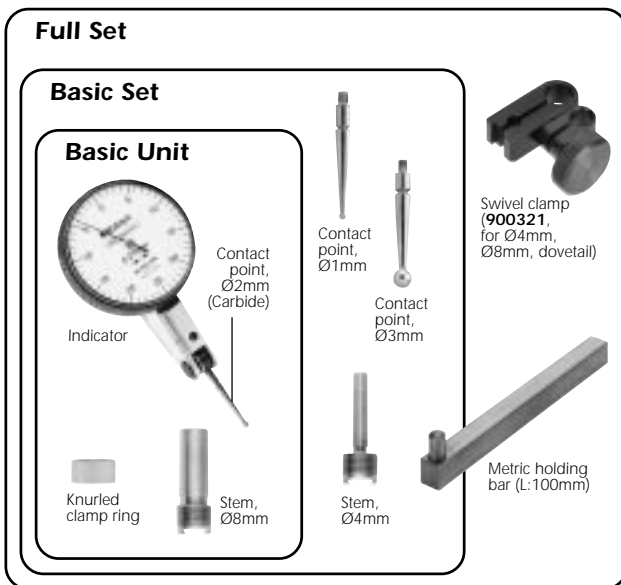
| Graduation     | Range        | Order No.  |           |          | Dial reading  | Accuracy | Measuring force | Remarks   |
|----------------|--------------|------------|-----------|----------|---------------|----------|-----------------|---|
|                |              | Basic unit | Basic set | Full set |               |          |                 |   |
| 0.002mm/.0001" | 0.2mm/.0075" | 513-409    | —         | 513-409T | 0-10-0/0-38-0 | 3μm      | 0.3N or less    |   |

### Inch / Metric

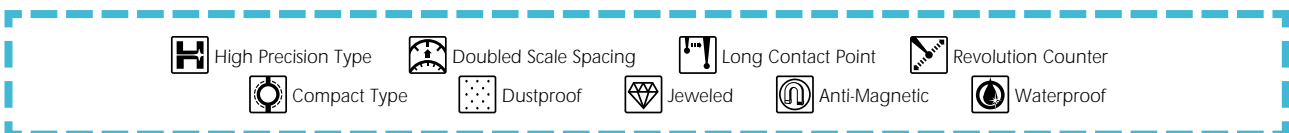
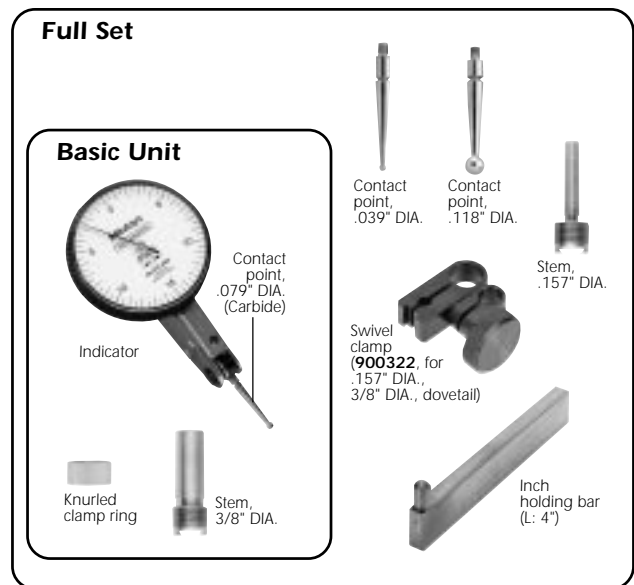
| Graduation    | Range      | Order No.  |          | Dial reading  | Accuracy | Measuring force | Remarks   |
|---------------|------------|------------|----------|---------------|----------|-----------------|---|
|               |            | Basic unit | Full set |               |          |                 |   |
| .0005"/0.01mm | .03"/0.7mm | 513-406    | 513-406T | 0-15-0/0-35-0 | ±.0005"  | 0.3N or less    |   |

## Set Configurations

### Metric (Metric/Inch)



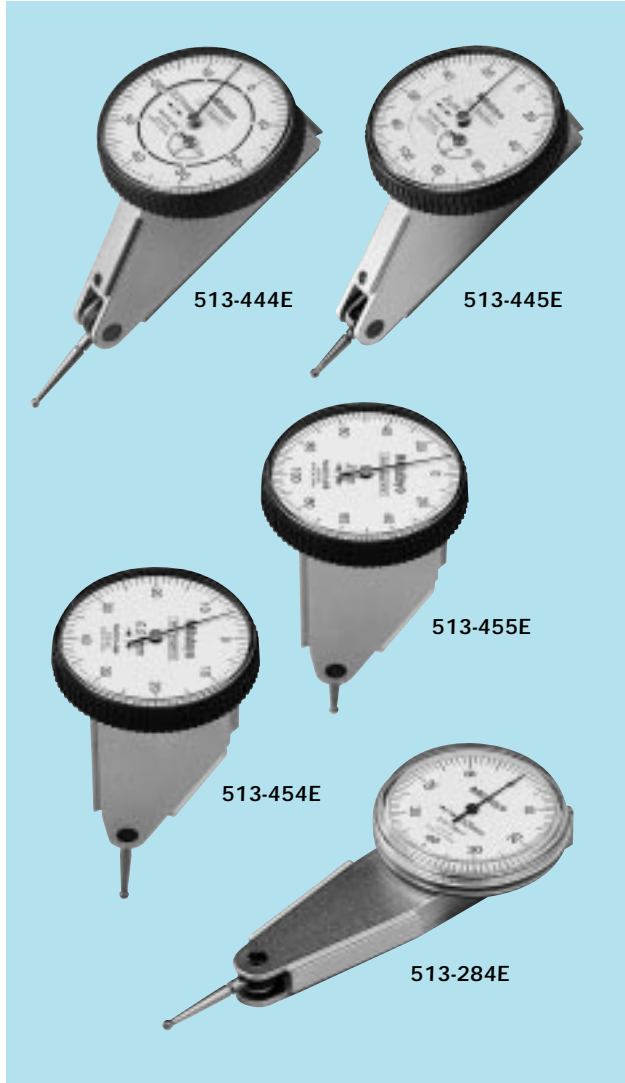
### Inch (Inch/Metric)



# Dial Test Indicators

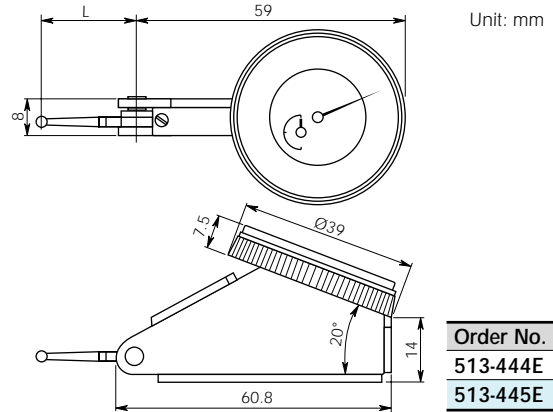
## SERIES 513

Horizontal (20° Tilted Face), Vertical, and Parallel Types

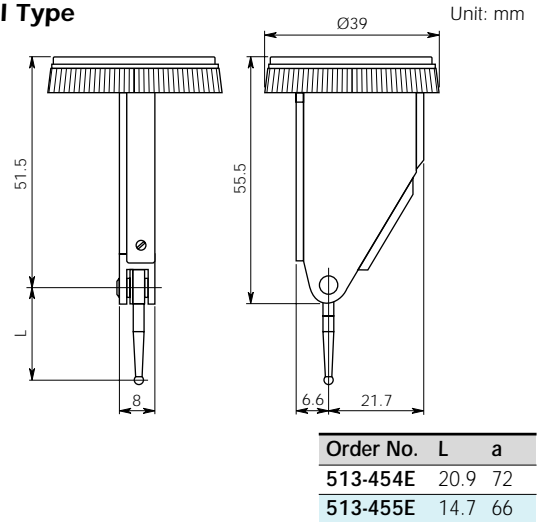


### Dimensions

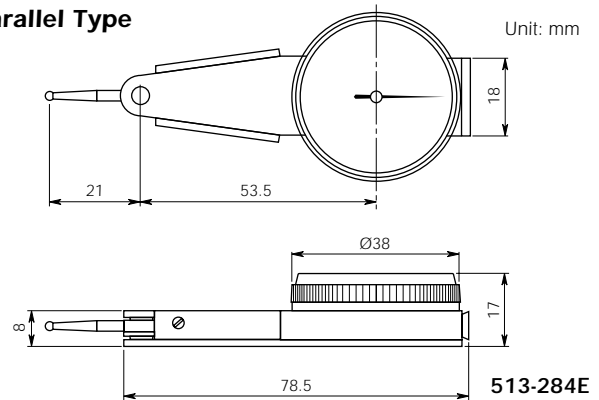
#### Horizontal (20° Tilted Face) Type



#### Vertical Type

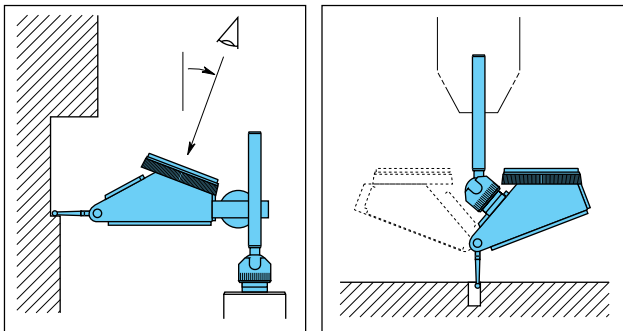


#### Parallel Type



### FEATURES

- Specially designed for easy viewing of measurements.



- High Precision Type
- Doubled Scale Spacing
- Long Contact Point
- Revolution Counter
- Compact Type
- Dustproof
- Jeweled
- Anti-Magnetic
- Waterproof



513-444E



513-445E



513-454E  
513-284FE



513-455E

## SPECIFICATIONS

### Horizontal (20° Tilted Face) Type Dial Test Indicators

#### Metric

| Graduation | Range | Order No.  |           |          | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|------------|-----------|----------|--------------|----------|-----------------|---------|
|            |       | Basic unit | Basic set | Full set |              |          |                 |         |
| 0.01mm     | 1.6mm | 513-444E   | 513-444A  | 513-444T | 0-40-0       | 10µm     | 0.3N or less    |         |
| 0.002mm    | 0.4mm | 513-445E   | 513-445A  | 513-445T | 0-100-0      | 5µm      | 0.3N or less    |         |

#### Inch

| Graduation | Range | Order No.  |             | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|------------|-------------|--------------|----------|-----------------|---------|
|            |       | Basic unit | Full set    |              |          |                 |         |
| .0005"     | .06"  | 513-442    | 513-442T    | 0-15-0       | ±.0005"  | 0.3N or less    |         |
|            |       | 513-442-01 | 513-442T-01 | 0-15-0       | ±.0005"  | 0.3N or less    | (Blue)  |
|            |       | 513-442-06 | 513-442T-06 | 0-15-0       | ±.0005"  | 0.3N or less    | (Black) |
|            |       | 513-446    | 513-446T    | 0-15-0       | ±.0005"  | 0.2N or less    |         |
| .0001"     | .016" | 513-446-06 | 513-446T-06 | 0-15-0       | ±.0005"  | 0.2N or less    | (Black) |
|            |       | 513-443    | 513-443T    | 0-4-0        | ±.0002"  | 0.3N or less    |         |
|            |       | 513-443-06 | 513-443T-06 | 0-4-0        | ±.0002"  | 0.3N or less    | (Black) |

Note: See page 221 for set configurations.



### Vertical Type Dial Test Indicators

#### Metric

| Graduation | Range | Order No.  |           |          | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|------------|-----------|----------|--------------|----------|-----------------|---------|
|            |       | Basic unit | Basic set | Full set |              |          |                 |         |
| 0.01mm     | 0.8mm | 513-454E   | 513-454A  | 513-454T | 0-40-0       | 8µm      | 0.3N or less    |         |
| 0.002mm    | 0.2mm | 513-455E   | 513-455A  | 513-455T | 0-100-0      | 3µm      | 0.3N or less    |         |

#### Inch

| Graduation | Range | Order No.  |          | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|------------|----------|--------------|----------|-----------------|---------|
|            |       | Basic unit | Full set |              |          |                 |         |
| .0005"     | .03"  | 513-452    | 513-452T | 0-15-0       | ±.0005"  | 0.3N or less    |         |
| .0001"     | .008" | 513-453    | 513-453T | 0-4-0        | ±.0001"  | 0.3N or less    |         |

Note: See page 221 for set configurations.

### Parallel Type Dial Test Indicator

#### Metric

| Graduation | Range | Order No.  |           |          | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|------------|-----------|----------|--------------|----------|-----------------|---------|
|            |       | Basic unit | Basic set | Full set |              |          |                 |         |
| 0.01mm     | 0.8mm | 513-284FE  | 513-284FA | 513-984F | 0-40-0       | 8µm      | 0.3N or less    |         |

#### Inch

| Graduation | Range | Order No.  |          | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|------------|----------|--------------|----------|-----------------|---------|
|            |       | Basic unit | Full set |              |          |                 |         |
| .0005"     | .03"  | 513-282    | 513-982  | 0-15-0       | ±.0005"  | 0.3N or less    |         |

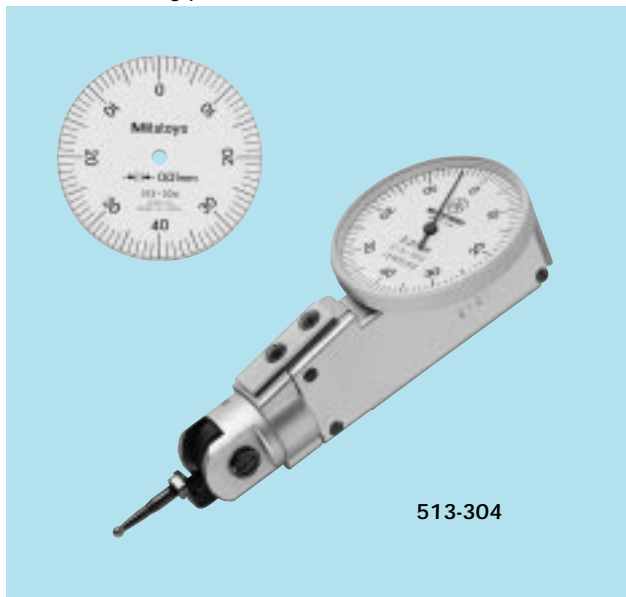
Note: See page 221 for set configurations.

|                     |                       |                    |                    |
|---------------------|-----------------------|--------------------|--------------------|
| High Precision Type | Doubled Scale Spacing | Long Contact Point | Revolution Counter |
| Compact Type        | Dustproof             | Jeweled            | Anti-Magnetic      |
| Waterproof          |                       |                    |                    |

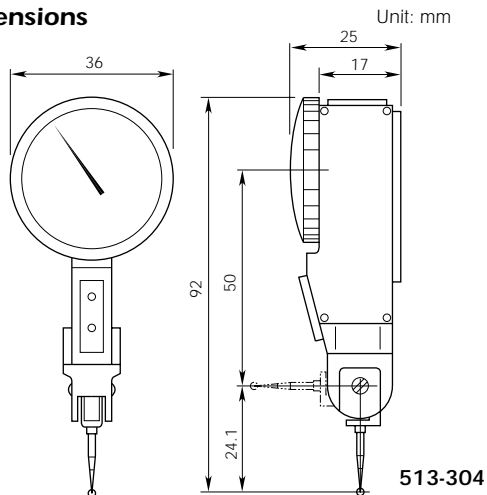
# Dial Test Indicator

## SERIES 513

Universal Type

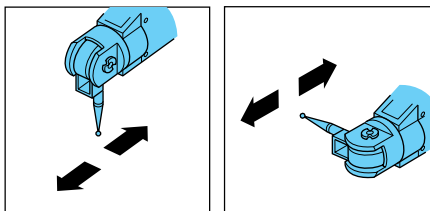


### Dimensions



### FEATURES

- Universal application to all directions. (Not only the direction of the measuring point, but also the direction of measurement itself can be adjusted 360 degrees without moving the indicator.)



### OPTIONAL ACCESSORIES

| Order No. | Description                      |
|-----------|----------------------------------|
| 102824    | Contact point, Ø1mm ball (Steel) |
| 102832    | Contact point, Ø2mm ball (Steel) |
| 102826    | Contact point, Ø3mm ball (Steel) |

### Set Configurations

**Full Set**

**Basic Unit**

Swivel clamp, **900321**  
(for Ø4mm stem, Ø8mm stem, dovetail) or **900322** (for Ø4mm stem, 3/8" DIA. stem, dovetail)

Metric holding bar  
**(900209)** or inch holding bar  
**(900306)**

### SPECIFICATIONS

#### Metric

| Graduation | Range | Order No.  | Dial reading | Accuracy | Measuring force | Remarks      |
|------------|-------|------------|--------------|----------|-----------------|--------------|
|            |       | Basic unit | Full set     |          |                 |              |
| 0.01mm     | 0.8mm | 513-304    | 513-944      | 0-40-0   | 8µm             | 0.3N or less |

#### Inch

| Graduation | Range | Order No.  | Dial reading | Accuracy | Measuring force | Remarks      |
|------------|-------|------------|--------------|----------|-----------------|--------------|
|            |       | Basic unit | Full set     |          |                 |              |
| .0005"     | .03"  | 513-302    | 513-942      | 0-15-0   | ±.0005"         | 0.3N or less |

High Precision Type

Doubled Scale Spacing

Long Contact Point

Revolution Counter

Compact Type

Dustproof

Jeweled

Anti-Magnetic

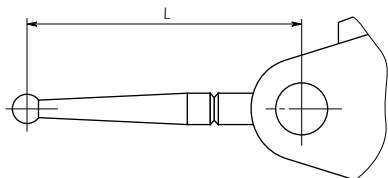
Waterproof

## Accessories for Dial Test Indicators

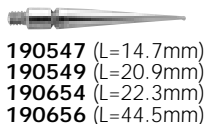
### Contact Points (for Metric Model Only\*)

\*Except for universal type dial test indicator (513-304 and 513-944).

- Use a contact point with the proper length for accurate measurement.

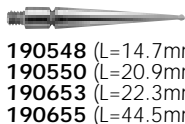


#### Ø0.5mm ball



190547 (L=14.7mm)  
190549 (L=20.9mm)  
190654 (L=22.3mm)  
190656 (L=44.5mm)

#### Ø0.7mm ball



190548 (L=14.7mm)  
190550 (L=20.9mm)  
190653 (L=22.3mm)  
190655 (L=44.5mm)

#### Ø1mm ball



21CZA044 (L=12.8mm)  
103017 (L=14.7mm)  
103013 (L=20.9mm)  
137558 (L=22.3mm)  
137746 (L=36.8mm)  
136235 (L=44.5mm)

#### Ø2mm ball (Carbide)



21CZA036 (L=12.8mm)  
103010 (L=14.7mm)  
103006 (L=20.9mm)  
137557 (L=22.3mm)  
129949 (L=36.8mm)  
136013 (L=44.5mm)

#### Ø2mm ball



103016 (L=14.7mm)  
103012 (L=20.9mm)

#### Ø3mm ball



21CZA045 (L=12.8mm)  
103018 (L=14.7mm)  
103014 (L=20.9mm)  
137559 (L=22.3mm)  
137747 (L=36.8mm)  
136236 (L=44.5mm)

### Stems with Knurled Clamp Ring

Ø4mm  
(.157" DIA.)



902802

Ø8mm



902804

3/8" DIA.



902805

Ø4mm  
and Ø8mm



902806

.157" DIA.  
and 3/8" DIA.



902808

### Swivel Clamps

- Can be used with Holding Bars.

For Ø4mm stem,  
Ø8mm stem, and  
dovetail



900321

For .157" DIA. stem, 3/  
8" DIA. stem, and  
dovetail



900322

### Holding Bars



9x9mm

953638 (Length: 50mm)  
900209 (Length: 100mm)



Ø8mm

900211 (Length: 115mm)



.25"x.5"

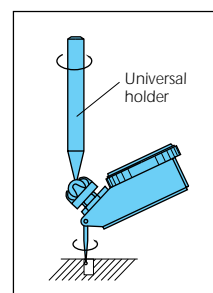
953639 (Length: 2")  
900306 (Length: 4")

### Universal Holder

- Allows the indicator to be set at a desired position.



901916 (Ø8mm stem)  
901459 (.25" DIA. stem)

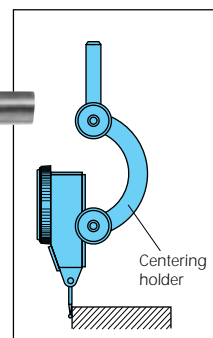


### Centering Holder

- Allows large diameter cylinders or holes to be centered.



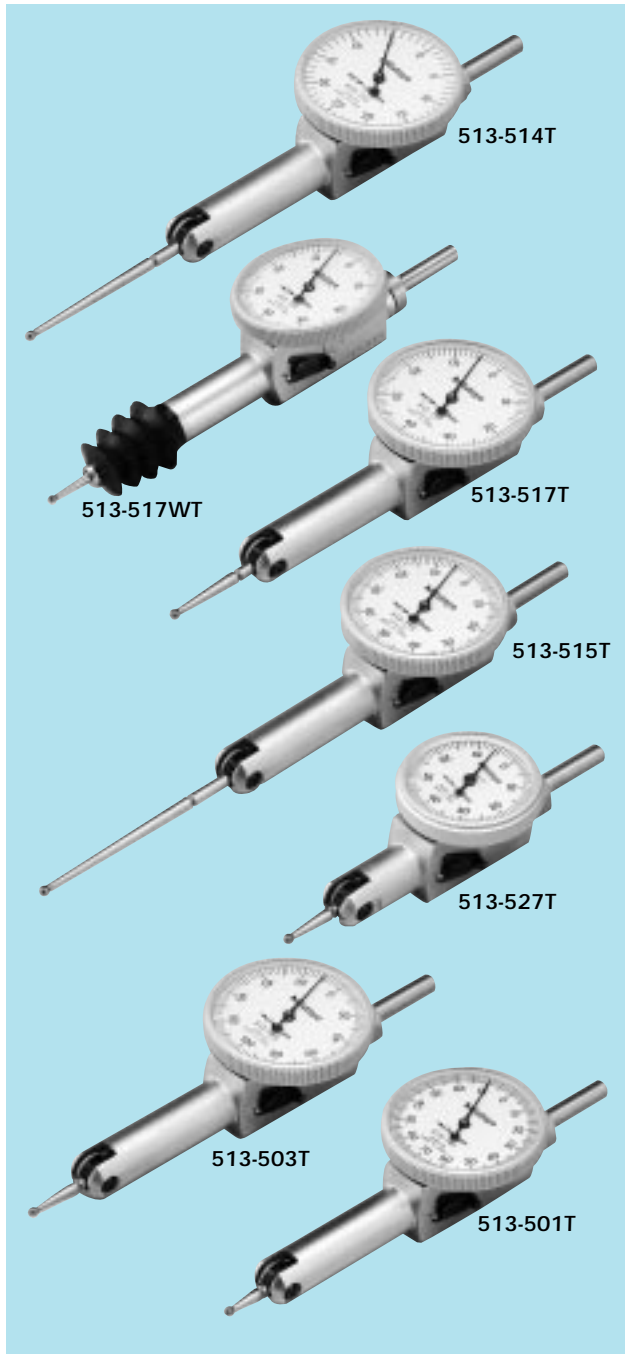
901959 (Ø8mm stem)  
901997 (.25" DIA. stem)





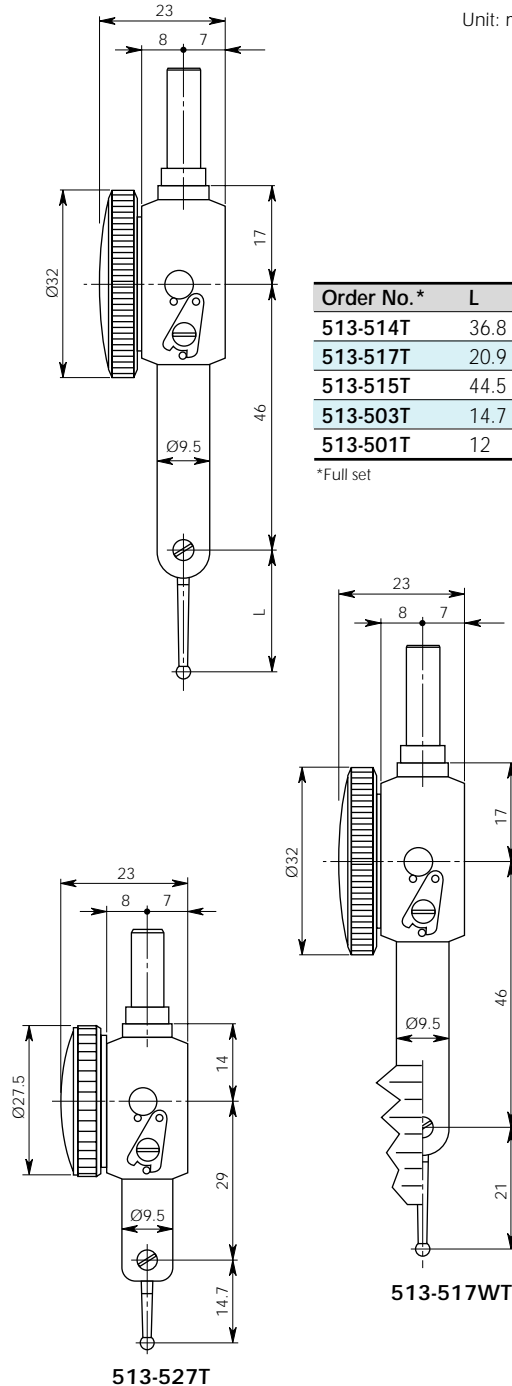
# Pocket Type Dial Test Indicators

## SERIES 513



### Dimensions

Unit: mm



### FEATURES

- Jeweled bearings assure higher sensitivity and accuracy.
- Reversible measuring direction.
- Two holding bars are supplied. (Full sets only.)
- Fully adjustable bezel/dial face.
- Contact point is adjustable within 220°.

|                     |                       |                    |                    |
|---------------------|-----------------------|--------------------|--------------------|
| High Precision Type | Doubled Scale Spacing | Long Contact Point | Revolution Counter |
| Compact Type        | Dustproof             | Jeweled            | Anti-Magnetic      |
| Waterproof          |                       |                    |                    |



513-514E/T



513-517E/T  
513-517WE/WT  
513-527E/T



513-515T



513-503E/T



513-501E/T

## SPECIFICATIONS

### Metric

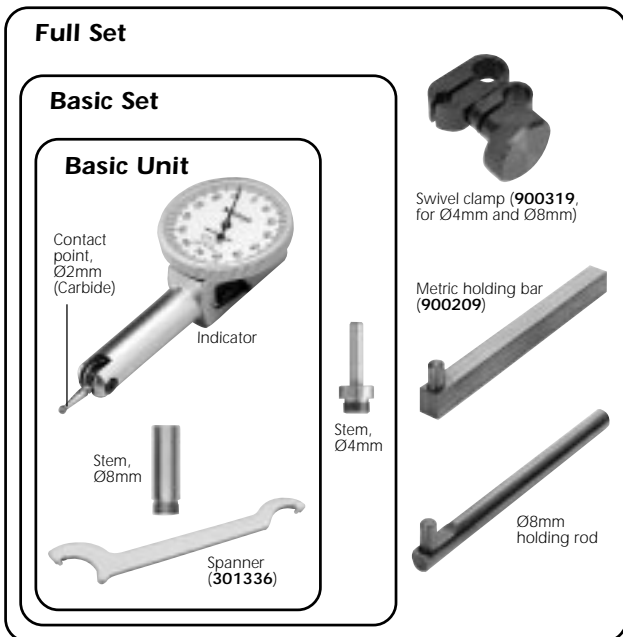
| Graduation | Range     | Order No.  |          | Dial reading | Accuracy     | Measuring force | Remarks |
|------------|-----------|------------|----------|--------------|--------------|-----------------|---------|
|            |           | Basic unit | Full set |              |              |                 |         |
| 0.01mm     | 0.5mm     | 513-514E   | 513-514T | 0-25-0       | 10μm         | 0.3N or less    |         |
|            |           | 513-517E   | 513-517T | 0-40-0       | 8μm          | 0.3N or less    |         |
|            | 513-517WE | 513-517WT  | 0-40-0   | 8μm          | 0.3N or less |                 |         |
|            | 513-527E  | 513-527T   | 0-40-0   | 8μm          | 0.3N or less |                 |         |
|            | 1mm       | —          | 513-515T | 0-50-0       | 10μm         | 0.3N or less    |         |
| 0.002mm    | 0.2mm     | 513-503E   | 513-503T | 0-100-0      | 3μm          | 0.3N or less    |         |
| 0.001mm    | 0.14mm    | 513-501E   | 513-501T | 0-70-0       | 3μm          | 0.3N or less    |         |

### Inch

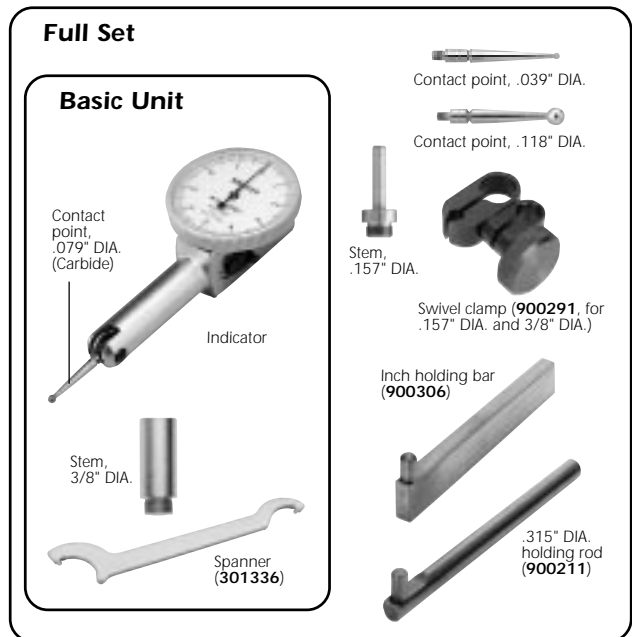
| Graduation | Range | Order No.  |          | Dial reading | Accuracy | Measuring force | Remarks |
|------------|-------|------------|----------|--------------|----------|-----------------|---------|
|            |       | Basic unit | Full set |              |          |                 |         |
| .001"      | .04"  | 513-518    | 513-518T | 0-20-0       | ±.001"   | 0.3N or less    |         |
|            |       | 513-528    | 513-528T | 0-20-0       | ±.001"   | 0.3N or less    |         |
| .0005"     | .02"  | 513-512    | 513-512T | 0-10-0       | ±.0005"  | 0.3N or less    |         |
| .0001"     | .01"  | 513-504    | 513-504T | 0-5-0        | ±.0002"  | 0.3N or less    |         |

## Set Configurations

### Metric



### Inch



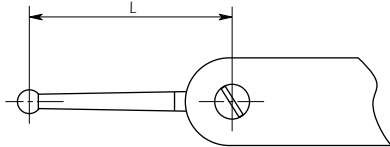
- High Precision Type
- Doubled Scale Spacing
- Long Contact Point
- Revolution Counter
- Compact Type
- Dustproof
- Jeweled
- Anti-Magnetic
- Waterproof

# Accessories

for Pocket Type Dial Test Indicators

## Contact Points (for Metric Model Only)

- Use a contact point with the proper length for accurate measurement.



### Ø0.5mm ball



190547 (L=14.7mm)  
190549 (L=20.9mm)  
190656 (L=44.5mm)

### Ø0.7mm ball



190548 (L=14.7mm)  
190550 (L=20.9mm)  
190655 (L=44.5mm)

### Ø1mm ball



136756 (L=12.1mm)  
103017 (L=14.7mm)  
103013 (L=20.9mm)  
136235 (L=44.5mm)

### Ø2mm ball (Carbide)



136104 (L=12.1mm)  
103010 (L=14.7mm)  
103006 (L=20.9mm)  
136013 (L=44.5mm)

### Ø2mm ball



136757 (L=12.1mm)  
103016 (L=14.7mm)  
103012 (L=20.9mm)

### Ø3mm ball



136758 (L=12.1mm)  
103018 (L=14.7mm)  
103014 (L=20.9mm)  
136236 (L=44.5mm)

## Stems

Ø4mm (.157" DIA.)



102036

Ø8mm



102822

3/8" DIA.



102081

## Swivel Clamps

- Can be used with Holding Bars.

For Ø4mm stem and Ø8mm stem



900319

For .157" DIA. stem and 3/8" DIA. stem



900291

## Holding Bars



9x9mm

953638 (Length: 50mm)  
900209 (Length: 100mm)



Ø8mm

900211 (Length: 115mm)



.25"x.5"

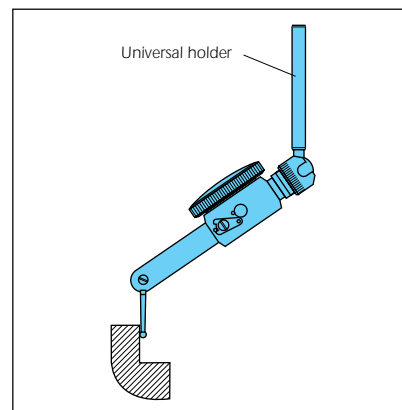
953639 (Length: 2")  
900306 (Length: 4")

## Universal Holder

- Since the Dial Test Indicator can be swiveled to a desired angle, the holder is useful for centering workpieces and installing workpieces on a milling machine.



901917 (Ø8mm stem)  
901546 (.25" DIA. stem)



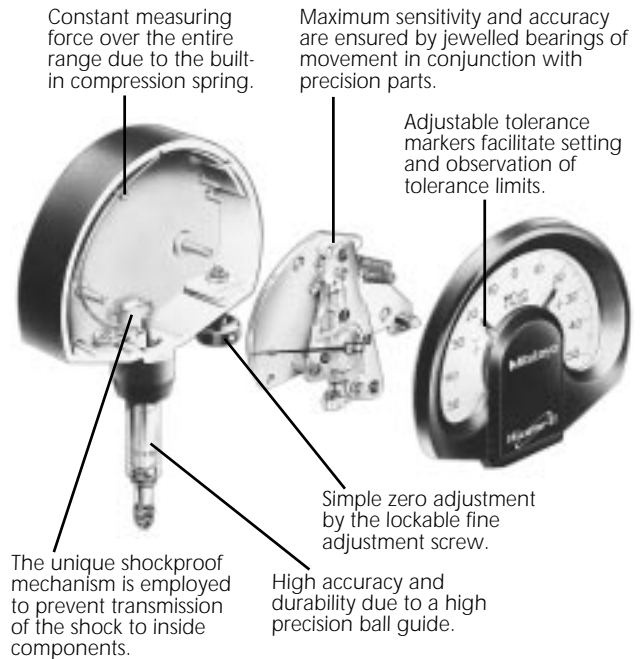
## Hicator-II

### SERIES 524

#### High-Accuracy Dial Indicator



### FEATURES



### SPECIFICATIONS

#### Metric ISO/JIS

| Graduation | Range  | Order No. |             | Dial reading | Accuracy | Measuring force | Mass |
|------------|--------|-----------|-------------|--------------|----------|-----------------|------|
|            |        | Standard  | Drip-proof* |              |          |                 |      |
| 0.0005mm   | 0.05mm | 524-523   | 524-533     | 25-0-25      | 0.6µm    | 1.2N or less    | 260g |
| 0.001mm    | 0.1mm  | 524-521   | 524-531     | 50-0-50      | 1.2µm    | 1.2N or less    | 260g |
| 0.01mm     | 0.5mm  | 524-525   | 524-535     | 25-0-25      | 8µm      | 1.2N or less    | 260g |

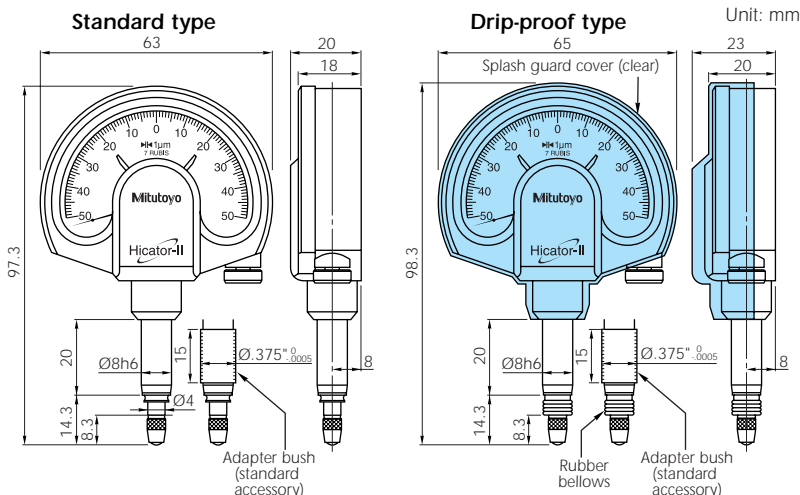
\*IP protection level: IP-52

#### Inch ANSI/AGD

| Graduation | Range | Order No. |             | Dial reading | Accuracy | Measuring force | Mass     |
|------------|-------|-----------|-------------|--------------|----------|-----------------|----------|
|            |       | Standard  | Drip-proof* |              |          |                 |          |
| .00002"    | .002" | 524-524   | 524-534     | 1-0-1        | .000024" | 1.2N or less    | .57 lbs. |
| .00005"    | .004" | 524-522   | 524-532     | 2-0-2        | .00006"  | 1.2N or less    | .57 lbs. |
| .005"      | .02"  | 524-526   | 524-536     | 10-0-10      | .0004"   | 1.2N or less    | .57 lbs. |

\*IP protection level: IP-52

### Dimensions



### OPTIONAL ACCESSORIES

| Order No. | Description                |
|-----------|----------------------------|
| 02AZA720  | Contact point (steel ball) |
| 02AZA721  | Contact point (ruby ball)  |
| 02AZA764  | Spindle lifting knob       |
| 02AZA765  | Splash guard cover         |
| 02AZA766  | Rubber bellows             |
| 02AZA767  | Mounting holder            |
| 540774    | Spindle lifting cable      |

# Linear Gage and Display Unit Selection Guide

## Gage Heads and Display Units (Linear Gage Counter)

| Resolution             | Measuring range     |                      |                     |                     |                    | Reference page | Applicable display unit                        |  |   |
|------------------------|---------------------|----------------------|---------------------|---------------------|--------------------|----------------|--|--|---|
|                        | 5mm (.2")           | 10mm (.4")           | 25mm (1")           | 50mm (2")           | 100mm (4")         |                | Single function                                | Multi-function   | Multi-gage  |
| 0.00001mm/<br>.000001" |                     | LGH: <b>542-923</b>  |                     |                     |                    | 243            | KH Counter                                     |  |   |
|                        |                     | LGH: <b>542-924</b>  |                     |                     |                    | 243            |  |  |   |
| 0.0001mm/<br>.000005"  | LGB: <b>542-246</b> |                      |                     |                     |                    | 242            | 542-051<br>542-053                             | EF Counter<br><b>542-060</b><br><b>542-062</b>                                 |   |
|                        |                     | LGF: <b>542-144</b>  | LGF: <b>542-145</b> |                     |                    | 234            |  |  |   |
|                        |                     | LGH: <b>542-711</b>  |                     |                     |                    | 242            |  |  |   |
|                        |                     | LGH: <b>542-712</b>  |                     |                     |                    | 242            |  |  |   |
|                        |                     | LKG: <b>542-158</b>  |                     |                     |                    | 241            |  |  |   |
| 0.0005mm/<br>.000005"  |                     | LGF: <b>542-131</b>  | LGF: <b>542-132</b> | LGF: <b>542-133</b> |                    | 234            | 542-051<br>542-053                             | EF Counter<br><b>542-059</b><br><b>542-061</b><br><b>542-092</b>               | EV Counter<br><b>542-067</b><br>Display unit<br><b>02ADD400</b> |
|                        |                     | LKG: <b>542-157</b>  |                     |                     |                    | 241            |  |  |   |
| 0.001mm/<br>.00005"    | LGB: <b>542-201</b> | LGB: <b>542-222</b>  |                     |                     | LG: <b>542-312</b> | 232/LG: 242    | 542-053  | EF Counter<br><b>542-061</b><br>EB Counter<br><b>542-092</b>                   | EV Counter<br><b>542-067</b><br>Display unit<br><b>02ADD400</b> |
|                        | LGB: <b>542-244</b> | LGB: <b>542-222H</b> |                     |                     | LG: <b>542-313</b> | 232/LG: 242    |  |  |   |
|                        |                     | LGB: <b>542-230</b>  |                     |                     | LG: <b>542-314</b> | 232/LG: 242    |  |  |   |
|                        |                     | LGB: <b>542-223</b>  |                     |                     | LG: <b>542-315</b> | 232/LG: 242    |  |  |   |
|                        |                     | LGB: <b>542-262</b>  |                     |                     | LG: <b>542-316</b> | 232/LG: 242    |  |  |   |
|                        |                     | LKG: <b>542-156</b>  |                     |                     | LG: <b>542-332</b> | 231/LG: 242    |  |  |   |
|                        |                     |                      |                     |                     | LG: <b>542-333</b> | 242            |  |  |   |
|                        |                     |                      |                     |                     | LG: <b>542-334</b> | 242            |  |  |   |
|                        |                     |                      |                     |                     | LG: <b>542-335</b> | 242            |  |  |   |
|                        |                     |                      |                     |                     | LG: <b>542-336</b> | 242            |  |  |   |
| 0.005mm/<br>.0005"     |                     | LGE: <b>542-601</b>  | LGE: <b>542-602</b> | LGE: <b>542-603</b> |                    | 235            | 542-053  | EF Counter<br><b>542-065</b><br><b>542-066</b><br>EB Counter<br><b>542-094</b> | EV Counter<br><b>542-067</b><br>Display unit<br><b>02ADD400</b> |
|                        |                     | LGE: <b>542-604</b>  |                     |                     |                    | 235            |  |  |   |
| *0.0005mm/<br>.000005" |                     | LGF: <b>542-134</b>  | LGF: <b>542-135</b> | LGF: <b>542-136</b> |                    | 234            | 542-053  | EF Counter<br><b>542-065</b><br><b>542-066</b><br>EB Counter<br><b>542-094</b> | EV Counter<br><b>542-067</b><br>Display unit<br><b>02ADD400</b> |
| *0.001mm/<br>.00005"   |                     | LGF: <b>542-124</b>  | LGF: <b>542-125</b> | LGF: <b>542-126</b> |                    | 234            |  |  |   |
| 0.01mm/<br>.0005"      |                     | LGD: <b>542-321</b>  | LGD: <b>542-322</b> | LGD: <b>542-323</b> |                    | 173            | SD-D1 unit<br><b>572-001</b><br><b>572-011</b> | SD-D2 unit<br><b>572-021</b><br><b>572-031</b>                                 | EV Counter<br><b>542-064</b><br>Display unit<br><b>02ADD400</b> |
|                        |                     | LGD: <b>542-331</b>  | LGD: <b>542-332</b> | LGD: <b>542-333</b> |                    | 173            |  |  |   |
|                        |                     | LGD: <b>542-324</b>  |                     |                     |                    | 173            |  |  |   |
|                        |                     | LGD: <b>542-334</b>  |                     |                     |                    | 173            |  |  |   |
|                        |                     | LGS: <b>542-301</b>  |                     |                     |                    | 174            |  |  |   |
|                        |                     | LGS: <b>542-311</b>  |                     |                     |                    | 174            |  |  |   |
|                        |                     | LGS: <b>542-302</b>  |                     |                     |                    | 174            |  |  |   |
|                        |                     | LGS: <b>542-312</b>  |                     |                     |                    | 174            |  |  |   |

\*Gage head with scale reference point

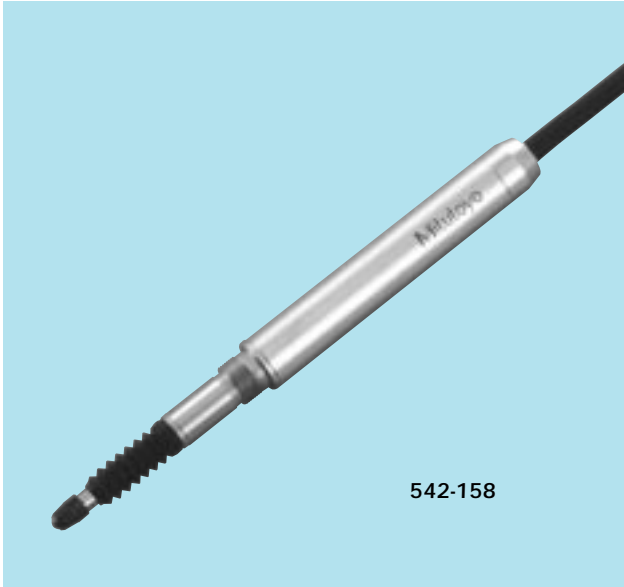
## Function Capabilities of Linear Gage Counters

| Functions                               | ES Counter (Assembly type) |         | EB Counter (Assembly type)    | EF Counter (Assembly/desktop type) |                      | EV Counter (Multi-gage system) |
|---|----------------------------|---------|-------------------------------|------------------------------------|----------------------|--------------------------------|
|   | 542-051                    | 542-053 | 542-092<br>542-093<br>542-094 | 542-059*<br>542-065*               | 542-061*<br>542-066* | 542-063<br>542-067             |
| • Zero-Set                              | —                          | —       | —                             | ○                                  | ○                    | ▲                              |
| • Preset                                | ○                          | ○       | ○                             | ○                                  | ○                    | ▲                              |
| • Counting direction switching          | ○                          | ○       | ○                             | ○                                  | ○                    | ○                              |
| • mm/inch switching                     | ○                          | ○       | ○                             | ○                                  | ○                    | ○                              |
| • Double-reading (diameter display)     | —                          | —       | —                             | ○                                  | ○                    | —                              |
| • Maximum measurement (upper peak hold) | —                          | —       | ○                             | ○                                  | ○                    | ○                              |
| • Minimum measurement (lower peak hold) | —                          | —       | ○                             | ○                                  | ○                    | ○                              |
| • TIR (runout) measurement              | —                          | —       | ○                             | ○                                  | ○                    | ○                              |
| • Limit setting                         | ○                          | —       | ○                             | ○                                  | ○                    | ○                              |
| • GO/±NG judgment                       | ○                          | —       | ○                             | ○                                  | ○                    | ○                              |
| • GO/±NG signal output                  | ○                          | —       | ○                             | ○                                  | ○                    | ○                              |
| • Error alarm                           | ○                          | ○       | ○                             | ○                                  | ○                    | ○                              |
| • Sum/difference of 2 gages (A+B, A-B)  | —                          | —       | —                             | —                                  | ○                    | —                              |
| • RS link (multiple measurement)        | —                          | —       | —                             | ○                                  | ○                    | ○                              |
| • Battery back-up                       | ○                          | ○       | ○                             | ○                                  | ○                    | —                              |
| • SPC data output                       | —                          | —       | ○                             | ○                                  | ○                    | —                              |
| • BCD data output                       | —                          | ○       | ○                             | —                                  | —                    | ○                              |
| • RS-232C interface unit                | —                          | —       | —                             | ○                                  | ○                    | ○                              |
| • GPIB interface unit                   | —                          | —       | —                             | —                                  | —                    | —                              |
| • AC adaptor                            | —                          | —       | —                             | ○                                  | ○                    | △                              |

○: Provided, △: Optional, ▲: Using the optional display unit (02ADD400)  
\*A suffix code is required to specify the AC adaptor type when ordering (see page 241.)

## LGK Series Linear Gages

SERIES 542  
with Slim Dimensions



The LGK Series Linear Gages are Mitutoyo's new, pencil type electronic gage heads designed to fit into very tight spaces. Employing an improved structure for the spindle guide, the LGK is highly durable to external shock and vibration.

### FEATURES

- Compact design with a 12mm outside diameter
- Excellent structure of protection against dust and water splash (IP-66) in harsh shop-floor environments.
- Maximum permissible acceleration values for shock and impact, 11ms (IEC68-2-27)
- Output differential square wave signals for a wide range of applications.
- Use linear stroke bearings on the spindle movement for durability
- Thrust Stem with a clamping nut is optional.

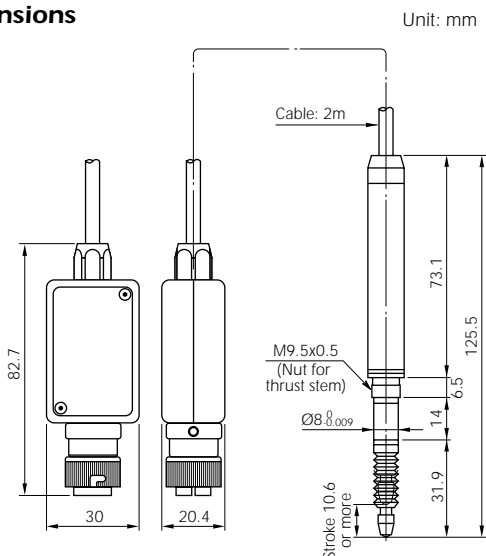
### SPECIFICATIONS

Metric / Inch Compatible

| Resolution          | Range      | Order No. | Accuracy            | Measuring force | Dust/Water protection level | Mass |
|---------------------|------------|-----------|---------------------|-----------------|-----------------------------|------|
| 0.0001mm (.000005") | 10mm (.4") | 542-158** | (1.5+L/50) $\mu$ m* | 0.8N or less    | Conforming to IP66          | 175g |
| 0.0005mm (.000005") | 10mm (.4") | 542-157   | (1.5+L/50) $\mu$ m* | 0.8N or less    | Conforming to IP66          | 175g |
| 0.001mm (.00005")   | 10mm (.4") | 542-156   | (1.5+L/50) $\mu$ m* | 0.8N or less    | Conforming to IP66          | 175g |

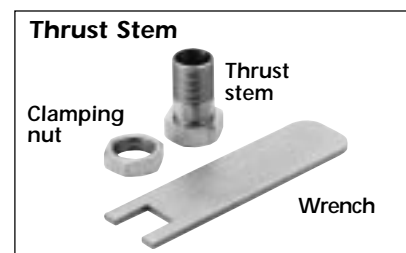
\*L=Measured length (mm)  
\*\*See page 244 for the applicable counters.

### Dimensions



### OPTIONAL ACCESSORIES

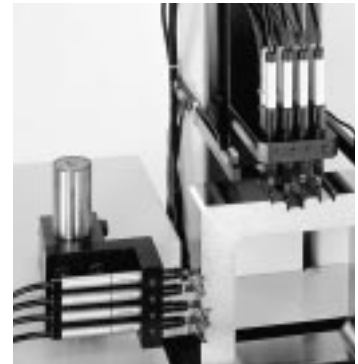
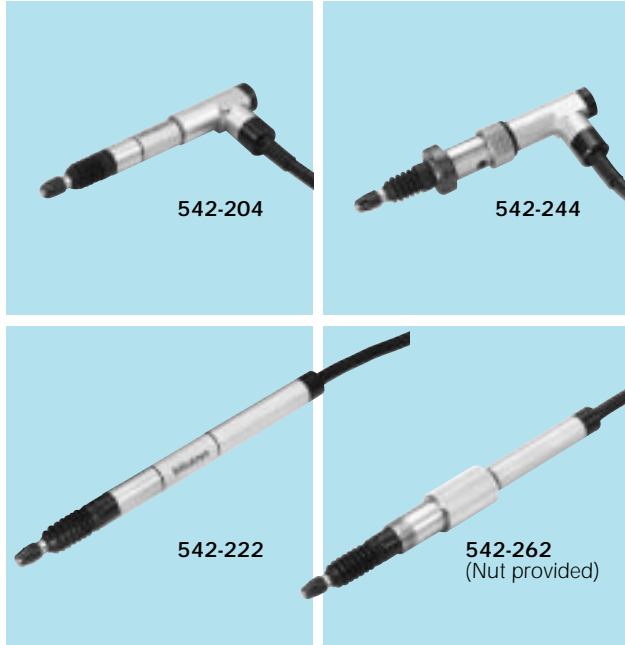
| Order No. | Description              |
|-----------|--------------------------|
| 238772    | 10mm rubber boot (spare) |
| 902434    | Extension cable (5m)     |
| 902433    | Extension cable (10m)    |
| 902432    | Extension cable (20m)    |
| 02ADE230  | Air drive unit           |
| 02ADB681  | Thrust stem              |
| 02ADB682  | Clamping nut             |
| 02ADB683  | Wrench                   |



# LGB Series Linear Gages

## SERIES 542

with Extra Slim Dimensions



These ultra-compact LGB Series Linear Gages have a diameter of only 8mm for use in very tight spaces. The design is also highly durable for a long service life.

### FEATURES

- Comes with or without a clamping nut on the stem.
- Interchangeable contact points for dial indicators are available. (See pages 190 and 191.)
- A variety of Linear Gage Counters (display units) are available to meet diverse measuring requirements.

### OPTIONAL ACCESSORIES

| Order No. | Description                      |
|-----------|----------------------------------|
| 902434    | Extension cable (5m)             |
| 902433    | Extension cable (10m)            |
| 902432    | Extension cable (20m)            |
| 238773    | Rubber boot for 5mm LGB (spare)  |
| 238772    | Rubber boot for 10mm LGB (spare) |

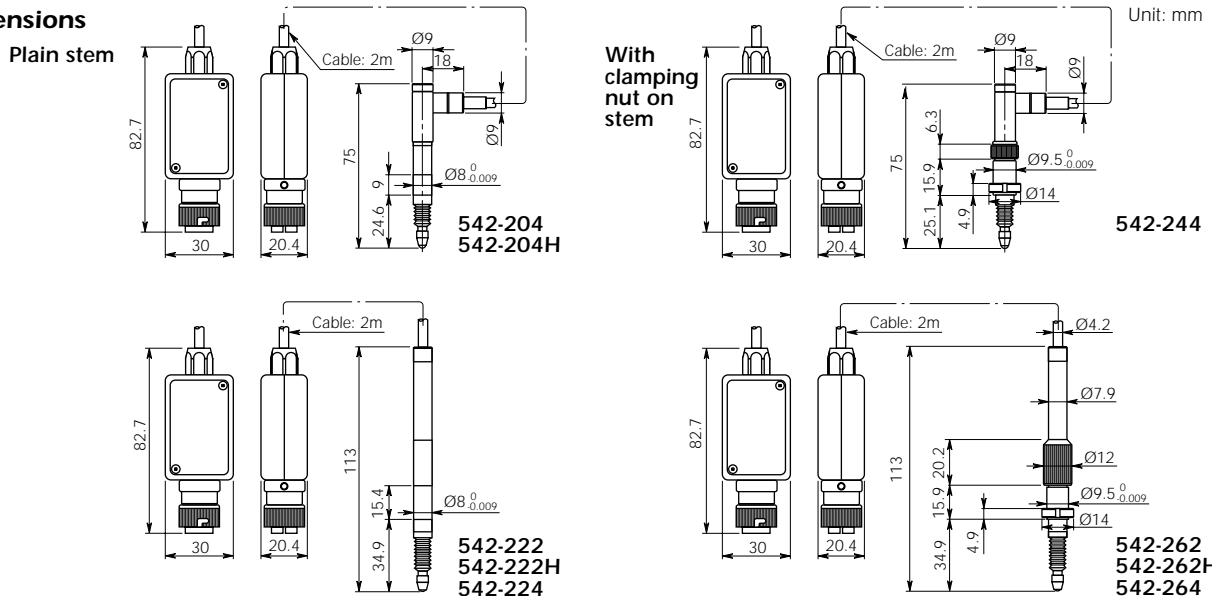
### SPECIFICATIONS

Metric/Inch Compatible

| Resolution           | Range     | Order No. | Accuracy | Measuring force | Dust/Water protection level | Mass | Remarks                |
|----------------------|-----------|-----------|----------|-----------------|-----------------------------|------|------------------------|
| 0.001mm<br>(.00005") | 5mm (.2") | 542-204   | 2µm      | 0.65N or less   | Conforming to IP54          | 145g | —                      |
|                      |           | 542-204H  | 1µm      | 0.65N or less   | Conforming to IP54          | 145g | —                      |
| 10mm (.4")           |           | 542-244   | 2µm      | 0.65N or less   | Conforming to IP54          | 160g | w/Clamping nut on stem |
|                      |           | 542-222   | 2µm      | 0.8N or less    | Conforming to IP54          | 150g | —                      |
|                      |           | 542-222H  | 1µm      | 0.8N or less    | Conforming to IP54          | 150g | —                      |
|                      |           | 542-224*  | 2µm      | 0.6N or less    | Conforming to IP54          | 150g | —                      |
|                      |           | 542-262   | 2µm      | 0.8N or less    | Conforming to IP54          | 170g | w/Clamping nut on stem |
|                      |           | 542-262H  | 1µm      | 0.8N or less    | Conforming to IP54          | 170g | w/Clamping nut on stem |
|                      |           | 542-264*  | 2µm      | 0.6N or less    | Conforming to IP54          | 170g | w/Clamping nut on stem |

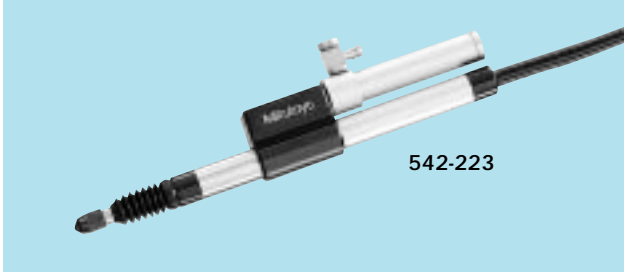
\*Low-measuring force type

### Dimensions



# LGB Series Linear Gages

SERIES 542  
with Pneumatic Cylinder



The world's first electronic gage head that has incorporated a pneumatic cylinder to control the spindle. Extremely easy to install on automated machines.

### FEATURES

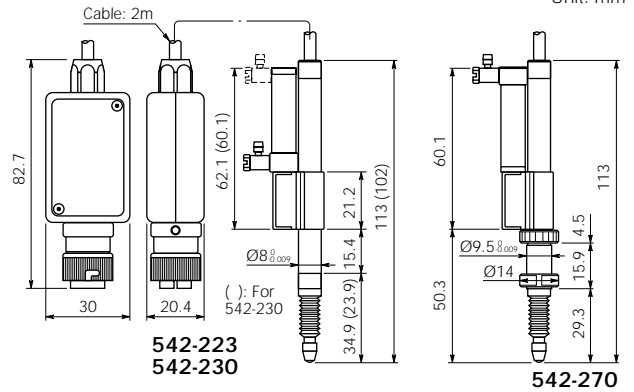
- Air pressure required: 0.3 - 0.4MPa (3 - 4kgf/cm<sup>2</sup>)
- Supplying air to the pneumatic cylinder, the spindle will be retracted (standard type) or released (retracted spindle type).

### SPECIFICATIONS

| Metric / Inch <small>Compatible</small> |               | Order No. | Accuracy | Measuring force | Dust/Water protection level | Mass | Remarks                |
|---|---------------|-----------|----------|-----------------|-----------------------------|------|------------------------|
| 0.001mm<br>(.00005")                    | 10mm<br>(.4") | 542-223   | 2µm      | 0.8N or less    | Conforming to IP54          | 165g | —                      |
|   |               | 542-230*  | 2µm      | 0.8N or less    | Conforming to IP54          | 165g | —                      |
|   |               | 542-270*  | 2µm      | 0.8N or less    | Conforming to IP54          | 170g | w/Clamping nut on stem |

\*Retracted-spindle type

### Dimensions



### OPTIONAL ACCESSORIES

| Order No. | Description                      |
|-----------|----------------------------------|
| 902434    | Extension cable (5m)             |
| 902433    | Extension cable (10m)            |
| 902432    | Extension cable (20m)            |
| 238772    | Rubber boot for 10mm LGB (spare) |

## Accessories

for Linear Gages

### Extension Signal Cables



### FEATURES

- The distance between a Linear Gage and the Counter can be extended up to 20m by using these cables.
- Cannot be used for LGS, LGD and LGF Linear Gages, and Laser Hologage.

### SPECIFICATIONS

| Order No. | Description             | Cable length |
|-----------|-------------------------|--------------|
| 902434    | Extension signal cable  | 5m           |
| 02ADF260  | Extension signal cable* | 5m           |
| 902433    | Extension signal cable  | 10m          |
| 02ADF280  | Extension signal cable* | 10m          |
| 902432    | Extension signal cable  | 20m          |
| 02ADF300  | Extension signal cable* | 20m          |

\*For LGF linear gage with scale reference point

### Spare Rubber Boots



### FEATURES

- Protects the spindle of a Linear Gage from dust.
- Dedicated for the following Linear Gages: LGB, LGD, LGE, and LGF.

### SPECIFICATIONS

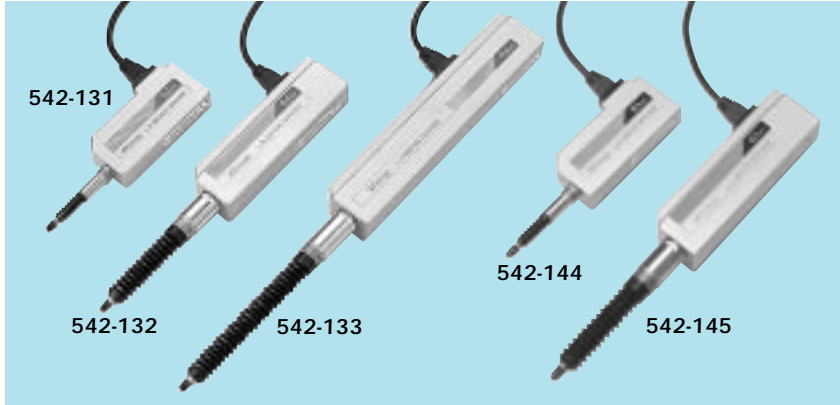
| Order No. | Description | Applicable Linear Gage    |
|-----------|-------------|---------------------------|
| 238773    | Rubber boot | LGB (5mm)                 |
| 238772    | Rubber boot | LGB, LGD, LGE, LGF (10mm) |
| 962504    | Rubber boot | LGD, LGE, LGF (25mm)      |
| 962505    | Rubber boot | LGD, LGE, LGF (50mm)      |



# LGF Series Linear Gages

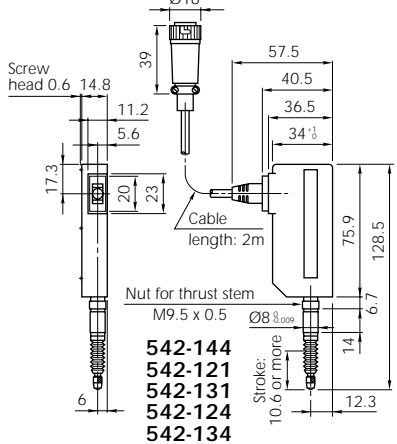
## SERIES 542

with Economical Design/Scale Reference Point



### Dimensions

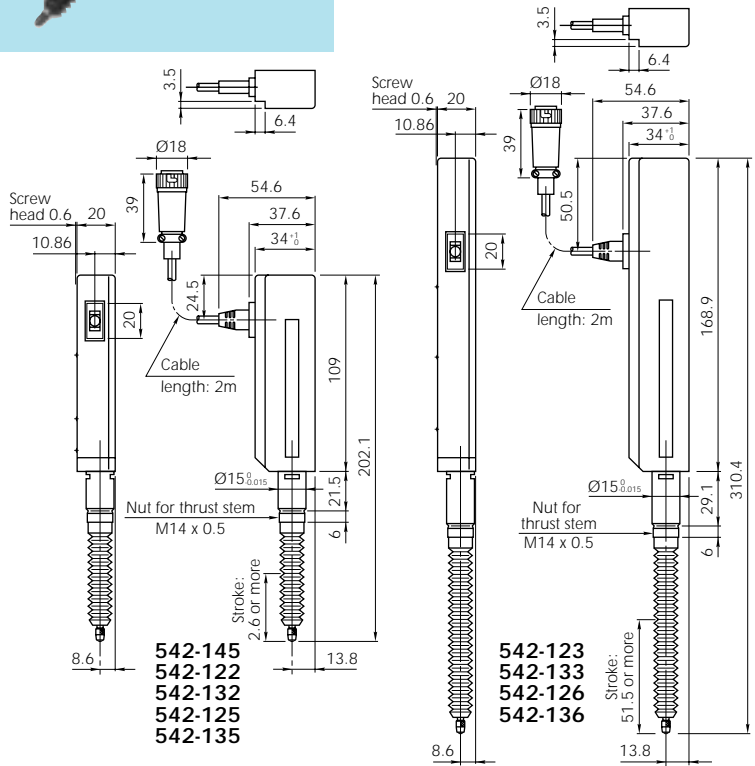
Unit: mm



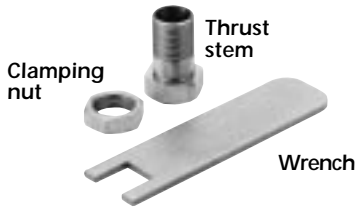
The LGF Series Linear Gages are Mitutoyo's new, low-cost type electronic gage heads designed to fit into very tight spaces. Employing an improved structure for the spindle guide, the LGF is highly durable to external shock and vibration.

### FEATURES

- Excellent structure of protection against dust and water splash (IP-66) in harsh shop-floor environments.
- Maximum permissible acceleration values for shock and impact, 11ms (IEC68-2-27)
- Output differential square wave signals for a wide range of applications.
- Use linear stroke bearings on the spindle movement for durability
- Thrust Stem with a clamping nut is optional.
- The models with a scale reference point are available for easy resetting of origin/datum position.



### Thrust Stem Set



### OPTIONAL ACCESSORIES

| Order No. | Description                               |
|-----------|---|
| 238772    | 10mm rubber boot (spare)                  |
| 962504    | 25mm rubber boot (spare)                  |
| 962505    | 50mm rubber boot (spare)                  |
| 02ADB680  | Ø9.5mm thrust stem set (for 10mm LGF)     |
| 02ADB690  | Ø18mm thrust stem set (for 25mm/50mm LGF) |

### SPECIFICATIONS

Metric / Inch Compatible

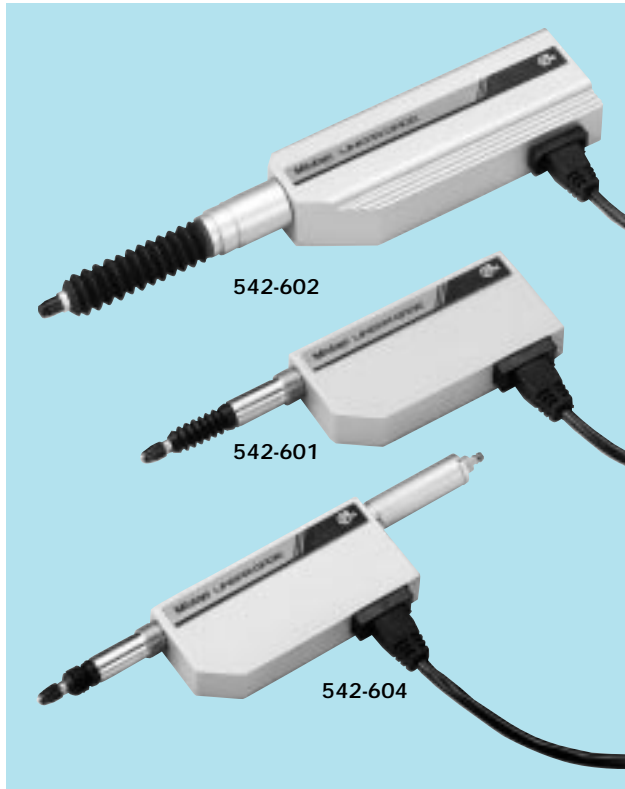
| Resolution             | Range      | Order No.<br>Standard w/reference point | Accuracy      | Measuring force | Dust/Water protection level | Mass |
|------------------------|------------|---|---------------|-----------------|-----------------------------|------|
| 0.0001mm<br>(.000005") | 10mm (.4") | 542-144**                               | (0.8+L/50)µm* | 1.2N or less    | Conforming to IP66          | 310g |
|                        | 25mm (1")  | 542-145**                               | (0.8+L/50)µm* | 1.2N or less    | Conforming to IP66          | 340g |
| 0.0005mm<br>(.000005") | 10mm (.4") | 542-131 542-134                         | (1.5+L/50)µm* | 1.2N or less    | Conforming to IP66          | 250g |
|                        | 25mm (1")  | 542-132 542-135                         | (1.5+L/50)µm* | 4.6N or less    | Conforming to IP66          | 290g |
|                        | 50mm (2")  | 542-133 542-136                         | (1.5+L/50)µm* | 5.7N or less    | Conforming to IP66          | 380g |
| 0.001mm<br>(.00005")   | 10mm (.4") | 542-121 542-124                         | (1.5+L/50)µm* | 1.2N or less    | Conforming to IP66          | 250g |
|                        | 25mm (1")  | 542-122 542-125                         | (1.5+L/50)µm* | 4.6N or less    | Conforming to IP66          | 290g |
|                        | 50mm (2")  | 542-123 542-126                         | (1.5+L/50)µm* | 5.7N or less    | Conforming to IP66          | 380g |

\*L=Measured length (mm)  
\*\*See page 244 for the applicable counters.

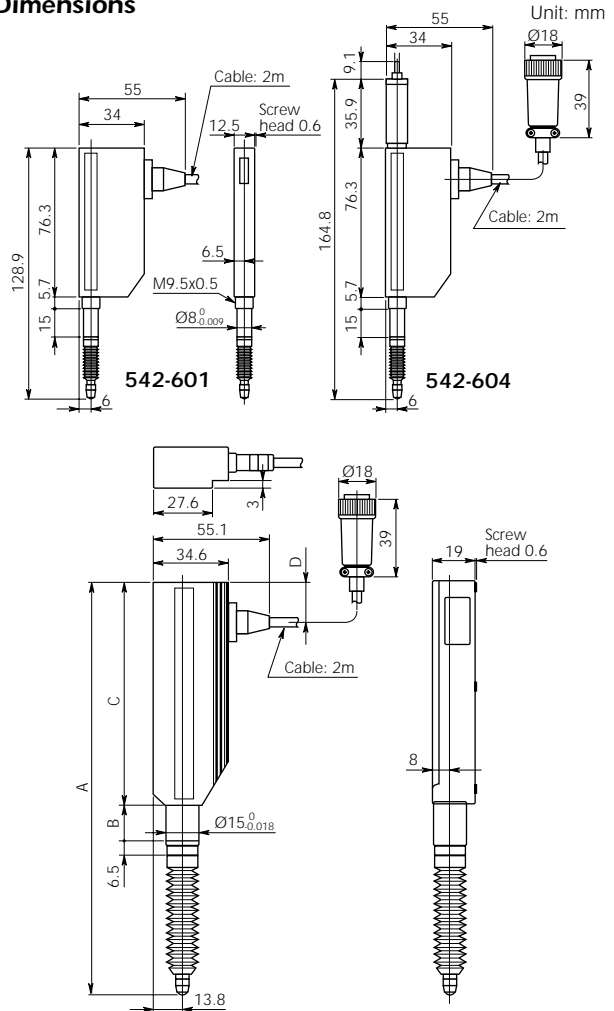
## LGE Series Linear Gages

### SERIES 542

with IP66 Dust/Water Protection



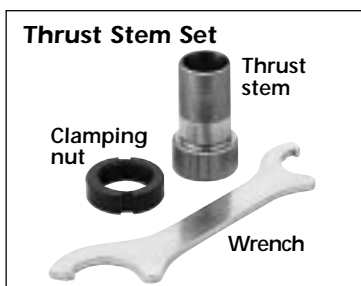
### Dimensions



The LGE Series Linear Gages are Mitutoyo's new, compact electronic gage heads designed to fit into very tight spaces. Employing linear ball bearings, the LGE is also highly durable for long life.

### FEATURES

- With a rubber boot for use in harsh environments.
- A variety of Linear Gage Counters are available to meet diverse measuring requirements.
- Thrust Stem with clamping nut is optional.
- Operating temperature: 0°C - 40°C



| Order No. | A     | B  | C     | D    |
|-----------|-------|----|-------|------|
| 542-602   | 194.1 | 17 | 105   | 18.9 |
| 542-603   | 299.4 | 20 | 166.5 | 44.9 |

### OPTIONAL ACCESSORIES

| Order No. | Description                               |
|-----------|---|
| 238772    | 10mm rubber boot (spare)                  |
| 962504    | 25mm rubber boot (spare)                  |
| 962505    | 50mm rubber boot (spare)                  |
| 02ADC730  | Ø9.5mm thrust stem set (for 10mm LGE)     |
| 02ADC740  | Ø18mm thrust stem set (for 25mm/50mm LGE) |

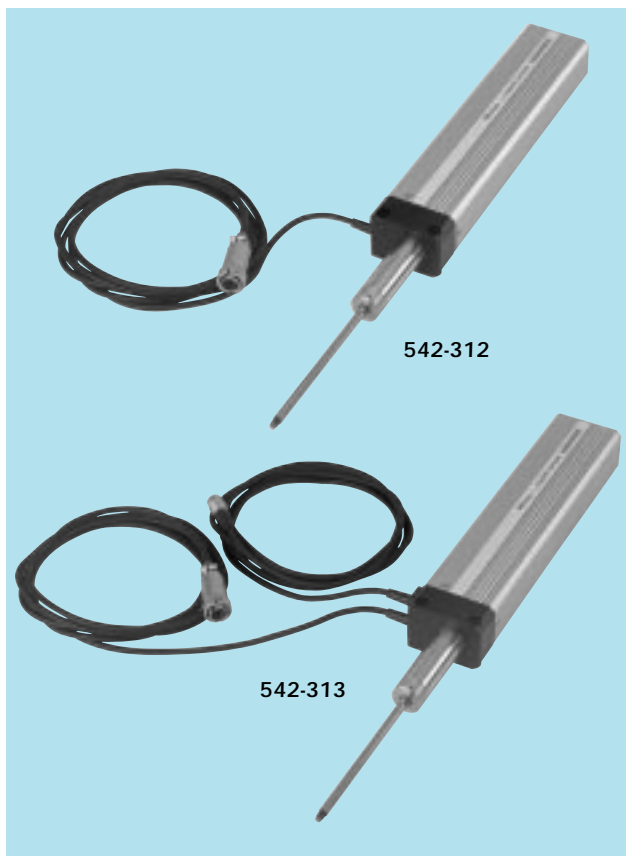
### SPECIFICATIONS

Metric / Inch Compatible

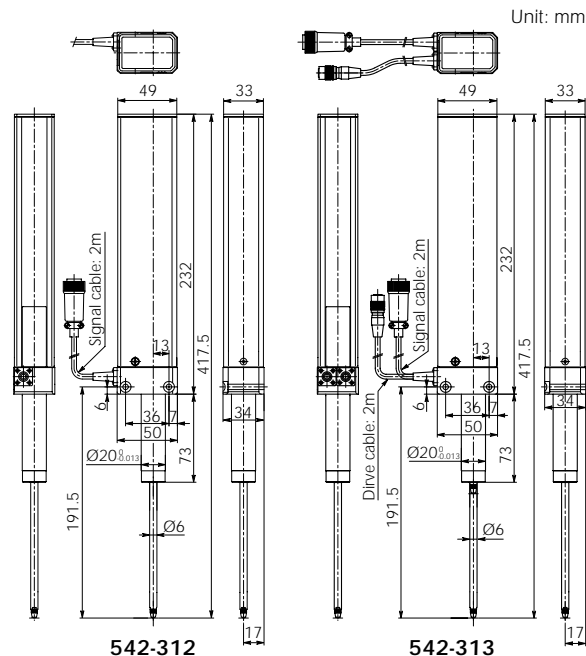
| Resolution          | Range      | Order No. | Accuracy | Measuring force | Dust/Water protection level | Mass | Remarks                 |
|---------------------|------------|-----------|----------|-----------------|-----------------------------|------|-------------------------|
| 0.005mm<br>(.0005") | 10mm (.4") | 542-601   | 20µm     | 1.2N or less    | Conforming to IP66          | 200g | —                       |
|                     |            | 542-604   | 20µm     | 1.2N or less    | Conforming to IP54          | 220g | With pneumatic cylinder |
|                     | 25mm (1")  | 542-602   | 20µm     | 4.6N or less    | Conforming to IP66          | 250g | —                       |
|                     | 50mm (2")  | 542-603   | 30µm     | 5.7N or less    | Conforming to IP66          | 300g | —                       |

# 100mm Stroke Linear Gage

## SERIES 542



### Dimensions



Unit: mm



Motor drive unit

### FEATURES

- With Ø3mm carbide ball contact point.
- Interchangeable contact points for dial indicators are available. (See pages 188 and 189.)
- A variety of Linear Gage Counters (display units) are available to meet diverse measuring requirements.
- Comes with a spindle lifting lever (except for 542-335 and 542-315)

### OPTIONAL ACCESSORIES

| Order No. | Description       |
|-----------|-------------------|
| 02ADA004  | Spare rubber boot |

### SPECIFICATIONS

#### Metric

| Resolution | Range | Order No. | Accuracy                        | Measuring force | Dust/Water protection level | Mass | Remarks                               |
|------------|-------|-----------|---------------------------------|-----------------|-----------------------------|------|---------------------------------------|
| 0.001mm    | 100mm | 542-332   | $(2.5+L/100) \leq 3\mu\text{m}$ | 8N or less      | Conforming to IP54          | 750g | —                                     |
|            |       | 542-336   | $(2.5+L/100) \leq 3\mu\text{m}$ | 3N or less      | Conforming to IP54          | 750g | —                                     |
|            |       | 542-312   | $(2+L/100) \leq 2.5\mu\text{m}$ | 8N or less      | Conforming to IP54          | 750g | —                                     |
|            |       | 542-316   | $(2+L/100) \leq 2.5\mu\text{m}$ | 3N or less      | Conforming to IP54          | 750g | —                                     |
|            |       | 542-334   | $(2.5+L/100) \leq 3\mu\text{m}$ | 8N or less      | Conforming to IP66          | 780g | With rubber boot                      |
|            |       | 542-314   | $(2+L/100) \leq 2.5\mu\text{m}$ | 8N or less      | Conforming to IP66          | 780g | With rubber boot                      |
|            |       | 519-335■  | $(2.5+L/100) \leq 3\mu\text{m}$ | 8N or less      | Conforming to IP66          | 970g | With motor drive unit                 |
|            |       | 542-315■  | $(2+L/100) \leq 2.5\mu\text{m}$ | 8N or less      | Conforming to IP66          | 970g | With motor drive unit                 |
|            |       | 542-333■  | $(2.5+L/100) \leq 3\mu\text{m}$ | 8N or less      | Conforming to IP54          | 940g | With motor drive unit and rubber boot |
|            |       | 542-313■  | $(2+L/100) \leq 2.5\mu\text{m}$ | 8N or less      | Conforming to IP54          | 940g | With motor drive unit and rubber boot |

Note: To denote your AC line voltage fill the blank of order number with the following suffixes (e.g. 542-335A). A for 120V, D for 220V, E for 240/220V. No suffix is required for 100V.

## ES Counter

### SERIES 542

Low-cost, Assembly Type Display Unit for Linear Gages



542-051

### FEATURES

- Compact panel-mounted type and DIN size (96mm wide x 48mm high). It can be easily incorporated into each system instrument.
- Two types of ES counters are available: the BCD data output type (542-053, 542-057) and the tolerance judgment output type (542-051, 542-055). Multiple counters can be connected to sequencers or other instruments.



- A low-cost automatic measuring system can be constructed.

### OPTIONAL ACCESSORY

| Order No. | Description                        |
|-----------|------------------------------------|
| 02ADB440  | Output connector pulg (with cover) |
| 02ADD930  | Terminal block connector cable     |
| 527428    | AC adapter*                        |

\*Used in combination with 02ADD930.

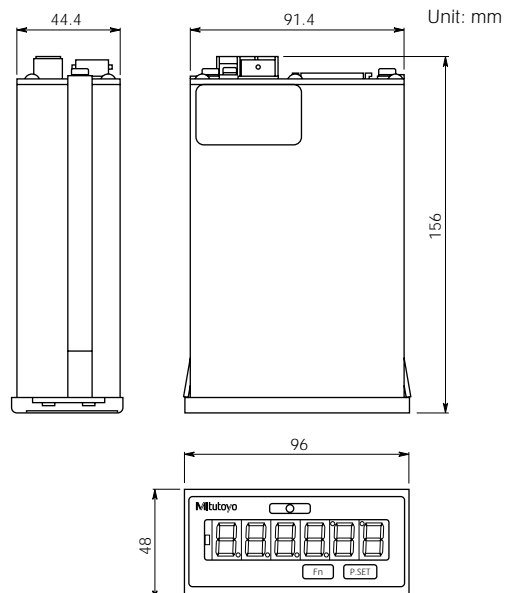
### SPECIFICATIONS

#### Metric /Inch

| Order No.                     | 542-051   | 542-053  |
|-------------------------------|---|--|
| Applicable gage               | LGB (excluding 0.0001mm resolution), LGF (0.001mm reading only), LGE, 100mm LG  |  |
| Resolution                    | 0.001mm, 0.005mm, 0.01mm, .00005", .0005"   |  |
| Order No.                     | 542-055   | 542-057  |
| Applicable gage               | LGD, LGP-M, LGS   |  |
| Resolution                    | 0.001mm, 0.01mm, .00005", .0005" (Automatically set depending on the gage)  |  |
| No. of gage input             | 1   |  |
| Display                       | 6-digit LED (red) and a negative [-] sign   |  |
| Function                      | <ul style="list-style-type: none"> <li>• Preset</li> <li>• Limit setting</li> <li>• GO/±NG judgment</li> <li>• mm/inch switch</li> <li>• +/- direction switch</li> <li>• Error alarm</li> </ul> | <ul style="list-style-type: none"> <li>• Preset</li> <li>• Data output (BCD)</li> <li>• mm/inch switch</li> <li>• +/- direction switch</li> <li>• Error alarm</li> </ul> |
| Output (open-collector)       | <ul style="list-style-type: none"> <li>• Limit signal (3 or 5-step)</li> <li>• Normal signal</li> </ul>   | <ul style="list-style-type: none"> <li>• Measurement data (BCD format)</li> <li>• Normal signal</li> </ul>   |
| External control signal input | <ul style="list-style-type: none"> <li>• Preset</li> <li>• Data hold</li> </ul>   | <ul style="list-style-type: none"> <li>• Preset</li> <li>• Data hold</li> <li>• Data output prohibit</li> </ul>  |
| Power supply                  | 12 - 24V DC, 6VA  |  |
| Operating temperature         | 0°C to 40°C   |  |
| Dimensions(WXDxH)             | 96X156X48mm   |  |
| Mass                          | 400g  |  |

\*Depending on the linear gage type connected.

### Dimensions



# EB Counter

## SERIES 542

Assembly Type Display Unit with Multiple Limit Setting Function for Linear Gages



542-092

### FEATURES

- 3-/5-step x 7-bank tolerance judgement or 7-channel x 2-bank limit setting.
- Standard serial BCD signal output for simple wiring with a PC, programmable controller, etc..
- Simple analog signal output for a dynamic measurement.
- DIN compatible (96x48mm/3.86"x1.89") and Panel-mounting compact body design.
- Choice of three models for various gage inputs.

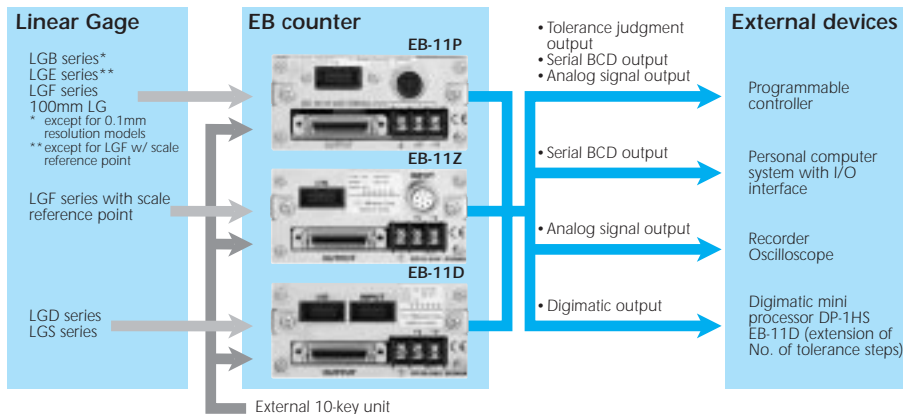
### OPTIONAL ACCESSORIES

| Order No. | Description                          |
|-----------|--------------------------------------|
| 02ADB440  | I/O output connector                 |
| 02ADF180  | 10-key unit                          |
| 02ADD950  | SPC data ooutput cable (0.5m)        |
| 936937    | SPC data ooutput cable (1m)          |
| 965014    | SPC data ooutput cable (2m)          |
| 527428    | AC adapter (100V)                    |
| 527428A   | AC adapter (120V)                    |
| 527428CED | AC adapter (220V)                    |
| 527428CEE | AC adapter (240V)                    |
| 02ADD930  | Connector for three-terminal section |

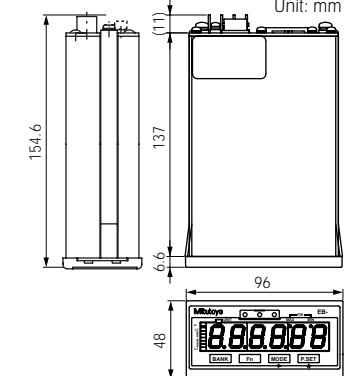
AC adapter



02ADD930



### Dimensions



### SPECIFICATIONS

| Order No.                          | 542-092  | 542-094                        | 542-093                            |
|------------------------------------|--|--------------------------------|------------------------------------|
| Model                              | EB-11P   | EB-11Z                         | EB-11D                             |
| Applicable input                   | Differential square-wave   | Differential square-wave       | Digimatic code (SPC)               |
| Applicable gage                    | LGB, LGE, LGF*, 100mm LG   | LGF with scale reference point | LGD, LGS                           |
| Number of gage input               | 1  | 1                              | 1                                  |
| Resolution (count display range)   | 0.01mm (±999.99mm)/.0005" (±99.9995")  |                                |                                    |
|                                    | 0.005mm (±999.995mm)/.00005" (±99.99995")  |                                | —                                  |
|                                    | 0.001mm (±999.999mm)/.00005" (±9.99995")   |                                |                                    |
|                                    | 0.0005mm (±99.9995mm)/.000005" (±.999995")   |                                | —                                  |
|                                    | Selection with the parameter   | Selection with the parameter   | Auto-selection with gage connected |
| Display                            | 6-digit and a negative (-) sign LED (green), Tolerance judgment indication LED (orange, green, red)  |                                |                                    |
| Function                           | Presetting, 3-/5-step x 7-bank or 7-channel x 2-bank limit setting, GO/±NG judgement, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, Counting direction switching, Scale reference point, mm/inch switching, Count standby display, Key protect |                                |                                    |
| Output                             | Tolerance judgment, Serial BCD output, Simplified analog output, Digimatic output  |                                |                                    |
| External control                   | Preset, Data hold, Bank switching, Peak mode switching, Analog range selection   |                                |                                    |
| Error display/output               | Power-supply voltage error, overspeed error, overflow error, gage error, communication error, tolerance setting error  |                                |                                    |
| Max. input frequency/count speed** | 1.25MHz (2-phase square waveform)/5MHz   |                                | -----                              |
| Power supply/Power consumption     | Via AC adapter (12V to 24V DC, 500mA (max.))/6VA   |                                |                                    |
| Operating environment              | 0°C to 40°C (20%RH to 80%RH, without condensation)   |                                |                                    |
| Mass                               | 400g (.88lbs.)   |                                |                                    |
| Standard accessory                 | Six washers for adjusting the mounting plate thickness   |                                |                                    |

\* For LGF with scale reference point use 542-094.

\*\* Depending on the gage connected. The input frequency of the scale reference point signal (EB-11Z) is also restricted by the gage connected

## EF Counter

### SERIES 542

Multi-function Display Unit  
for Linear Gages



Single-display type  
(with 1-gage input channel)



Double-display type  
(with 2-gage input channels)

### SPECIFICATIONS

#### Inch / Metric

| Order No.   | (100V)   | 542-059/542-065*      | 542-061/542-066*   |
|---|--|-----------------------|--------------------|
| (Order number suffix denotes the AC adaptor type equipped.) | (120V)   | 542-059A/542-065A*    | 542-061A/542-066A* |
|   | (220V)   | 542-059D/542-065D*    | 542-061D/542-066D* |
|   | (240V)   | 542-059E/542-065E*    | 542-061E/542-066E* |
| **  |  | 542-059-1/542-065*    | 542-061-1/542-066* |
| Number of gage input  | 1<br>(Single-display)  | 2<br>(Double-display) |                    |
| Resolution***   | 0.0005mm, 0.001mm, 0.005mm, 0.01mm, .00005", .0005"  |                       |                    |
| Display   | 8-digit LED (green) and a [-] sign   |                       |                    |
| Function  | Zero-set, preset, limit setting (3 or 5-step), GO/±NG judgment, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, double reading, mm/inch switching, sum/difference of 2 gages (542-061 only), output mode selection, error alarm, RS link |                       |                    |
| Output  | Measurement data (via RS-232C interface/SPC output port), 3 or 5-step limit signal (via I/O connector), normal signal  |                       |                    |
| Counting speed  | 5MHz   |                       |                    |
| Applicable gage****   | LGB, LGE, LGF  |                       |                    |
| Power supply  | Via AC adaptor (12 - 24V DC, 8.4VA)  |                       |                    |
| Operating temperature                                       | 0°C to 40°C  |                       |                    |
| Dimensions (WxDxH)  | 144x148x72mm   |                       |                    |
| Mass  | 700g   | 800g                  |                    |

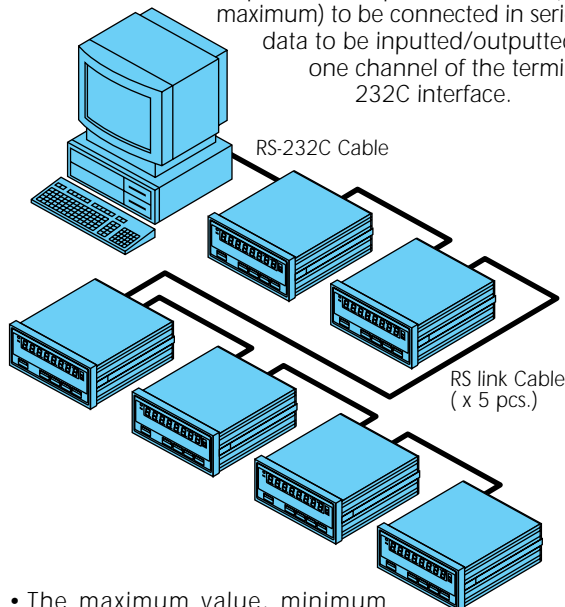
\*For LGF Series linear gage with scale reference point.  
\*\*AC adaptor is not equipped.  
\*\*\*Depending on the linear gage type connected.  
\*\*\*\*Excluding 0.0001mm resolution models and sine wave output models.

### FEATURES

- Panel-mounted type and DIN size (144mm wide x 72mm high). It can be easily incorporated into each system instrument.
- This counter can be used on a desktop by mounting it on the supplied stand.

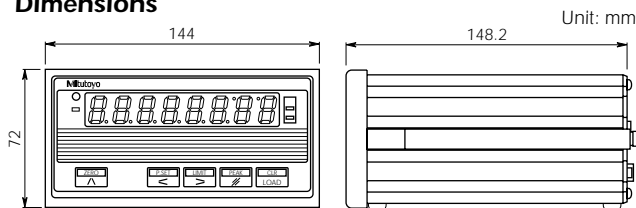


- The standard RS-232C interface allows easy communication with an external PC.
- The RS Link function permits multiple EF counters (6 units maximum) to be connected in series and data to be inputted/outputted from one channel of the terminal RS-232C interface.



- The maximum value, minimum value, and TIR (total indicator reading) measurements are possible.
- The 2-gage input type can perform 2-axis display and make addition or subtraction calculations between 2 gages.
- A low-cost automatic measuring system can be constructed.

### Dimensions



### OPTIONAL ACCESSORIES

| Order No. | Description                          |
|-----------|--------------------------------------|
| 02ADB440  | Output connector pulg (with cover)   |
| 02ADD950  | SPC data output/RS link cable (0.5m) |
| 936937    | SPC data output/RS link cable (1m)   |
| 965014    | SPC data output/RS link cable (2m)   |

# EV Counter

## SERIES 542

For multi-gage system



542-063

### SPECIFICATIONS

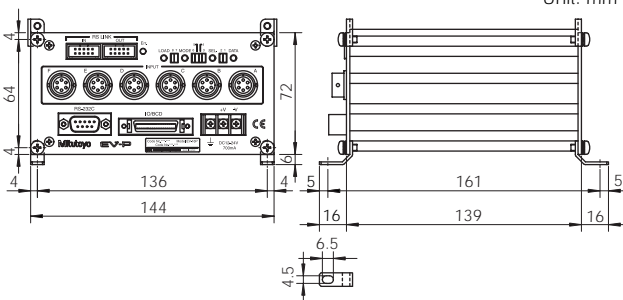
#### Inch./Metric

|                       |  |
|-----------------------|--|
| <b>Order No.</b>      | <b>542-063</b>   |
| Applicable gage       | LGB (excluding 0.0001mm resolution), LGF, LGE, 100mm LG  |
| Resolution            | 0.0005mm, 0.001mm, 0.005mm, 0.01mm, .000005", .00005", .0005"  |
| <b>Order No.</b>      | <b>542-064</b>   |
| Applicable gage       | LGD, LGS   |
| Resolution            | 0.001mm, 0.01mm, .00005", .0005"   |
| <b>Order No.</b>      | <b>519-355</b>   |
| Applicable gage       | Mu-Checker probes (See page 248 and 249)   |
| Resolution/Range      | 0.001mm/±2mm, 0.0001mm/±0.2mm, .00005"/±.08", .000005"/±.008"  |
| Number of gage input  | 6  |
| Function              | Limit setting (3-step), GO/±NG judgment, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, mm/inch switching, calculation (sum, difference, mean, max., min.), output mode selection, error alarm, RS link (up to 10 counters) |
| Output                | Measurement data (via RS-232C interface/BCD output port), GO/±NG signal (3-step) (via I/O connector)   |
| Counting speed        | 5MHz   |
| Power supply          | 12 - 24V DC, 700mA (max.)  |
| Operating temperature | 0°C to 40°C  |
| Dimensions (WxDxH)    | 144x139x72mm   |
| Mass                  | 910g   |

\*AC adaptor is not equipped.  
\*\*Depending on the linear gage type connected.

### Dimensions

Unit: mm



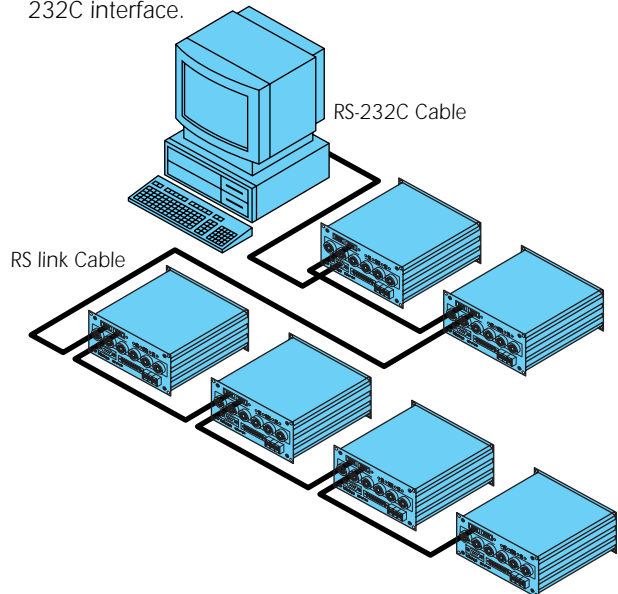
### FEATURES

- Panel-mounted type and DIN size (144mm wide x 72mm high). It can be easily incorporated into each system instrument.
- Up to 6-gage can be connected.
- Optional D-EV display unit is available.
- Max, min, and TIR (runout) measurements can be made for the connected gages.
- Peak hold measurement (max., min., runout) is available.



02ADD400

- The standard RS-232C interface allows easy communication with an external PC.
- The RS Link function permits multiple EV counters (10 units/60 gages maximum) to be connected in series and data to be inputted/outputted from one channel of the terminal RS-232C interface.



- The maximum value, minimum value, and TIR (total indicator reading) measurements are possible.
- A low-cost multi-gage measuring system can be constructed.

### OPTIONAL ACCESSORIES

| Order No. | Description                          |
|-----------|--------------------------------------|
| 02ADB440  | Output connector plug (with cover)   |
| 02ADD400  | D-EV Display Unit                    |
| 02ADD950  | SPC data output/RS link cable (0.5m) |
| 936937    | SPC data output/RS link cable (1m)   |
| 965014    | SPC data output/RS link cable (2m)   |

# Accessories for Linear Gage Counters

## D/A Conversion Unit



### FEATURES

- The D/A Conversion Unit outputs Linear Gage displacements as analog signals in real-time.
- Can be used with a Linear Gage Counter. Connecting cable (965606) is optional.

### SPECIFICATIONS

|                    |   |
|--------------------|---|
| Order No.          | 542-003   |
| Resolution         | 0.001mm reading Linear Gage: 0.001mm - 0.05mm<br>0.01mm reading Linear Gage: 0.005mm - 0.25mm |
| Power supply       | Via AC adapter (9V, 0.5A)   |
| Dimensions (WxDxH) | 235x160x44.2mm  |
| Mass               | 1.5kg   |

Note: To denote your AC line voltage fill the blank of order number with the following suffixes (e.g. 542-003D). **D** for 220V, **E** for 240/220V. No suffix is required for 100V.

## Difference/Sum Unit



### FEATURES

- Adds or subtracts the measurement data from two Linear Gages and outputs the calculated results to a Linear Gage Counter.
- AC adapter is optional.

### SPECIFICATIONS

|                    |                           |
|--------------------|---------------------------|
| Order No.          | 542-004                   |
| Measurement mode   | A, B, A+B, A-B            |
| Power supply       | Via AC adapter (9V, 0.5A) |
| Dimensions (WxDxH) | 235x160x44.2mm            |
| Mass               | 1.5kg                     |

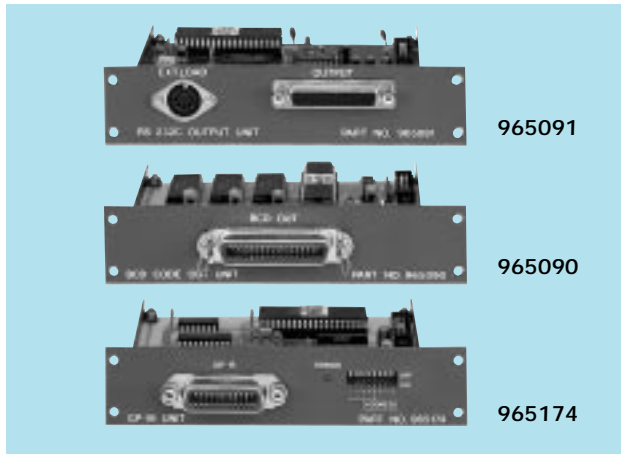
## GO/± NG Judgment Cable (3m)



965093

Note: Connector is not provided on the input side.

## Codeout Units



965091

965090

965174

### FEATURES

- Allows the LG-L1 Counter to output the measurement data to an external printer or personal computer.

### SPECIFICATIONS

| Order No. | Description                       |
|-----------|-----------------------------------|
| 965091    | RS-232C interface unit            |
| 965090    | BCD codeout unit (CMOS)           |
| 965835    | BCD codeout unit (Open collector) |
| 965174    | GPIB interface unit               |





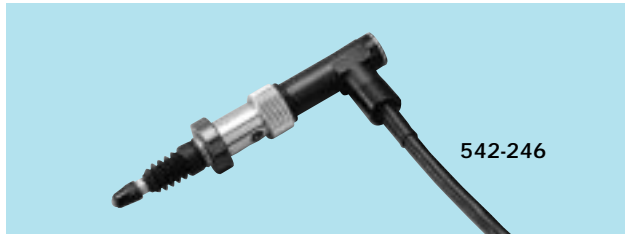
# LGB Series Linear Gage

SERIES 542

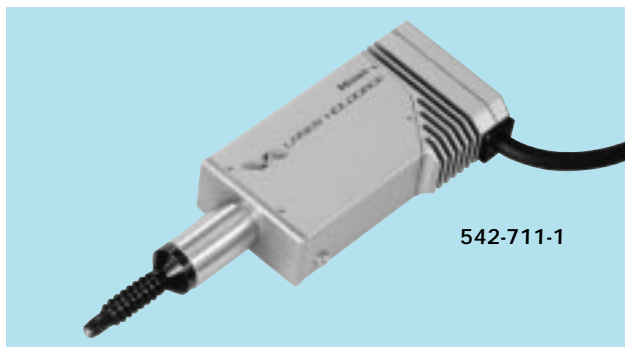
## Laser Hologage

SERIES 542

0.0001mm Reading Type



542-246



542-711-1

These are extra-high accuracy gaging heads provided with resolution up to 0.0001mm. The compact dimensions allow easy installation to very tight spaces. Especially the Laser Hologage employs an unique holography scale as the length standard, ensuring excellent measuring accuracy and repeatability. The dedicated EF Counter is optional.

### FEATURES

- A linear ball bearing in the spindle guide provides excellent durability for an extended service life.
- The 0.0001mm reading type LGB linear gage (542-246) comes with a clamping nut on the stem.

### OPTIONAL ACCESSORIES

| Order No. | Description                              |
|-----------|--|
| 902434    | Extension cable (5m) for LGB             |
| 902433    | Extension cable (10m) for LGB            |
| 902432    | Extension cable (20m) for LGB            |
| 238773    | Rubber boot for LGB (spare)              |
| 971751    | Stem fixture for Laser Hologage          |
| 971752    | Stem fixture for Laser Hologage          |
| 971753    | Spindle lifting cable for Laser Hologage |
| 971750    | Laser Hologage stand                     |

### SPECIFICATIONS

#### LGB Series Linear Gage (0.0001mm Reading Type)

Metric / Inch Compatible

| Resolution             | Range        | Order No. | Accuracy | Measuring force  | Dust/Water protection level | Mass | Remarks                            |
|------------------------|--------------|-----------|----------|------------------|-----------------------------|------|------------------------------------|
| 0.0001mm<br>(.000005") | 5mm<br>(.2") | 542-246   | 0.8μm    | 0.65N<br>or less | Conforming to<br>IP54       | 160g | With a clamping nut<br>on the stem |

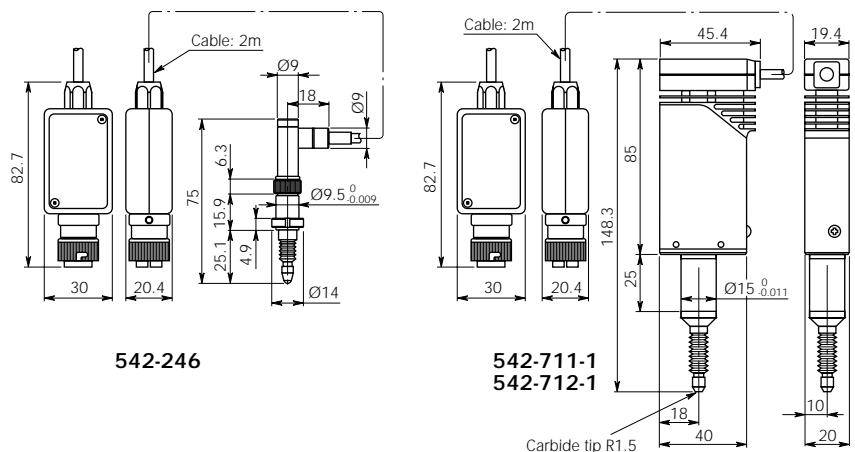
#### Laser Hologage (0.0001mm Reading Type)

Metric / Inch Compatible

| Resolution             | Range         | Order No.  | Accuracy | Measuring force | Dust/Water protection level | Mass | Remarks                  |
|------------------------|---------------|------------|----------|-----------------|-----------------------------|------|--------------------------|
| 0.0001mm<br>(.000005") | 10mm<br>(.4") | 542-711-1  | 0.2μm    | 0.4N or less    | Not specified               | 410g | —                        |
|                        |               | 542-712-1* | 0.2μm    | 0.1N            | Not specified               | 410g | Low-measuring force type |

\*This gage can only be used in the spindle-downward position.

### Dimensions



- 542-060\*: Single-display
- 542-062\*: Double-display
- 0.0001mm/.000005" resolution is available. Other specifications are the same as those of standard EF Counter. (See page 247.)
- \*Suffix for the AC adapter type equipped is necessary. (See page 246.)
- An optional power supply unit is required when using two units of Laser Hologage with 542-062. Please contact Mitutoyo.

# Laser Hologage and KH Counter Set

## SERIES 542

0.00001mm Reading Type



The Mitutoyo Laser Hologage is a high-end digital gaging system that employs diffracted beam interference to make highly accurate and repeatable measurements. It features ultra-fine diffraction gratings which are holographically recorded on the scale. The Laser Hologage is suitable for measuring ultra-high precision parts, especially those in semiconductor and related industries

### SPECIFICATIONS

#### Inch/Metric

| Order No.<br>(Order number suffix denotes the AC cord type equipped.) | 542-923-1 (100V)<br>542-923-1A (120V)<br>542-923-1D (220V)<br>542-923-1E (240V)<br>542-923-1F (240V)*   | 542-924-1 (100V)<br>542-924-1A (120V)<br>542-924-1D (220V)<br>542-924-1E (240V)<br>542-924-1F (240V)* |
|---|---|---|
| Resolution  | 0.00001mm (.000001")  |   |
| Range   | 10mm (.4")  |   |
| Accuracy  | 0.1µm   |   |
| Measuring force   | 0.4N or less  | 0.1N**<br>(Low-force type)  |
| Dust/Water protection level   | Not specified   |   |
| Max. response speed   | 250mm/s   |   |
| Display   | 8-digit fluorescent tubes and a [-] sign  |   |
| Functions   | Zero-set, preset, halved reading, double reading (diameter display), ABS/INC coordinate switching, counting direction switching, mm/inch conversion, linear error compensation, error alarm |   |
| Data output   | Via RS-232C interface (provided)  |   |
| Power supply  | 100-120V/200-240V AC, 50/60Hz   |   |
| Power consumption   | Approx. 30VA  |   |
| Operating temperature   | 0 - 40°C  |   |
| Mass  | Laser Hologage: 0.4kg<br>KH Counter: 2kg  |   |

\*For Australia

\*\*The gage can only be used in a spindle-downward position.

### FEATURES

- Highly accurate measurement due to an ultra-high resolution of 0.00001mm (0.01µm), which is close to the performance of laser interferometers.
- A display unit (KH Counter) is provided.



- A semiconductor laser is used as a light source to achieve a compact design for easy installation and adjustment.
- Excellent measuring stability — the design is also highly resistant to unfavorable environmental conditions such as changes in temperature and atmospheric pressure.

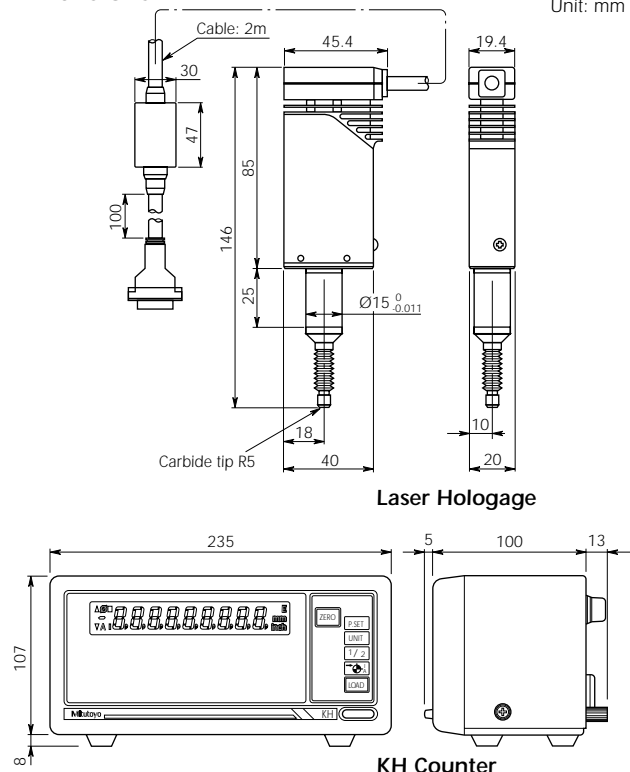
### OPTIONAL ACCESSORIES

| Order No. | Description                              |
|-----------|--|
| 09CAA335  | Zero-Set remote controller               |
| 971751    | Stem fixture for Laser Hologage          |
| 971752    | Stem fixture for Laser Hologage          |
| 971753    | Spindle lifting cable for Laser Hologage |
| 971750    | Laser Hologage stand                     |














### Dimensions

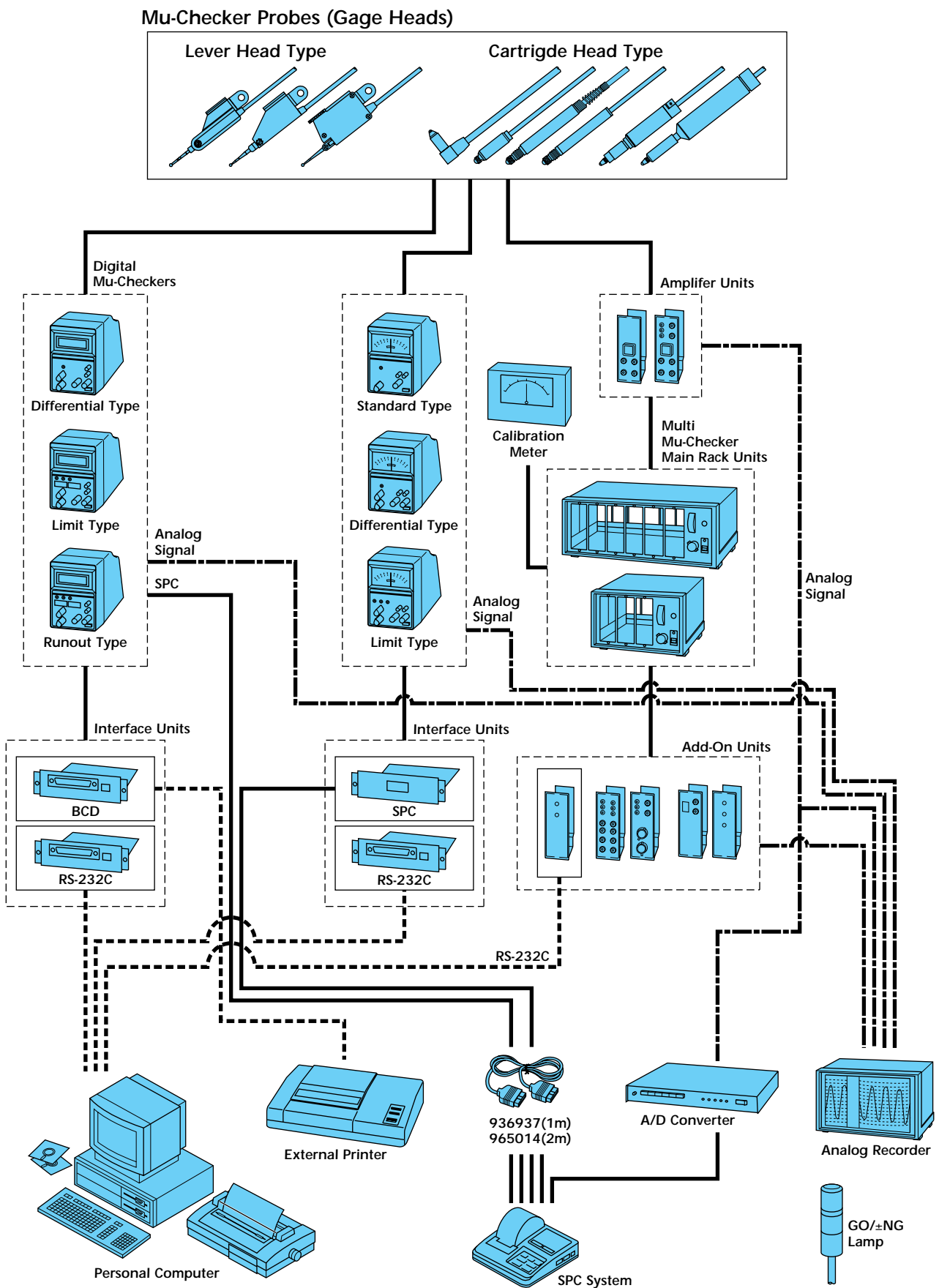
Unit: mm



# Mu-Checker Probe Selection Guide

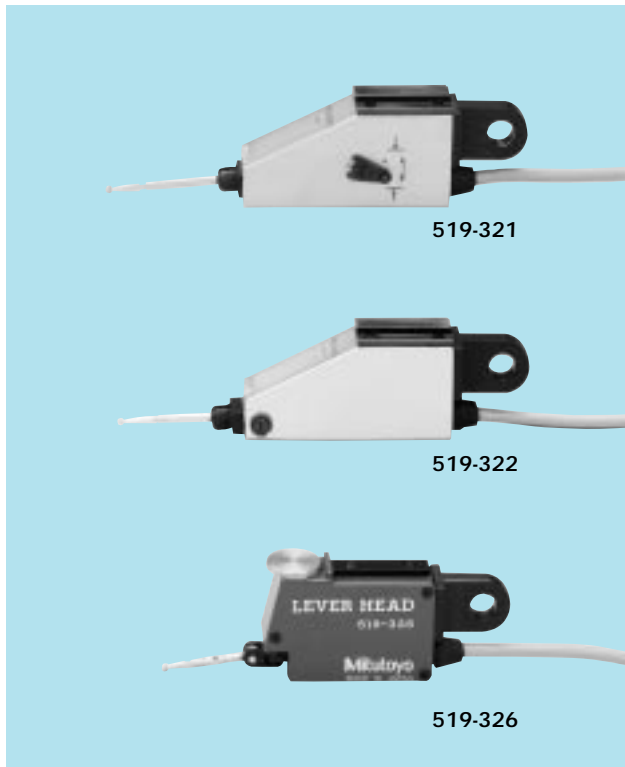
| Type           | Remarks                               | Effective range  |   |  |  |   |
|----------------|---------------------------------------|--|---|--|--|---|
|                |                                       | ±0.25mm  | ±0.5mm  | ±1.0mm   | ±1.5mm   | ±5.0mm  |
| Lever Head     | Non-clutch Type                       |  | <br>519-327  |  |  |   |
|                | Clutch Type (with Direction Switch)   |  | <br>519-321  |  |  |   |
|                | Low Measuring Force (Non-clutch Type) |  | <br>519-322  |  |  |   |
|                | High-Accuracy (Non-clutch Type)       |  | <br>519-326  |  |  |   |
| Cartridge Head | Slim Type (with Linear Ball Bearing)  | <br>519-346 | <br>519-347  | <br>519-348 (Ø8mm)<br>519-349 (Ø6mm) | <br>519-335 | <br>519-338<br>519-336*<br><small>*Wide range type for Multi Mu-Checker only</small> |
|                | Plain Type                            |  | <br>519-331*<br><small>*Low measuring force type</small> | <br>519-333                          |  |   |

## Mu-Checker System Diagram



# Lever Heads

## SERIES 519



### FEATURES

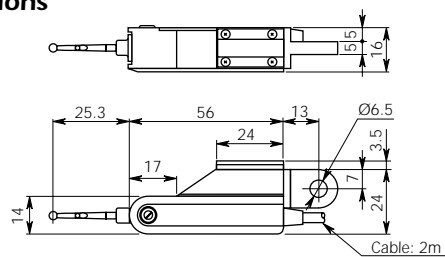
- A half-bridge circuit connection.
- Non-clutch type lever heads provide automatic reversal of measuring direction.
- **519-321** lever head is provided with a direction switch.
- The contact point of **519-326** lever head can be orientated at any direction.

### SPECIFICATIONS

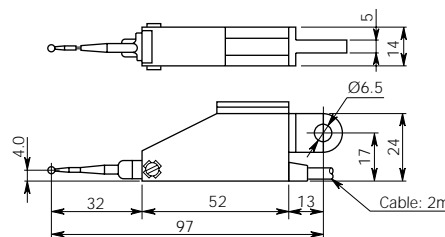
| Effective range | Order No.      | Head stroke | Linearity | Contact point     | Measuring force | Remarks                              |
|-----------------|----------------|-------------|-----------|-------------------|-----------------|--------------------------------------|
| ±0.5mm          | <b>519-327</b> | ±0.65mm     | ±0.5%     | Ø2mm carbide ball | 0.15N or less   | Non-clutch type reversible direction |
|                 | <b>519-321</b> | ±0.6mm      | 0.5%      | Ø2mm steel ball   | 0.2N or less    | Switch type reversible direction     |
|                 | <b>519-322</b> | ±0.6mm      | 0.5%      | Ø2mm steel ball   | 0.02N or less   | Low measuring force type             |
|                 | <b>519-326</b> | ±0.6mm      | ±0.3%     | Ø2mm steel ball   | 0.15N or less   | High-accuracy type                   |

### Dimensions

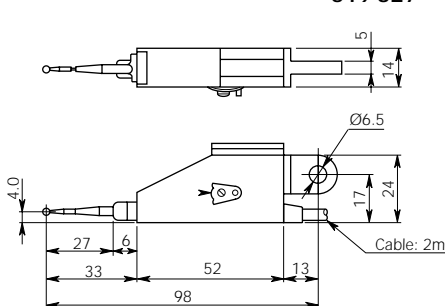
Unit: mm



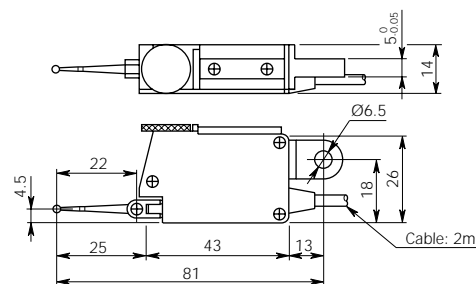
519-321



519-322



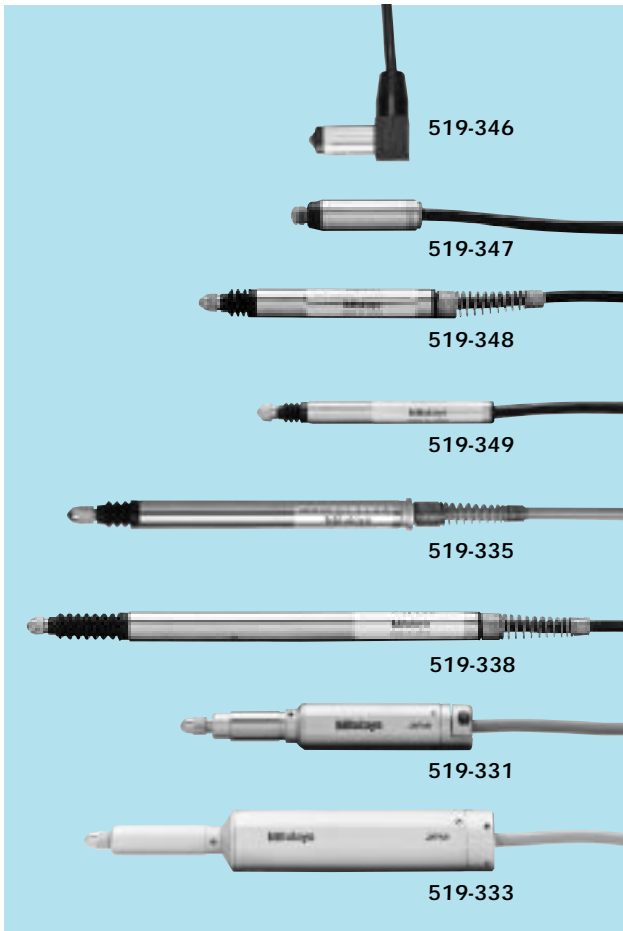
519-321



519-326

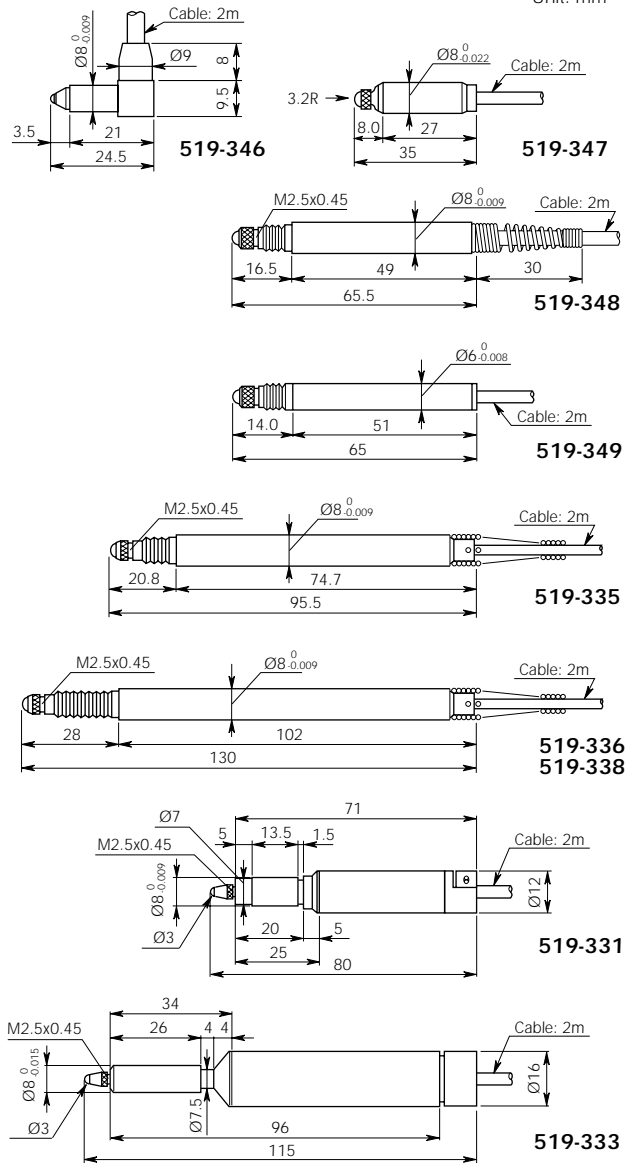
## Cartridge Heads

### SERIES 519



### Dimensions

Unit: mm



### FEATURES

- A half-bridge circuit connection.
- The Slim Type Cartridge Head employs a linear ball bearing for excellent durability.

### SPECIFICATIONS

#### Slim Type Cartridge Heads

| Effective range | Order No. | Head stroke | Linearity | Stem diameter | Measuring force | Remarks   |
|-----------------|-----------|-------------|-----------|---------------|-----------------|---|
| ±0.25mm         | 519-346   | 0.6mm       | 0.3%      | 8mm           | 0.65N or less   | —   |
| ±0.5mm          | 519-347   | 1.5mm       | 0.3%      | 8mm           | 0.6N or less    | —   |
| ±1.0mm          | 519-348   | 2.5mm       | 0.3%      | 8mm           | 0.7N or less    | —   |
|                 | 519-349   | 2.5mm       | 0.3%      | 6mm           | 0.7N or less    | —   |
| ±1.5mm          | 519-335   | ±4mm        | ±0.3%     | 8mm           | 0.6±0.15N       | —   |
| ±5mm            | 519-336   | ±5.5mm      | ±0.5%     | 8mm           | 1.05N or less   | Wide range type for Multi Mu-Checker only (Range: ±5000μm or ±2500μm) |
|                 | 519-338   | ±5.5mm      | ±0.5%     | 8mm           | 1.05N or less   | —   |

#### Cartridge Heads

| Effective range | Order No. | Head stroke | Linearity | Stem diameter | Measuring force | Remarks                                    |
|-----------------|-----------|-------------|-----------|---------------|-----------------|--|
| ±0.5mm          | 519-331   | ±0.65mm     | 0.5%      | 8mm           | 0.25N or less   | —  |
|                 | 519-332   | ±0.65mm     | 0.5%      | .375"         | 0.25N or less   | (#4-48UNF threads for contact point mount) |
| ±1.0mm          | 519-333   | ±1.2mm      | 0.5%      | 8mm           | 1N or less      | —  |



# Digital Mu-Checkers

## SERIES 519

Differential, Limit, and Runout Types

Differential Type  
Digital Mu-Checker



Rear Panel

Limit Type  
Digital Mu-Checker



Rear Panel

Runout Type  
Digital Mu-Checker



Rear Panel

### FEATURES

- The Digital Mu-Checker offers easy-to-read digital displays and SPC data output to a wide variety of Mitutoyo Digimatic Mini-Processors.
- Digital Mu-Checkers are available in three types for diverse measuring requirements.

| Type                  | Differential | Limit | Runout |
|-----------------------|--------------|-------|--------|
| • Zero-Set            | ○            | ○     | ○      |
| • -/+ switching       | ○            | ○     | ○      |
| • MAX, MIN, Runout    | —            | —     | ○      |
| • GO/±NG judgment     | —            | ○     | ○      |
| • GO/±NG output       | —            | ○     | —      |
| • 2-probe measurement | ○            | ○     | ○      |
| • SPC output          | ○            | ○     | ○      |
| • BCD output          | ▲            | ▲     | ▲      |
| • RS-232C output      | ▲            | ▲     | ▲      |
| • Analog output       | ○            | ○     | ○      |

○: Available, ▲: Optional

### SPECIFICATIONS

#### Metric

| Description      | Differential type Digital Mu-Checker | Limit type Digital Mu-Checker | Runout type Digital Mu-Checker |
|------------------|--------------------------------------|-------------------------------|--------------------------------|
| <b>Order No.</b> | <b>519-411■</b>                      | <b>519-413■</b>               | <b>519-417■</b>                |
| Probe channels   | 2                                    | 2                             | 1                              |
| Range            | HIGH: ±0.2mm<br>LOW: ±2mm            |                               |                                |
| Resolution       | HIGH: 0.0001mm<br>LOW: 0.001mm       |                               |                                |

#### Inch/Metric

| Description      | Differential type Digital Mu-Checker              | Limit type Digital Mu-Checker | Runout type Digital Mu-Checker |
|------------------|---|-------------------------------|--------------------------------|
| <b>Order No.</b> | <b>519-412■</b>                                   | <b>519-414■</b>               | <b>519-418■</b>                |
| Probe channels   | 2   | 2                             | 1                              |
| Range            | HIGH: ±.008", ±0.2mm<br>LOW: ±.08", ±2mm          |                               |                                |
| Resolution       | HIGH: .000005", 0.0001mm<br>LOW: .00005", 0.001mm |                               |                                |

Note: To denote your AC line voltage fill the blank of order number with the following suffixes (e.g. **519-411A**). **A** for 120V, **D** for 220V, **E** for 240/220V. No suffix is required for 100V.

|                       |                             |       |     |
|-----------------------|-----------------------------|-------|-----|
| Display mode          | A, B, A+B, A-B, B-A, -(A+B) | —     |     |
| Data output           | SPC                         |       |     |
| Analog output         | ±1V DC/fullscale            |       |     |
| Power supply          | Via AC adapter              |       |     |
| Operating temperature | 0°C - 40°C                  |       |     |
| Dimensions (WxDxH)    | 134x183x210mm               |       |     |
| Mass                  | 1.7kg                       | 1.7kg | 2kg |

### OPTIONAL ACCESSORIES

| Order No.      | Description            |
|----------------|------------------------|
| <b>936937</b>  | SPC cable (1m)         |
| <b>965014</b>  | SPC cable (2m)         |
| <b>965838B</b> | RS-232C interface unit |
| <b>965839A</b> | BCD output unit        |
| <b>271214</b>  | Vertical stand         |

## Analog Mu-Checkers

### SERIES 519

Standard, Differential, and Limit Types

Standard Type Analog Mu-Checker



Rear Panel

Differential Type Analog Mu-Checker



Rear Panel

Limit Type Analog Mu-Checker



Rear Panel

### FEATURES

- The Analog Mu-Checker can output digital data via an optional interface unit.
- Analog Mu-Checkers are available in three types for diverse measuring requirements.

| Type                  | Standard | Differential | Limit |
|-----------------------|----------|--------------|-------|
| • Zero-Set            | ○        | ○            | ○     |
| • +/- switching       | ○        | ○            | ○     |
| • GO/±NG judgment     | —        | —            | ○     |
| • GO/±NG output       | —        | —            | ○     |
| • 2-probe measurement | —        | ○            | ○     |
| • SPC output          | ▲        | ▲            | ▲     |
| • RS-232C output      | ▲        | ▲            | ▲     |
| • Analog output       | ○        | ○            | ○     |

○: Available, ▲: Optional (SPC Output Unit can be used for Metric model only.)

### SPECIFICATIONS

#### Metric

| Description    | Standard type Analog Mu-Checker             | Differential type Analog Mu-Checker | Limit type Analog Mu-Checker |
|----------------|---|-------------------------------------|------------------------------|
| Order No.      | 519-401■                                    | 519-403■                            | 519-405■                     |
| Probe channels | 1   | 2                                   | 2                            |
| Range          | ±5μm, ±15μm, ±50μm, ±150μm, ±500μm, ±1500μm |                                     |                              |
| Graduation     | 0.1μm, 0.5μm, 1μm, 5μm, 10μm, 50μm          |                                     |                              |

#### Inch/Metric

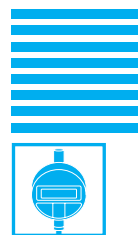
| Description    | Standard type Analog Mu-Checker   | Differential type Analog Mu-Checker | Limit type Analog Mu-Checker |
|----------------|---|-------------------------------------|------------------------------|
| Order No.      | 519-402■  | 519-404■                            | 519-406■                     |
| Probe channels | 1   | 2                                   | 2                            |
| Range          | ±.00015", ±.0005", ±.0015", ±.005", ±.015", ±.05", ±5μm, ±15μm, ±50μm, ±150μm, ±500μm, ±1500μm    |                                     |                              |
| Graduation     | .000005", .00001", .00005", .0001", .0005", .001", .01", .05", 0.1μm, 0.5μm, 1μm, 5μm, 10μm, 50μm |                                     |                              |

Note: To denote your AC line voltage fill the blank of order number with the following suffixes (e.g. 519-401A). **A** for 120V, **D** for 220V, **E** for 240/220V. No suffix is required for 100V.

|                       |                  |                             |       |
|-----------------------|------------------|-----------------------------|-------|
| Display mode          | —                | A, B, A+B, A-B, B-A, -(A+B) |       |
| Analog output         | ±1V DC/fullscale |                             |       |
| Power supply          | Via AC adapter   |                             |       |
| Operating temperature | 0°C - 40°C       |                             |       |
| Dimensions (WxDxH)    | 134x183x210mm    |                             |       |
| Mass                  | 1.7kg            | 1.8kg                       | 1.8kg |

### OPTIONAL ACCESSORIES

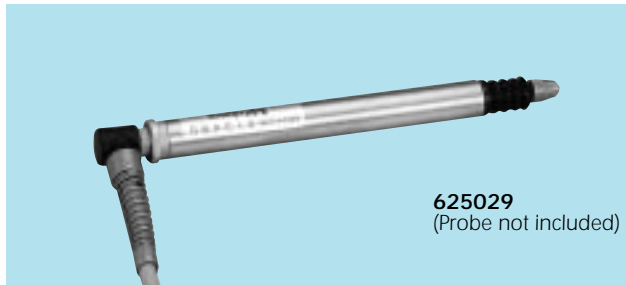
| Order No. | Description                             |
|-----------|---|
| 965690    | RS-232C interface unit                  |
| 965691    | SPC output unit (for metric model only) |
| 271214    | Vertical stand                          |





## Accessories for Mu-Checker Probes

### Right Angle Adapter

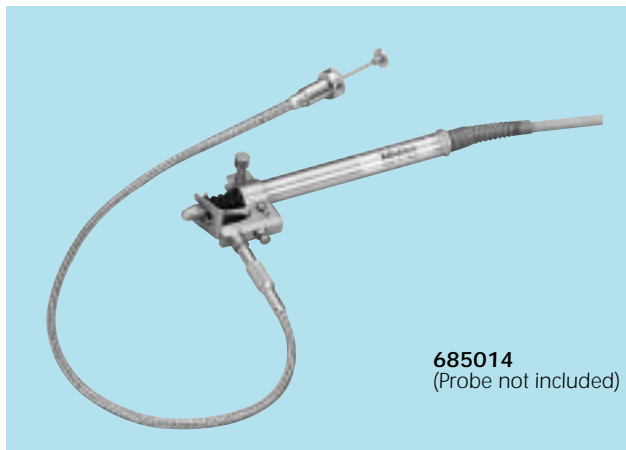


625029  
(Probe not included)

#### SPECIFICATIONS

| Order No. | Applicable probes   |
|-----------|---|
| 625029    | Slim type cartridge head probes: 519-348, 519-335, 519-338, 519-336 |

### Spindle Lifting Unit



685014  
(Probe not included)

#### SPECIFICATIONS

| Order No. | Applicable probes   |
|-----------|---|
| 685014    | Slim type cartridge heads: 519-348, 519-335, 519-338, 519-336 |

### Extension Signal Cable

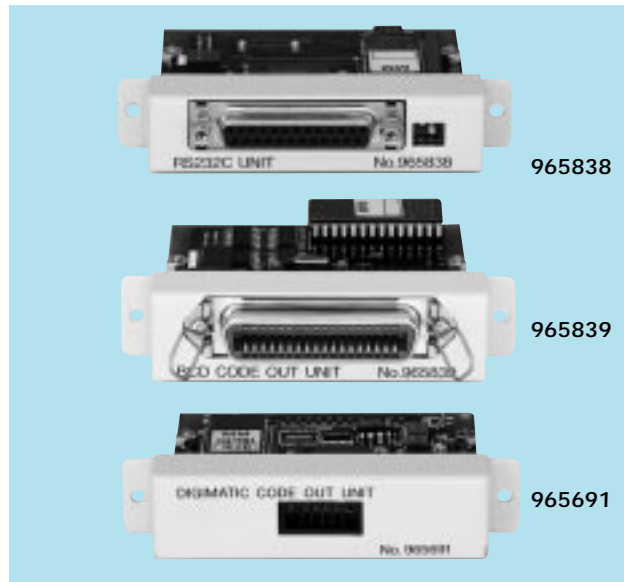


934386

- Cable length: 5m

## Accessories for Digital and Analog Mu-Checkers

### Codeout Units



965838

965839

965691

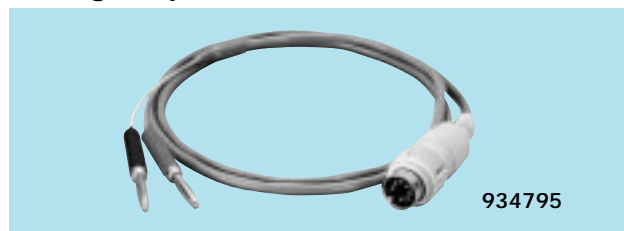
#### FEATURES

- Allows the Digital/Analog Mu-Checker to output the measurement data to an external printer or personal computer.

#### SPECIFICATIONS

| Order No. | Description                                     |
|-----------|---|
| 965838    | RS-232C interface unit for Digital Mu-Checker   |
| 965690    | RS-232C interface unit for Analog Mu-Checker    |
| 965839    | BCD parallel output unit for Digital Mu-Checker |
| 965691    | SPC output unit for Analog Mu-Checker (metric)  |

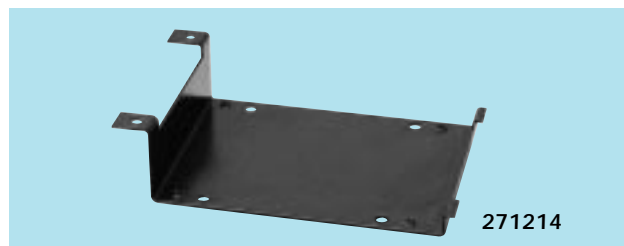
### Analog Output Cable



934795

- Cable length: 1m

### Vertical Stand

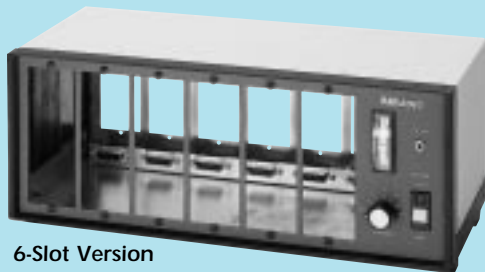


271214

- Used for supporting the Digital/Analog Mu-Checker in vertical position.

# Multi Mu-Checker Main Rack Units

SERIES 519



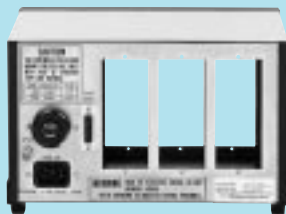
6-Slot Version



Rear Panel



3-Slot Version



Rear Panel

### Calibration Meter (519-030)

- Indicator reading: 5-0-5, 15-0-15
- Accuracy of indication:  $\pm 1\%$
- Dimensions (WxDxH): 165x68x108mm
- Mass: 0.8kg



### FEATURES

- The Multi Mu-Checker Main Rack Unit incorporates a power unit and analog indicator. It is available with 3 slots or 6 slots for different applications.
- Optional Calibration Meter (519-030) is available for accurate and easy-to-read measurement.
- By selecting the appropriate add-on units that include Amplifier Unit for Mu-Checker probes, the Multi Mu-Checker System offers diverse measuring applications with minimum investment.

### SPECIFICATIONS

| Order No.              | 519-352■  | 519-351■        |
|------------------------|---|-----------------|
| Number of slots        | 6   | 3               |
| Accuracy of indication | $\pm 2.5\%$   |                 |
| Analog output          | $\pm 1V$ DC/ $\pm$ fullscale (for optional Calibration Meter) |                 |
| Power supply           | 100/110/120/220/240V AC, 50/60Hz                              |                 |
| Operating temperature  | 0°C - 40°C  |                 |
| Dimensions (WxDxH)     | 371x182.5x152mm   | 236x182.5x152mm |
| Mass                   | 3kg   | 2.6kg           |

Note: To denote your AC line voltage fill the blank of order number with the following suffixes (e.g. 519-352A). **A** for 120V, **D** for 220V. No suffix is required for 100V.

### OPTIONAL ACCESSORIES

| Order No.      | Description                      |
|----------------|----------------------------------|
| 519-030        | Calibration Meter                |
| 625200         | Bus line connector               |
| 937929         | Blind panel set for a blank slot |
| (See listing.) | Optional Add-On Units            |

### Function Capabilities of Optional Add-On Units

| Description                              | Amplifier Unit | Amplifier Unit with GO/ $\pm$ NG Judgment | Differential Unit | Analog Memory Unit | Classification Unit | Total Judgment Unit | RS-232C Interface Unit |
|--|----------------|---|-------------------|--------------------|---------------------|---------------------|------------------------|
| Order No.                                | 519-361        | 519-363                                   | 519-374           | 519-371            | 519-372             | 519-373             | 519-360                |
| • Probe input                            | ○              | ○   | —                 | —                  | —                   | —                   | —                      |
| • Range (graduation) setting             | ○              | ○   | —                 | —                  | —                   | —                   | —                      |
| • -/+ switching                          | ○              | ○   | —                 | —                  | —                   | —                   | —                      |
| • Difference/sum between 2 probes        | ○              | ○   | —                 | —                  | —                   | —                   | —                      |
| • GO/ $\pm$ NG judgment                  | —              | ○   | ○                 | ○                  | ○                   | —                   | —                      |
| • GO/ $\pm$ NG output                    | —              | ○   | ○                 | ○                  | ○                   | —                   | —                      |
| • Classification of tolerance            | —              | —   | —                 | —                  | ○                   | —                   | —                      |
| • Total judgment of GO/ $\pm$ NG results | —              | —   | —                 | —                  | —                   | ○                   | —                      |
| • MAX, MIN, Runout, Mean                 | —              | —   | —                 | ○                  | —                   | —                   | —                      |
| • Difference/sum between 2 units         | —              | —   | ○                 | —                  | —                   | —                   | —                      |
| • Analog output                          | ○              | ○   | ○                 | ○                  | —                   | —                   | —                      |
| • SPC output                             | ▲              | ▲   | ▲                 | ▲                  | —                   | —                   | —                      |
| • RS-232C output                         | —              | —   | —                 | —                  | —                   | —                   | ○                      |

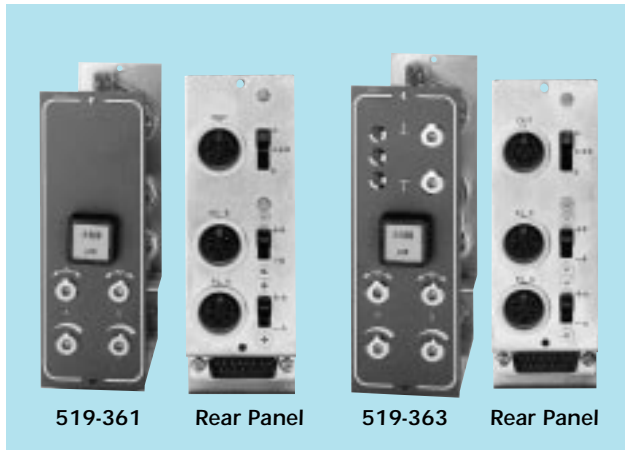
○: Available, ▲: Optional



## Multi Mu-Checker Add-On Units

## SERIES 519

## Amplifier Units



519-361

Rear Panel

519-363

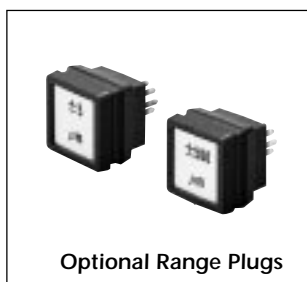
Rear Panel

## SPECIFICATIONS

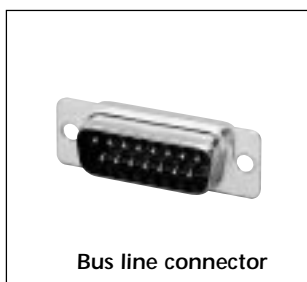
| Order No.                            | 519-361                                       | 519-363           |
|--------------------------------------|---|-------------------|
| Probe channels                       | 2   |                   |
| Range                                | ±500μm (By Range Plug <b>625034</b> provided) |                   |
| Graduation<br>(on Calibration Meter) | 10μm  |                   |
| Display mode                         | A, B, A+B, A-B, B-A, -(A+B)                   |                   |
| GO/±NG judgment                      | —   | by LED            |
| Analog output                        | ±1V DC/±fullscale                             | ±1V DC/±fullscale |
| GO/±NG output                        | —   | Open collector    |

## OPTIONAL ACCESSORIES

| Order No.       | Description                                      |
|-----------------|--|
| <b>625030</b>   | Range Plug, ±5μm (Graduation: 0.1μm)             |
| <b>625031</b>   | Range Plug, ±15μm (Graduation: 0.5μm)            |
| <b>625032</b>   | Range Plug, ±50μm (Graduation: 1μm)              |
| <b>625033</b>   | Range Plug, ±150μm (Graduation: 5μm)             |
| <b>625035</b>   | Range Plug, ±1500μm (Graduation: 50μm)           |
| <b>625036</b>   | Range Plug, ±2500μm                              |
| <b>625037</b>   | Range Plug, ±5000μm (Graduation: 100μm)          |
| <b>625040</b>   | Range Plug, ±.00015" (Graduation: .000005")      |
| <b>625041</b>   | Range Plug, ±.0005" (Graduation: .00001")        |
| <b>625042</b>   | Range Plug, ±.0015" (Graduation: .00005")        |
| <b>625043</b>   | Range Plug, ±.005" (Graduation: .0001")          |
| <b>625044</b>   | Range Plug, ±.015" (Graduation: .0005")          |
| <b>625045</b>   | Range Plug, ±.05" (Graduation: .001")            |
| <b>529035</b>   | Analog output connector                          |
| <b>625200</b>   | Bus line connector                               |
| (See page 260.) | <b>A/D Conversion Unit (for SPC data output)</b> |

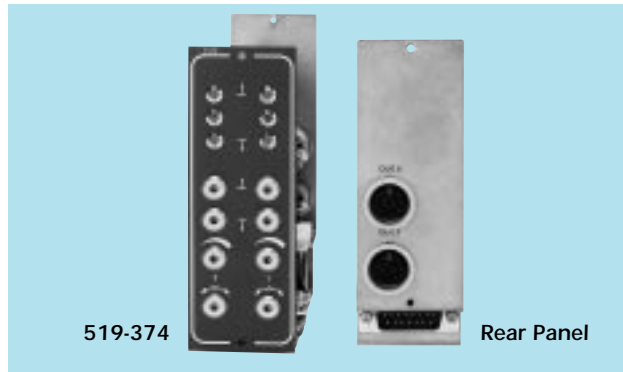


Optional Range Plugs



Bus line connector

## Differential Unit



519-374

Rear Panel

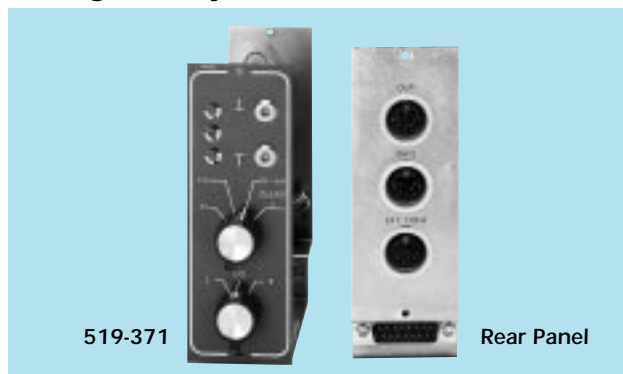
## SPECIFICATIONS

| Order No.            | 519-374                                     |
|----------------------|---|
| Calculation mode     | Difference/sum between data of Add-On Units |
| Calculation channels | 2   |
| GO/±NG judgment      | by LED                                      |
| Analog output        | ±1V DC/±fullscale                           |
| GO/±NG output        | Open collector                              |

## OPTIONAL ACCESSORIES

| Order No.       | Description                                      |
|-----------------|--|
| <b>529035</b>   | Analog output connector                          |
| <b>625200</b>   | Bus line connector                               |
| (See page 260.) | <b>A/D Conversion Unit (for SPC data output)</b> |

## Analog Memory Unit



519-371

Rear Panel

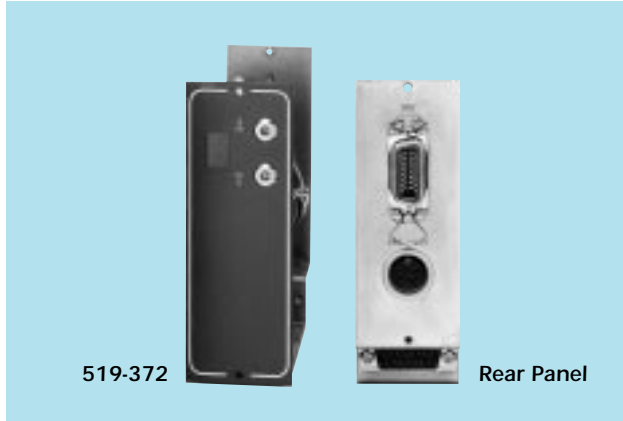
## SPECIFICATIONS

| Order No.         | 519-371                        |
|-------------------|--------------------------------|
| Measurement modes | Maximum, Minimum, Runout, Mean |
| GO/±NG judgment   | by LED                         |
| Analog output     | ±1V DC/±fullscale              |
| GO/±NG output     | Open collector                 |

## OPTIONAL ACCESSORIES

| Order No.       | Description                                      |
|-----------------|--|
| <b>529035</b>   | Analog output connector (OUT1)                   |
| <b>625201</b>   | Analog output connector (OUT2)                   |
| <b>625202</b>   | External control connector                       |
| <b>625200</b>   | Bus line connector                               |
| (See page 260.) | <b>A/D Conversion Unit (for SPC data output)</b> |

### Classification Unit



#### SPECIFICATIONS

|                        |                          |
|------------------------|--------------------------|
| Order No.              | 519-372                  |
| Classification display | Digital (0 - 9)          |
| Limit setting range    | 10% - 100% fullscale     |
| Data output            | BCD (0-9 classification) |
| GO/±NG output          | TTL                      |

#### OPTIONAL ACCESSORIES

| Order No. | Description                |
|-----------|----------------------------|
| 625203    | BCD output connector       |
| 625200    | Bus line connector         |
| 625202    | External control connector |

### Total Judgment Unit



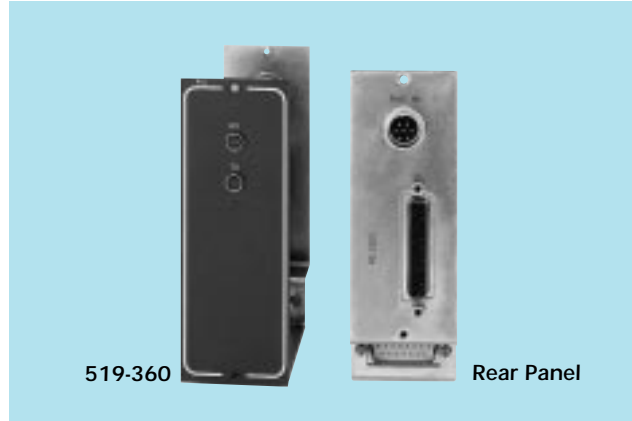
#### SPECIFICATIONS

|                 |               |
|-----------------|---------------|
| Order No.       | 519-373       |
| GO/±NG judgment | by LED        |
| GO/±NG output   | Relay circuit |

#### OPTIONAL ACCESSORIES

| Order No. | Description                |
|-----------|----------------------------|
| 625204    | GO/±NG output connector    |
| 625202    | External control connector |
| 625200    | Bus line connector         |

### RS-232C Interface Unit



#### FEATURES

- Allows the Multi Mu-Checker to output the measurement data to an external printer or personal computer through RS-232C.

#### SPECIFICATIONS

|                       |                   |
|-----------------------|-------------------|
| Order No.             | 519-360           |
| Analog input channels | 11                |
| Applicable range      | ±50μm and more    |
| Analog input          | ±1V DC/±fullscale |
| Sampling speed        | 12 times/s        |

#### OPTIONAL ACCESSORIES

| Order No. | Description                              |
|-----------|--|
| 965000    | Main Rack Unit connecting cable (BUS IN) |
| 625200    | Bus line connector                       |

An Example of Multi Mu-Checker System



## A/D Conversion Unit

### SERIES 519

For SPC Data Output



Rear Panel

### FEATURES

- The A/D Conversion Unit converts analog signals from the Mu-Checker into digital signals and outputs SPC data.
- When connected with a Digimatic Mini-Processor (DP-1VR), the A/D Conversion Unit is powered by the processor.

### SPECIFICATIONS

#### Metric

|             |  |
|-------------|--|
| Order No.   | 519-391  |
| Range       | $\pm 5\mu\text{m}$ , $\pm 15\mu\text{m}$ , $\pm 50\mu\text{m}$ , $\pm 150\mu\text{m}$ , $\pm 500\mu\text{m}$ , $\pm 1500\mu\text{m}$ |
| Resolution* | 0.01 $\mu\text{m}$ , 0.1 $\mu\text{m}$ , 1 $\mu\text{m}$   |

\*Depends on the range selected.

#### Inch/Metric

|             |  |
|-------------|--|
| Order No.   | 519-392  |
| Range       | $\pm 0.00015"$ , $\pm 0.0005"$ , $\pm 0.0015"$ , $\pm 0.005"$ , $\pm 0.015"$ , $\pm 0.05"$ ,<br>$\pm 5\mu\text{m}$ , $\pm 15\mu\text{m}$ , $\pm 50\mu\text{m}$ , $\pm 150\mu\text{m}$ , $\pm 500\mu\text{m}$ , $\pm 1500\mu\text{m}$ |
| Resolution* | .00001", .0001", .001", 0.01 $\mu\text{m}$ , 0.1 $\mu\text{m}$ , 1 $\mu\text{m}$   |

\*Depends on the range selected.

|                      |   |
|----------------------|---|
| Analog input channel | 1   |
| Analog input         | $\pm 1\text{V DC}/\pm\text{fullscale}$  |
| Sampling speed       | 7.5 times/s   |
| Data output          | SPC   |
| Power supply         | Via AC adapter (optional) or Digimatic Mini-Processor (through the SPC cable) |
| Dimensions (WxDxH)   | 235x195x41mm  |
| Mass                 | 1.3kg   |

### OPTIONAL ACCESSORIES

| Order No. | Description              |
|-----------|--------------------------|
| 526688    | AC adapter (100V AC)     |
| 526688A   | AC adapter (120V AC)     |
| 526688D   | AC adapter (220V AC)     |
| 526688E   | AC adapter (240/220V AC) |

## A/D Conversion Unit

### SERIES 519

For SPC Data Output



### FEATURES

- Specially designed for a wide measuring range.
- Provided with an LCD display for direct reading.

### SPECIFICATIONS

#### Metric

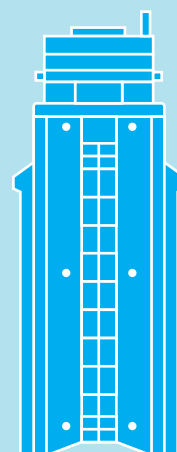
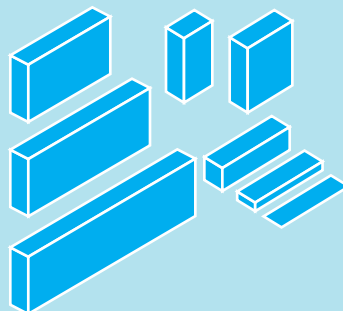
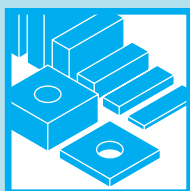
|                      |   |
|----------------------|---|
| Order No.            | 519-393 (100V AC)<br>519-393D (220V AC)                     |
| Analog input channel | 1   |
| Analog input         | $\pm 0.5\text{V}$ to $\pm 5\text{V DC}/\pm\text{fullscale}$ |
| Resolution*          | 0.01 $\mu\text{m}$ - 1 $\mu\text{m}$                        |
| Display              | LCD   |
| Sampling speed       | 7.5 times/s   |
| Data output          | SPC   |
| Power supply         | Via AC adapter  |
| Dimensions (WxDxH)   | 220x170x75  |
| Mass                 | 1.3kg   |

\*Depends on the range selected.

Gauge Blocks Pages 262 — 279

Reference Gages Pages 280 — 288

Granite Surface Plates Pages 289 — 290



# Gauge Blocks

## SERIES 516



Mitutoyo offers a complete selection of gauge blocks available in a choice of rectangular or square, metric or inch and steel (Gauge Blocks) or ceramic (CERA Blocks) types. Mitutoyo CERA Blocks are some of the finest gauge blocks available anywhere in the world.

### TOLERANCES ON LENGTH OF GAUGE BLOCKS

JIS B 7506-1997 (Japan)/  
DIN 861-1980 (Germany)

| Length<br>Over Up to | Accuracy at 20°C (µm) |         |         |         |
|----------------------|-----------------------|---------|---------|---------|
|                      | Grade K*              | Grade 0 | Grade 1 | Grade 2 |
| 0.5 — 10mm           | ±0.20                 | ±0.12   | ±0.20   | ±0.45   |
| 10 — 25mm            | ±0.30                 | ±0.14   | ±0.30   | ±0.60   |
| 25 — 50mm            | ±0.40                 | ±0.20   | ±0.40   | ±0.80   |
| 50 — 75mm            | ±0.50                 | ±0.25   | ±0.50   | ±1.00   |
| 75 — 100mm           | ±0.60                 | ±0.30   | ±0.60   | ±1.20   |
| 100 — 150mm          | ±0.80                 | ±0.40   | ±0.80   | ±1.60   |
| 150 — 200mm          | ±1.00                 | ±0.50   | ±1.00   | ±2.00   |
| 200 — 250mm          | ±1.20                 | ±0.60   | ±1.20   | ±2.40   |
| 250 — 300mm          | ±1.40                 | ±0.70   | ±1.40   | ±2.80   |
| 300 — 400mm          | ±1.80                 | ±0.90   | ±1.80   | ±3.60   |
| 400 — 500mm          | ±2.20                 | ±1.10   | ±2.20   | ±4.40   |
| 500 — 600mm          | ±2.60                 | ±1.30   | ±2.60   | ±5.00   |
| 600 — 700mm          | ±3.00                 | ±1.50   | ±3.00   | ±6.00   |
| 700 — 800mm          | ±3.40                 | ±1.70   | ±3.40   | ±6.50   |
| 800 — 900mm          | ±3.80                 | ±1.90   | ±3.80   | ±7.50   |
| 900 — 1000mm         | ±4.20                 | ±2.00   | ±4.20   | ±8.00   |

\*Accuracy is more strict than Grade 0 on permissible length variation.

### Federal Specification GGG-G-15C (US)

| Length<br>Over Up to | Accuracy at 20°C (µinch) |         |         |           |
|----------------------|--------------------------|---------|---------|-----------|
|                      | Grade 1                  | Grade 2 | Grade 3 | Grade B** |
| 1"                   | ±2                       | +4 -2   | +8 -4   | +10 -6    |
| 1" — 2"              | ±4                       | +8 -4   | +16 -8  | +20 -12   |
| 2" — 3"              | ±5                       | +10 -5  | +20 -10 | +30 -18   |
| 3" — 4"              | ±6                       | +12 -6  | +24 -12 | +40 -24   |

\*\*This grade is not specified by GGG-G-15C.

### BS 4311: Part 1: 1993 (UK)

| Length<br>Over Up to | Accuracy at 20°C (µm) |         |         |         |
|----------------------|-----------------------|---------|---------|---------|
|                      | Grade K***            | Grade 0 | Grade 1 | Grade 2 |
| 0 — 10mm             | ±0.12                 | ±0.12   | ±0.25   | ±0.50   |
| 10 — 25mm            | ±0.15                 | ±0.15   | ±0.30   | ±0.60   |
| 25 — 50mm            | ±0.20                 | ±0.20   | ±0.40   | ±0.80   |
| 50 — 75mm            | ±0.25                 | ±0.25   | ±0.50   | ±1.00   |
| 75 — 100mm           | ±0.30                 | ±0.30   | ±0.60   | ±1.20   |

\*\*\*Accuracy is more strict than Grade 0 on parallelism and flatness.

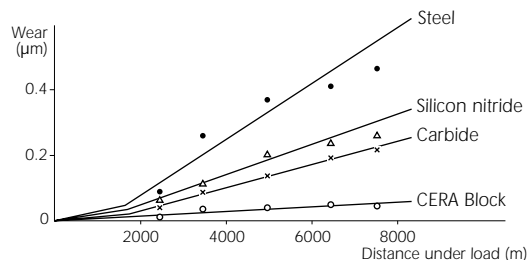
### FEATURES

#### Inspection Certificates

- Each Mitutoyo gauge block set is supplied in a high quality wooden case with:
  - i) Certificate of Inspection (Grade 0, 1, 2, 3, B) or
  - ii) Certificate of Calibration, and Certificate of Inspection (Grade K only)

#### CERA Blocks

- Corrosion-resistant: The CERA Block is made from zirconium-based ceramic which will not corrode unless subjected to the most corrosive chemicals. Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.
- Abrasion resistant: CERA Blocks have 10 times the abrasion resistance of steel gauge blocks.

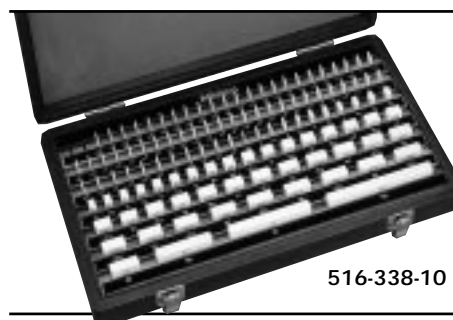


Distance under load and wear

(Each block was put under exactly the same load and rubbed on a cast iron plate.)

- Dimensional stability: CERA Blocks are free from dimensional change over time.
- Marking: The black characters, indicating the nominal size, are inscribed by laser and are clearly visible against the white surface of the block.

#### 1mm Base Block Set



516-338-10

## Metric Rectangular Gauge Block Sets

### SERIES 516

#### 1mm Base Block Sets

| Blocks per set | Blocks included in set                 | Order No.   |            |             | Order No.    |            |            | Order No. |            |            |
|----------------|--|-------------|------------|-------------|--------------|------------|------------|-----------|------------|------------|
|                |  | ISO/DIN/JIS | Steel      | CERA        | Federal Spec | Steel      | CERA       | BS        | Steel      | CERA       |
| 122            | 1.0005 (1pc.)                          |             |            | —           | —            | —          | —          | —         | —          | —          |
|                | Step of 0.001mm: 1.001 — 1.009 (9pcs.) |             |            | —           | —            | —          | —          | —         | —          | —          |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   |             |            | —           | —            | —          | —          | —         | —          | —          |
|                | Step of 0.1mm: 1.6 — 1.9 (4pcs.)       | Grade K     | 516-596-60 | —           | Grade K      | —          | —          | Grade K   | —          | —          |
|                | Step of 0.5mm: 0.5 — 24.5 (49pcs.)     | Grade 0     | 516-597-10 | —           | Grade 0      | —          | —          | Grade 0   | —          | —          |
|                | Step of 10mm: 30 — 100 (8pcs.)         | Grade 1     | 516-598-10 | —           | Grade 1      | —          | —          | Grade 1   | —          | —          |
|                | 25, 75 (2pcs.)                         | Grade2      | 516-599-10 | —           | Grade2       | —          | —          | Grade2    | —          | —          |
| 112            | 1.0005mm (1pc.)                        |             |            |             |              |            |            |           |            |            |
|                | Step of 0.001mm: 1.001 — 1.009 (9pcs.) | Grade K     | 516-937-60 | 516-337-60  | Grade 1      | 516-938-12 | 516-337-12 | Grade K   | 516-937-71 | 516-337-71 |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade 0     | 516-938-10 | 516-338-10  | Grade 2      | 516-939-12 | 516-338-12 | Grade 0   | 516-938-11 | 516-338-11 |
|                | Step of 0.5mm: 0.5 — 24.5 (49pcs.)     | Grade 1     | 516-939-10 | 516-339-10  | Grade 3      | 516-940-12 | 516-339-12 | Grade 1   | 516-939-11 | 516-339-11 |
|                | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-940-10 | 516-340-10* | Grade B      | —          | —          | Grade 2   | 516-940-11 | 516-340-11 |
| 103            | 1.005mm (1pc.)                         | Grade K     | 516-941-60 | 516-341-60  | Grade 1      | 516-941-12 | 516-341-12 | Grade K   | 516-941-71 | 516-341-71 |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade 0     | 516-942-10 | 516-342-10  | Grade 2      | 516-942-12 | 516-342-12 | Grade 0   | 516-942-11 | 516-342-11 |
|                | Step of 0.5mm: 0.5 — 24.5 (49pcs.)     | Grade 1     | 516-943-10 | 516-343-10  | Grade 3      | 516-943-12 | 516-343-12 | Grade 1   | 516-943-11 | 516-343-11 |
|                | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-944-10 | 516-344-10* | Grade B      | —          | —          | Grade 2   | 516-944-11 | 516-344-11 |
|                |  |             |            |             |              |            |            |           |            |            |
| 88             | 1.0005mm (1pc.)                        |             |            |             |              |            |            |           |            |            |
|                | Step of 0.001mm: 1.001 — 1.009 (9pcs.) | Grade K     | —          | —           | Grade 1      | —          | —          | Grade K   | 516-969-71 | 516-369-71 |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade 0     | 516-970-10 | —           | Grade 2      | —          | —          | Grade 0   | 516-970-11 | 516-370-11 |
|                | Step of 0.5mm: 0.5 — 9.5 (19pcs.)      | Grade 1     | 516-971-10 | —           | Grade 3      | —          | —          | Grade 1   | 516-971-11 | 516-371-11 |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-972-10 | —           | Grade B      | —          | —          | Grade 2   | 516-972-11 | 516-372-11 |
| 87             | Step of 0.001mm: 1.001 — 1.009 (9pcs.) | Grade K     | 516-945-60 | 516-345-60  | Grade 1      | 516-945-12 | 516-345-12 | Grade K   | 516-945-71 | 516-345-71 |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade 0     | 516-946-10 | 516-346-10  | Grade 2      | 516-946-12 | 516-346-12 | Grade 0   | 516-946-11 | 516-346-11 |
|                | Step of 0.5mm: 0.5 — 9.5 (19pcs.)      | Grade 1     | 516-947-10 | 516-347-10  | Grade 3      | 516-947-12 | 516-347-12 | Grade 1   | 516-947-11 | 516-347-11 |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-948-10 | 516-348-10  | Grade B      | —          | —          | Grade 2   | 516-948-11 | 516-348-11 |
|                |  |             |            |             |              |            |            |           |            |            |
| 76             | 1.005mm (1pc.)                         |             |            |             |              |            |            |           |            |            |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade K     | 516-949-60 | 516-349-60  | Grade 1      | —          | —          | Grade K   | —          | —          |
|                | Step of 0.5mm: 0.5 — 9.5 (19pcs.)      | Grade 0     | 516-950-10 | 516-350-10  | Grade 2      | —          | —          | Grade 0   | —          | —          |
|                | Step of 10mm: 10 — 40 (4pcs.)          | Grade 1     | 516-951-10 | 516-351-10  | Grade 3      | —          | —          | Grade 1   | —          | —          |
|                | Step of 25mm: 50 — 100 (3pcs.)         | Grade 2     | 516-952-10 | 516-352-10* | Grade B      | —          | —          | Grade 2   | —          | —          |
| 56             | 0.5mm (1pc.)                           |             |            |             |              |            |            |           |            |            |
|                | Step of 0.001mm: 1.001 — 1.009 (9pcs.) |             |            |             |              |            |            |           |            |            |
|                | Step of 0.01mm: 1.01 — 1.09 (9pcs.)    | Grade K     | 516-953-60 | 516-353-60  | Grade 1      | 516-953-12 | 516-353-12 | Grade K   | —          | —          |
|                | Step of 0.1mm: 1.1 — 1.9 (9pcs.)       | Grade 0     | 516-954-10 | 516-354-10  | Grade 2      | 516-954-12 | 516-354-12 | Grade 0   | —          | —          |
|                | Step of 1mm: 1 — 24 (24pcs.)           | Grade 1     | 516-955-10 | 516-355-10  | Grade 3      | 516-955-12 | 516-355-12 | Grade 1   | —          | —          |
|                | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-956-10 | 516-356-10* | Grade B      | —          | —          | Grade 2   | —          | —          |
| 47             | 1.005mm (1pc.)                         |             |            |             |              |            |            |           |            |            |
|                | Step of 0.01mm: 1.01 — 1.09 (9pcs.)    | Grade K     | 516-957-60 | 516-357-60  | Grade 1      | 516-957-12 | 516-357-12 | Grade K   | —          | —          |
|                | Step of 0.1mm: 1.1 — 1.9 (9pcs.)       | Grade 0     | 516-958-10 | 516-358-10  | Grade 2      | 516-958-12 | 516-358-12 | Grade 0   | —          | —          |
|                | Step of 1mm: 1 — 24 (24pcs.)           | Grade 1     | 516-959-10 | 516-359-10  | Grade 3      | 516-959-12 | 516-359-12 | Grade 1   | —          | —          |
|                | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-960-10 | 516-360-10* | Grade B      | —          | —          | Grade 2   | —          | —          |
| 47             | 1.005mm (1pc.)                         |             |            |             |              |            |            |           |            |            |
|                | Step of 0.01mm: 1.01 — 1.19 (19pcs.)   | Grade K     | 516-961-60 | 516-361-60  | Grade 1      | —          | —          | Grade K   | 516-961-71 | 516-361-71 |
|                | Step of 0.1mm: 1.2 — 1.9 (8pcs.)       | Grade 0     | 516-962-10 | 516-362-10  | Grade 2      | —          | —          | Grade 0   | 516-962-11 | 516-362-11 |
|                | Step of 1mm: 1 — 9 (9pcs.)             | Grade 1     | 516-963-10 | 516-363-10  | Grade 3      | —          | —          | Grade 1   | 516-963-11 | 516-363-11 |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-964-10 | 516-364-10  | Grade B      | —          | —          | Grade 2   | 516-964-11 | 516-364-11 |
| 46             | Step of 0.001mm: 1.001 — 1.009 (9pcs.) |             |            |             |              |            |            |           |            |            |
|                | Step of 0.01mm: 1.01 — 1.09 (9pcs.)    | Grade K     | 516-994-60 | 516-394-60  | Grade 1      | —          | —          | Grade K   | —          | —          |
|                | Step of 0.1mm: 1.1 — 1.9 (9pcs.)       | Grade 0     | 516-995-10 | 516-395-10  | Grade 2      | —          | —          | Grade 0   | —          | —          |
|                | Step of 1mm: 1 — 9 (9pcs.)             | Grade 1     | 516-996-10 | 516-396-10  | Grade 3      | —          | —          | Grade 1   | —          | —          |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-997-10 | 516-397-10  | Grade B      | —          | —          | Grade 2   | —          | —          |
| 32             | 1.005mm (1pc.)                         |             |            |             |              |            |            |           |            |            |
|                | Step of 0.01mm: 1.01 — 1.09 (9pcs.)    |             |            |             |              |            |            |           |            |            |
|                | Step of 0.1mm: 1.1 — 1.9 (9pcs.)       | Grade K     | 516-965-60 | 516-365-60  | Grade 1      | —          | —          | Grade K   | 516-965-71 | 516-365-71 |
|                | Step of 1mm: 1 — 9 (9pcs.)             | Grade 0     | 516-966-10 | 516-366-10  | Grade 2      | —          | —          | Grade 0   | 516-966-11 | 516-366-11 |
|                | Step of 10mm: 10 — 30 (3pcs.)          | Grade 1     | 516-967-10 | 516-367-10  | Grade 3      | —          | —          | Grade 1   | 516-967-11 | 516-367-11 |
|                | 60mm (1pc.)                            | Grade 2     | 516-968-10 | 516-368-10  | Grade B      | —          | —          | Grade 2   | 516-968-11 | 516-368-11 |

\*Economy CERA/steel combination sets including steel blocks for sizes 50, 75, and 100mm in place of CERA Blocks for shop-floor use are available. Use suffix "-13" in place of "-10" when ordering: **516-340-13** (112-block), **516-344-13** (103-block), **516-352-13** (76-block), **516-356-13** (56-block), **516-360-13** (47-block).  
 Note 1: Use suffix "-60" in place of "-10" to order the ISO/DIN/JIS grade 0, 1, or 2 gauge block sets with Certificate of Calibration. (The charge for calibration is not included in the prior set price.)  
 Note 2: Gauge block sets with NKO Certificate are also available. Contact your Mitutoyo distributor or the Mitutoyo regional office near you for more information.





**2mm Base Block Sets**

| Blocks per set | Blocks included in set                 | ISO/DIN/JIS | Order No.  |      | Order No.    |            |      | Order No. |              |
|----------------|--|-------------|------------|------|--------------|------------|------|-----------|--------------|
|                |  |             | Steel      | CERA | Federal Spec | Steel      | CERA | BS        | Steel        |
| 112            | 2.0005mm (1pc.)                        |             |            |      |              |            |      |           |              |
|                | Step of 0.001mm: 2.001 — 2.009 (9pcs.) | Grade K     | 516-513-60 | —    | Grade 1      | 516-514-12 | —    | Grade K   | 516-513-71 — |
|                | Step of 0.01mm: 2.01 — 2.49 (49pcs.)   | Grade 0     | 516-514-10 | —    | Grade 2      | 516-515-12 | —    | Grade 0   | 516-514-11 — |
|                | Step of 0.5mm: 0.5 — 24.5 (49pcs.)     | Grade 1     | 516-515-10 | —    | Grade 3      | 516-516-12 | —    | Grade 1   | 516-515-11 — |
|                | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-516-10 | —    | Grade B      | —          | —    | Grade 2   | 516-516-11 — |
| 88             | 1.0005mm (1pc.)                        |             |            |      |              |            |      |           |              |
|                | Step of 0.001mm: 2.001 — 2.009 (9pcs.) | Grade K     | 516-501-60 | —    | Grade 1      | —          | —    | Grade K   | 516-501-71 — |
|                | Step of 0.01mm: 2.01 — 2.49 (49pcs.)   | Grade 0     | 516-502-10 | —    | Grade 2      | —          | —    | Grade 0   | 516-502-11 — |
|                | Step of 0.5mm: 0.5 — 9.5 (19pcs.)      | Grade 1     | 516-503-10 | —    | Grade 3      | —          | —    | Grade 1   | 516-503-11 — |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-504-10 | —    | Grade B      | —          | —    | Grade 2   | 516-504-11 — |
| 88             | 2.0005mm (1pc.)                        |             |            |      |              |            |      |           |              |
|                | Step of 0.001mm: 2.001 — 2.009 (9pcs.) | Grade K     | 516-517-60 | —    | Grade 1      | 516-518-12 | —    | Grade K   | — —          |
|                | Step of 0.01mm: 2.01 — 2.49 (49pcs.)   | Grade 0     | 516-518-10 | —    | Grade 2      | 516-519-12 | —    | Grade 0   | — —          |
|                | Step of 0.5mm: 0.5 — 9.5 (19pcs.)      | Grade 1     | 516-519-10 | —    | Grade 3      | 516-520-12 | —    | Grade 1   | — —          |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-520-10 | —    | Grade B      | —          | —    | Grade 2   | — —          |
| 47             | 2.0005mm (1pc.)                        |             |            |      |              |            |      |           |              |
|                | Step of 0.001mm: 2.001 — 2.009 (9pcs.) |             |            |      |              |            |      |           |              |
|                | Step of 0.01mm: 2.01 — 2.09 (9pcs.)    | Grade K     | 516-521-60 | —    | Grade 1      | 516-522-12 | —    | Grade K   | — —          |
|                | Step of 0.1mm: 2.1 — 2.9 (9pcs.)       | Grade 0     | 516-522-10 | —    | Grade 2      | 516-523-12 | —    | Grade 0   | — —          |
|                | Step of 1mm: 1 — 9 (9pcs.)             | Grade 1     | 516-523-10 | —    | Grade 3      | 516-524-12 | —    | Grade 1   | — —          |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-524-10 | —    | Grade B      | —          | —    | Grade 2   | — —          |
| 46             | Step of 0.001mm: 2.001 — 2.009 (9pcs.) |             |            |      |              |            |      |           |              |
|                | Step of 0.01mm: 2.01 — 2.09 (9pcs.)    | Grade K     | 516-505-60 | —    | Grade 1      | —          | —    | Grade K   | 516-505-71 — |
|                | Step of 0.1mm: 2.1 — 2.9 (9pcs.)       | Grade 0     | 516-506-10 | —    | Grade 2      | —          | —    | Grade 0   | 516-506-11 — |
|                | Step of 1mm: 1 — 9 (9pcs.)             | Grade 1     | 516-507-10 | —    | Grade 3      | —          | —    | Grade 1   | 516-507-11 — |
|                | Step of 10mm: 10 — 100 (10pcs.)        | Grade 2     | 516-508-10 | —    | Grade B      | —          | —    | Grade 2   | 516-508-11 — |
| 33             | 2.005mm (1pc.)                         |             |            |      |              |            |      |           |              |
|                | Step of 0.01mm: 2.01 — 2.09 (9pcs.)    |             |            |      |              |            |      |           |              |
|                | Step of 0.1mm: 2.1 — 2.9 (9pcs.)       | Grade K     | 516-509-60 | —    | Grade 1      | 516-510-12 | —    | Grade K   | 516-509-71 — |
|                | Step of 1mm: 1 — 9 (9pcs.)             | Grade 0     | 516-510-10 | —    | Grade 2      | 516-511-12 | —    | Grade 0   | 516-510-11 — |
|                | Step of 10mm: 10 — 30 (3pcs.)          | Grade 1     | 516-511-10 | —    | Grade 3      | 516-512-12 | —    | Grade 1   | 516-511-11 — |
|                | 60 (1pc.), 100 (1pc.)                  | Grade 2     | 516-512-10 | —    | Grade B      | —          | —    | Grade 2   | 516-512-11 — |

Note: Gauge block sets with NKO Certificate are also available. Contact your Mitutoyo distributor or the Mitutoyo regional office near you for more information.

**2mm Base Block Sets**

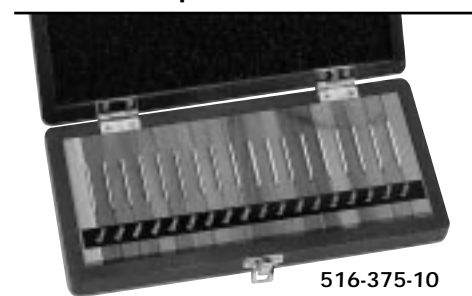


516-515-10



516-524-10

**0.001mm Step Block Sets**



516-375-10

**Thin Block Sets**



516-991-10

## 0.001mm Step Block Sets

| Blocks per set | Blocks included in set  | ISO/DIN/JIS | Order No.         |                   | Order No.    |       |      | Order No. |                   |                   |
|----------------|---|-------------|-------------------|-------------------|--------------|-------|------|-----------|-------------------|-------------------|
|                |   |             | Steel             | CERA              | Federal Spec | Steel | CERA | BS        | Steel             | CERA              |
| 18             | Step of 0.001mm: 0.991 — 0.999 (9pcs.)<br>1.001 — 1.009 (9pcs.) | Grade K     | <b>516-973-60</b> | <b>516-373-60</b> | Grade 1      | —     | —    | Grade K   | —                 | —                 |
|                |   | Grade 0     | <b>516-974-10</b> | <b>516-374-10</b> | Grade 2      | —     | —    | Grade 0   | —                 | —                 |
|                |   | Grade 1     | <b>516-975-10</b> | <b>516-375-10</b> | Grade 3      | —     | —    | Grade 1   | —                 | —                 |
|                |   | Grade 2     | <b>516-976-10</b> | <b>516-376-10</b> | Grade B      | —     | —    | Grade 2   | —                 | —                 |
| 9              | Step of 0.001mm: 1.001 — 1.009 (9pcs.)                          | Grade K     | <b>516-981-60</b> | <b>516-381-60</b> | Grade 1      | —     | —    | Grade K   | <b>516-981-71</b> | <b>516-381-71</b> |
|                |   | Grade 0     | <b>516-982-10</b> | <b>516-382-10</b> | Grade 2      | —     | —    | Grade 0   | <b>516-982-11</b> | <b>516-382-11</b> |
|                |   | Grade 1     | <b>516-983-10</b> | <b>516-383-10</b> | Grade 3      | —     | —    | Grade 1   | <b>516-983-11</b> | <b>516-383-11</b> |
|                |   | Grade 2     | <b>516-984-10</b> | <b>516-384-10</b> | Grade B      | —     | —    | Grade 2   | <b>516-984-11</b> | <b>516-384-11</b> |
| 9              | Step of 0.001mm: 0.991 — 0.999 (9pcs.)                          | Grade K     | <b>516-985-60</b> | <b>516-385-60</b> | Grade 1      | —     | —    | Grade K   | —                 | —                 |
|                |   | Grade 0     | <b>516-986-10</b> | <b>516-386-10</b> | Grade 2      | —     | —    | Grade 0   | —                 | —                 |
|                |   | Grade 1     | <b>516-987-10</b> | <b>516-387-10</b> | Grade 3      | —     | —    | Grade 1   | —                 | —                 |
|                |   | Grade 2     | <b>516-988-10</b> | <b>516-388-10</b> | Grade B      | —     | —    | Grade 2   | —                 | —                 |

## Thin Block Sets

| Blocks per set | Blocks included in set              | ISO/DIN/JIS | Order No.         |      | Order No.    |       |      | Order No. |       |      |
|----------------|-------------------------------------|-------------|-------------------|------|--------------|-------|------|-----------|-------|------|
|                |                                     |             | Steel             | CERA | Federal Spec | Steel | CERA | BS        | Steel | CERA |
| 9              | Step of 0.05mm: 0.10 — 0.50 (9pcs.) | Grade K     | —                 | —    | Grade 1      | —     | —    | Grade K   | —     | —    |
|                |                                     | Grade 0     | <b>516-990-10</b> | —    | Grade 2      | —     | —    | Grade 0   | —     | —    |
|                |                                     | Grade 1     | <b>516-991-10</b> | —    | Grade 3      | —     | —    | Grade 1   | —     | —    |
|                |                                     | Grade 2     | <b>516-992-10</b> | —    | Grade B      | —     | —    | Grade 2   | —     | —    |

## Long Block Sets

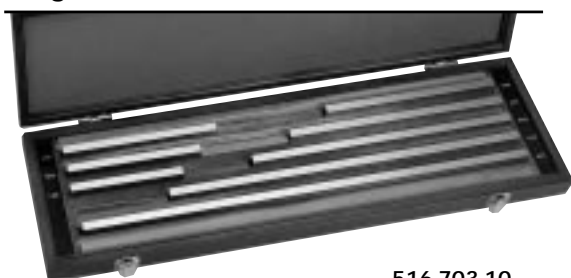
| Blocks per set | Blocks included in set  | ISO/DIN/JIS | Order No.         |                   | Order No.    |                   |                   | Order No. |       |      |
|----------------|---|-------------|-------------------|-------------------|--------------|-------------------|-------------------|-----------|-------|------|
|                |   |             | Steel             | CERA              | Federal Spec | Steel             | CERA              | BS        | Steel | CERA |
| 8              | 125mm (1pc.), 150mm (1pc.),<br>175mm (1pc.), 200mm (1pc.),<br>250mm (1pc.), 300mm (1pc.),<br>400mm (1pc.), 500mm (1pc.) | Grade K     | <b>516-701-60</b> | <b>516-731-60</b> | Grade 1      | <b>516-701-12</b> | <b>516-731-12</b> | Grade K   | —     | —    |
|                |   | Grade 0     | <b>516-702-10</b> | <b>516-732-10</b> | Grade 2      | <b>516-702-12</b> | <b>516-732-12</b> | Grade 0   | —     | —    |
|                |   | Grade 1     | <b>516-703-10</b> | <b>516-733-10</b> | Grade 3      | <b>516-703-12</b> | <b>516-733-12</b> | Grade 1   | —     | —    |
|                |   | Grade 2     | <b>516-704-10</b> | <b>516-734-10</b> | Grade B      | —                 | —                 | Grade 2   | —     | —    |

## Wear Block Sets

| Blocks per set | Blocks included in set | ISO/DIN/JIS | Order No.         |                   | Order No.    |                   |                   | Order No. |         |      |
|----------------|------------------------|-------------|-------------------|-------------------|--------------|-------------------|-------------------|-----------|---------|------|
|                |                        |             | Carbide           | CERA              | Federal Spec | Carbide           | CERA              | BS        | Carbide | CERA |
| 2              | 1mm (2pcs.)            | Grade K     | —                 | —                 | Grade 1      | —                 | —                 | Grade K   | —       | —    |
|                |                        | Grade 0     | <b>516-807-10</b> | <b>516-832-10</b> | Grade 2      | <b>516-807-12</b> | <b>516-832-12</b> | Grade 0   | —       | —    |
|                |                        | Grade 1     | <b>516-806-10</b> | <b>516-833-10</b> | Grade 3      | <b>516-806-12</b> | <b>516-833-12</b> | Grade 1   | —       | —    |
|                |                        | Grade 2     | —                 | —                 | Grade B      | —                 | —                 | Grade 2   | —       | —    |
| 2              | 2mm (2pcs.)            | Grade K     | —                 | —                 | Grade 1      | —                 | —                 | Grade K   | —       | —    |
|                |                        | Grade 0     | <b>516-803-10</b> | <b>516-830-10</b> | Grade 2      | <b>516-803-12</b> | <b>516-830-12</b> | Grade 0   | —       | —    |
|                |                        | Grade 1     | <b>516-802-10</b> | <b>516-831-10</b> | Grade 3      | <b>516-802-12</b> | <b>516-831-12</b> | Grade 1   | —       | —    |
|                |                        | Grade 2     | —                 | —                 | Grade B      | —                 | —                 | Grade 2   | —       | —    |

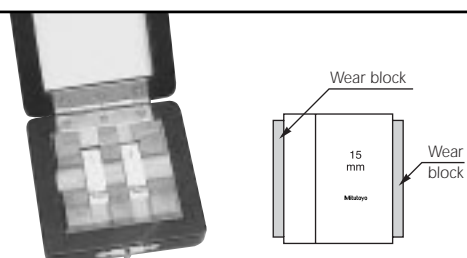
Note: Use suffix "-60" in place of "-10" to order the ISO/DIN/JIS grade 0, 1, or 2 gauge block sets with Certificate of Calibration. (The charge for calibration is not included in the prior set price.)

## Long Block Sets



516-703-10

## Wear Block Sets



516-831-10



# Inch Rectangular Gauge Block Sets

## SERIES 516

| Blocks per set | Blocks included in set  | Order No.    |            |             | Order No. |            |            |
|----------------|---|--------------|------------|-------------|-----------|------------|------------|
|                |   | Federal Spec | Steel      | CERA        | BS        | Steel      | CERA       |
| 82             | .10005" (1pc.)  |              |            |             |           |            |            |
|                | Step of .0001": .1001 — .1009 (9pcs.)   | Grade 1      | 516-905-12 | 516-305-12  | Grade K   | —          | —          |
|                | Step of .001": .101 — .149 (49pcs.)   | Grade 2      | 516-906-12 | 516-306-12  | Grade 0   | 516-906-11 | —          |
|                | Step of .05": .05 — .95 (19pcs.)  | Grade 3      | 516-907-12 | 516-307-12  | Grade 1   | 516-907-11 | —          |
|                | Step of 1": 1 — 4 (4pcs.)   | Grade B      | 516-908-12 | 516-308-12  | Grade 2   | 516-908-11 | —          |
| 81             | Step of .0001": .1001 — .1009 (9pcs.)   | Grade 1      | 516-901-12 | 516-301-12* | Grade K   | —          | —          |
|                | Step of .001": .101 — .149 (49pcs.)   | Grade 2      | 516-902-12 | 516-302-12* | Grade 0   | 516-902-11 | 516-302-11 |
|                | Step of .05": .05 — .95 (19pcs.)  | Grade 3      | 516-903-12 | 516-303-12  | Grade 1   | 516-903-11 | 516-303-11 |
|                | Step of 1": 1 — 4 (4pcs.)   | Grade B      | 516-904-12 | 516-304-12  | Grade 2   | 516-904-11 | 516-304-11 |
|                | Step of .0001": .1001 — .1009 (9pcs.)   | Grade 1      | —          | —           | Grade K   | —          | —          |
| 49             | Step of .001": .101 — .109 (9pcs.)  | Grade 2      | —          | —           | Grade 0   | 516-910-11 | —          |
|                | Step of .01": .01 — .19 (19pcs.)  | Grade 3      | —          | —           | Grade 1   | 516-911-11 | —          |
|                | Step of .1": .2 — .9 (8pcs.)  | Grade B      | —          | —           | Grade 2   | 516-912-11 | —          |
|                | Step of 1": 1 — 4 (4pcs.)   |              |            |             |           |            |            |
| 35             | .10005" (1pc.)  |              |            |             |           |            |            |
|                | Step of .0001": .1001 — .1009 (9pcs.)   | Grade 1      | 516-913-12 | 516-313-12* | Grade K   | —          | —          |
|                | Step of .001": .101 — .109 (9pcs.)  | Grade 2      | 516-914-12 | 516-314-12* | Grade 0   | 516-914-11 | 516-314-11 |
|                | Step of .01": .11 — .19 (9pcs.)   | Grade 3      | 516-915-12 | 516-315-12  | Grade 1   | 516-915-11 | 516-315-11 |
|                | .1" (1pc.), .2" (1pc.), .3" (1pc.), .5" (1pc.), 1" (1pc.), 2" (1pc.), 4" (1pc.) | Grade B      | 516-916-12 | 516-316-12  | Grade 2   | 516-916-11 | 516-316-11 |
| 28             | .02005" (1pc.)  | Grade 1      | 516-917-12 | —           | Grade K   | —          | —          |
|                | Step of .0001": .0201 — .0209 (9pcs.)   | Grade 2      | 516-918-12 | —           | Grade 0   | —          | —          |
|                | Step of .001": .021 — .029 (9pcs.)  | Grade 3      | 516-919-12 | —           | Grade 1   | —          | —          |
|                | Step of .01": .01 — .09 (9pcs.)   | Grade B      | 516-920-12 | —           | Grade 2   | —          | —          |
|                |   |              |            |             |           |            |            |

\*Economy CERA/steel combination sets including steel blocks for sizes 2", 3", and 4" in place of CERA Blocks for shop-floor use are available. Use suffix "-14" in place of "-12" when ordering: 516-301-14 (81-block), 516-302-14 (81-block), 516-313-14 (35-block), 516-314-14 (35-block).

### Thin Block Sets

| Blocks per set | Blocks included in set              | Order No.    |            |      | Order No. |            |      |
|----------------|-------------------------------------|--------------|------------|------|-----------|------------|------|
|                |                                     | Federal Spec | Steel      | CERA | BS        | Steel      | CERA |
| 10             | Step of .005": .005 — .050 (10pcs.) | Grade 1      | —          | —    | Grade K   | —          | —    |
|                |                                     | Grade 2      | 516-926-12 | —    | Grade 0   | 516-926-11 | —    |
|                |                                     | Grade 3      | 516-927-12 | —    | Grade 1   | 516-927-11 | —    |
|                |                                     | Grade B      | —          | —    | Grade 2   | 516-928-11 | —    |
|                |                                     |              |            |      |           |            |      |

### Long Block Sets

| Blocks per set | Blocks included in set   | Order No.    |            |            | Order No. |       |      |
|----------------|--|--------------|------------|------------|-----------|-------|------|
|                |  | Federal Spec | Steel      | CERA       | BS        | Steel | CERA |
| 8              | 5" (1pc.), 6" (1pc.), 7" (1pc.), 8" (1pc.), 10" (1pc.), 12" (1pc.), 16" (1pc.), 20" (1pc.) | Grade 1      | —          | 516-741-12 | Grade K   | —     | —    |
|                |  | Grade 2      | 516-712-12 | 516-742-12 | Grade 0   | —     | —    |
|                |  | Grade 3      | 516-713-12 | 516-743-12 | Grade 1   | —     | —    |
|                |  | Grade B      | —          | —          | Grade 2   | —     | —    |
|                |  |              |            |            |           |       |      |

### Wear Block Sets

| Blocks per set | Blocks included in set | Order No.    |            |            | Order No. |         |      |
|----------------|------------------------|--------------|------------|------------|-----------|---------|------|
|                |                        | Federal Spec | Carbide    | CERA       | BS        | Carbide | CERA |
| 2              | .05" (2pcs.)           | Grade 1      | —          | —          | Grade K   | —       | —    |
|                |                        | Grade 2      | 516-809-12 | 516-836-12 | Grade 0   | —       | —    |
|                |                        | Grade 3      | 516-808-12 | 516-837-12 | Grade 1   | —       | —    |
|                |                        | Grade B      | —          | —          | Grade 2   | —       | —    |
|                |                        |              |            |            |           |         |      |
| 2              | .1" (2pcs.)            | Grade 1      | —          | —          | Grade K   | —       | —    |
|                |                        | Grade 2      | 516-805-12 | 516-834-12 | Grade 0   | —       | —    |
|                |                        | Grade 3      | 516-804-12 | 516-835-12 | Grade 1   | —       | —    |
|                |                        | Grade B      | —          | —          | Grade 2   | —       | —    |
|                |                        |              |            |            |           |         |      |

## Rectangular Gauge Block Sets for Micrometer Inspection

### SERIES 516

#### Metric Block Sets

| Blocks per set | Blocks and accessories included in set  | ISO/DIN/JIS | Order No.  |            | Order No.    |            |            | Order No. |       |      |
|----------------|---|-------------|------------|------------|--------------|------------|------------|-----------|-------|------|
|                |   |             | Steel      | CERA       | Federal Spec | Steel      | CERA       | BS        | Steel | CERA |
| 16             | Step of 0.25mm: 1.00 — 1.50 (3pcs.)<br>Step of 5mm: 5 — 50 (10pcs.)<br>2mm (1pc.), 3mm (1pc.), 25.25mm (1pc.)<br>• Arkansas grinding stone<br>• Optical parallels (12mm and 25mm)   | Grade K     | —          | —          | Grade 1      | —          | —          | Grade K   | —     | —    |
|                |   | Grade 0     | 516-111-10 | 516-161-10 | Grade 2      | —          | —          | Grade 0   | —     | —    |
|                |   | Grade 1     | 516-112-10 | 516-162-10 | Grade 3      | —          | —          | Grade 1   | —     | —    |
|                |   | Grade 2     | 516-113-10 | 516-163-10 | Grade B      | —          | —          | Grade 2   | —     | —    |
| 10             | Step of 0.25mm: 1.00 — 1.50 (3pcs.)<br>Step of 5mm: 5 — 25 (5pcs.)<br>2mm (1pc.), 3mm (1pc.)  | Grade K     | —          | —          | Grade 1      | —          | —          | Grade K   | —     | —    |
|                |   | Grade 0     | 516-103-10 | 516-152-10 | Grade 2      | 516-103-12 | —          | Grade 0   | —     | —    |
|                |   | Grade 1     | 516-101-10 | 516-153-10 | Grade 3      | 516-101-12 | —          | Grade 1   | —     | —    |
|                |   | Grade 2     | —          | 516-154-10 | Grade B      | —          | —          | Grade 2   | —     | —    |
| 10             | Step of 0.25mm: 1.00 — 1.50 (3pcs.)<br>Step of 5mm: 5 — 25 (5pcs.)<br>2mm (1pc.), 3mm (1pc.)<br>• Optical parallel (12mm)   | Grade K     | 516-977-60 | —          | Grade 1      | —          | —          | Grade K   | —     | —    |
|                |   | Grade 0     | 516-978-10 | 516-378-10 | Grade 2      | —          | —          | Grade 0   | —     | —    |
|                |   | Grade 1     | 516-979-10 | 516-379-10 | Grade 3      | —          | —          | Grade 1   | —     | —    |
|                |   | Grade 2     | 516-980-10 | 516-380-10 | Grade B      | —          | —          | Grade 2   | —     | —    |
| 10             | 2.5mm (1pc.), 5.1mm (1pc.), 7.7mm (1pc.),<br>10.3mm (1pc.), 12.9mm (1pc.),<br>15mm (1pc.), 17.6mm (1pc.),<br>20.2mm (1pc.), 22.8mm (1pc.), 25mm (1pc.)<br>• Optical parallel (12mm) | Grade K     | —          | —          | Grade 1      | —          | —          | Grade K   | —     | —    |
|                |   | Grade 0     | 516-106-10 | 516-156-10 | Grade 2      | —          | —          | Grade 0   | —     | —    |
|                |   | Grade 1     | 516-107-10 | 516-157-10 | Grade 3      | —          | —          | Grade 1   | —     | —    |
|                |   | Grade 2     | 516-108-10 | 516-158-10 | Grade B      | —          | —          | Grade 2   | —     | —    |
| 8              | Step of 25mm: 25 — 200 (8pcs.)  | Grade K     | —          | 516-164-60 | Grade 1      | —          | 516-164-12 | Grade K   | —     | —    |
|                |   | Grade 0     | 516-115-10 | 516-165-10 | Grade 2      | —          | 516-165-12 | Grade 0   | —     | —    |
|                |   | Grade 1     | 516-116-10 | 516-166-10 | Grade 3      | —          | 516-166-12 | Grade 1   | —     | —    |
|                |   | Grade 2     | 516-117-10 | 516-167-10 | Grade B      | —          | —          | Grade 2   | —     | —    |

Note: Use suffix “-60” in place of “-10” to order the ISO/DIN/JIS grade 0, 1, or 2 gauge block sets with Certificate of Calibration. (The charge for calibration is not included in the prior set price.)

#### Inch Block Sets

| Blocks per set | Blocks and accessories included in set  | Federal Spec | Order No.  |            | BS      | Order No.  |            |
|----------------|---|--------------|------------|------------|---------|------------|------------|
|                |   |              | Steel      | CERA       |         | Steel      | CERA       |
| 10             | .105" (1pc), .210" (1pc), .315" (1pc), .420" (1pc),<br>.500" (1pc), .605" (1pc), .710" (1pc), .815" (1pc),<br>.920" (1pc), 1" (1pc)                   | Grade 1      | 516-921-12 | 516-321-12 | Grade K | —          | —          |
|                |   | Grade 2      | 516-922-12 | 516-322-12 | Grade 0 | 516-921-11 | 516-321-11 |
|                |   | Grade 3      | 516-923-12 | 516-323-12 | Grade 1 | 516-922-11 | 516-322-11 |
|                |   | Grade B      | —          | —          | Grade 2 | 516-923-11 | 516-323-11 |
| 9              | • Optical parallel .5" (1pc)<br>.0625" (1pc), .100" (1pc), .125" (1pc),<br>.200" (1pc), .250" (1pc), .300" (1pc),<br>.500" (1pc), 1" (1pc), 2" (1pc.) | Grade 1      | 516-929-12 | 516-333-12 | Grade K | —          | —          |
|                |   | Grade 2      | 516-930-12 | 516-334-12 | Grade 0 | —          | —          |
|                |   | Grade 3      | 516-931-12 | 516-335-12 | Grade 1 | —          | —          |
|                |   | Grade B      | 516-932-12 | 516-336-12 | Grade 2 | —          | —          |
| 9              | • Optical parallel (.5")<br>.0625" (1pc), .100" (1pc), .125" (1pc),<br>.200" (1pc), .250" (1pc), .300" (1pc),<br>.500" (1pc), 1" (1pc), 2" (1pc.)     | Grade 1      | —          | 516-329-12 | Grade K | —          | —          |
|                |   | Grade 2      | 516-934-12 | 516-330-12 | Grade 0 | —          | —          |
|                |   | Grade 3      | 516-935-12 | 516-331-12 | Grade 1 | —          | —          |
|                |   | Grade B      | 516-936-12 | 516-332-12 | Grade 2 | —          | —          |
| 8              | Step of 1":1 — 8 (8pcs.)  | Grade 1      | —          | —          | Grade K | —          | —          |
|                |   | Grade 2      | 516-126-12 | 516-176-12 | Grade 0 | —          | —          |
|                |   | Grade 3      | 516-127-12 | 516-177-12 | Grade 1 | —          | —          |
|                |   | Grade B      | —          | —          | Grade 2 | —          | —          |

## Rectangular Gauge Block Sets for Caliper Inspection

### SERIES 516

| Blocks per set | Blocks and accessories included in set                                       | ISO/DIN/JIS | Order No.  |            | Order No.    |       |      | Order No. |       |      |
|----------------|--|-------------|------------|------------|--------------|-------|------|-----------|-------|------|
|                |  |             | Steel      | CERA       | Federal Spec | Steel | CERA | BS        | Steel | CERA |
| 2              | 41.3mm (1pc), 131.4mm (1pc.)<br>• Setting ring (Ø20mm)<br>• Inspecting glove | Grade K     | —          | —          | Grade 1      | —     | —    | Grade K   | —     | —    |
|                |  | Grade 0     | —          | —          | Grade 2      | —     | —    | Grade 0   | —     | —    |
|                |  | Grade 1     | 516-122-10 | 516-172-10 | Grade 3      | —     | —    | Grade 1   | —     | —    |
|                |  | Grade 2     | 516-123-10 | 516-173-10 | Grade B      | —     | —    | Grade 2   | —     | —    |



# Metric Rectangular Gauge Blocks

## INDIVIDUAL



**NOTE:** If ordering a gauge block, append either of the following suffixes to the order number to specify the grade of the gauge block and the standard to which the block must conform.  
(e.g. **611671-021** for a grade 0 ISO/DIN/JIS steel gauge block with a nominal length of 10mm)

| Suffixes | Grade and relevant standard |                       |
|----------|-----------------------------|-----------------------|
| 016      | Grade K                     | ISO/DIN/JIS           |
| 021      | Grade 0                     | ISO/DIN/JIS           |
| 031      | Grade 1                     | ISO/DIN/JIS           |
| 041      | Grade 2                     | ISO/DIN/JIS           |
| 221      | Grade 1                     | Federal Specification |
| 231      | Grade 2                     | Federal Specification |
| 241      | Grade 3                     | Federal Specification |
| 117      | Grade K                     | British Standard      |
| 121      | Grade 0                     | British Standard      |
| 131      | Grade 1                     | British Standard      |
| 141      | Grade 2                     | British Standard      |

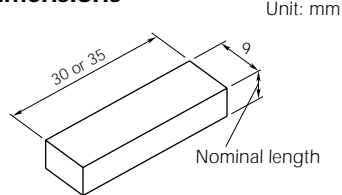
• Applicable accuracy grade depends on the block length.

| Length (mm) | Order No.  |            |
|-------------|------------|------------|
|             | Steel      | CERA       |
| 0.1         | 611821-███ | —          |
| 0.11        | 611860-███ | —          |
| 0.12        | 611861-███ | —          |
| 0.13        | 611862-███ | —          |
| 0.14        | 611863-███ | —          |
| 0.15        | 611822-███ | —          |
| 0.16        | 611864-███ | —          |
| 0.17        | 611865-███ | —          |
| 0.18        | 611866-███ | —          |
| 0.19        | 611867-███ | —          |
| 0.2         | 611823-███ | —          |
| 0.21        | 611868-███ | —          |
| 0.22        | 611869-███ | —          |
| 0.23        | 611870-███ | —          |
| 0.24        | 611871-███ | —          |
| 0.25        | 611824-███ | —          |
| 0.26        | 611872-███ | —          |
| 0.27        | 611873-███ | —          |
| 0.28        | 611874-███ | —          |
| 0.29        | 611875-███ | —          |
| 0.3         | 611825-███ | —          |
| 0.31        | 611876-███ | —          |
| 0.32        | 611877-███ | —          |
| 0.33        | 611878-███ | —          |
| 0.34        | 611879-███ | —          |
| 0.35        | 611826-███ | —          |
| 0.36        | 611880-███ | —          |
| 0.37        | 611881-███ | —          |
| 0.38        | 611882-███ | —          |
| 0.39        | 611883-███ | —          |
| 0.4         | 611827-███ | —          |
| 0.41        | 611884-███ | —          |
| 0.42        | 611885-███ | —          |
| 0.43        | 611886-███ | —          |
| 0.44        | 611887-███ | —          |
| 0.45        | 611828-███ | —          |
| 0.46        | 611888-███ | —          |
| 0.47        | 611889-███ | —          |
| 0.48        | 611890-███ | —          |
| 0.49        | 611891-███ | —          |
| 0.5         | 611506-███ | 613506-███ |
| 0.51        | 611892-███ | —          |
| 0.52        | 611893-███ | —          |

| Length (mm) | Order No.  |      |
|-------------|------------|------|
|             | Steel      | CERA |
| 0.53        | 611894-███ | —    |
| 0.54        | 611895-███ | —    |
| 0.55        | 611896-███ | —    |
| 0.56        | 611897-███ | —    |
| 0.57        | 611898-███ | —    |
| 0.58        | 611899-███ | —    |
| 0.59        | 611900-███ | —    |
| 0.6         | 611901-███ | —    |
| 0.61        | 611902-███ | —    |
| 0.62        | 611903-███ | —    |
| 0.63        | 611904-███ | —    |
| 0.64        | 611905-███ | —    |
| 0.65        | 611906-███ | —    |
| 0.66        | 611907-███ | —    |
| 0.67        | 611908-███ | —    |
| 0.68        | 611909-███ | —    |
| 0.69        | 611910-███ | —    |
| 0.7         | 611911-███ | —    |
| 0.71        | 611912-███ | —    |
| 0.72        | 611913-███ | —    |
| 0.73        | 611914-███ | —    |
| 0.74        | 611915-███ | —    |
| 0.75        | 611916-███ | —    |
| 0.76        | 611917-███ | —    |
| 0.77        | 611918-███ | —    |
| 0.78        | 611919-███ | —    |
| 0.79        | 611920-███ | —    |
| 0.8         | 611921-███ | —    |
| 0.81        | 611922-███ | —    |
| 0.82        | 611923-███ | —    |
| 0.83        | 611924-███ | —    |
| 0.84        | 611925-███ | —    |
| 0.85        | 611926-███ | —    |
| 0.86        | 611927-███ | —    |
| 0.87        | 611928-███ | —    |
| 0.88        | 611929-███ | —    |
| 0.89        | 611930-███ | —    |
| 0.9         | 611931-███ | —    |
| 0.91        | 611932-███ | —    |
| 0.92        | 611933-███ | —    |
| 0.93        | 611934-███ | —    |
| 0.94        | 611935-███ | —    |
| 0.95        | 611936-███ | —    |

| Length (mm) | Order No.  |            |
|-------------|------------|------------|
|             | Steel      | CERA       |
| 0.96        | 611937-███ | —          |
| 0.97        | 611938-███ | —          |
| 0.98        | 611939-███ | —          |
| 0.99        | 611940-███ | —          |
| 0.991       | 611551-███ | 613551-███ |
| 0.992       | 611552-███ | 613552-███ |
| 0.993       | 611553-███ | 613553-███ |
| 0.994       | 611554-███ | 613554-███ |
| 0.995       | 611555-███ | 613555-███ |
| 0.996       | 611556-███ | 613556-███ |
| 0.997       | 611557-███ | 613557-███ |
| 0.998       | 611558-███ | 613558-███ |
| 0.999       | 611559-███ | 613559-███ |
| 1           | 611611-███ | 613611-███ |
| 1.0005      | 611520-███ | 613520-███ |
| 1.001       | 611521-███ | 613521-███ |
| 1.002       | 611522-███ | 613522-███ |
| 1.003       | 611523-███ | 613523-███ |
| 1.004       | 611524-███ | 613524-███ |
| 1.005       | 611525-███ | 613525-███ |
| 1.006       | 611526-███ | 613526-███ |
| 1.007       | 611527-███ | 613527-███ |
| 1.008       | 611528-███ | 613528-███ |
| 1.009       | 611529-███ | 613529-███ |
| 1.01        | 611561-███ | 613561-███ |
| 1.02        | 611562-███ | 613562-███ |
| 1.03        | 611563-███ | 613563-███ |
| 1.04        | 611564-███ | 613564-███ |
| 1.05        | 611565-███ | 613565-███ |
| 1.06        | 611566-███ | 613566-███ |
| 1.07        | 611567-███ | 613567-███ |
| 1.08        | 611568-███ | 613568-███ |
| 1.09        | 611569-███ | 613569-███ |
| 1.1         | 611570-███ | 613570-███ |
| 1.11        | 611571-███ | 613571-███ |
| 1.12        | 611572-███ | 613572-███ |
| 1.13        | 611573-███ | 613573-███ |
| 1.14        | 611574-███ | 613574-███ |
| 1.15        | 611575-███ | 613575-███ |
| 1.16        | 611576-███ | 613576-███ |
| 1.17        | 611577-███ | 613577-███ |
| 1.18        | 611578-███ | 613578-███ |
| 1.19        | 611579-███ | 613579-███ |

### Dimensions



Rectangular Gauge Block

| Length (mm) | Order No.  |            |
|-------------|------------|------------|
|             | Steel      | CERA       |
| 1.2         | 611580-███ | 613580-███ |
| 1.21        | 611581-███ | 613581-███ |
| 1.22        | 611582-███ | 613582-███ |
| 1.23        | 611583-███ | 613583-███ |
| 1.24        | 611584-███ | 613584-███ |
| 1.25        | 611585-███ | 613585-███ |
| 1.26        | 611586-███ | 613586-███ |
| 1.27        | 611587-███ | 613587-███ |
| 1.28        | 611588-███ | 613588-███ |
| 1.29        | 611589-███ | 613589-███ |
| 1.3         | 611590-███ | 613590-███ |
| 1.31        | 611591-███ | 613591-███ |
| 1.32        | 611592-███ | 613592-███ |
| 1.33        | 611593-███ | 613593-███ |
| 1.34        | 611594-███ | 613594-███ |
| 1.35        | 611595-███ | 613595-███ |
| 1.36        | 611596-███ | 613596-███ |
| 1.37        | 611597-███ | 613597-███ |
| 1.38        | 611598-███ | 613598-███ |
| 1.39        | 611599-███ | 613599-███ |
| 1.4         | 611600-███ | 613600-███ |
| 1.41        | 611601-███ | 613601-███ |
| 1.42        | 611602-███ | 613602-███ |
| 1.43        | 611603-███ | 613603-███ |
| 1.44        | 611604-███ | 613604-███ |
| 1.45        | 611605-███ | 613605-███ |
| 1.46        | 611606-███ | 613606-███ |
| 1.47        | 611607-███ | 613607-███ |
| 1.48        | 611608-███ | 613608-███ |
| 1.49        | 611609-███ | 613609-███ |
| 1.5         | 611641-███ | 613641-███ |
| 1.6         | 611516-███ | 613516-███ |
| 1.7         | 611517-███ | 613517-███ |
| 1.8         | 611518-███ | 613518-███ |
| 1.9         | 611519-███ | 613519-███ |
| 2           | 611612-███ | 613612-███ |
| 2.0005      | 611690-███ | —          |
| 2.001       | 611691-███ | —          |
| 2.002       | 611692-███ | —          |
| 2.003       | 611693-███ | —          |
| 2.004       | 611694-███ | —          |
| 2.005       | 611695-███ | —          |
| 2.006       | 611696-███ | —          |
| 2.007       | 611697-███ | —          |
| 2.008       | 611698-███ | —          |
| 2.009       | 611699-███ | —          |
| 2.01        | 611701-███ | —          |
| 2.02        | 611702-███ | —          |
| 2.03        | 611703-███ | —          |
| 2.04        | 611704-███ | —          |
| 2.05        | 611705-███ | —          |
| 2.06        | 611706-███ | —          |
| 2.07        | 611707-███ | —          |
| 2.08        | 611708-███ | —          |
| 2.09        | 611709-███ | —          |

| Length (mm) | Order No.  |            |
|-------------|------------|------------|
|             | Steel      | CERA       |
| 2.1         | 611710-███ | —          |
| 2.11        | 611711-███ | —          |
| 2.12        | 611712-███ | —          |
| 2.13        | 611713-███ | —          |
| 2.14        | 611714-███ | —          |
| 2.15        | 611715-███ | —          |
| 2.16        | 611716-███ | —          |
| 2.17        | 611717-███ | —          |
| 2.18        | 611718-███ | —          |
| 2.19        | 611719-███ | —          |
| 2.2         | 611720-███ | —          |
| 2.21        | 611721-███ | —          |
| 2.22        | 611722-███ | —          |
| 2.23        | 611723-███ | —          |
| 2.24        | 611724-███ | —          |
| 2.25        | 611725-███ | —          |
| 2.26        | 611726-███ | —          |
| 2.27        | 611727-███ | —          |
| 2.28        | 611728-███ | —          |
| 2.29        | 611729-███ | —          |
| 2.3         | 611730-███ | —          |
| 2.31        | 611731-███ | —          |
| 2.32        | 611732-███ | —          |
| 2.33        | 611733-███ | —          |
| 2.34        | 611734-███ | —          |
| 2.35        | 611735-███ | —          |
| 2.36        | 611736-███ | —          |
| 2.37        | 611737-███ | —          |
| 2.38        | 611738-███ | —          |
| 2.39        | 611739-███ | —          |
| 2.4         | 611740-███ | —          |
| 2.41        | 611741-███ | —          |
| 2.42        | 611742-███ | —          |
| 2.43        | 611743-███ | —          |
| 2.44        | 611744-███ | —          |
| 2.45        | 611745-███ | —          |
| 2.46        | 611746-███ | —          |
| 2.47        | 611747-███ | —          |
| 2.48        | 611748-███ | —          |
| 2.49        | 611749-███ | —          |
| 2.5         | 611642-███ | 613642-███ |
| 2.6         | 611750-███ | —          |
| 2.7         | 611751-███ | —          |
| 2.8         | 611752-███ | —          |
| 2.9         | 611753-███ | —          |
| 3           | 611613-███ | 613613-███ |
| 3.5         | 611643-███ | 613643-███ |
| 4           | 611614-███ | 613614-███ |
| 4.5         | 611644-███ | 613644-███ |
| 5           | 611615-███ | 613615-███ |
| 5.1         | 611850-███ | 613850-███ |
| 5.5         | 611645-███ | 613645-███ |
| 6           | 611616-███ | 613616-███ |
| 6.5         | 611646-███ | 613646-███ |
| 7           | 611617-███ | 613617-███ |
| 7.5         | 611647-███ | 613647-███ |
| 7.7         | 611851-███ | 613851-███ |
| 8           | 611618-███ | 613618-███ |
| 8.5         | 611648-███ | 613648-███ |
| 9           | 611619-███ | 613619-███ |
| 9.5         | 611649-███ | 613649-███ |
| 10          | 611671-███ | 613671-███ |
| 10.3        | 611852-███ | 613852-███ |
| 10.5        | 611650-███ | 613650-███ |
| 11          | 611621-███ | 613621-███ |
| 11.5        | 611651-███ | 613651-███ |
| 12          | 611622-███ | 613622-███ |

| Length (mm) | Order No.  |            |
|-------------|------------|------------|
|             | Steel      | CERA       |
| 12.5        | 611652-███ | 613652-███ |
| 12.9        | 611853-███ | 613853-███ |
| 13          | 611623-███ | 613623-███ |
| 13.5        | 611653-███ | 613653-███ |
| 14          | 611624-███ | 613624-███ |
| 14.5        | 611654-███ | 613654-███ |
| 15          | 611625-███ | 613625-███ |
| 15.5        | 611655-███ | 613655-███ |
| 16          | 611626-███ | 613626-███ |
| 16.5        | 611656-███ | 613656-███ |
| 17          | 611627-███ | 613627-███ |
| 17.5        | 611657-███ | 613657-███ |
| 17.6        | 611854-███ | 613854-███ |
| 18          | 611628-███ | 613628-███ |
| 18.5        | 611658-███ | 613658-███ |
| 19          | 611629-███ | 613629-███ |
| 19.5        | 611659-███ | 613659-███ |
| 20          | 611672-███ | 613672-███ |
| 20.2        | 611855-███ | 613855-███ |
| 20.5        | 611660-███ | 613660-███ |
| 21          | 611631-███ | 613631-███ |
| 21.5        | 611661-███ | 613661-███ |
| 22          | 611632-███ | 613632-███ |
| 22.5        | 611662-███ | 613662-███ |
| 22.8        | 611856-███ | 613856-███ |
| 23          | 611633-███ | 613633-███ |
| 23.5        | 611663-███ | 613663-███ |
| 24          | 611634-███ | 613634-███ |
| 24.5        | 611664-███ | 613664-███ |
| 25          | 611635-███ | 613635-███ |
| 25.25       | 611754-███ | 613754-███ |
| 30          | 611673-███ | 613673-███ |
| 35          | 611755-███ | 613755-███ |
| 40          | 611674-███ | 613674-███ |
| 45          | 611756-███ | 613756-███ |
| 50          | 611675-███ | 613675-███ |
| 60          | 611676-███ | 613676-███ |
| 70          | 611677-███ | 613677-███ |
| 75          | 611801-███ | 613801-███ |
| 80          | 611678-███ | 613678-███ |
| 90          | 611679-███ | 613679-███ |
| 100         | 611681-███ | 613681-███ |
| 125         | 611802-███ | 613802-███ |
| 150         | 611803-███ | 613803-███ |
| 175         | 611804-███ | 613804-███ |
| 200         | 611682-███ | 613682-███ |
| 250         | 611805-███ | 613805-███ |
| 300         | 611683-███ | 613683-███ |
| 400         | 611684-███ | 613684-███ |
| 500         | 611685-███ | 613685-███ |
| 600         | 611840-███ | —          |
| 700         | 611841-███ | —          |
| 750         | 611842-███ | —          |
| 800         | 611843-███ | —          |
| 900         | 611844-███ | —          |
| 1000        | 611845-███ | —          |

### Wear Blocks

| Length (mm) | Order No.        |
|-------------|------------------|
|             | Tungsten carbide |
| 1           | 612611-███       |
| 2           | 612612-███       |



# Inch Rectangular Gauge Blocks

## INDIVIDUAL

**NOTE:** If ordering a gauge block, append either of the following suffixes to the order number to specify the grade of the gauge block and the standard to which the block must conform.

| Suffixes | Grade and relevant standard |                       |
|----------|-----------------------------|-----------------------|
| 221      | Grade 1                     | Federal Specification |
| 231      | Grade 2                     | Federal Specification |
| 241      | Grade 3                     | Federal Specification |
| 121      | Grade 0                     | British Standard      |
| 131      | Grade 1                     | British Standard      |
| 141      | Grade 2                     | British Standard      |

\* Applicable accuracy grade depends on the block length.

| Length<br>(inch) | Order No.  |            |
|------------------|------------|------------|
|                  | Steel      | CERA       |
| .004             | 611304-███ | —          |
| .005             | 611305-███ | —          |
| .006             | 611306-███ | —          |
| .007             | 611307-███ | —          |
| .008             | 611308-███ | —          |
| .009             | 611309-███ | —          |
| .01              | 611310-███ | —          |
| .011             | 611311-███ | —          |
| .012             | 611312-███ | —          |
| .013             | 611313-███ | —          |
| .014             | 611314-███ | —          |
| .015             | 611315-███ | —          |
| .016             | 611316-███ | —          |
| .017             | 611317-███ | —          |
| .018             | 611318-███ | —          |
| .019             | 611319-███ | —          |
| .02              | 611320-███ | —          |
| .02005           | 611240-███ | —          |
| .0201            | 611231-███ | —          |
| .0202            | 611232-███ | —          |
| .0203            | 611233-███ | —          |
| .0204            | 611234-███ | —          |
| .0205            | 611235-███ | —          |
| .0206            | 611236-███ | —          |
| .0207            | 611237-███ | —          |
| .0208            | 611238-███ | —          |
| .0209            | 611239-███ | —          |
| .021             | 611321-███ | —          |
| .022             | 611322-███ | —          |
| .023             | 611323-███ | —          |
| .024             | 611324-███ | —          |
| .025             | 611325-███ | —          |
| .026             | 611326-███ | —          |
| .027             | 611327-███ | —          |
| .028             | 611328-███ | —          |
| .029             | 611329-███ | —          |
| .03              | 611330-███ | —          |
| .031             | 611331-███ | —          |
| .03125 (1/32)    | 611101-███ | 613103-███ |
| .032             | 611332-███ | —          |
| .033             | 611333-███ | —          |
| .034             | 611334-███ | —          |
| .035             | 611335-███ | —          |
| .036             | 611336-███ | —          |
| .037             | 611337-███ | —          |
| .038             | 611338-███ | —          |
| .039             | 611339-███ | —          |
| .04              | 611340-███ | —          |
| .041             | 611341-███ | —          |
| .042             | 611342-███ | —          |
| .043             | 611343-███ | —          |
| .044             | 611344-███ | —          |
| .045             | 611345-███ | —          |
| .046             | 611346-███ | —          |
| .046875 (3/64)   | 611102-███ | 613104-███ |
| .047             | 611347-███ | —          |
| .048             | 611348-███ | —          |
| .049             | 611349-███ | —          |

| Length<br>(inch) | Order No.  |            |
|------------------|------------|------------|
|                  | Steel      | CERA       |
| .05              | 611105-███ | 613105-███ |
| .06              | 611106-███ | —          |
| .0625            | 611303-███ | 613303-███ |
| .07              | 611107-███ | —          |
| .078125 (5/64)   | 611103-███ | 613100-███ |
| .08              | 611108-███ | —          |
| .09              | 611109-███ | —          |
| .09375 (3/32)    | 611104-███ | 613101-███ |
| .1               | 611191-███ | 613191-███ |
| .100025          | 611111-███ | 613110-███ |
| .10005           | 611135-███ | 613135-███ |
| .100075          | 611112-███ | 613111-███ |
| .1001            | 611121-███ | 613121-███ |
| .1002            | 611122-███ | 613122-███ |
| .1003            | 611123-███ | 613123-███ |
| .1004            | 611124-███ | 613124-███ |
| .1005            | 611125-███ | 613125-███ |
| .1006            | 611126-███ | 613126-███ |
| .1007            | 611127-███ | 613127-███ |
| .1008            | 611128-███ | 613128-███ |
| .1009            | 611129-███ | 613129-███ |
| .101             | 611141-███ | 613141-███ |
| .102             | 611142-███ | 613142-███ |
| .103             | 611143-███ | 613143-███ |
| .104             | 611144-███ | 613144-███ |
| .105             | 611145-███ | 613145-███ |
| .106             | 611146-███ | 613146-███ |
| .107             | 611147-███ | 613147-███ |
| .108             | 611148-███ | 613148-███ |
| .109             | 611149-███ | 613149-███ |
| .109375 (7/64)   | 611110-███ | 613102-███ |
| .11              | 611150-███ | 613150-███ |
| .111             | 611151-███ | 613151-███ |
| .112             | 611152-███ | 613152-███ |
| .113             | 611153-███ | 613153-███ |
| .114             | 611154-███ | 613154-███ |
| .115             | 611155-███ | 613155-███ |
| .116             | 611156-███ | 613156-███ |
| .117             | 611157-███ | 613157-███ |
| .118             | 611158-███ | 613158-███ |
| .119             | 611159-███ | 613159-███ |
| .12              | 611160-███ | 613160-███ |
| .121             | 611161-███ | 613161-███ |
| .122             | 611162-███ | 613162-███ |
| .123             | 611163-███ | 613163-███ |
| .124             | 611164-███ | 613164-███ |
| .125             | 611165-███ | 613165-███ |
| .126             | 611166-███ | 613166-███ |
| .127             | 611167-███ | 613167-███ |
| .128             | 611168-███ | 613168-███ |
| .129             | 611169-███ | 613169-███ |
| .13              | 611170-███ | 613170-███ |
| .131             | 611171-███ | 613171-███ |
| .132             | 611172-███ | 613172-███ |
| .133             | 611173-███ | 613173-███ |
| .134             | 611174-███ | 613174-███ |
| .135             | 611175-███ | 613175-███ |
| .136             | 611176-███ | 613176-███ |

| Length<br>(inch) | Order No.  |            |
|------------------|------------|------------|
|                  | Steel      | CERA       |
| .137             | 611177-███ | 613177-███ |
| .138             | 611178-███ | 613178-███ |
| .139             | 611179-███ | 613179-███ |
| .14              | 611180-███ | 613180-███ |
| .141             | 611181-███ | 613181-███ |
| .142             | 611182-███ | 613182-███ |
| .143             | 611183-███ | 613183-███ |
| .144             | 611184-███ | 613184-███ |
| .145             | 611185-███ | 613185-███ |
| .146             | 611186-███ | 613186-███ |
| .147             | 611187-███ | 613187-███ |
| .148             | 611188-███ | 613188-███ |
| .149             | 611189-███ | 613189-███ |
| .15              | 611115-███ | 613115-███ |
| .16              | 611116-███ | 613116-███ |
| .17              | 611117-███ | 613117-███ |
| .18              | 611118-███ | 613118-███ |
| .19              | 611119-███ | 613119-███ |
| .2               | 611192-███ | 613192-███ |
| .21              | 611221-███ | —          |
| .25              | 611212-███ | 613212-███ |
| .3               | 611193-███ | 613193-███ |
| .35              | 611213-███ | 613213-███ |
| .375 (3/8)       | 611113-███ | 613112-███ |
| .4               | 611194-███ | 613194-███ |
| .45              | 611214-███ | 613214-███ |
| .5               | 611195-███ | 613195-███ |
| .55              | 611215-███ | 613215-███ |
| .6               | 611196-███ | 613196-███ |
| .65              | 611216-███ | 613216-███ |
| .7               | 611197-███ | 613197-███ |
| .75              | 611217-███ | 613217-███ |
| .8               | 611198-███ | 613198-███ |
| .85              | 611218-███ | 613218-███ |
| .9               | 611199-███ | 613199-███ |
| .95              | 611219-███ | 613219-███ |
| 1                | 611201-███ | 613201-███ |
| 2                | 611202-███ | 613202-███ |
| 3                | 611203-███ | 613203-███ |
| 4                | 611204-███ | 613204-███ |
| 5                | 611205-███ | 613205-███ |
| 6                | 611206-███ | 613206-███ |
| 7                | 611207-███ | 613207-███ |
| 8                | 611208-███ | 613208-███ |
| 10               | 611222-███ | 613222-███ |
| 12               | 611223-███ | 613223-███ |
| 16               | 611224-███ | 613224-███ |
| 20               | 611225-███ | 613225-███ |

## Wear Blocks

| Length<br>(inch) | Order No.        |
|------------------|------------------|
|                  | Tungsten carbide |
| .05              | 612105-███       |
| .1               | 612191-███       |

## Rectangular Gauge Block Accessories

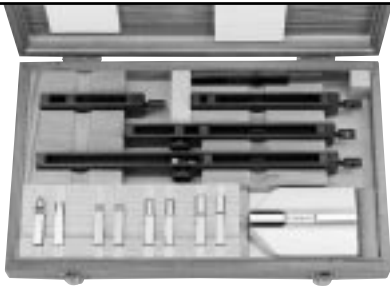
### SERIES 516

To expand the variety of Rectangular Gauge Block (CERA Block) applications, Mitutoyo offers the Gauge Block Accessories Set. By assembling the items in the set, you can easily and quickly build up a precision measuring instrument.

#### Accessories for Gauge Blocks over 100mm:

Specially designed for the long gauge blocks over 100mm which have two holes on the body for coupling.

#### Accessories Set



516-602

#### Accessories Set (Over 100mm)



516-605



#### Holder base



619009

#### Holders



619002



619005

#### Scriber point



619019

#### Center point



619020

#### Tram point



619021

#### Half round jaws



619012



619013

#### Plain jaw



619018

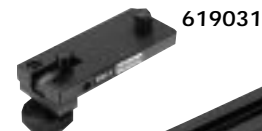
#### Triangular straight edge



619022

#### For Gauge Blocks over 100mm

##### Holders



619031



619032



619035



619034

### SPECIFICATIONS

#### Accessories for Gauge Blocks up to 100mm

| Order No.   | Assortment of accessories |   |
|-------------|---------------------------|---|
| 22 pcs./set | 14 pcs./set               | (●: Included in set)                    |
| 516-601     | 516-602                   |   |
| ●           | ●                         | Holder 15 - 60mm (619002)               |
| ●           | ●                         | Holder 5 - 100mm (619003)               |
| ●           | ●                         | Holder 15 - 160mm (619004)              |
| ●           | ●                         | Holder 20 - 250mm (619005)              |
| ●           | ●                         | Holder base 35mm (619009)               |
| ●           | ●                         | Half round jaw 2mm x 2 pcs. (619010)    |
| ●           | ●                         | Half round jaw 5mm x 2 pcs. (619011)    |
| ●           | ●                         | Half round jaw 8mm x 2 pcs. (619012)    |
| ●           | ●                         | Half round jaw 12mm x 2 pcs. (619013)   |
| ●           | ●                         | Half round jaw 20mm x 2 pcs. (619014)   |
| ●           | ●                         | Plain jaw x 2 pcs. (619018)             |
| ●           | ●                         | Scriber point (619019)                  |
| ●           | ●                         | Center point (619020)                   |
| ●           | ●                         | Tram point x 2 pcs. (619021)            |
| ●           | ●                         | Triangular straight edge 100mm (619022) |
| ●           | ●                         | Triangular straight edge 160mm (619023) |

#### Accessories for Gauge Blocks over 100mm

| Order No. | Assortment of accessories   |
|-----------|---|
| 516-605   | Holder (619031) for coupling two gauge blocks                               |
|           | Holder (619032) for coupling long blocks together with other blocks         |
|           | Holder (619033) for coupling long blocks together with other blocks         |
|           | Holder (619034) for attaching to the holder base                            |
|           | Holder (619035) for attaching to the holder base together with other blocks |
|           | Adaptor x 3 pcs. (619036) for attaching jaws to the holder                  |
|           | Holder base 35mm (619009)   |
|           | Half round jaw 12mm x 2 pcs. (619013)                                       |
|           | Plain jaw x 2 pcs. (619018)   |
|           | Scriber point (619019)  |

Note: These accessories can be used for Inch Rectangular Gauge Blocks.





# Metric Square Gauge Block Sets

## SERIES 516

A Square Gauge Block can retain stable orientation both longitudinally and laterally. A wide range of application measurements can be made, including cutting tool positioning, angle measurement with a sine bar, taper measurement with a roller, and inspection of depth micrometers.

### Metric Block Set



516-440-10

| Blocks per set | Blocks included in set                 | Order No.   |            |      | Order No.    |            |      |
|----------------|--|-------------|------------|------|--------------|------------|------|
|                |  | ISO/DIN/JIS | Steel      | CERA | Federal Spec | Steel      | CERA |
| 112            | 1.0005mm (1pc.)                        |             |            |      |              |            |      |
|                | Step of 0.001mm: 1.001 — 1.009 (9pcs.) | Grade K     | —          | —    | Grade 1      | 516-437-12 | —    |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade 0     | 516-438-10 | —    | Grade 2      | 516-438-12 | —    |
|                | Step of 0.5mm: 0.5 — 24.5 (49pcs.)     | Grade 1     | 516-439-10 | —    | Grade 3      | 516-439-12 | —    |
|                | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-440-10 | —    | Grade B      | —          | —    |
| 103            | 1.005mm (1pc.)                         | Grade K     | —          | —    | Grade 1      | 516-441-12 | —    |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade 0     | 516-442-10 | —    | Grade 2      | 516-442-12 | —    |
|                | Step of 0.5mm: 0.5 — 24.5 (49pcs.)     | Grade 1     | 516-443-10 | —    | Grade 3      | 516-443-12 | —    |
|                | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-444-10 | —    | Grade B      | —          | —    |
| 76             | 1.005mm (1pc.)                         |             |            |      |              |            |      |
|                | Step of 0.01mm: 1.01 — 1.49 (49pcs.)   | Grade K     | —          | —    | Grade 1      | 516-449-12 | —    |
|                | Step of 0.5mm: 0.5 — 9.5 (19pcs.)      | Grade 0     | 516-450-10 | —    | Grade 2      | 516-450-12 | —    |
|                | Step of 10mm: 10 — 40 (4pcs.)          | Grade 1     | 516-451-10 | —    | Grade 3      | 516-451-12 | —    |
| 47             | 1.005mm (1pc.)                         |             |            |      |              |            |      |
|                | Step of 0.01mm: 1.01 — 1.09 (9pcs.)    | Grade K     | —          | —    | Grade 1      | 516-457-12 | —    |
|                | Step of 0.1mm: 1.1 — 1.9 (9pcs.)       | Grade 0     | 516-458-10 | —    | Grade 2      | 516-458-12 | —    |
|                | Step of 1mm: 1 — 24 (24pcs.)           | Grade 1     | 516-459-10 | —    | Grade 3      | 516-459-12 | —    |
| 32             | Step of 25mm: 25 — 100 (4pcs.)         | Grade 2     | 516-460-10 | —    | Grade B      | —          | —    |
|                | 1.005mm (1pc.)                         |             |            |      |              |            |      |
|                | Step of 0.01mm: 1.01 — 1.09 (9pcs.)    |             |            |      |              |            |      |
|                | Step of 0.1mm: 1.1 — 1.9 (9pcs.)       | Grade K     | —          | —    | Grade 1      | 516-465-12 | —    |
|                | Step of 1mm: 1 — 9 (9pcs.)             | Grade 0     | 516-466-10 | —    | Grade 2      | 516-466-12 | —    |
|                | Step of 10mm: 10 — 30 (3pcs.)          | Grade 1     | 516-467-10 | —    | Grade 3      | 516-467-12 | —    |
|                | 60mm (1pc.)                            | Grade 2     | 516-468-10 | —    | Grade B      | —          | —    |

Note: Use suffix "-60" in place of "-10" to order the ISO/DIN/JIS grade 0, 1, or 2 gauge block sets with Certificate of Calibration. (The charge for calibration is not included in the prior set price.)

### Long Block Sets

| Blocks per set | Blocks included in set   | Order No.   |            |      | Order No.    |       |      |
|----------------|--|-------------|------------|------|--------------|-------|------|
|                |  | ISO/DIN/JIS | Steel      | CERA | Federal Spec | Steel | CERA |
| 8              | 125mm (1pc.), 150mm (1pc.), 175mm (1pc.), 200mm (1pc.), 250mm (1pc.), 300mm (1pc.), 400mm (1pc.), 500mm (1pc.) | Grade K     | —          | —    | Grade 1      | —     | —    |
|                |  | Grade 0     | 516-752-10 | —    | Grade 2      | —     | —    |
|                |  | Grade 1     | 516-753-10 | —    | Grade 3      | —     | —    |
|                |  | Grade 2     | 516-754-10 | —    | Grade B      | —     | —    |

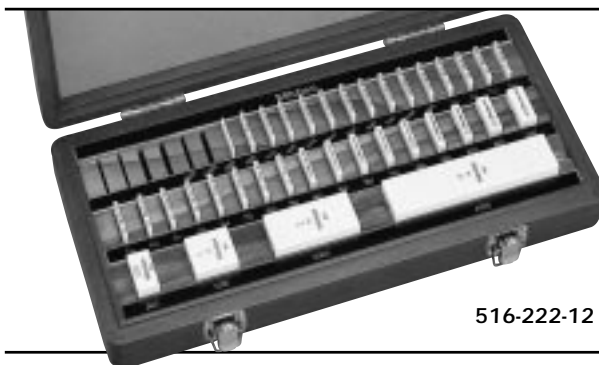
### Wear Block Sets

| Blocks per set | Blocks included in set | Order No.   |            |      | Order No.    |         |      |
|----------------|------------------------|-------------|------------|------|--------------|---------|------|
|                |                        | ISO/DIN/JIS | Carbide    | CERA | Federal Spec | Carbide | CERA |
| 2              | 1mm (2pcs.)            | Grade K     | —          | —    | Grade 1      | —       | —    |
|                |                        | Grade 0     | 516-820-10 | —    | Grade 2      | —       | —    |
|                |                        | Grade 1     | 516-821-10 | —    | Grade 3      | —       | —    |
|                |                        | Grade 2     | —          | —    | Grade B      | —       | —    |
| 2              | 2mm (2pcs.)            | Grade K     | —          | —    | Grade 1      | —       | —    |
|                |                        | Grade 0     | 516-822-10 | —    | Grade 2      | —       | —    |
|                |                        | Grade 1     | 516-823-10 | —    | Grade 3      | —       | —    |
|                |                        | Grade 2     | —          | —    | Grade B      | —       | —    |

## Inch Square Gauge Block Sets

SERIES 516

### Inch Block Set



516-222-12

| Blocks per set | Blocks included in set                 | Order No.    |                       |
|----------------|--|--------------|-----------------------|
|                |  | Federal Spec | Steel CERA            |
| 81             | .05" (1pc.)                            |              |                       |
|                | Step of .0001": .1000 — .1009 (10pcs.) | Grade 1      | 516-401-12 516-201-12 |
|                | Step of .001": .101 — .149 (49pcs.)    | Grade 2      | 516-402-12 516-202-12 |
|                | Step of .05": .15 — .95 (17pcs.)       | Grade 3      | 516-403-12 516-203-12 |
|                | Step of 1": 1 — 4 (4pcs.)              | Grade B      | 516-404-12 516-204-12 |
| 36             | .05" (1pc.)                            |              |                       |
|                | Step of .0001": .1000 — .1009 (10pcs.) | Grade 1      | 516-421-12 516-221-12 |
|                | Step of .001": .101 — .109 (9pcs.)     | Grade 2      | 516-422-12 516-222-12 |
|                | Step of .01": .11 — .19 (9pcs.)        | Grade 3      | 516-423-12 516-223-12 |
|                | Step of .1": .2 — .5 (4pcs.)           | Grade B      | 516-424-12 516-224-12 |
|                | 1" (1pc.), 2" (1pc.), 4" (1pc.)        |              |                       |
| 28             | .02005" (1pc.)                         | Grade 1      | 516-417-12 —          |
|                | Step of .0001": .0201 — .0209 (9pcs.)  | Grade 2      | 516-418-12 —          |
|                | Step of .001": .021 — .029 (9pcs.)     | Grade 3      | 516-419-12 —          |
|                | Step of .01": .01 — .09 (9pcs.)        | Grade B      | 516-420-12 —          |

### Long Block Sets

| Blocks per set | Blocks included in set  | Order No.    |              |
|----------------|---|--------------|--------------|
|                |   | Federal Spec | Steel CERA   |
| 8              | 5" (1pc.), 6" (1pc.), 7" (1pc.), 8" (1pc.),<br>10" (1pc.), 12" (1pc.), 16" (1pc.), 20" (1pc.) | Grade 1      | — —          |
|                |   | Grade 2      | 516-762-12 — |
|                |   | Grade 3      | 516-763-12 — |
|                |   | Grade B      | — —          |

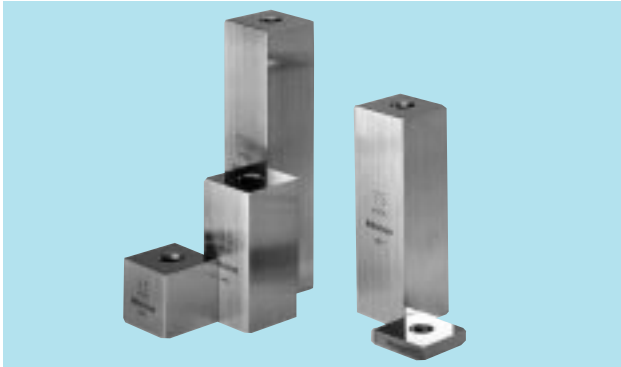
### Wear Block Sets

| Blocks per set | Blocks included in set | Order No.    |                       |
|----------------|------------------------|--------------|-----------------------|
|                |                        | Federal Spec | Carbide CERA          |
| 2              | .05" (2pcs.)           | Grade 1      | — —                   |
|                |                        | Grade 2      | 516-824-12 516-846-12 |
|                |                        | Grade 3      | 516-825-12 516-847-12 |
|                |                        | Grade B      | — —                   |
| 2              | .1" (2pcs.)            | Grade 1      | — —                   |
|                |                        | Grade 2      | 516-826-12 516-844-12 |
|                |                        | Grade 3      | 516-827-12 516-845-12 |
|                |                        | Grade B      | — —                   |



# Metric Square Gauge Blocks

## INDIVIDUAL



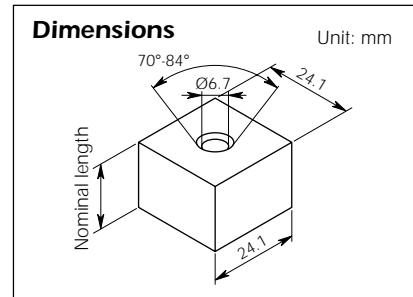
**NOTE:** If ordering a gauge block, append either of the following suffixes to the order number to specify the grade of the gauge block and the standard to which the block must conform. (e.g. **614671-031** for a grade 1 ISO/DIN/JIS steel gauge block with a nominal length of 10mm).

| Suffixes | Grade and relevant standard |                       |
|----------|-----------------------------|-----------------------|
| 021      | Grade 0                     | ISO/DIN/JIS           |
| 031      | Grade 1                     | ISO/DIN/JIS           |
| 041      | Grade 2                     | ISO/DIN/JIS           |
| 221      | Grade 1                     | Federal Specification |
| 231      | Grade 2                     | Federal Specification |
| 241      | Grade 3                     | Federal Specification |

• Applicable accuracy grade depends on the block length.

| Length<br>(mm) | Order No.  |      |
|----------------|------------|------|
|                | Steel      | CERA |
| 5              | 614506-■■■ | —    |
| 1              | 614611-■■■ | —    |
| 1.0005         | 614520-■■■ | —    |
| 1.001          | 614521-■■■ | —    |
| 1.002          | 614522-■■■ | —    |
| 1.003          | 614523-■■■ | —    |
| 1.004          | 614524-■■■ | —    |
| 1.005          | 614525-■■■ | —    |
| 1.006          | 614526-■■■ | —    |
| 1.007          | 614527-■■■ | —    |
| 1.008          | 614528-■■■ | —    |
| 1.009          | 614529-■■■ | —    |
| 1.01           | 614561-■■■ | —    |
| 1.02           | 614562-■■■ | —    |
| 1.03           | 614563-■■■ | —    |
| 1.04           | 614564-■■■ | —    |
| 1.05           | 614565-■■■ | —    |
| 1.06           | 614566-■■■ | —    |
| 1.07           | 614567-■■■ | —    |
| 1.08           | 614568-■■■ | —    |
| 1.09           | 614569-■■■ | —    |
| 1.1            | 614570-■■■ | —    |
| 1.11           | 614571-■■■ | —    |
| 1.12           | 614572-■■■ | —    |
| 1.13           | 614573-■■■ | —    |
| 1.14           | 614574-■■■ | —    |
| 1.15           | 614575-■■■ | —    |
| 1.16           | 614576-■■■ | —    |
| 1.17           | 614577-■■■ | —    |
| 1.18           | 614578-■■■ | —    |
| 1.19           | 614579-■■■ | —    |
| 1.2            | 614580-■■■ | —    |
| 1.21           | 614581-■■■ | —    |
| 1.22           | 614582-■■■ | —    |
| 1.23           | 614583-■■■ | —    |
| 1.24           | 614584-■■■ | —    |
| 1.25           | 614585-■■■ | —    |
| 1.26           | 614586-■■■ | —    |
| 1.27           | 614587-■■■ | —    |
| 1.28           | 614588-■■■ | —    |
| 1.29           | 614589-■■■ | —    |
| 1.3            | 614590-■■■ | —    |
| 1.31           | 614591-■■■ | —    |
| 1.32           | 614592-■■■ | —    |
| 1.33           | 614593-■■■ | —    |
| 1.34           | 614594-■■■ | —    |
| 1.35           | 614595-■■■ | —    |
| 1.36           | 614596-■■■ | —    |
| 1.37           | 614597-■■■ | —    |

| Length<br>(mm) | Order No.  |      |
|----------------|------------|------|
|                | Steel      | CERA |
| 1.38           | 614598-■■■ | —    |
| 1.39           | 614599-■■■ | —    |
| 1.4            | 614600-■■■ | —    |
| 1.41           | 614601-■■■ | —    |
| 1.42           | 614602-■■■ | —    |
| 1.43           | 614603-■■■ | —    |
| 1.44           | 614604-■■■ | —    |
| 1.45           | 614605-■■■ | —    |
| 1.46           | 614606-■■■ | —    |
| 1.47           | 614607-■■■ | —    |
| 1.48           | 614608-■■■ | —    |
| 1.49           | 614609-■■■ | —    |
| 1.5            | 614641-■■■ | —    |
| 1.6            | 614516-■■■ | —    |
| 1.7            | 614517-■■■ | —    |
| 1.8            | 614518-■■■ | —    |
| 1.9            | 614519-■■■ | —    |
| 2              | 614612-■■■ | —    |
| 2.5            | 614642-■■■ | —    |
| 3              | 614613-■■■ | —    |
| 3.5            | 614643-■■■ | —    |
| 4              | 614614-■■■ | —    |
| 4.5            | 614644-■■■ | —    |
| 5              | 614615-■■■ | —    |
| 5.5            | 614645-■■■ | —    |
| 6              | 614616-■■■ | —    |
| 6.5            | 614646-■■■ | —    |
| 7              | 614617-■■■ | —    |
| 7.5            | 614647-■■■ | —    |
| 8              | 614618-■■■ | —    |
| 8.5            | 614648-■■■ | —    |
| 9              | 614619-■■■ | —    |
| 9.5            | 614649-■■■ | —    |
| 10             | 614671-■■■ | —    |
| 10.5           | 614650-■■■ | —    |
| 11             | 614621-■■■ | —    |
| 11.5           | 614651-■■■ | —    |
| 12             | 614622-■■■ | —    |
| 12.5           | 614652-■■■ | —    |
| 13             | 614623-■■■ | —    |
| 13.5           | 614653-■■■ | —    |
| 14             | 614624-■■■ | —    |
| 14.5           | 614654-■■■ | —    |
| 15             | 614625-■■■ | —    |
| 15.5           | 614655-■■■ | —    |
| 16             | 614626-■■■ | —    |
| 16.5           | 614656-■■■ | —    |
| 17             | 614627-■■■ | —    |
| 17.5           | 614657-■■■ | —    |



| Length<br>(mm) | Order No.  |      |
|----------------|------------|------|
|                | Steel      | CERA |
| 18             | 614628-■■■ | —    |
| 18.5           | 614658-■■■ | —    |
| 19             | 614629-■■■ | —    |
| 19.5           | 614659-■■■ | —    |
| 20             | 614672-■■■ | —    |
| 20.5           | 614660-■■■ | —    |
| 21             | 614631-■■■ | —    |
| 21.5           | 614661-■■■ | —    |
| 22             | 614632-■■■ | —    |
| 22.5           | 614662-■■■ | —    |
| 23             | 614633-■■■ | —    |
| 23.5           | 614663-■■■ | —    |
| 24             | 614634-■■■ | —    |
| 24.5           | 614664-■■■ | —    |
| 25             | 614635-■■■ | —    |
| 30             | 614673-■■■ | —    |
| 40             | 614674-■■■ | —    |
| 50             | 614675-■■■ | —    |
| 60             | 614676-■■■ | —    |
| 75             | 614801-■■■ | —    |
| 100            | 614681-■■■ | —    |
| 125            | 614802-■■■ | —    |
| 150            | 614803-■■■ | —    |
| 175            | 614804-■■■ | —    |
| 200            | 614682-■■■ | —    |
| 250            | —          | —    |
| 300            | —          | —    |
| 400            | —          | —    |
| 500            | —          | —    |

### Wear Blocks

| Length<br>(mm) | Order No.        |
|----------------|------------------|
|                | Tungsten carbide |
| 1              | 615611-■■■       |
| 2              | 615612-■■■       |

## Inch Square Gauge Blocks

### INDIVIDUAL

**NOTE:** If ordering a gauge block, append either of the following suffixes to the order number to specify the grade of the gauge block and the standard to which the block must conform.

| Suffixes | Grade and relevant standard |                       |
|----------|-----------------------------|-----------------------|
| 221      | Grade 1                     | Federal Specification |
| 231      | Grade 2                     | Federal Specification |
| 241      | Grade 3                     | Federal Specification |

• Applicable accuracy grade depends on the block length.

| Length (inch)  | Order No.  |            |
|----------------|------------|------------|
|                | Steel      | CERA       |
| .01            | 614310-███ | —          |
| .02005         | 614240-███ | —          |
| .0201          | 614231-███ | —          |
| .0202          | 614232-███ | —          |
| .0203          | 614233-███ | —          |
| .0204          | 614234-███ | —          |
| .0205          | 614235-███ | —          |
| .0206          | 614236-███ | —          |
| .0207          | 614237-███ | —          |
| .0208          | 614238-███ | —          |
| .0209          | 614239-███ | —          |
| .02            | 614320-███ | —          |
| .021           | 614321-███ | —          |
| .022           | 614322-███ | —          |
| .023           | 614323-███ | —          |
| .024           | 614324-███ | —          |
| .025           | 614325-███ | —          |
| .026           | 614326-███ | —          |
| .027           | 614327-███ | —          |
| .028           | 614328-███ | —          |
| .029           | 614329-███ | —          |
| .03            | 614330-███ | —          |
| .03125 (1/32)  | 614301-███ | —          |
| .04            | 614340-███ | —          |
| .046875 (3/64) | 614302-███ | —          |
| .05            | 614105-███ | 616105-███ |
| .06            | 614106-███ | —          |
| .0625          | —          | 616303-███ |
| .07            | 614107-███ | —          |
| .078125 (5/64) | 614304-███ | —          |
| .08            | 614108-███ | —          |
| .09            | 614109-███ | —          |
| .09375 (3/32)  | 614305-███ | —          |
| .1             | 614191-███ | 616191-███ |
| .100025        | 614307-███ | —          |
| .10005         | 614135-███ | 616135-███ |
| .100075        | 614308-███ | —          |
| .1001          | 614121-███ | 616121-███ |
| .1002          | 614122-███ | 616122-███ |
| .1003          | 614123-███ | 616123-███ |
| .1004          | 614124-███ | 616124-███ |
| .1005          | 614125-███ | 616125-███ |
| .1006          | 614126-███ | 616126-███ |
| .1007          | 614127-███ | 616127-███ |
| .1008          | 614128-███ | 616128-███ |
| .1009          | 614129-███ | 616129-███ |
| .101           | 614141-███ | 616141-███ |
| .102           | 614142-███ | 616142-███ |
| .103           | 614143-███ | 616143-███ |
| .104           | 614144-███ | 616144-███ |
| .105           | 614145-███ | 616145-███ |

| Length (inch)  | Order No.  |            |
|----------------|------------|------------|
|                | Steel      | CERA       |
| .106           | 614146-███ | 616146-███ |
| .107           | 614147-███ | 616147-███ |
| .108           | 614148-███ | 616148-███ |
| .109           | 614149-███ | 616149-███ |
| .109375 (7/64) | 614306-███ | —          |
| .11            | 614150-███ | 616150-███ |
| .111           | 614151-███ | 616151-███ |
| .112           | 614152-███ | 616152-███ |
| .113           | 614153-███ | 616153-███ |
| .114           | 614154-███ | 616154-███ |
| .115           | 614155-███ | 616155-███ |
| .116           | 614156-███ | 616156-███ |
| .117           | 614157-███ | 616157-███ |
| .118           | 614158-███ | 616158-███ |
| .119           | 614159-███ | 616159-███ |
| .12            | 614160-███ | 616160-███ |
| .121           | 614161-███ | 616161-███ |
| .122           | 614162-███ | 616162-███ |
| .123           | 614163-███ | 616163-███ |
| .124           | 614164-███ | 616164-███ |
| .125           | 614165-███ | 616165-███ |
| .126           | 614166-███ | 616166-███ |
| .127           | 614167-███ | 616167-███ |
| .128           | 614168-███ | 616168-███ |
| .129           | 614169-███ | 616169-███ |
| .13            | 614170-███ | 616170-███ |
| .131           | 614171-███ | 616171-███ |
| .132           | 614172-███ | 616172-███ |
| .133           | 614173-███ | 616173-███ |
| .134           | 614174-███ | 616174-███ |
| .135           | 614175-███ | 616175-███ |
| .136           | 614176-███ | 616176-███ |
| .137           | 614177-███ | 616177-███ |
| .138           | 614178-███ | 616178-███ |
| .139           | 614179-███ | 616179-███ |
| .14            | 614180-███ | 616180-███ |
| .141           | 614181-███ | 616181-███ |
| .142           | 614182-███ | 616182-███ |
| .143           | 614183-███ | 616183-███ |
| .144           | 614184-███ | 616184-███ |
| .145           | 614185-███ | 616185-███ |
| .146           | 614186-███ | 616186-███ |
| .147           | 614187-███ | 616187-███ |
| .148           | 614188-███ | 616188-███ |
| .149           | 614189-███ | 616189-███ |
| .15            | 614115-███ | 616115-███ |
| .16            | 614116-███ | 616116-███ |
| .17            | 614117-███ | 616117-███ |
| .18            | 614118-███ | 616118-███ |
| .19            | 614119-███ | 616119-███ |
| .2             | 614192-███ | 616192-███ |

| Length (inch) | Order No.  |            |
|---------------|------------|------------|
|               | Steel      | CERA       |
| .25           | 614212-███ | 616212-███ |
| .3            | 614193-███ | 616193-███ |
| .35           | 614213-███ | 616213-███ |
| .375 (3/8)    | 614309-███ | —          |
| .4            | 614194-███ | 616194-███ |
| .45           | 614214-███ | 616214-███ |
| .5            | 614195-███ | 616195-███ |
| .55           | 614215-███ | 616215-███ |
| .6            | 614196-███ | 616196-███ |
| .65           | 614216-███ | 616216-███ |
| .7            | 614197-███ | 616197-███ |
| .75           | 614217-███ | 616217-███ |
| .8            | 614198-███ | 616198-███ |
| .85           | 614218-███ | 616218-███ |
| .9            | 614199-███ | 616199-███ |
| .95           | 614219-███ | 616219-███ |
| 1             | 614201-███ | 616201-███ |
| 2             | 614202-███ | 616202-███ |
| 3             | 614203-███ | 616203-███ |
| 4             | 614204-███ | 616204-███ |
| 5             | 614205-███ | —          |
| 6             | 614206-███ | —          |
| 7             | 614207-███ | —          |
| 8             | 614208-███ | —          |
| 10            | 614228-███ | —          |
| 12            | 614223-███ | —          |
| 16            | 614224-███ | —          |
| 20            | 614225-███ | —          |

### Wear Blocks

| Length (inch) | Order No.        |
|---------------|------------------|
|               | Tungsten carbide |
| .05           | 615105-███       |
| .1            | 615191-███       |



# Square Gauge Block Accessories

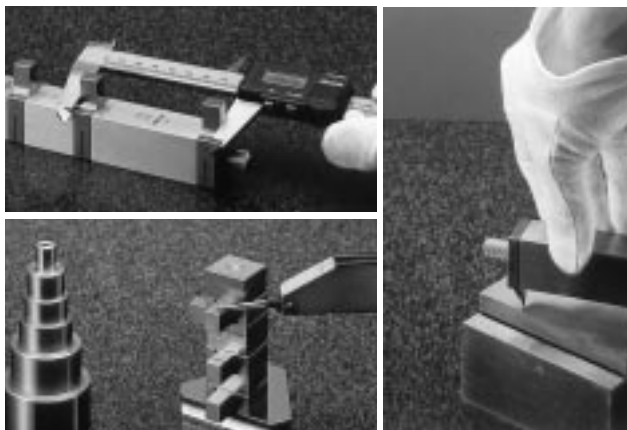
## SERIES 516

To expand the variety of Square Gauge Block applications, Mitutoyo offers the Gauge Block Accessories Set. By assembling the items in the set, you can easily and quickly build up a precision measuring instrument.

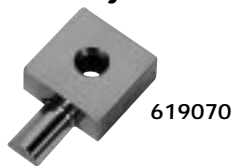
### Accessories Set



516-611

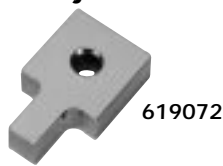


#### Half round jaw



619070

#### Plain jaw



619072

#### Center point



619073

#### Scriber point



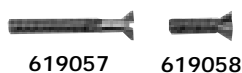
619054

#### Block base



619074

#### Flat head screws



619057

619058

#### Slotted head nut



619059

### SPECIFICATIONS

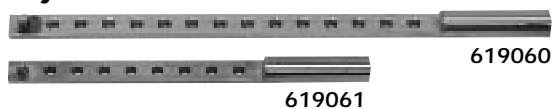
#### Metric

| Order No. | Assortment of accessories                |
|-----------|--|
| 516-611   | Half round jaw 2mm x 2 pcs. (619070)     |
|           | Half round jaw 5mm x 2 pcs. (619071)     |
|           | Plain jaw x 2 pcs. (619072)              |
|           | Center point (619073)                    |
|           | Scriber point (619054)                   |
|           | Block base (619074)                      |
|           | Flat head screw 31.6mm x 2 pcs. (619057) |
|           | Flat head screw 15.8mm x 2 pcs. (619058) |
|           | Slotted head nut x 2 pcs. (619059)       |
|           | Adjustable tie rod 124.5mm (619060)      |
|           | Adjustable tie rod 86.5mm (619061)       |
|           | Tie rod 76mm (619062)                    |
|           | Tie rod 57mm (619063)                    |
|           | Tie rod 38mm (619064)                    |
|           | Tie rod 19mm (619065)                    |
|           | Stud x 2 pcs. (619056)                   |
|           | Knurled head screw x 2 pcs. (619066)     |

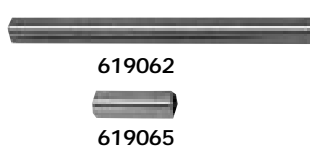
#### Inch

| Order No. | Assortment of accessories              |
|-----------|--|
| 516-612   | Half round jaw .125" x 2 pcs. (619050) |
|           | Half round jaw .25" x 2 pcs. (619051)  |
|           | Plain jaw x 2 pcs. (619052)            |
|           | Center point (619053)                  |
|           | Scriber point (619054)                 |
|           | Block base (619055)                    |
|           | Flat head screw 5/4" x 2 pcs. (619057) |
|           | Flat head screw 5/8" x 2 pcs. (619058) |
|           | Slotted head nut x 2 pcs. (619059)     |
|           | Adjustable tie rod 4.9" (619060)       |
|           | Adjustable tie rod 3.41" (619061)      |
|           | Tie rod 3" (619062)                    |
|           | Tie rod 9/4" (619063)                  |
|           | Tie rod 3/2" (619064)                  |
|           | Tie rod 3/4" (619065)                  |
|           | Stud x 2 pcs. (619056)                 |
|           | Knurled head screw x 2 pcs. (619066)   |

#### Adjustable tie rods



#### Tie rods



#### Knurled head screw



619066

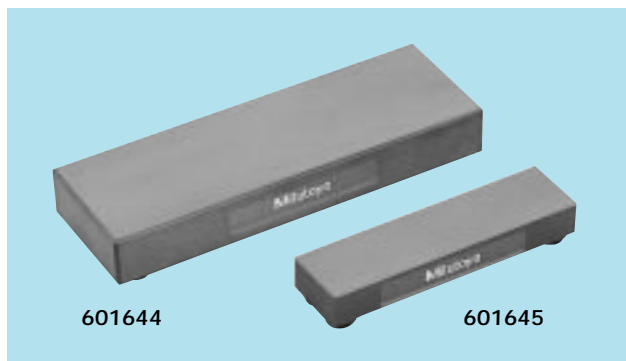
#### Stud



619056

## Ceraston

ACCESSORY FOR GAUGE BLOCKS



601644

601645



### FEATURES

- Alumina-ceramic grinding stone for removing burrs from hard materials such as ceramics that ordinary grinding stones cannot handle.
- Can be used both for steel gauge blocks and CEAR Blocks.

### SPECIFICATIONS

| Order No. | Dimensions (WxDxH) | Mass |
|-----------|--------------------|------|
| 601645    | 100x25x12mm        | 110g |
| 601644    | 150x50x20mm        | 530g |

## Maintenance Kit for Gauge Blocks

SERIES 516



516-650



### FEATURES

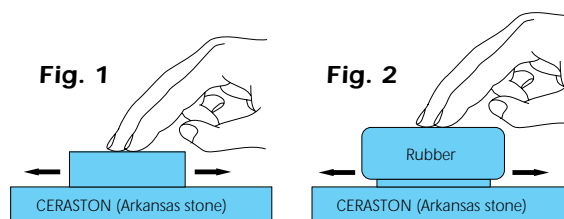
- Includes all necessary maintenance tools for daily care and storage of gauge blocks.
- Supplied in a fitted wooden case for portable use.

### SPECIFICATIONS

| Order No. | Assortment of tools and accessories |
|-----------|-------------------------------------|
| 516-650   | Anti-corrosive oil                  |
|           | Ceraston (601645)                   |
|           | Optical flat                        |
|           | Tweezers                            |
|           | Blower brush                        |
|           | Cleaning paper                      |
|           | Artificial leather mat              |
|           | Reagent bottle                      |
|           | Gloves                              |

### Removing burrs

- (1) Wipe any dust and oil films from the gauge block and the Ceraston (or Arkansas stone) using a solvent.
- (2) Place the gauge block on the Ceraston so that the measuring face that has burrs is on the abrasive surface of the stone. While applying light pressure, move the gauge block to and fro about ten times (Fig. 1). Use a block rubber for thin gauge blocks to apply even pressure (Fig. 2).
- (3) Check the measuring face for burrs with an optical flat. If the burrs have not been removed, repeat step (2). If burrs are too large, they may not be removed with a grinding stone. If so, discard the gauge block.



**Note:** The abrasive surface of a Ceraston must be made flat by lapping it from time to time. After lapping the Ceraston, the lapping powder must be completely removed from the surface to prevent the surface of the gauge block from being scratched.

## GBI

### Automatic Gauge Block Interferometer



GBI

#### FEATURES

- Automatic measuring instrument for gauge block lengths between 0.1mm and 250mm using optical interference.
- The intensity and wavelength of the He-Ne laser light source is highly stable. This allows high-accuracy measurement.
- To reduce the effects of operator body heat, automatic remote measurement can be performed.
- The GBI automatically detects the light quantity distribution of interference fringes and processes data, thus eliminating human errors.
- Both the refractive index and the thermal expansion of gauge blocks are automatically compensated for by the computer which is linked to the thermometer, hygrometer, and digital barometer.

#### SPECIFICATIONS

| Model No.   | GBI   |
|---|---|
| Light source  | 632.8 $\mu$ m wavelength system He-Ne laser<br>543.5 $\mu$ m wavelength system He-Ne laser  |
| Measuring range   | 0.5mm - 250mm   |
| Accuracy<br>(Uncertainty 95%)                               | $\pm 0.02\mu$ m (when measuring a gauge block of 100mm length),<br>$\pm 0.04\mu$ m (when measuring a gauge block of 200mm length) |
| Number of gauge blocks to be mounted on the measuring table | 12  |

## GBCD-100A

### SERIES 565

### Dual-head Type Automatic Gauge Block Comparator



GBCD-100A

The GBCD-100A Automatic Gauge Block Comparator is an easy-to-operate dual-head type gauge block inspecting system. It automatically compares workpieces with the standard gauge block and determines accuracies of such as central length, maximum length, minimum length, and parallelism through the operation of the connected personal computer.

#### SPECIFICATIONS

| Model No.                       | GBCD-100A   |
|---------------------------------|---|
| Order No.                       | 100V AC <b>565-111K</b><br>110V AC <b>565-111C</b><br>120V AC <b>565-111A</b><br>240V AC <b>565-111E</b>  |
| Resolution                      | 0.00001mm (0.01 $\mu$ m)  |
| Range                           | 0.5 - 100mm (.02" - 4")   |
| Measuring unit                  | Differential (dual-head) type Mu-Checker  |
| Accuracy in narrow range (20°C) | $\pm(0.03+0.3L/1000)\mu$ m*<br>L = Gauge block length (mm)<br>*Uncertainty of measurement is 95% (not including the calibration error of the standard gauge block). |
| Measuring force                 | Upper gauge head: 1N (100gf)<br>Lower gauge head: 0.6N (60gf)   |
| Air requirement                 | 400kPa (4kgf/cm <sup>2</sup> )  |
| Operating condition             | Temperature: 20°C $\pm 1^\circ$ C<br>Humidity: 58%RH $\pm 15\%$ RH  |
| Power supply                    | 100 - 120V/200 - 240V AC, 50/60Hz   |
| Dimensions (WxDxH)              | Main unit: 710X366X783mm<br>Electronic unit: 160X410X382mm  |
| Mass                            | Main unit: 120kg<br>Electronic unit: 14kg   |

#### OPTIONAL ACCESSORIES

| Order No.        | Description                                  |
|------------------|--|
| <b>962723</b>    | Gauge block set for probe calibration        |
| <b>962764</b>    | Gauge block holder for probe calibration     |
| <b>611615-02</b> | 5mm gauge block (glade 0) for origin setting |
| <b>243989</b>    | Auxiliary stage (Size: 360X253mm)            |
| <b>218-007</b>   | Work bench                                   |

## GBCD-250

### SERIES 565

Dual-head Type  
Gauge Block Comparator



GBCD-250

#### FEATURES

- Gage blocks between 0.1mm and 250mm can be easily compared with the standard gauge block on the GBCD-250.
- The upper and lower gaging heads assure the operator of a high-accuracy measurement with ease of use.

#### SPECIFICATIONS

##### GBCD-250 Gauge Block Comparator

###### Metric

| Model No.                       | GBCD-250   |
|---------------------------------|--|
| Order No.                       | 100V AC <b>565-130</b>   |
|                                 | 110V AC <b>565-130A</b>  |
|                                 | 120V AC <b>565-130D</b>  |
|                                 | 240V AC <b>565-130E</b>  |
| Range                           | 0.1mm - 250mm  |
| Resolution                      | 0.00001mm (0.01μm)   |
| Accuracy in narrow range (20°C) | ±(0.03+0.3L/1000)μm*<br>L = Gauge block length (mm)<br>*Uncertainty of measurement is 95% (not including the calibration error of the standard gauge block). |
| Measuring units                 | Laser Hologage (upper), Mu-checker (lower)   |
| Operating condition             | Temperature: 20°C ±1°C<br>Humidity: 58%RH ±15%RH   |
| Data output                     | Via SPC output port  |
| Power supply                    | 100 - 120V/200 - 240V AC, 50/60Hz  |
| Dimensions (WxDxH)              | Main unit: 455X318X691mm<br>Display unit: 345X397X187mm  |
| Mass                            | Main unit: Approx. 50kg<br>Display unit: Approx. 9kg   |

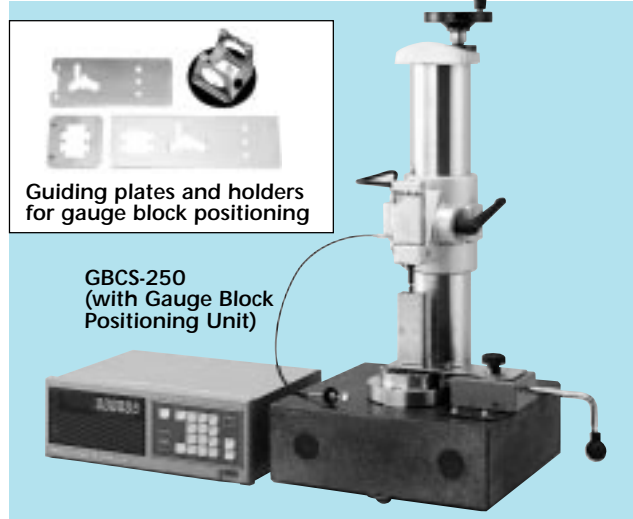
#### OPTIONAL ACCESSORIES

| Order No.       | Description                             |
|-----------------|---|
| <b>962723</b>   | Gage head calibration kit               |
| <b>02ASD130</b> | Square gauge block measuring kit        |
| <b>02ASF040</b> | Heat cover                              |
| <b>02ASD100</b> | Gauge block set for accuracy inspection |

## GBCS-250

### SERIES 565

Single-head Type  
Gauge Block Comparator



Guiding plates and holders for gauge block positioning

GBCS-250 (with Gauge Block Positioning Unit)

#### FEATURES

- By using the gauge block positioning unit, the operator can perform accuracy checking of many pieces of gauge blocks efficiently.
- A gauge block handling arm is provided for the GBCS which does not include a gauge block positioning unit.

#### SPECIFICATIONS

| Model No.                       | GBCS-250   |                          |
|---------------------------------|--|--------------------------|
| Order No.                       | 100V AC <b>565-120</b>   | <b>565-122</b>           |
|                                 | 110V AC <b>565-120A</b>  | <b>565-122A</b>          |
|                                 | 120V AC <b>565-120D</b>  | <b>565-122D</b>          |
|                                 | 240V AC <b>565-120E</b>  | <b>565-122E</b>          |
| Standard accessory              | Gauge block positioning unit   | Gauge block handling arm |
| Range                           | 0.1mm - 250mm  |                          |
| Resolution                      | 0.00001mm (0.01μm)   |                          |
| Accuracy in narrow range (20°C) | ±(0.03+0.3L/1000)μm*<br>L = Gauge block length (mm)<br>*Uncertainty of measurement is 95% (not including the calibration error of the standard gauge block). |                          |
| Measuring unit                  | Laser Hologage   |                          |
| Measuring force                 | Approx. 0.4N (40gf)  |                          |
| Operating condition             | Temperature: 20°C ±1°C<br>Humidity: 58%RH ±15%RH   |                          |
| Data output                     | Via RS-232C interface unit   |                          |
| Power supply                    | 100 - 120V/200 - 240V AC, 50/60Hz  |                          |
| Dimensions (WxDxH)              | Main unit: 300X300X687mm<br>Display unit: 235X115X118mm  |                          |
| Mass                            | Main unit: Approx. 60kg<br>Display unit: Approx. 2kg   |                          |

#### OPTIONAL ACCESSORIES

| Order No.       | Description                        |
|-----------------|------------------------------------|
| <b>02ASB530</b> | Heat cover                         |
| <b>02ASD130</b> | Square gauge block measuring kit*  |
| <b>02ASD150</b> | Square gauge block measuring kit** |

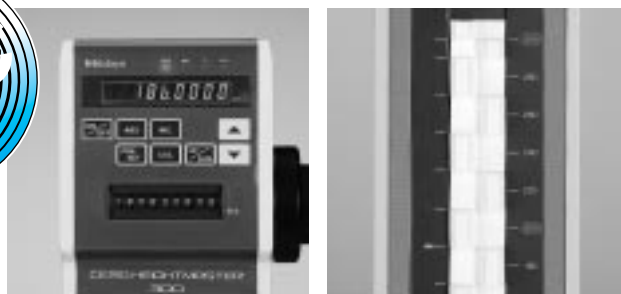
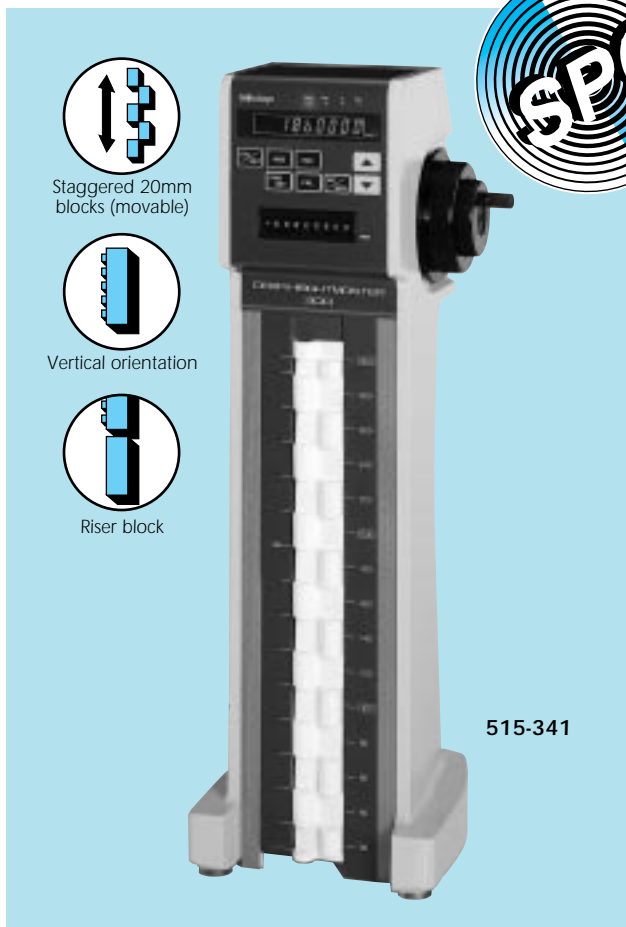
\*For the GBCS-250 with gauge block positioning unit only  
\*\*For the GBCS-250 with gauge block handling arm only





# CERA Height Master

## SERIES 515



### FEATURES

- The measuring blocks are made from a zirconia-based ceramic material which is highly resistant to corrosion and wear, and free from deterioration over time.
- The CERA Height Master features the staggered arrangement of block stack which has two measuring faces on the same level, one facing up and the other facing down.
- The measuring block currently used is indicated by LEDs, resulting in easy operation.
- Digimatic output function for connection with data processing units in the SPC system.

### SPECIFICATIONS

#### CERA Height Master

##### Metric

|                       |                              |                 |
|-----------------------|------------------------------|-----------------|
| Order No.             | 100V AC                      | <b>515-341</b>  |
|                       | 110V AC                      | <b>515-341A</b> |
|                       | 120V AC                      | <b>515-341D</b> |
|                       | 240V AC                      | <b>515-341E</b> |
| Resolution            | 0.0001mm                     |                 |
| Range                 | 5 < R ≤ 310mm*               |                 |
| Block travel          | 20mm                         |                 |
| Total accuracy        | ±0.001mm                     |                 |
| Block pitch accuracy  | ±0.0005mm                    |                 |
| Parallelism of blocks | 0.0005mm                     |                 |
| Block feeding error   | ±0.0005mm                    |                 |
| Block step            | 20mm (staggered arrangement) |                 |
| Data output           | SPC, RS-232C (optional)      |                 |
| Power supply          | Via AC adaptor               |                 |
| Dimensions (WxDxH)    | 150X140X465mm                |                 |
| Mass                  | 18kg                         |                 |

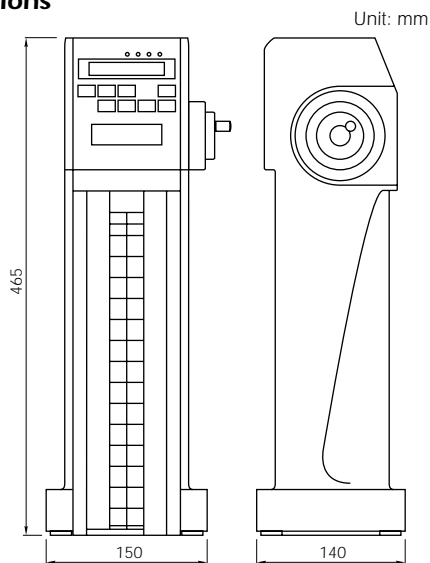
\*The CERA Height Master cannot measure a height of 5mm.

##### Inch

|                       |                            |                 |
|-----------------------|----------------------------|-----------------|
| Order No.             | 100V AC                    | <b>515-342</b>  |
|                       | 110V AC                    | <b>515-342A</b> |
|                       | 120V AC                    | <b>515-342D</b> |
|                       | 240V AC                    | <b>515-342E</b> |
| Resolution            | .000005"                   |                 |
| Range                 | .2" < R ≤ 12"*             |                 |
| Block travel          | 1"                         |                 |
| Total accuracy        | .00004"                    |                 |
| Block pitch accuracy  | ±.00002"                   |                 |
| Parallelism of blocks | .00002"                    |                 |
| Block feeding error   | ±.00002"                   |                 |
| Block step            | 1" (staggered arrangement) |                 |

\*The CERA Height Master cannot measure a height of .2".

### Dimensions

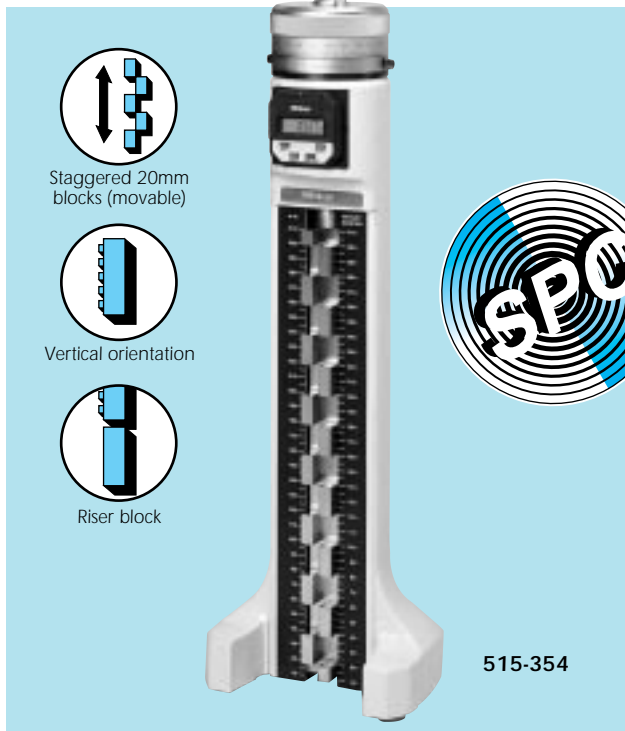


### OPTIONAL ACCESSORIES

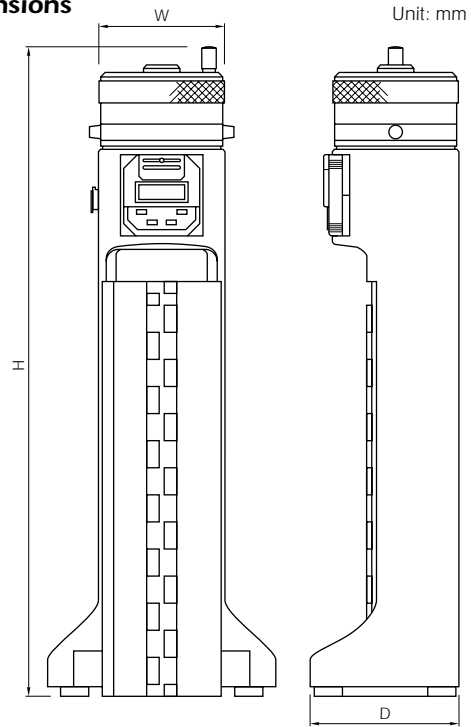
| Order No.       | Description            |
|-----------------|------------------------|
| <b>936937</b>   | SPC cable (1m)         |
| <b>965014</b>   | SPC cable (2m)         |
| <b>940269</b>   | RS-232C interface unit |
| (See page 283.) | <b>Riser blocks</b>    |

## Digimatic Height Master

### SERIES 515



#### Dimensions



| Order No. | W   | D   | H   |
|-----------|-----|-----|-----|
| 515-354   | 137 | 150 | 483 |
| 515-356   | 137 | 150 | 633 |
| 515-358   | 150 | 170 | 786 |

#### FEATURES

- Standard model with a digital display, featuring all essential specifications required for versatile height standard.
- Provided with an SPC data output port.
- Can be used with riser blocks (optional).
- Each Height Master is supplied with a gauge block for zero setting.
- Certificate of inspection is attached to each Height Master.

#### Technical Data

**Display:** 6-digit LCD (Character height: 5.4mm)

**Functions:** Zero-Set, presetting, ABS/INC measurement mode switching, SPC data output, data hold, power on/off

**Battery:** SR44 x 2 pcs. (05SAA217)

**Battery life:** Approx. 1.8 years in normal use

#### OPTIONAL ACCESSORIES

| Order No.       | Description                                       |
|-----------------|---|
| 937387          | SPC cable (1m)                                    |
| 965013          | SPC cable (2m)                                    |
| 515-111         | Auxiliary block kit for checking bore gage (mm)   |
| 515-120         | Auxiliary block kit for checking bore gage (inch) |
| (See page 283.) | Riser blocks                                      |

#### SPECIFICATIONS

##### Digimatic Height Master

###### Metric

| LCD resolution | Range           | Order No. | Block step | Block travel | Block pitch accuracy | Parallelism of blocks | Block feeding error | Mass   |
|----------------|-----------------|-----------|------------|--------------|----------------------|-----------------------|---------------------|--------|
| 0.001mm        | 10 < R ≤ 310mm* | 515-354   | 20mm**     | 20mm         | ±0.0015mm            | 0.002mm               | ±0.002mm            | 9.5kg  |
|                | 10 < R ≤ 460mm* | 515-356   | 20mm**     | 20mm         | ±0.0025mm            | 0.0025mm              | ±0.002mm            | 13.6kg |
|                | 10 < R ≤ 610mm* | 515-358   | 20mm**     | 20mm         | ±0.0035mm            | 0.0025mm              | ±0.0025mm           | 16kg   |

\*The Digimatic Height Master cannot measure a height of 10mm.

\*\*Staggered arrangement

###### Inch

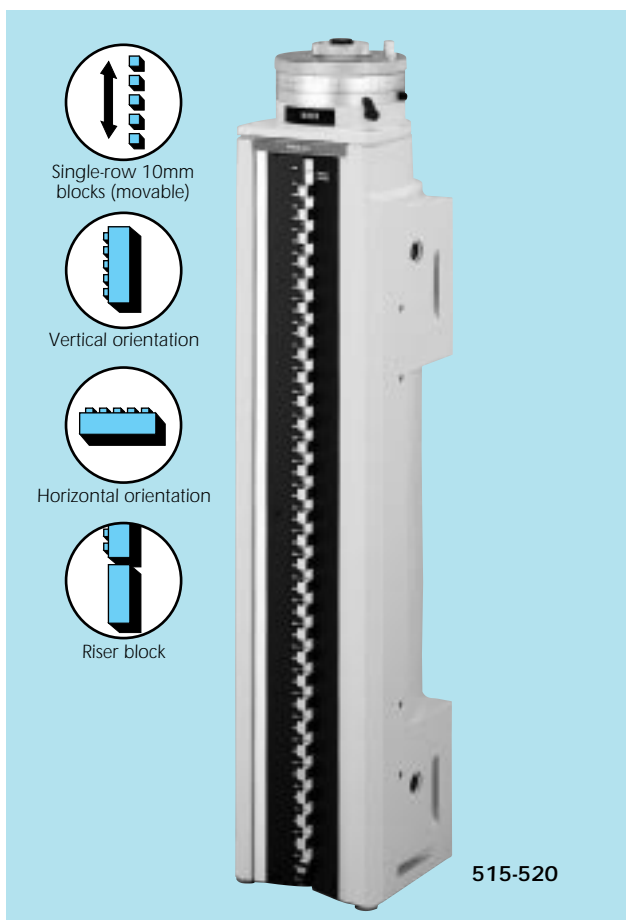
| LCD resolution | Range          | Order No. | Block step | Block travel | Block pitch accuracy | Parallelism of blocks | Block feeding error | Mass      |
|----------------|----------------|-----------|------------|--------------|----------------------|-----------------------|---------------------|-----------|
| .0001"         | .5" < R ≤ 12"* | 515-355   | 1***       | 1"           | ±.0001"              | .00005"               | ±.0001"             | 20.9 lbs. |
|                | .5" < R ≤ 18"* | 515-357   | 1***       | 1"           | ±.0001"              | .0001"                | ±.0001"             | 30 lbs.   |
|                | .5" < R ≤ 24"* | 515-359   | 1***       | 1"           | ±.00015"             | .0001"                | ±.0001"             | 35.2 lbs. |

\*The Digimatic Height Master cannot measure a height of .5".

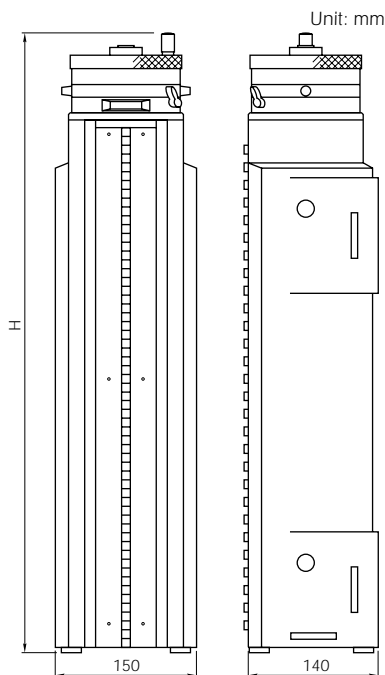
\*\*Staggered arrangement

# Universal Height Master

## SERIES 515



### Dimensions



| Order No. | H    |
|-----------|------|
| 515-520   | 760  |
| 515-523   | 1165 |

### OPTIONAL ACCESSORIES

| Order No.       | Description                                       |
|-----------------|---|
| 900574*         | Supporting base for vertical operation            |
| 515-110         | Auxiliary block kit for checking bore gage (mm)   |
| 515-119         | Auxiliary block kit for checking bore gage (inch) |
| (See page 283.) | <b>Riser blocks</b>                               |

\*Supplied as a standard accessory for 515-523 and 515-513

### FEATURES

- The Universal Height Master is designed for both vertical and horizontal orientations, providing a wide range of applications such as accuracy checking of machine tool table movements.
- Straight arrangement of block stack (Block pitch: 20mm (1")).
- Can be used with riser blocks (optional).
- Certificate of inspection is attached to each Height Master.
- Fitted wooden case supplied.

### SPECIFICATIONS

#### Universal Height Master

##### Metric

| Graduation | Range           | Order No. | Block step | Block travel | Block pitch accuracy | Parallelism of blocks | Block feeding error | Mass   |
|------------|-----------------|-----------|------------|--------------|----------------------|-----------------------|---------------------|--------|
| 0.001mm    | 5 < R ≤ 610mm*  | 515-520   | 10mm       | 20mm         | ±0.0025mm            | 0.0015mm              | ±0.0012mm           | 42kg   |
|            | 5 < R ≤ 1010mm* | 515-523   | 10mm       | 20mm         | ±0.0035mm            | 0.002mm               | ±0.0015mm           | 63.5kg |

\*The Universal Height Master cannot measure a height (length) of 5mm.

##### Inch

| Graduation | Range            | Order No. | Block step | Block travel | Block pitch accuracy | Parallelism of blocks | Block feeding error | Mass       |
|------------|------------------|-----------|------------|--------------|----------------------|-----------------------|---------------------|------------|
| .00001"    | .2" < R ≤ 18.2"* | 515-512   | .5"        | 1"           | ±.0001"              | .00006"               | ±.00004"            | 77 lbs.    |
|            | .2" < R ≤ 24.2"* | 515-510   | .5"        | 1"           | ±.0001"              | .00006"               | ±.00004"            | 92.4 lbs.  |
|            | .2" < R ≤ 40.2"* | 515-513   | .5"        | 1"           | ±.00015"             | .00008"               | ±.00006"            | 139.7 lbs. |

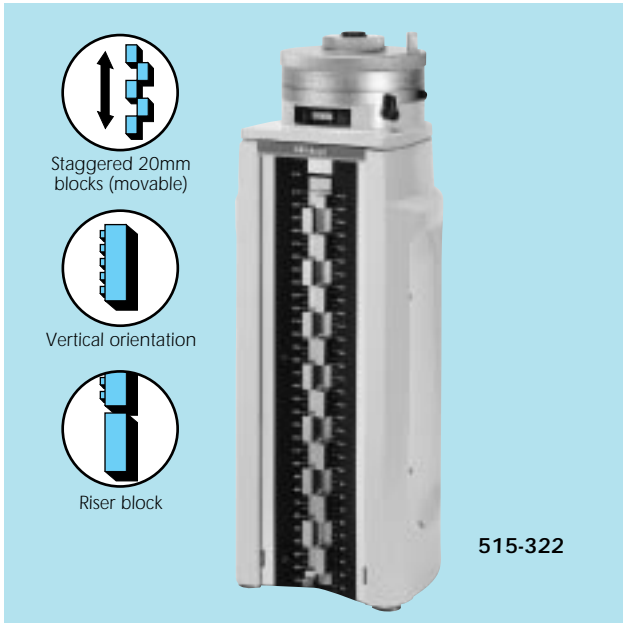
\*The Universal Height Master cannot measure a height (length) of .2".



Supporting Base attached to the Height Master

# Height Master

## SERIES 515



### FEATURES

- Contains accurate reference block stack, which easily provides a desired height.
- Models with staggered arrangement of block stack have two measuring faces on the same level, one facing up and the other down (except **515-310**).
- Each Height Master is supplied with a gauge block for zero-setting.
- Can be used with riser blocks (optional).

### Technical Data

**Block travel:** 20mm (1")  
**Block pitch accuracy:** ±0.0015mm (±.00005")  
**Parallelism of blocks:** 0.001mm (.00004")  
**Block feeding error:** ±0.001mm (±.00005")  
**Dimensions (WxDxH):** 164 x 146 x 460mm

### SPECIFICATIONS

#### Height Master

##### Metric

| Graduation | Range          | Order No.      | Block step | Mass |
|------------|----------------|----------------|------------|------|
| 0.001mm    | 5 < R ≤ 310mm* | <b>515-322</b> | 20mm**     | 20kg |

\*The Height Master cannot measure a height of 5mm\*.

##### Inch

| Graduation | Range            | Order No.      | Block step | Mass      |
|------------|------------------|----------------|------------|-----------|
| .00001"    | .2" < R ≤ 12.2"* | <b>515-311</b> | .5"        | 50.6 lbs. |
|            |                  | <b>515-310</b> | 1***       | 50.6 lbs. |

\*The Height Master can measure a height over .2".

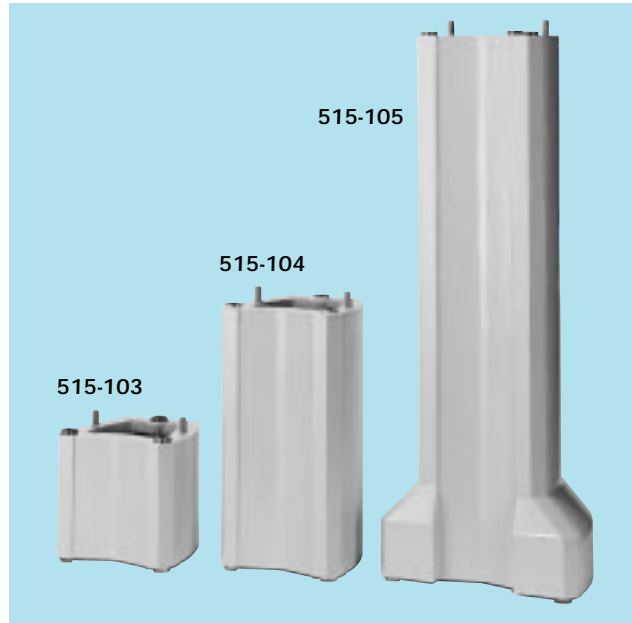
\*\*Straight arrangement

### OPTIONAL ACCESSORIES

| Order No.      | Description   |
|----------------|---|
| <b>515-112</b> | Auxiliary block kit for bore gage (mm)                  |
| <b>515-119</b> | Auxiliary block kit for bore gage (for <b>515-310</b> ) |
| <b>515-121</b> | Auxiliary block kit for bore gage (for <b>515-311</b> ) |

# Riser Blocks

## SERIES 515



### FEATURES

- These riser blocks are specially designed and precisely made to maintain the stipulated basic accuracy of both standard and Digimatic Height Masters.
- The seasoned, cast-iron riser blocks sit on three carbide-faced and lapped feet which assure perpendicularity to the surface plate. The Height Masters, in turn, fit onto three carbide-faced mounts on the riser blocks, and are accurately positioned by two locating pins.

### SPECIFICATIONS

#### Riser Blocks

##### Metric

| Height | Order No.      | Accuracy  | Mass   |
|--------|----------------|-----------|--------|
| 150mm  | <b>515-113</b> | ±0.0006mm | 5.7kg  |
| 300mm  | <b>515-114</b> | ±0.001mm  | 11.3kg |
| 600mm  | <b>515-115</b> | ±0.002mm  | 31kg   |

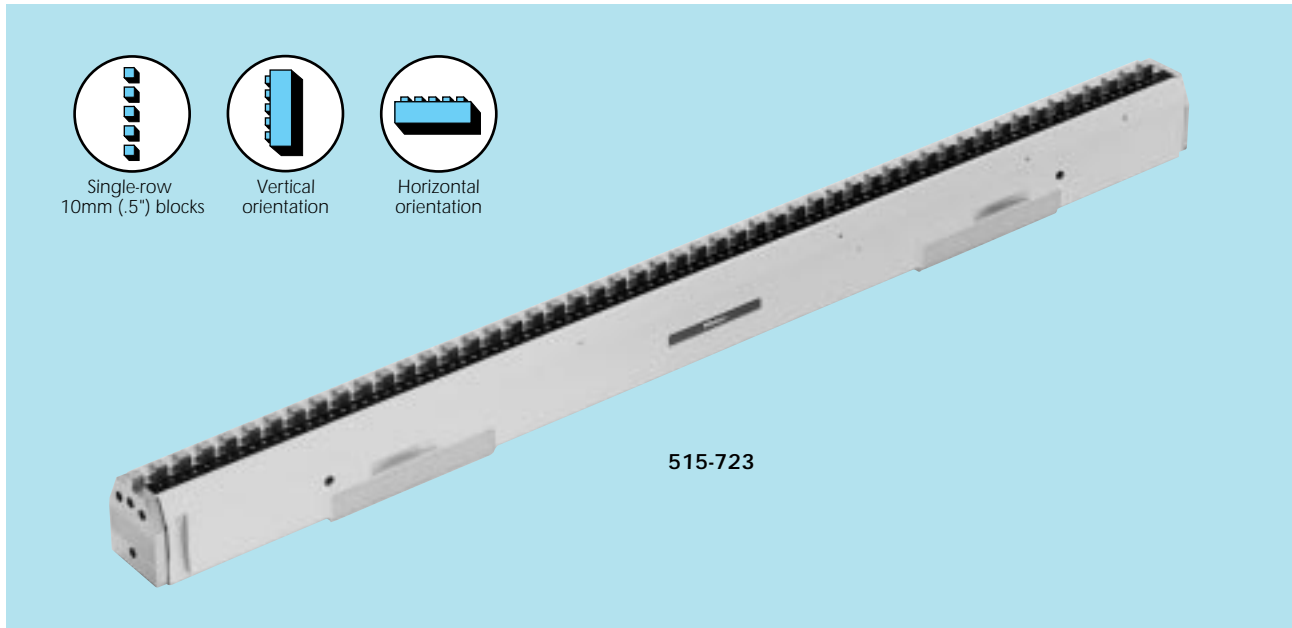
##### Inch

| Height | Order No.      | Accuracy | Mass      |
|--------|----------------|----------|-----------|
| 6"     | <b>515-116</b> | ±.00002" | 12.5 lbs. |
| 12"    | <b>515-117</b> | ±.00004" | 24.9 lbs. |
| 24"    | <b>515-118</b> | ±.00008" | 68.2 lbs. |



# Check Master

## SERIES 515



515-723

### FEATURES

- Designed to check the accuracy of table movements of machine tools and calibrate CMMs. Permanently wrung stack of gauge blocks is housed in a rigid frame.
- Can be used in either a vertical or horizontal orientation for models up to 1500mm range.
- Straight arrangement of block stack (Block pitch: 20mm or 1").
- Certificate of Inspection is attached to each Check Master.
- Fitted wooden case supplied.

### Accuracy

- Block pitch accuracy:
  - ±0.0025mm (±.0001") for ranges up to 300mm (12")
  - ±0.0035mm (±.00015") for ranges up to 600mm (24")
  - ±0.005mm (±.0002") for ranges up to 1000mm (40")
  - ±0.008mm for ranges up to 1500mm
- Parallelism of blocks:
  - 0.0012mm (.00005") for ranges up to 300mm (12")
  - 0.0015mm (.00006") for ranges up to 600mm (24")
  - 0.002mm (.00008") for ranges up to 1000mm (40")
  - 0.0025mm for ranges up to 1500mm

### SPECIFICATIONS

#### Metric

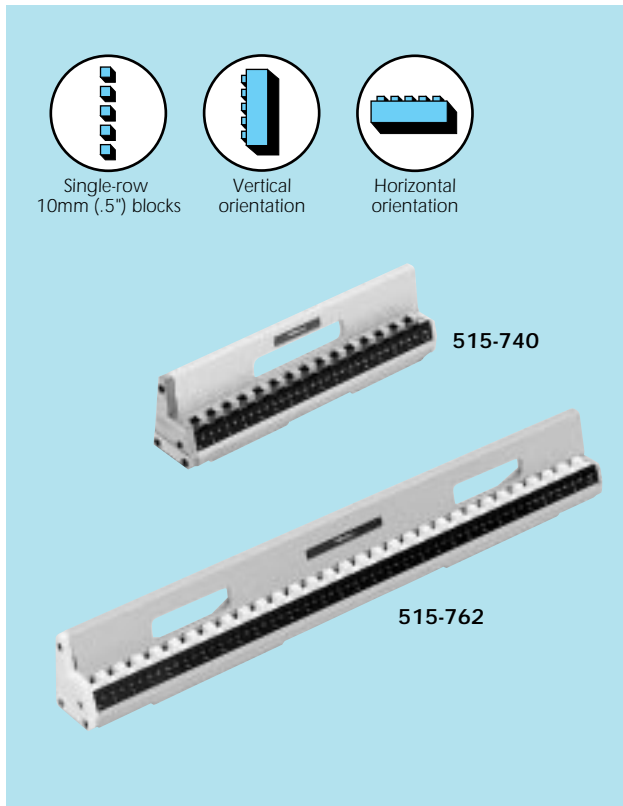
| Range  | Order No. | Block step | Dimensions (WxDxH) | Mass |
|--------|-----------|------------|--------------------|------|
| 300mm  | 515-720   | 10mm       | 338x64x83mm        | 7kg  |
| 450mm  | 515-721   | 10mm       | 478x64x83mm        | 10kg |
| 600mm  | 515-722   | 10mm       | 633x64x83mm        | 13kg |
| 1000mm | 515-723   | 10mm       | 1033x64x83mm       | 22kg |
| 1500mm | 515-724   | 10mm       | 1533x50x85mm       | 30kg |

#### Inch

| Range | Order No. | Block step | Dimensions (WxDxH) | Mass      |
|-------|-----------|------------|--------------------|-----------|
| 12"   | 515-710   | .5"        | 13.4"x2.52"x3.27"  | 15.4 lbs. |
| 18"   | 515-711   | .5"        | 19"x2.52"x3.27"    | 22 lbs.   |
| 24"   | 515-712   | .5"        | 25"x2.52"x3.27"    | 28.6 lbs. |
| 40"   | 515-713   | .5"        | 41"x2.52"x3.27"    | 48.4 lbs. |

## High Accuracy Check Master

### SERIES 515



#### FEATURES

- Can be used in either vertical and horizontal orientation.
- Dimensions (WxH) of the measuring face: 9x10mm
- Straight arrangement of block stack (Block pitch: 20mm or 1").
- Certificate of Inspection is attached to each Check Master.
- Fitted wooden case is supplied.

#### Specifications for Ceramic Check Master:

- Each measuring block is made of zirconia-based ceramic.
- No anti-corrosion treatment is required for measuring faces.
- Abrasion resistance of the ceramic block is 5 - 10 times that of steel.
- Free from deterioration and dimensional changes over time.

#### SPECIFICATIONS

##### Metric

| Range  | Order No. | Block type | Block step | Mass   |
|--------|-----------|------------|------------|--------|
| 300mm  | 515-740   | Steel      | 10mm       | 3.6kg  |
|        | 515-760   | Ceramic    | 10mm       | 3.4kg  |
| 450mm  | 515-741   | Steel      | 10mm       | 5.4kg  |
|        | 515-761   | Ceramic    | 10mm       | 5.2kg  |
| 600mm  | 515-742   | Steel      | 10mm       | 7.2kg  |
|        | 515-762   | Ceramic    | 10mm       | 6.9kg  |
| 750mm  | 515-765   | Ceramic    | 10mm       | 9.7kg  |
| 1000mm | 515-743   | Steel      | 10mm       | 12kg   |
|        | 515-763   | Ceramic    | 10mm       | 11.5kg |
| 1500mm | 515-744   | Steel      | 10mm       | 18kg   |
|        | 515-764   | Ceramic    | 10mm       | 17.3kg |

##### Inch

| Range | Order No. | Block type | Block step | Mass       |
|-------|-----------|------------|------------|------------|
| 12"   | 515-730   | Steel      | .5"        | 7.92 lbs.  |
|       | 515-750   | Ceramic    | .5"        | 7.48 lbs.  |
| 18"   | 515-731   | Steel      | .5"        | 11.88 lbs. |
|       | 515-751   | Ceramic    | .5"        | 11.44 lbs. |
| 24"   | 515-732   | Steel      | .5"        | 15.84 lbs. |
|       | 515-752   | Ceramic    | .5"        | 15.18 lbs. |
| 30"   | 515-755   | Ceramic    | .5"        | 21.34 lbs. |
| 40"   | 515-733   | Steel      | .5"        | 26.4 lbs.  |
|       | 515-753   | Ceramic    | .5"        | 25.3 lbs.  |
| 60"   | 515-734   | Steel      | .5"        | 39.6 lbs.  |
|       | 515-754   | Ceramic    | .5"        | 38.06 lbs. |

#### Accuracy

- Block pitch accuracy:
  - ±0.0012mm (±.00005") for ranges up to 300mm (12")
  - ±0.0018mm (±.00007") for ranges up to 600mm (24")
  - ±0.0025mm (±.0001") for ranges up to 1000mm (40")
  - ±0.004mm (±.000158") for ranges up to 1500mm (60")
- Parallelism of blocks:
  - 0.001mm (.00004") for ranges up to 450mm (18")
  - 0.0015mm (.00006") for ranges up to 1000mm (40")
  - 0.002mm (.00008") for ranges up to 1500mm (60")

#### OPTIONAL ACCESSORY

##### Supporting Base (601167)

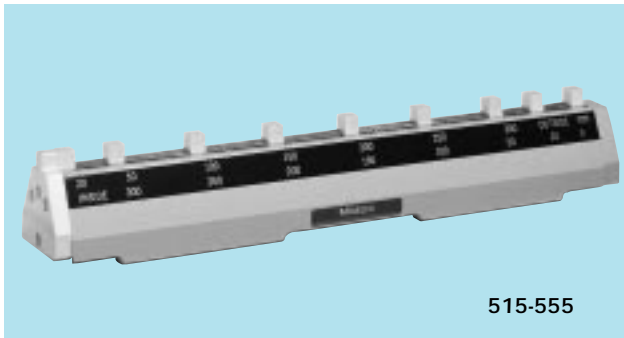
- Provides enhanced stability for vertical orientation.
- Dimensions: 360 (W) x 220 (D) x 210 (H) mm
- Mass: 3kg



Supporting base attached to the Check Master.

# Caliper Checker

## SERIES 515



### FEATURES

- The Caliper Checker is designed to calibrate vernier, dial and Digimatic calipers of various types. It is comprised of permanently wrung, high-grade gauge blocks in a protective casting.
- The Caliper Checker also stands perpendicular to a surface for height gage inspection.
- Each measuring block is made of zirconia-based ceramic and it is free from deterioration and dimensional changes over time.

### SPECIFICATIONS

#### Metric

| Range | Order No. | Length to check  | Mass  |
|-------|-----------|--|-------|
| 300mm | 515-555   | 20, 50, 100, 150, 200, 250, 300mm                                  | 4kg   |
| 600mm | 515-556   | 20, 50, 100, 150, 200 (250), 300 (350), 400 (450), 500, 550, 600mm | 8.5kg |

( ): Length for checking accuracy of inside measurement

#### Inch

| Range | Order No. | Length to check              | Mass     |
|-------|-----------|------------------------------|----------|
| 12"   | 515-565   | 1", 2", 4", 6", 8", 10", 12" | 8.8 lbs. |

### Accuracy

- Block pitch accuracy:  
 ±0.005mm (±.0002") for ranges up to 300mm (12")  
 ±0.007mm for ranges up to 600mm
- Parallelism of blocks:  
 0.002mm (.00008") for ranges up to 300mm (12")  
 0.004mm for ranges up to 600mm

### Dimensions

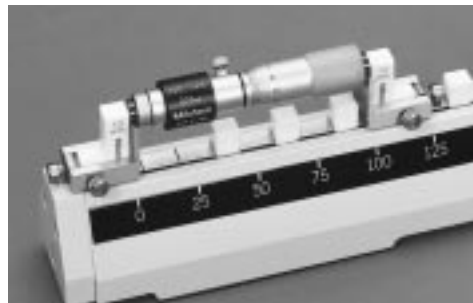
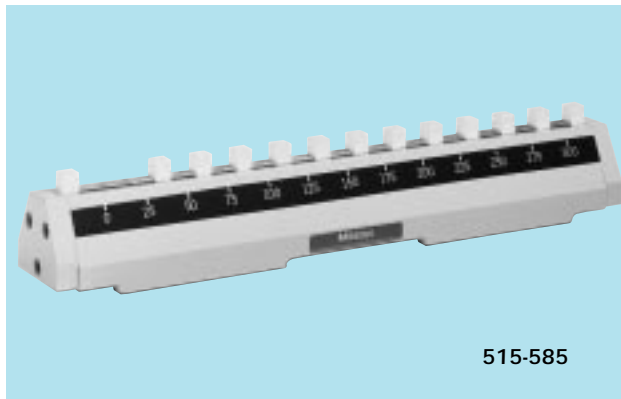
- 515-555/565: 375 (W) x 50 (D) x 63 (H) mm
- 515-556: 685 (W) x 50 (D) x 63 (H) mm

### OPTIONAL ACCESSORIES

| Order No. | Description                               |
|-----------|---|
| 602162    | Wooden case for 300mm/12" Caliper Checker |
| 602164    | Wooden case for 600mm Caliper Checker     |

# Inside Micro Checker

## SERIES 515



### FEATURES

- The Inside Micro Checker is designed to efficiently check the zero point of a tubular inside micrometer.
- Each measuring block is made of zirconia-based ceramic and it is free from deterioration and dimensional changes over time.

### SPECIFICATIONS

| Range | Order No. | Length to check   | Mass  |
|-------|-----------|---|-------|
| 300mm | 515-585   | 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300mm   | 3.9kg |
| 600mm | 515-586   | 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600mm | 7kg   |

### Accuracy

- ±(0.001+L/150000)mm\*  
 \*L= Length to check (mm)

### Dimensions

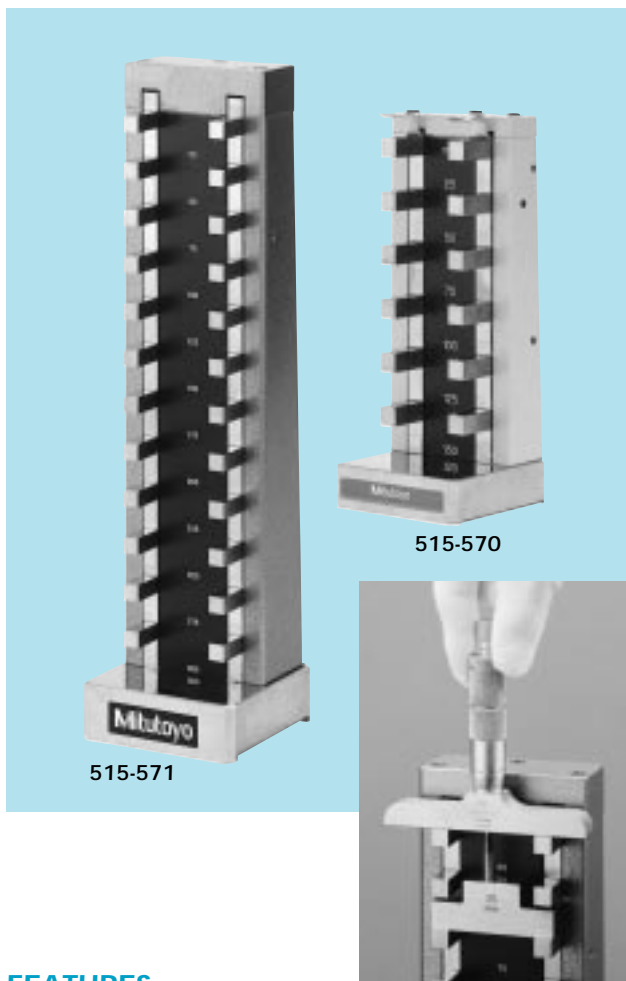
- 515-585: 364 (W) x 50 (D) x 62 (H) mm
- 515-586: 664 (W) x 50 (D) x 62 (H) mm

### OPTIONAL ACCESSORIES

| Order No. | Description                                |
|-----------|--|
| 602160    | Wooden case for 300mm Inside Micro Checker |
| 602163    | Wooden case for 600mm Inside Micro Checker |

## Depth Micro Checker

SERIES 515



### FEATURES

- The Depth Micro Checker is designed to efficiently check the zero point of a depth micrometer.
- Supplied with an anvil block (25mm or 1").

### SPECIFICATIONS

#### Metric

| Range | Order No. | Length to check   | Mass |
|-------|-----------|---|------|
| 150mm | 515-570   | 25, 50, 75, 100, 125, 150mm                               | 3kg  |
| 300mm | 515-571   | 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300mm | 17kg |

#### Inch

| Range | Order No. | Length to check        | Mass     |
|-------|-----------|------------------------|----------|
| 6"    | 515-575   | 1", 2", 3", 4", 5", 6" | 6.6 lbs. |

### Accuracy

- Main unit:  $\pm(0.001 + L/150000)\text{mm}^*$   
 $[\pm(.00004 + L/150000)]\text{"}^*$   
 \*L= Length to check (mm) [(inch)]
- Anvil block:  $\pm 0.0005\text{mm}$  ( $\pm .00002\text{"}$ )

### Dimensions

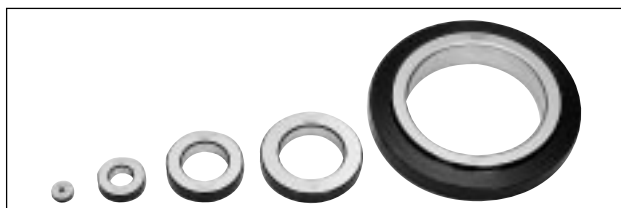
- 515-570/575: 72 (W) x 72 (D) x 82 (H) mm
- 515-571: 92 (W) x 92 (D) x 355 (H) mm

## RM-120 Ring Master

Ring Gage Measuring Machine



RM-120  
(Standard counter type)



### FEATURES

- The laser holoscale incorporated in the RM-120 eliminates the need for a reference gauge block set and reference ring gages.
- Probe change is not required for the entire measuring range.
- Enhanced repeatability and lower measuring force achieved with the air bearing on the probe carriage guide.
- Workpiece alignment is easy to perform with the specially designed measuring table which is capable of moving, tilting, elevating, and 90 degree rotating.
- The model with an analog meter will further facilitate workpiece positioning.

### SPECIFICATIONS

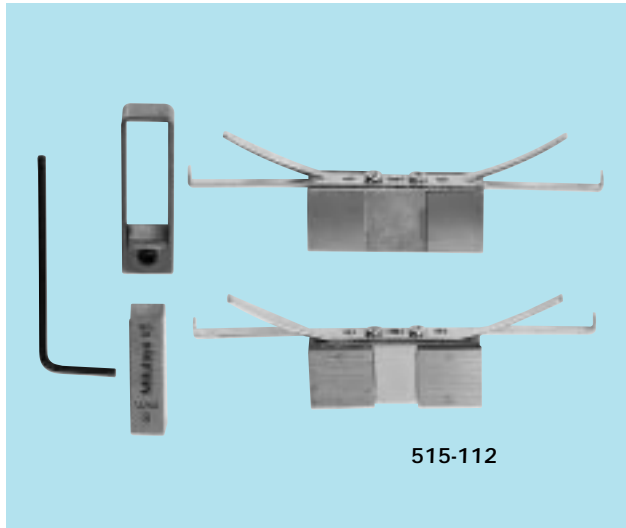
| Model No.                       | RM-120  |
|---------------------------------|---|
| Range                           | ID: 6mm - 120mm   |
| Resolution                      | 0.0001mm (0.1 $\mu\text{m}$ )   |
| Accuracy (20°C)                 | $\pm(0.03+5D/1000)\mu\text{m}$<br>D= Measuring internal diameter (mm) |
| Repeatability ( $\pm 2\sigma$ ) | $\pm 0.2\mu\text{m}$  |
| Measuring unit                  | Laser Holoscale   |
| Measuring force                 | Approx. 0.2N  |
| Workpiece size                  | OD: 20mm to 200mm<br>Thickness: Up to 40mm                            |
| Ambient temperature             | 20°C $\pm 0.5^\circ\text{C}$  |
| Air requirement                 | 400KPa  |
| Air consumption                 | Approx. 30 liters per minute  |
| Dimensions (WxDxH)              | 720X500X880mm   |





## Auxiliary Block Kit for Bore Gage

SERIES 515



515-112

### FEATURES

- Used for efficient zero-setting of dial bore gages and tubular inside micrometers on a Height Master.
- Zero setting range: 18 - 150mm (.7" - 6")
- Order number differs depending on the type of Height Master being used.

### SPECIFICATIONS

#### Auxiliary Block Kit for Bore Gage

##### Metric

| Order No. | Applicable Height Master |
|-----------|--------------------------|
| 515-110   | Universal Height Master  |
| 515-111   | Digimatic Height Master  |
| 515-112   | Height Master            |

##### Inch

| Order No. | Applicable Height Master                                       |
|-----------|--|
| 515-119   | Universal Height Master<br>Height Master (.5" block step type) |
| 515-120   | Digimatic Height Master  |
| 515-121   | Height Master (1" block step type)                             |



## Snap Gage Checker

SERIES 515



515-611

### FEATURES

- Capable of inspecting the snap gage quickly and accurately with resolution down to 0.0001mm.
- The digital display and constant-force measurement capability allow skill-free operation.
- Ceramic zirconia measuring blocks ensure a long service life with minimized maintenance service.
- Provided with an SPC data output.

### SPECIFICATIONS

#### Metric

| Order No.          | 100V AC                       | 515-611K |
|--------------------|-------------------------------|----------|
|                    | 120V AC                       | 515-611A |
|                    | 220V AC                       | 515-611D |
|                    | 240V AC                       | 515-611E |
| Resolution         | 0.0001mm/0.001mm (switchable) |          |
| Range              | 20 - 320mm                    |          |
| Block travel       | 100mm                         |          |
| Data output        | SPC                           |          |
| Power supply       | Via AC adapter                |          |
| Dimensions (WxDxH) | 486X106X106mm                 |          |
| Mass               | 12.5kg                        |          |

#### Inch

| Order No.    | 120V AC                     | 515-612A |
|--------------|-----------------------------|----------|
|              | 220V AC                     | 515-612D |
|              | 240V AC                     | 515-612E |
| Resolution   | .00001"/.0001" (switchable) |          |
| Range        | .8" - 12.8"                 |          |
| Block travel | 4"                          |          |

### Technical Data

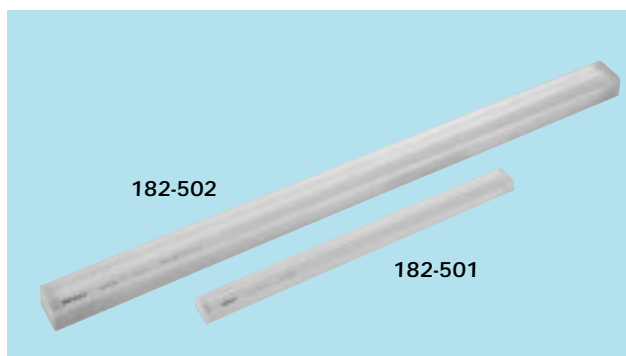
- Block pitch accuracy:** ±0.001mm (±.00004")
- Parallelism of blocks:** 0.001mm (.00004") or less\*  
\*Between the anvil block and the 1st measuring block.
- Block feeding error:** ±0.002mm (±.00008") or less

### OPTIONAL ACCESSORIES

| Order No. | Description    |
|-----------|----------------|
| 936937    | SPC cable (1m) |
| 965014    | SPC cable (2m) |
| 990554    | Workpiece rest |

## Standard Scales

### SERIES 182



#### FEATURES

- High precision glass scales manufactured under Mitutoyo's leading-edge Linear Scale production technology.
- High accuracy is guaranteed to be used as a standard for calibrating graduated scales.
- Made of low expansion glass.
- Coefficient of thermal expansion:  $8 \times 10^{-8}/^{\circ}\text{C}$

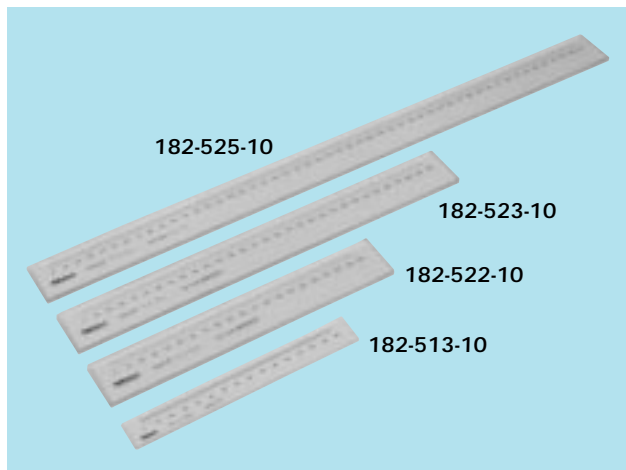
#### SPECIFICATIONS

| Minimum reading | Range | Order No.   | Accuracy (at 20°C) | Graduation thickness | Dimensions |       |           | Mass   |
|-----------------|-------|-------------|--------------------|----------------------|------------|-------|-----------|--------|
|                 |       |             |                    |                      | Length     | Width | Thickness |        |
| 1mm             | 250mm | 182-501-50  | 0.75μm             | 4μm                  | 280mm      | 20mm  | 10mm      | 0.75kg |
|                 |       | 182-501-60* | 0.75μm             | 4μm                  | 280mm      | 20mm  | 10mm      | 0.75kg |
|                 | 500mm | 182-502-50  | 1μm                | 4μm                  | 530mm      | 30mm  | 20mm      | 1.8kg  |
|                 |       | 182-502-60* | 1μm                | 4μm                  | 530mm      | 30mm  | 20mm      | 1.8kg  |

\*: with English JCSS certificate.

## Working Standard Scales

### SERIES 182



#### FEATURES

- High precision glass scales manufactured under Mitutoyo's leading-edge Linear Scale production technology.
- Ideal for checking magnification accuracy of profile projectors and microscopes, and the table feeding accuracy of measuring equipment.
- Made of sodium glass.
- Coefficient of thermal expansion:  $(8 \pm 1) \times 10^{-6}/^{\circ}\text{C}$

#### SPECIFICATIONS

| Minimum reading | Range  | Order No.  | Accuracy (at 20°C) | Graduation thickness | Dimensions |       |           | Mass   |
|-----------------|--------|------------|--------------------|----------------------|------------|-------|-----------|--------|
|                 |        |            |                    |                      | Length     | Width | Thickness |        |
| 0.1mm           | 50mm   | 182-511-10 | 1.6μm              | 20μm                 | 75mm       | 22mm  | 3mm       | 0.23kg |
|                 | 100mm  | 182-512-10 | 1.7μm              | 20μm                 | 125mm      | 22mm  | 3mm       | 0.24kg |
|                 | 150mm  | 182-513-10 | 1.8μm              | 20μm                 | 175mm      | 22mm  | 3mm       | 0.35kg |
|                 | 200mm  | 182-514-10 | 1.9μm              | 20μm                 | 225mm      | 22mm  | 3mm       | 0.36kg |
| 0.5mm           | 100mm  | 182-521-10 | 1.7μm              | 50μm                 | 130mm      | 36mm  | 5mm       | 0.27kg |
|                 | 200mm  | 182-522-10 | 1.9μm              | 50μm                 | 230mm      | 36mm  | 5mm       | 0.32kg |
|                 | 300mm  | 182-523-10 | 2.1μm              | 50μm                 | 330mm      | 36mm  | 5mm       | 0.57kg |
|                 | 400mm  | 182-524-10 | 2.3μm              | 50μm                 | 430mm      | 36mm  | 5mm       | 0.71kg |
|                 | 500mm  | 182-525-10 | 2.5μm              | 50μm                 | 530mm      | 36mm  | 5mm       | 0.86kg |
| 1mm             | 250mm  | 182-531-10 | 2μm                | 100μm                | 280mm      | 36mm  | 5mm       | 0.55kg |
|                 | 500mm  | 182-532-10 | 2.5μm              | 100μm                | 530mm      | 36mm  | 5mm       | 0.86kg |
|                 | 750mm  | 182-533-10 | 3μm                | 100μm                | 780mm      | 36mm  | 5mm       | 1.22kg |
|                 | 1000mm | 182-534-10 | 3.5μm              | 100μm                | 1030mm     | 36mm  | 5mm       | 1.54kg |

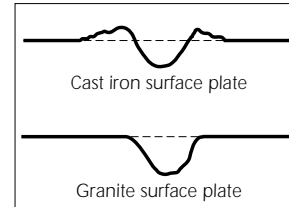


# Black Granite Surface Plates

## SERIES 517



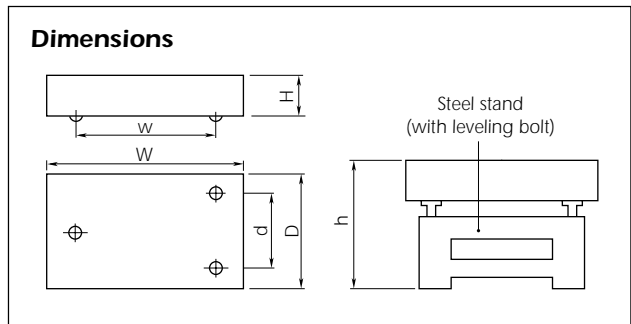
- Free from wringing, so there is no interruption of work.
- Free from burrs or protrusions because of the fine grain structure and insignificant stickiness; this ensures a high degree of flatness over a long service life and causes no damage to other parts or instruments.



- Trouble-free operation for use with magnetic materials.
- Long life and rust-free, resulting in low maintenance costs.
- Steel stands are optional.

### FEATURES

- Natural granite seasoned for thousands of years is free from deterioration or dimensional change over time.
- Granite surface plate has many advantages over cast iron surface plates:  
Twice as hard as cast iron.  
Minimal changes in dimension due to temperature changes.



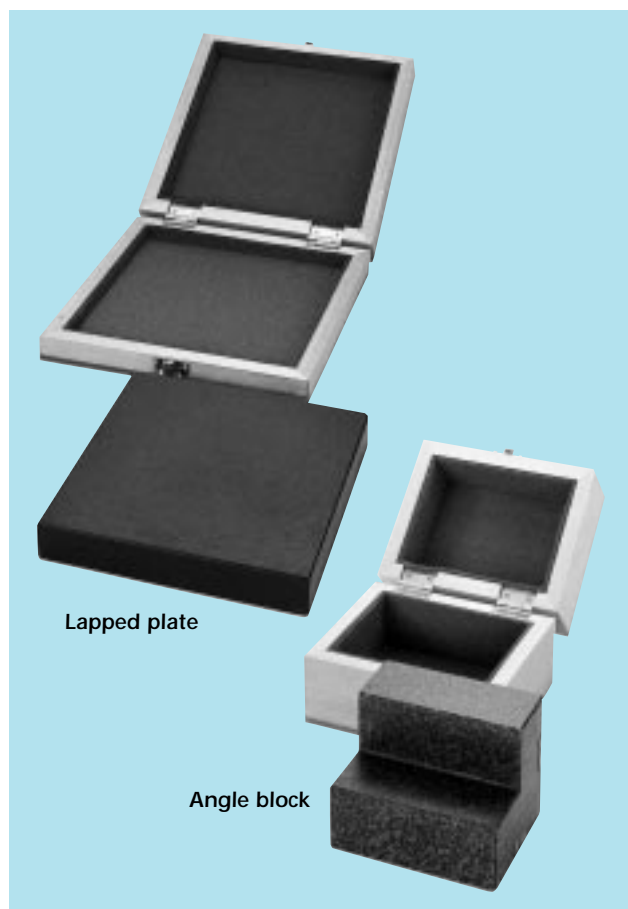
### SPECIFICATIONS

| Dimensions (WxDxH) | Order No. | Flatness | w      | d      | Mass   | Steel stands (optional) |                | Remarks             |
|--------------------|-----------|----------|--------|--------|--------|-------------------------|----------------|---------------------|
|                    |           |          |        |        |        | Order No.               | h (adjustable) |                     |
| 300x300x100mm      | 517-101   | 0.005mm  | 240mm  | 240mm  | 27kg   | —                       | —              | —                   |
|                    | 517-301   | 0.003mm  | 240mm  | 240mm  | 27kg   | —                       | —              | —                   |
| 450x300x100mm      | 517-111   | 0.006mm  | 390mm  | 240mm  | 40kg   | —                       | —              | —                   |
|                    | 517-311   | 0.003mm  | 390mm  | 240mm  | 40kg   | —                       | —              | —                   |
| 600x450x100mm      | 517-114   | 0.008mm  | 500mm  | 370mm  | 80kg   | 517-203/203R*/203CR**   | 755 - 780mm    | With levelling bolt |
|                    | 517-314   | 0.004mm  | 500mm  | 370mm  | 80kg   | 517-203/203R*/203CR**   | 755 - 780mm    | With levelling bolt |
| 600x600x130mm      | 517-103   | 0.008mm  | 500mm  | 500mm  | 140kg  | 517-204/204R*/204CR**   | 785 - 810mm    | With levelling bolt |
|                    | 517-303   | 0.005mm  | 500mm  | 500mm  | 140kg  | 517-204/204R*/204CR**   | 785 - 810mm    | With levelling bolt |
| 750x500x130mm      | 517-105   | 0.009mm  | 630mm  | 420mm  | 146kg  | 517-205/205R*/205CR**   | 785 - 810mm    | With levelling bolt |
|                    | 517-305   | 0.005mm  | 630mm  | 420mm  | 146kg  | 517-205/205R*/205CR**   | 785 - 810mm    | With levelling bolt |
| 1000x750x150mm     | 517-107   | 0.012mm  | 700mm  | 630mm  | 337kg  | 517-206/206R*/206CR**   | 755 - 780mm    | With levelling bolt |
|                    | 517-307   | 0.007mm  | 700mm  | 630mm  | 337kg  | 517-206/206R*/206CR**   | 755 - 780mm    | With levelling bolt |
| 1000x1000x150mm    | 517-109   | 0.013mm  | 700mm  | 700mm  | 450kg  | 517-207/207R*/207CR**   | 735 - 775mm    | With levelling bolt |
|                    | 517-309   | 0.008mm  | 700mm  | 700mm  | 450kg  | 517-207/207R*/207CR**   | 735 - 775mm    | With levelling bolt |
| 1500x1000x200mm    | 517-113   | 0.016mm  | 1100mm | 700mm  | 900kg  | 517-208/208R*/208CR**   | 735 - 775mm    | With levelling bolt |
|                    | 517-313   | 0.009mm  | 1100mm | 700mm  | 900kg  | 517-208/208R*/208CR**   | 735 - 775mm    | With levelling bolt |
| 2000x1000x250mm    | 517-110   | 0.019mm  | 1500mm | 700mm  | 1500kg | 517-209/209R*/209CR**   | 735 - 775mm    | With levelling bolt |
|                    | 517-310   | 0.012mm  | 1500mm | 700mm  | 1500kg | 517-209/209R*/209CR**   | 735 - 775mm    | With levelling bolt |
| 2000x1500x300mm    | 517-116   | 0.021mm  | 1500mm | 1100mm | 2700kg | 517-210/210R*/210CR**   | 735 - 775mm    | With levelling bolt |
|                    | 517-316   | 0.013mm  | 1500mm | 1100mm | 2700kg | 517-210/210R*/210CR**   | 735 - 775mm    | With levelling bolt |
| 2000x2000x350mm    | 517-117   | 0.022mm  | 2000mm | 1500mm | 4200kg | 066AAY174               | 700 - 706mm    | —                   |
|                    | 517-317   | 0.014mm  | 2000mm | 1500mm | 4200kg | 066AAY174               | 700 - 706mm    | —                   |
| 3000x1500x400mm    | 517-118   | 0.025mm  | 1500mm | 1100mm | 5400kg | 066AAY175               | 700 - 706mm    | —                   |
|                    | 517-318   | 0.015mm  | 1500mm | 1100mm | 5400kg | 066AAY175               | 700 - 706mm    | —                   |
| 3000x2000x500mm    | 517-119   | 0.027mm  | 2000mm | 1500mm | 9000kg | 066AAA176               | 700 - 706mm    | —                   |
|                    | 517-319   | 0.016mm  | 2000mm | 1500mm | 9000kg | 066AAA176               | 700 - 706mm    | —                   |

\*: Drop prevention stand  
 \*\*: Castored wheel stand (drop preventioned)

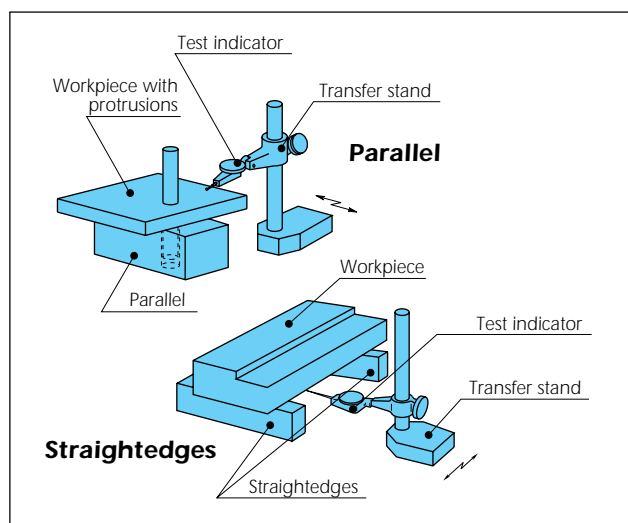
## Accessories for Black Granite Surface Plates

### SERIES 517



#### FEATURES

- Made from the same high quality black granite as Mitutoyo surface plates, allow extra flexibility in work holding and positioning.



#### SPECIFICATIONS

##### Lapped Plates

| Dimensions  | Order No. | Flatness | Mass  | Remarks |
|-------------|-----------|----------|-------|---------|
| 50x90x25mm  | 517-501   | 0.8µm    | 0.3kg | —       |
| 90x145x30mm | 517-503   | 1.3µm    | 1.1kg | —       |

##### Supporting Blocks

| Dimensions    | Order No. | Flatness | Mass | Remarks         |
|---------------|-----------|----------|------|-----------------|
| 100x100x100mm | 517-533   | 2.6µm    | 3kg  | With M6 inserts |
| 200x200x200mm | 517-537   | 3.6µm    | 24kg | With M6 inserts |

##### Parallel

| Dimensions    | Order No. | Flatness | Mass   | Remarks      |
|---------------|-----------|----------|--------|--------------|
| 200x125x300mm | 517-549   | 5.0µm    | 22.5kg | With 2 holes |

##### Straightedges (Pair)

| Dimensions   | Order No. | Flatness | Mass  | Remarks        |
|--------------|-----------|----------|-------|----------------|
| 100x750x40mm | 517-579   | 10µm     | 8.6kg | 4 lapped faces |

##### Square

| Dimensions   | Order No. | Flatness | Mass | Remarks         |
|--------------|-----------|----------|------|-----------------|
| 280x140x45mm | 517-665   | 1.5µm    | 5kg  | Squareness: 5µm |

##### Angle Block

| Dimensions  | Order No. | Flatness | Mass  | Remarks        |
|-------------|-----------|----------|-------|----------------|
| 75x100x75mm | 517-607   | 1.3µm    | 0.8kg | 4 lapped faces |

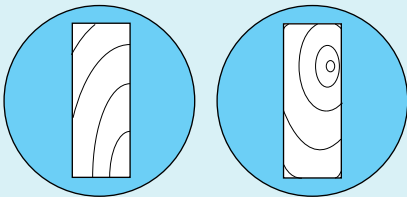


# QUICK GUIDE TO PRECISION MEASUREMENT

## Gauge Block Terminology

### WRINGING

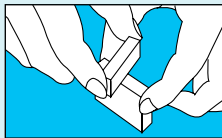
- (1) Decide on the combination of gauge blocks to be used while keeping the following points in mind:
  - a. Use as few gauge blocks as possible to obtain the required dimension.
  - b. Select thick gauge blocks whenever possible.
  - c. Select gauge blocks starting with the one that has least significant digit required, and then work up to ones with more significant digits.
- (2) Clean the gauge blocks with an appropriate cleaning agent.
- (3) Check the gauge blocks for burrs. Use an optical flat to check for burrs, as follows:



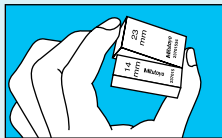
- a. Clean the measuring face.
- b. Gently bring the optical flat into contact with the measuring face.

- c. Gently slide the optical flat on the measuring face and interference fringes will appear.
    - Check 1: If no interference fringes can be seen, a large burr or dust may be contaminating the measuring face.
  - d. Gently press the optical flat against the measuring face and the interference fringes will disappear.
    - Check 2: If the interference fringes disappear, it indicates that there is no burr present.
    - Check 3: If the interference fringes remain partially, gently move the optical flat to and fro. Then, if the fringes are seen in the same location on the measuring face, there is a burr on the gauge block surface; if the fringes remain in the same location on the optical flat, there is a burr on the optical flat.
  - e. Remove burrs, if any, from the measuring face. (See page 273.)
- (4) Apply a very small amount of oil to the measuring face and spread it evenly over the entire surface. Wipe the film of oil from the surface.
    - Grease, spindle oil, or Vaseline is normally applied.
  - (5) Gently bring the two measuring faces into contact using one of the following methods, depending on the sizes of the gauge blocks to be wrung together.

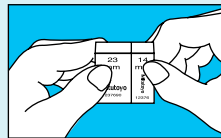
#### a. Wringing two thick gauge blocks:



Bring the two measuring faces into contact with each other at right angles.

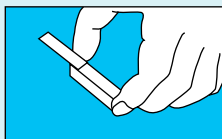


While applying a small amount of pressure, gently turn one gauge block on the other. You will feel the two blocks stick together.

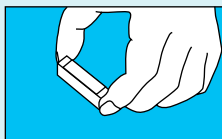


Slide one gauge block over the other so that the sides of the gauge blocks are flush with each other.

#### b. Wringing a thin gauge block to a thick gauge block:

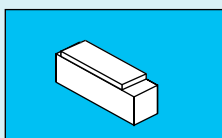


Place one end of the thin gauge block onto one end of the thick gauge block.

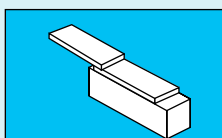


While applying pressure evenly over the entire wringing surface, slide the thin gauge block over the other until the two measuring faces coincide with each other.

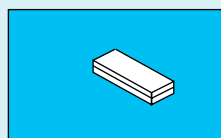
#### c. Wringing two thin gauge blocks:



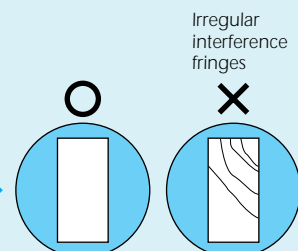
To prevent the gauge blocks from bending, temporarily wring one of the thin gauge blocks to a thick gauge block that will be used as a support.



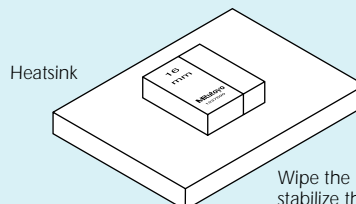
Wring the other thin gauge block to the first block.



Remove the thick gauge block.



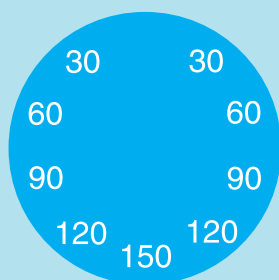
Check the wringing condition with an optical flat.



Wipe the measuring faces clean and thermally stabilize the gauge blocks before measurement.

# Miscellaneous

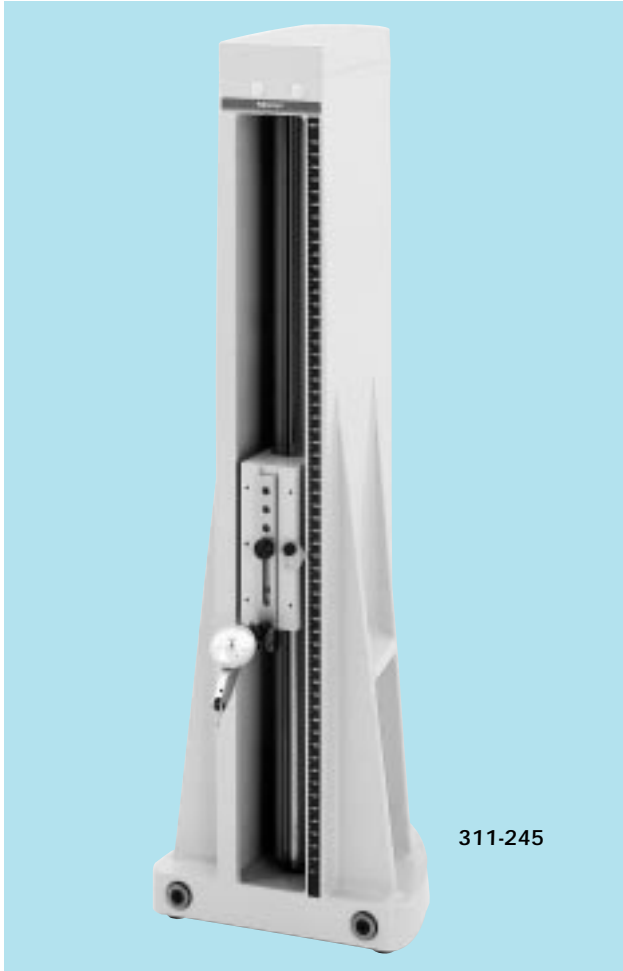
Pages 294 — 310



# Square Master

## SERIES 311

Squareness/Straightness Measuring Instrument



311-245

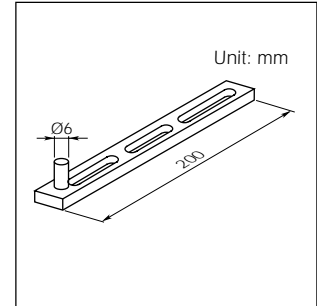
### FEATURES

- Squareness (perpendicularity) and straightness measurements can be performed accurately and efficiently by moving a lever. (Parallelism between surfaces can be determined from straightness measurements.)
- With a dial test indicator for reading displacements.
- Its own squareness is adjustable.

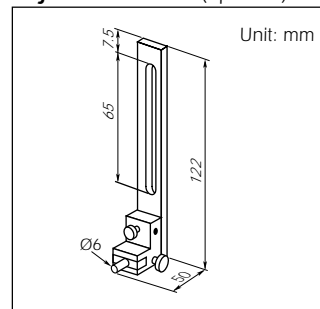
Riser block (optional)



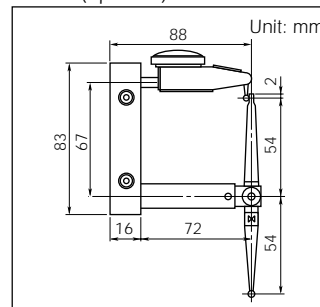
Extension holder (optional)



Adjustable holder (optional)



Feeler (optional)



### OPTIONAL ACCESSORIES

| Order No.       | Description                              |
|-----------------|--|
| (See page 283.) | <b>Riser blocks*</b>                     |
| 517-665         | Granite square, 45 (W)x140 (D)x280 (H)mm |
| 900571          | Adjustable holder                        |
| 900551          | Extension holder                         |
| 900565          | Feeler**                                 |

\*Not available for 450mm (18") model.

\*\*Adapter (902803) is required for metric model.

### SPECIFICATIONS

#### Metric

| Vertical travel | Order No. | Squareness | Straightness | Dial test indicator (provided) |       |              |          | Mass   |
|-----------------|-----------|------------|--------------|--------------------------------|-------|--------------|----------|--------|
|                 |           |            |              | Graduation                     | Range | Dial reading | Accuracy |        |
| 150mm           | 311-215   | 3µm        | 2µm          | 0.002mm                        | 0.2mm | 0-100-0      | 3µm      | 13.7kg |
| 250mm           | 311-225   | 6µm        | 2.5µm        | 0.002mm                        | 0.2mm | 0-100-0      | 3µm      | 16.2kg |
| 450mm           | 311-245   | 9µm        | 3.5µm        | 0.002mm                        | 0.2mm | 0-100-0      | 3µm      | 24kg   |

#### Inch

| Vertical travel | Order No. | Squareness | Straightness | Dial test indicator (provided) |       |              |          | Mass       |
|-----------------|-----------|------------|--------------|--------------------------------|-------|--------------|----------|------------|
|                 |           |            |              | Graduation                     | Range | Dial reading | Accuracy |            |
| 6"              | 311-216   | .00012"    | .00008"      | .0001"                         | .008" | 0-4-0        | ±.0001"  | 30.14 lbs. |
| 10"             | 311-226   | .00024"    | .0001"       | .0001"                         | .008" | 0-4-0        | ±.0001"  | 35.64 lbs. |
| 18"             | 311-246   | .00036"    | .00014"      | .0001"                         | .008" | 0-4-0        | ±.0001"  | 52.8 lbs.  |

# CERA Straight Master

## SERIES 311

Straightness Measuring Instrument



CERA Straight Master is a master gage used for the straightness inspection of each axis movement such as a CMM, machine tool, semiconductor related equipment and form measuring machine. An alminaceramic material is adopted to achieve the significant weight reduction compared with the conventional masters made from a stone or iron. The CERA Straight Master is high precision, high rigidity and easy to carry.

### FEATURES

- Alminaceramic made
- 50mm / 100" pitch gradation scales
- Precision lapped measuring surface
- Little secular change
- Lightweight



### SPECIFICATIONS

#### Metric

| Nominal length | Order No. | Section form | Straightness | Mass      |
|----------------|-----------|--------------|--------------|-----------|
| 400mm          | 311-302   | 35mm X 50mm  | 0.3µm        | 3.96 lbs. |
| 700mm          | 311-305   | 35mm X 50mm  | 0.5µm        | 6.6 lbs.  |
| 1000mm         | 311-307   | 45mm X 80mm  | 1µm          | 17.6 lbs. |
| 1300mm         | 311-309   | 45mm X 80mm  | 1.5µm        | 22 lbs.   |

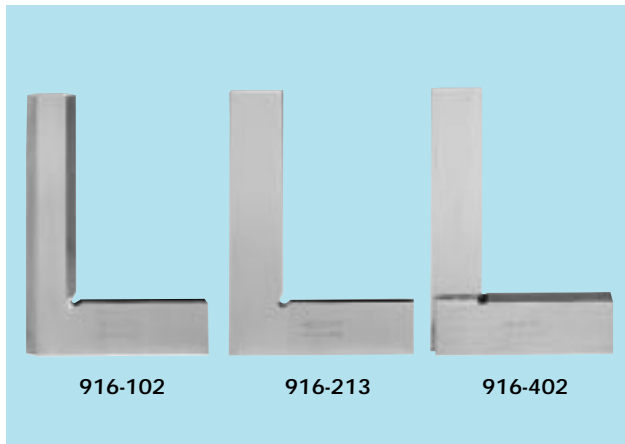
#### Inch

| Nominal length | Order No. | Section form  | Straightness | Mass      |
|----------------|-----------|---------------|--------------|-----------|
| 16"            | 311-322   | 1.38" X 1.97" | 12µin        | 3.96 lbs. |
| 28"            | 311-325   | 1.38" X 1.97" | 20µin        | 6.6 lbs.  |
| 40"            | 311-327   | 1.78" X 3.15" | 40µin        | 17.6 lbs. |
| 50"            | 311-329   | 1.78" X 3.15" | 60µin        | 22 lbs.   |



## Precision Squares

### SERIES 916



#### FEATURES

- Regular type and beveled-edge type squares are available.
- All edges are hardened and precision ground.

#### SPECIFICATIONS

##### Squares (Beveled-edge Type)

| Dimensions (HxW) | Order No. | Squareness |        |
|------------------|-----------|------------|--------|
|                  |           | Outside    | Inside |
| 50x40mm          | 916-100   | 2.5µm      | 6µm    |
| 75x50mm          | 916-101   | 3µm        | 6.5µm  |
| 100x70mm         | 916-102   | 3µm        | 7µm    |
| 150x100mm        | 916-103   | 3.5µm      | 8µm    |
| 200x130mm        | 916-104   | 4µm        | 9µm    |

##### Squares

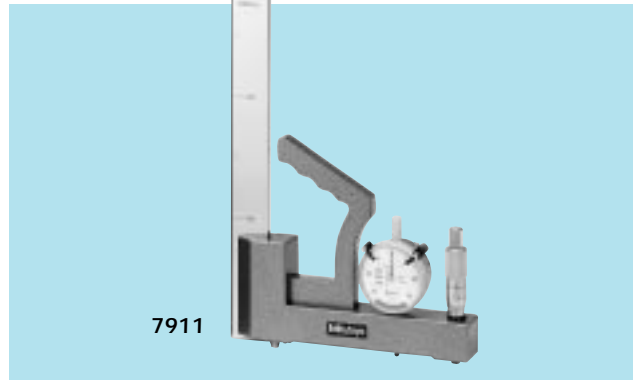
| Dimensions (HxW) | Order No. | Squareness |        |
|------------------|-----------|------------|--------|
|                  |           | Outside    | Inside |
| 50x40mm          | 916-211   | 6µm        | 12.5µm |
| 75x50mm          | 916-212   | 6.5µm      | 14µm   |
| 100x70mm         | 916-213   | 7µm        | 15µm   |
| 150x100mm        | 916-214   | 8µm        | 17.5µm |
| 200x130mm        | 916-215   | 9µm        | 20µm   |
| 250x165mm        | 916-216   | 10µm       | 22.5µm |
| 300x200mm        | 916-217   | 11µm       | 25µm   |
| 400x250mm        | 916-218   | 13µm       | 30µm   |

##### Squares with Stand

| Dimensions (HxW) | Order No. | Squareness |        |
|------------------|-----------|------------|--------|
|                  |           | Outside    | Inside |
| 75x50mm          | 916-401   | 6.5µm      | 14µm   |
| 100x70mm         | 916-402   | 7µm        | 15µm   |
| 150x100mm        | 916-403   | 8µm        | 17.5µm |
| 200x130mm        | 916-404   | 9µm        | 20µm   |
| 250x165mm        | 916-405   | 10µm       | 22.5µm |
| 300x200mm        | 916-406   | 11µm       | 25µm   |
| 400x250mm        | 916-407   | 13µm       | 30µm   |
| 500x300mm        | —         | 15µm       | 35µm   |
| 750x400mm        | —         | 20µm       | 47.5µm |
| 1000x500mm       | —         | 25µm       | 60µm   |

## Precision Dial Square

### SERIES 7



#### FEATURES

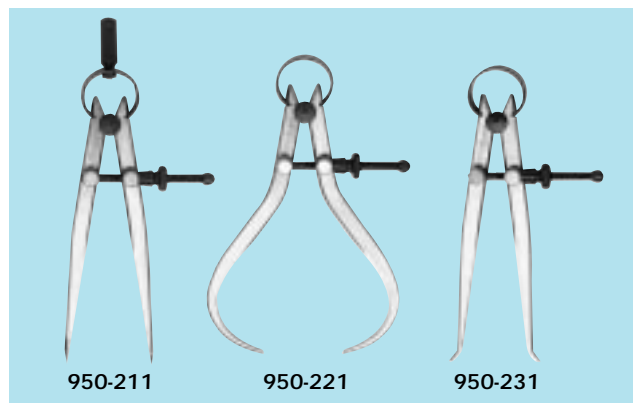
- Regular type and beveled-edge type blades are interchangeable.
- Squareness is indicated numerically on the dial.

#### SPECIFICATIONS

| Size  | Order No. | Graduation | Range   | Squareness   |
|-------|-----------|------------|---------|--------------|
| 300mm | 7911      | 0.005mm    | ±0.17mm | ±2.5µm/300mm |
| 600mm | 7912      | 0.025mm    | ±0.24mm | ±5µm/600mm   |

## Spring Dividers, Outside Spring Calipers, Inside Spring Calipers

### SERIES 950



#### FEATURES

- **Spring Divider** — Fully hardened and tempered joints, spring, washers and divider points.
- **Outside Spring Caliper** — Contact ends fully rounded to give accurate dimensions.
- **Inside Spring Caliper** — Ends fully rounded to give accurate contact with a workpiece.

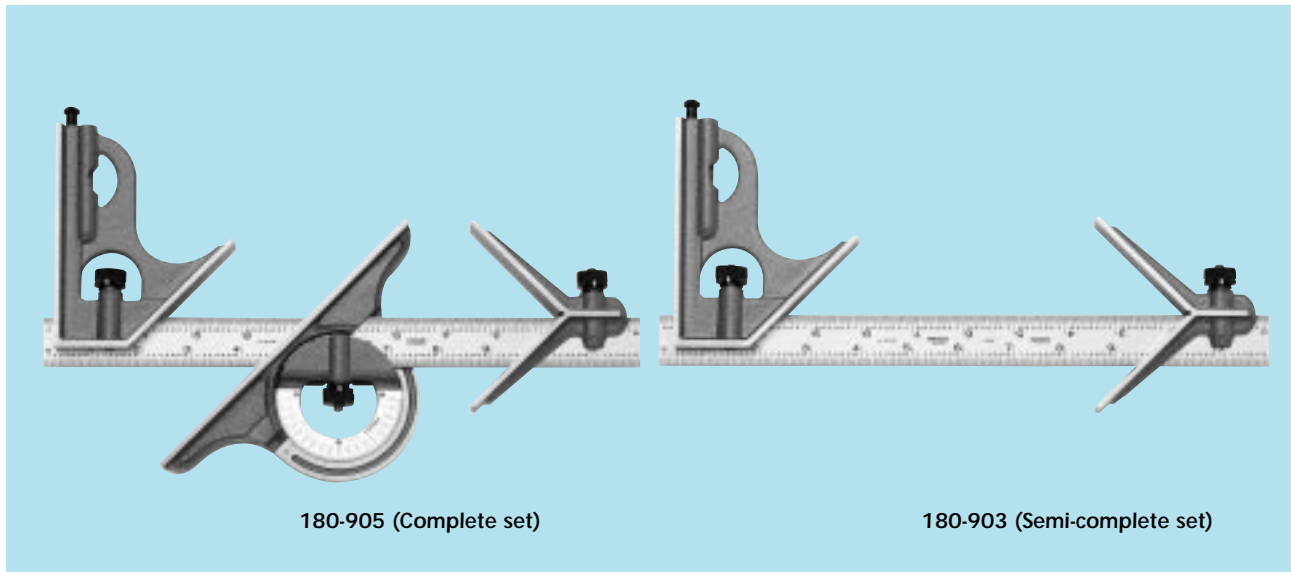
#### SPECIFICATIONS

| Range      | Order No.      |                         |                        |
|------------|----------------|-------------------------|------------------------|
|            | Spring divider | Outside spring calipers | Inside spring calipers |
| 4" (100mm) | 950-211        | 950-221                 | 950-231                |
| 6" (150mm) | 950-212        | 950-222                 | 950-232                |
| 8" (200mm) | 950-213        | 950-223                 | 950-233                |



# Combination Square Sets

## SERIES 180



180-905 (Complete set)

180-903 (Semi-complete set)

### FEATURES

- Three measuring heads are attached to the stainless steel rule (blade), allowing versatile measurements on various types of workpieces.
- Square head** — Used to set the rule at 90 degrees or 45 degrees to an edge of a workpiece.
- Center head** — Used to locate centers of round workpieces.
- Protractor head** — Used to set the rule at a desired angle to an edge of a workpiece. Also used for measuring angles.
- The measuring heads are hardened.
- Economy sets not including a protractor head are also available.

### SPECIFICATIONS

#### Combination Square Sets

##### Metric

| Size  | Order No. |               | Remarks              |
|-------|-----------|---------------|----------------------|
|       | Complete  | Semi-complete |                      |
| 150mm | —         | 180-919       | With blade (180-405) |
| 300mm | 180-910   | 180-920       | With blade (180-505) |

##### Inch/Metric

| Size      | Order No. |               | Remarks              |
|-----------|-----------|---------------|----------------------|
|           | Complete  | Semi-complete |                      |
| 6"/150mm  | —         | 180-915       | With blade (180-403) |
| 12"/300mm | 180-907   | 180-909       | With blade (180-503) |

##### Inch

| Size | Order No. |               | Remarks              |
|------|-----------|---------------|----------------------|
|      | Complete  | Semi-complete |                      |
| 6"   | —         | 180-901       | With blade (180-401) |
|      | —         | 180-902       | With blade (180-402) |
| 12"  | 180-905   | 180-903       | With blade (180-501) |
|      | 180-906   | 180-904       | With blade (180-502) |

#### Blades (Individual)

| Range     | Order No. | Graduation                  |
|-----------|-----------|-----------------------------|
| 150mm     | 180-405   | 1mm, 0.5mm, 1mm, 0.5mm      |
| 300mm     | 180-505   | 1mm, 0.5mm, 1mm, 0.5mm      |
| 450mm     | 180-705   | 1mm, 0.5mm, 1mm, 0.5mm      |
| 600mm     | 180-605   | 1mm, 0.5mm, 1mm, 0.5mm      |
| 6"/150mm  | 180-403   | 1/32", 1/64", 1mm, 0.5mm    |
| 12"/300mm | 180-503   | 1/32", 1/64", 1mm, 0.5mm    |
| 18"/450mm | 180-703   | 1/32", 1/64", 1mm, 0.5mm    |
| 24"/600mm | 180-603   | 1/32", 1/64", 1mm, 0.5mm    |
| 6"        | 180-401   | 1/8", 1/16", 1/32", 1/64"   |
| 6"        | 180-402   | 1/32", 1/50", 1/64", 1/100" |
| 12"       | 180-501   | 1/8", 1/16", 1/32", 1/64"   |
| 12"       | 180-502   | 1/32", 1/50", 1/64", 1/100" |
| 18"       | 180-701   | 1/8", 1/16", 1/32", 1/64"   |
| 18"       | 180-702   | 1/32", 1/50", 1/64", 1/100" |
| 24"       | 180-601   | 1/8", 1/16", 1/32", 1/64"   |
| 24"       | 180-602   | 1/32", 1/50", 1/64", 1/100" |

#### Measuring Heads (Individual)

| Order No. | Description     | Remarks  |
|-----------|-----------------|--|
| 180-101   | Square head     | For 150mm (6") blades                            |
| 180-102   | Square head     | For 300mm (12"), 450mm (18"), 600mm (24") blades |
| 180-201   | Center head     | For 150mm (6") blades                            |
| 180-202   | Center head     | For 300mm (12"), 450mm (18"), 600mm (24") blades |
| 180-301   | Protractor head | For 300mm (12"), 450mm (18"), 600mm (24") blades |



## Digimatic Universal Protractor

SERIES 187



### FEATURES

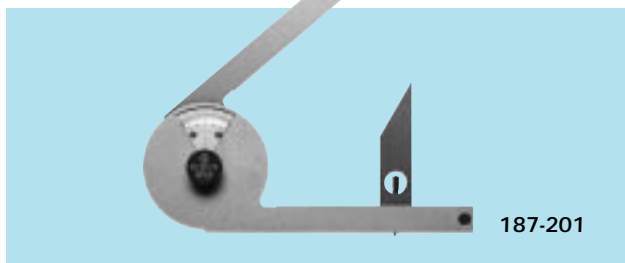
- Data output function make it easy to see the statistical data.
- Setting preset value.
- Removable blade.
- Can be attached to height gages.
- Product complying with the EMC Directive.

### SPECIFICATIONS

| Order No.            | 187-501  | 187-502 | 187-551                                   | 187-552 |
|----------------------|--|---------|---|---------|
| Blade length         | 150mm  | 300mm   | 6"  | 12"     |
| Measuring range      | -360° to +360°   |         |   |         |
| Resolution           | 1' (0.01°)   |         |   |         |
| Tolerance            | ±2" (±0.03°)   |         |   |         |
| Repeatability        | 1'   |         |   |         |
| IP                   | 40   |         |   |         |
| Response speed       | 3rps   |         |   |         |
| Battery              | Lithium battery  |         |   |         |
| Battery life         | 2,000 hours  |         |   |         |
| Thermal              | 0°C to 40°C  |         |   |         |
| Function             | Zero setting, Switchable direction, Data output, Data hold, presetting, sexagesimal/decimal notation |         |   |         |
| Mass                 | 624g   | 662g    | 621g                                      | 659g    |
| Standard accessories | Battery, mm height gage holder (950750)  |         | Battery, inch height gage holder (950749) |         |

## Bevel Protractor

SERIES 187



### FEATURES

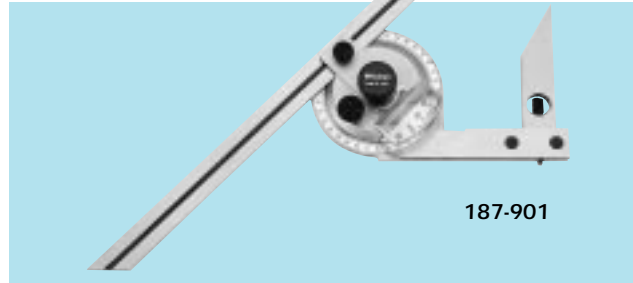
- Consists of three sheets of stainless steel, the middle one of which is made for angle measurements.

### SPECIFICATIONS

| Blade length | Order No. | Graduation             | Remarks          |
|--------------|-----------|------------------------|------------------|
| 135mm        | 187-201   | 5 min. (0° - 90° - 0°) | w/60°, 30° edges |

## Universal Bevel Protractor

SERIES 187



### FEATURES

- High-precision angle gage for accurate angle measurement of machines, molds, and jigs.
- Can be attached to height gages.

### SPECIFICATIONS

#### Metric

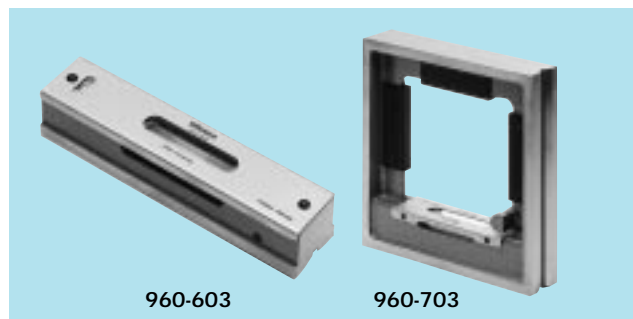
| Blade length | Order No. | Graduation             | Remarks               |
|--------------|-----------|------------------------|-----------------------|
| 150, 300mm   | 187-901   | 5 min. (0° - 90° - 0°) | w/60°, 45°, 30° edges |
| 150mm        | 187-907   | 5 min. (0° - 90° - 0°) | w/60°, 45° edges      |
| 300mm        | 187-908   | 5 min. (0° - 90° - 0°) | w/60°, 45° edges      |

#### Inch

| Blade length | Order No. | Graduation             | Remarks               |
|--------------|-----------|------------------------|-----------------------|
| 6", 12"      | 187-902   | 5 min. (0° - 90° - 0°) | w/60°, 45°, 30° edges |
| 6"           | 187-904   | 5 min. (0° - 90° - 0°) | w/60°, 45° edges      |
| 12"          | 187-906   | 5 min. (0° - 90° - 0°) | w/60°, 45° edges      |

## Precision Levels

SERIES 960



### FEATURES

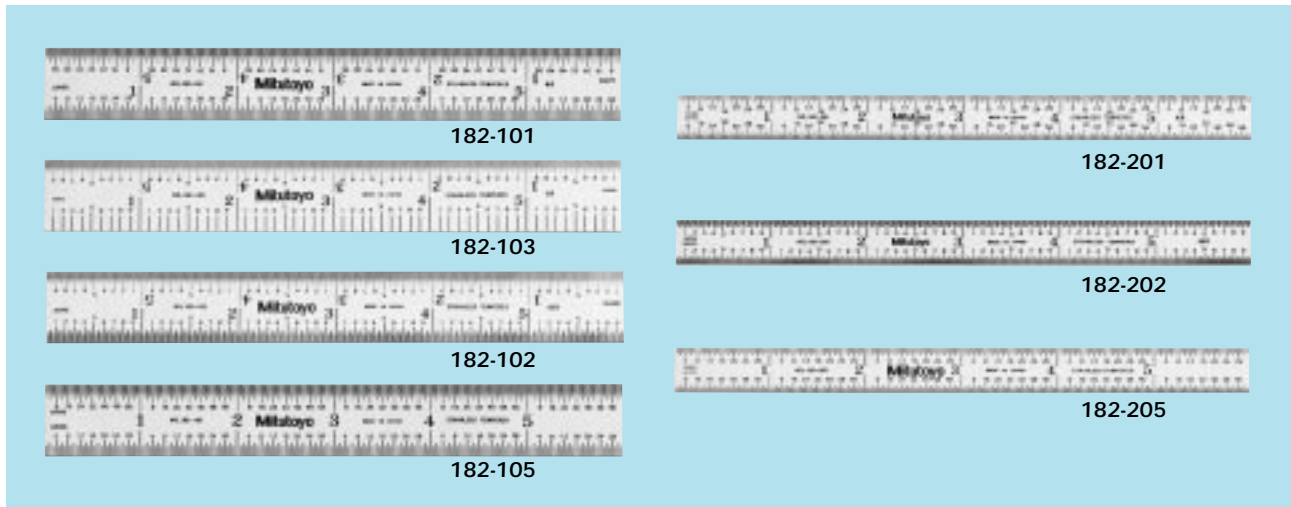
- High precision longitudinal and transverse vials make it possible to check or level surfaces.

### SPECIFICATIONS

| Order No. | Sensitivity | Accuracy of graduations | Dimensions (WxDxH) |
|-----------|-------------|-------------------------|--------------------|
| 960-603   | 0.02mm/m    | ±0.7                    | 200x44x38.2mm      |
| 960-703   | 0.02mm/m    | ±0.3                    | 200x44x200mm       |

## Steel Rules

### SERIES 182



#### FEATURES

- Clear graduations on satin-chrome finish.
- Stainless tempered.

#### SPECIFICATIONS

##### Wide Rigid Rules

###### Metric

| Graduations                | Range | Order No.      | Width |
|----------------------------|-------|----------------|-------|
| 1mm, 0.5mm (on both faces) | 150mm | <b>182-111</b> | 19mm  |
|                            | 300mm | <b>182-131</b> | 25mm  |
|                            | 450mm | <b>182-151</b> | 30mm  |
|                            | 600mm | <b>182-171</b> | 30mm  |

###### Inch/Metric

| Graduations               | Range     | Order No.      | Width |
|---------------------------|-----------|----------------|-------|
| 1/32", 1/64", 1mm, 0.5mm  | 6"/150mm  | <b>182-105</b> | .75"  |
|                           | 12"/300mm | <b>182-125</b> | .98"  |
|                           | 18"/450mm | <b>182-145</b> | 1.18" |
|                           | 24"/600mm | <b>182-165</b> | 1.18" |
| 1/50", 1/100", 1mm, 0.5mm | 6"/150mm  | <b>182-106</b> | .75"  |
|                           | 12"/300mm | <b>182-126</b> | .98"  |
| 1/10", 1/100", 1mm, 0.5mm | 6"/150mm  | <b>182-107</b> | .75"  |
| 1/10", 1/50", 1mm, 0.5mm  | 6"/150mm  | <b>182-108</b> | .75"  |

###### Inch

| Graduations                 | Range | Order No.      | Width |
|-----------------------------|-------|----------------|-------|
| 1/8", 1/16", 1/32", 1/64"   | 6"    | <b>182-101</b> | .75"  |
|                             | 12"   | <b>182-121</b> | .98"  |
|                             | 18"   | <b>182-241</b> | 1.18" |
|                             | 24"   | <b>182-161</b> | 1.18" |
| 1/50", 1/100", 1/32", 1/64" | 6"    | <b>182-102</b> | .75"  |
|                             | 12"   | <b>182-122</b> | .98"  |
|                             | 18"   | <b>182-142</b> | 1.18" |
|                             | 24"   | <b>182-162</b> | 1.18" |
| 1/10", 1/100", 1/32", 1/64" | 6"    | <b>182-103</b> | .75"  |
|                             | 12"   | <b>182-123</b> | .98"  |
|                             | 18"   | <b>182-143</b> | 1.18" |
|                             | 24"   | <b>182-163</b> | 1.18" |
| 1/10", 1/50", 1/32", 1/64"  | 6"    | <b>182-104</b> | .75"  |
|                             | 12"   | <b>182-124</b> | .98"  |

##### Full-Flexible Rules

###### Metric

| Graduations                | Range | Order No.      | Width |
|----------------------------|-------|----------------|-------|
| 1mm, 0.5mm (on both faces) | 150mm | <b>182-211</b> | 12mm  |
|                            | 300mm | <b>182-231</b> | 12mm  |
|                            | 450mm | <b>182-251</b> | 18mm  |
|                            | 600mm | <b>182-271</b> | 18mm  |

###### Inch/Metric

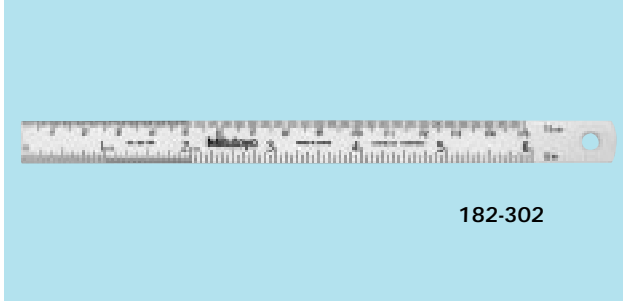
| Graduations               | Range     | Order No.      | Width |
|---------------------------|-----------|----------------|-------|
| 1/32", 1/64", 1mm, 0.5mm  | 6"/150mm  | <b>182-205</b> | .47"  |
|                           | 12"/300mm | <b>182-225</b> | .47"  |
|                           | 18"/450mm | <b>182-245</b> | .71"  |
|                           | 24"/600mm | <b>182-265</b> | .71"  |
| 1/50", 1/100", 1mm, 0.5mm | 6"/150mm  | <b>182-206</b> | .47"  |
|                           | 12"/300mm | <b>182-226</b> | .47"  |
| 1/10", 1/100", 1mm, 0.5mm | 6"/150mm  | <b>182-207</b> | .47"  |
| 1/10", 1/50", 1mm, 0.5mm  | 6"/150mm  | <b>182-208</b> | .47"  |

###### Inch

| Graduations                 | Range | Order No.      | Width |
|-----------------------------|-------|----------------|-------|
| 1/8", 1/16", 1/32", 1/64"   | 6"    | <b>182-201</b> | .47"  |
|                             | 12"   | <b>182-221</b> | .47"  |
|                             | 18"   | <b>182-141</b> | .71"  |
|                             | 24"   | <b>182-261</b> | .71"  |
| 1/50", 1/100", 1/32", 1/64" | 6"    | <b>182-202</b> | .47"  |
|                             | 12"   | <b>182-222</b> | .47"  |
|                             | 18"   | <b>182-242</b> | .71"  |
|                             | 24"   | <b>182-262</b> | .71"  |
| 1/10", 1/100", 1/32", 1/64" | 6"    | <b>182-203</b> | .47"  |
|                             | 12"   | <b>182-223</b> | .47"  |
|                             | 18"   | <b>182-243</b> | .71"  |
|                             | 24"   | <b>182-263</b> | .71"  |
| 1/10", 1/50", 1/32", 1/64"  | 6"    | <b>182-204</b> | .47"  |
|                             | 12"   | <b>182-224</b> | .47"  |



Semi-Flexible Rules



Metric

| Graduations                | Range | Order No.      | Width |
|----------------------------|-------|----------------|-------|
| 1mm, 0.5mm (on both faces) | 150mm | <b>182-311</b> | 15mm  |

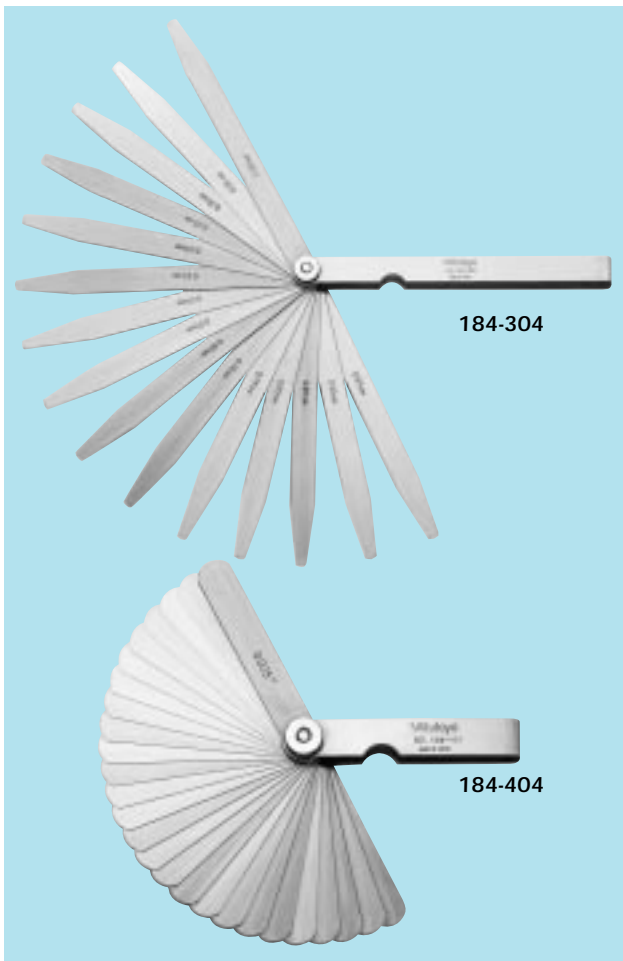
Inch / Metric

| Graduations*                       | Range      | Order No.      | Width |
|------------------------------------|------------|----------------|-------|
| 1/16", 1/32", 1/64",<br>1mm, 0.5mm | 6"/150mm   | <b>182-302</b> | .51"  |
|                                    | 8"/200mm   | <b>182-303</b> | .51"  |
|                                    | 12"/300mm  | <b>182-305</b> | .59"  |
|                                    | 20"/500mm  | <b>182-307</b> | .59"  |
|                                    | 40"/1000mm | <b>182-309</b> | .59"  |

\* Engraved on the frontside only.

Thickness Gages

SERIES 184



SPECIFICATIONS

Metric

| Range                       | Order No.      | Composition of leaves                                     | Remarks   |
|-----------------------------|----------------|---|-----------|
| 0.05 - 1mm<br>(28 leaves)   | <b>184-313</b> | 0.05 - 0.15mm by 0.01mm,<br>0.2 - 1mm by 0.05mm           | —         |
|                             | <b>184-303</b> | 0.05 - 0.15mm by 0.01mm,<br>0.2 - 1mm by 0.05mm           | Long leaf |
| 0.05 - 1mm<br>(20 leaves)   | <b>184-304</b> | 0.05 - 1mm by 0.05mm                                      | Long leaf |
| 0.05 - 1mm<br>(13 leaves)   | <b>184-305</b> | 0.05 - 0.3mm by 0.05mm,<br>0.4 - 1mm by 0.1mm             | —         |
|                             | <b>184-301</b> | 0.05 - 0.3mm by 0.05mm,<br>0.4 - 1mm by 0.1mm             | Long leaf |
| 0.05 - 0.8mm<br>(10 leaves) | <b>184-306</b> | 0.05 - 0.2mm by 0.05mm,<br>0.3 - 0.8mm by 0.1mm           | —         |
|                             | <b>184-308</b> | 0.05 - 0.2mm by 0.05mm,<br>0.3 - 0.8mm by 0.1mm           | Long leaf |
| 0.03 - 0.5mm<br>(13 leaves) | <b>184-307</b> | 0.03 - 0.1mm by 0.01mm,<br>0.2 - 0.5mm by 0.1mm<br>0.15mm | —         |
|                             | <b>184-302</b> | 0.03 - 0.1mm by 0.01mm,<br>0.2 - 0.5mm by 0.1mm<br>0.15mm | Long leaf |

Inch

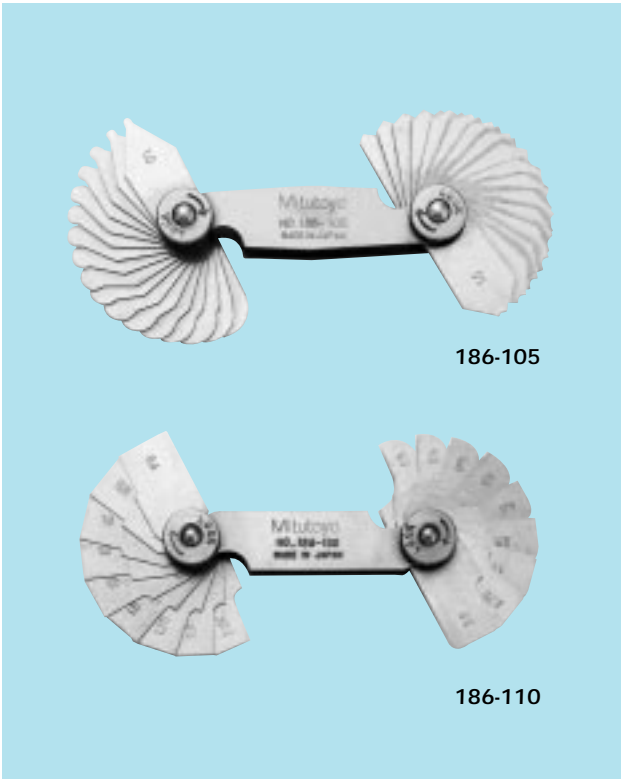
| Size                          | Order No.      | Composition of leaves   | Remarks         |
|-------------------------------|----------------|---|-----------------|
| .0015" - .025"<br>(26 leaves) | <b>184-103</b> | .0015", .0025",<br>.002" - .025" by .001"   | Tapered<br>leaf |
|                               | <b>184-404</b> | .0015", .0025",<br>.002" - .025" by .001"   | Straight leaf   |
| .0015" - .025"<br>(18 leaves) | <b>184-406</b> | .0015" - .006" by .0005",<br>.007" - .01" by .001",<br>.012", .015", .02", .025"                        | Tapered<br>leaf |
| .0015" - .015"<br>(9 leaves)  | <b>184-101</b> | .0015", .002", .003", .004",<br>.006", .008", .01", .012", .015"  | Tapered<br>leaf |
| .002" - .025"<br>(15 leaves)  | <b>184-405</b> | .002" - .006" by .001",<br>.008" - .012" by .002",<br>.013", .015", .018", .019",<br>.02", .022", .025" | Straight leaf   |
| .004" - .025"<br>(22 leaves)  | <b>184-102</b> | .004" - .025" by .001"  | Tapered<br>leaf |

FEATURES

- Metric thickness gages are available with tapered leaves.
- Inch thickness gages are tapered or straight leaves.
- Each leaf is marked with its thickness.
- Each leaf is detachable if necessary.

## Radius Gages

### SERIES 186



#### FEATURES

- Radius size is stamped on each gage.
- Both concave and convex radius gages become a pair.
- With a locking clamp.

#### SPECIFICATIONS

##### Metric

| Range                     | Order No.      | Composition of gages   | Remarks  |
|---------------------------|----------------|--|----------|
| 0.4 - 6mm<br>(18 pairs)   | <b>186-110</b> | 0.4, 0.8, 1, 1.2, 1.5, 1.6mm,<br>1.75 - 3mm by 0.25mm,<br>3.5 - 6mm by 0.5mm | 90° arc  |
| 0.5 - 13mm<br>(26 pairs)  | <b>186-902</b> | 0.5 - 13mm by 0.5mm  | 90° arc  |
| 1 - 7mm<br>(34 pairs)     | <b>186-105</b> | 1 - 3mm by 0.25mm<br>3.5 - 7mm by 0.5mm                                      | 180° arc |
| 7.5 - 15mm<br>(32 pairs)  | <b>186-106</b> | 7.5 - 15mm by 0.5mm  | 180° arc |
| 15.5 - 25mm<br>(30 pairs) | <b>186-107</b> | 15.5 - 20mm by 0.5mm,<br>21 - 25mm by 1mm                                    | 180° arc |

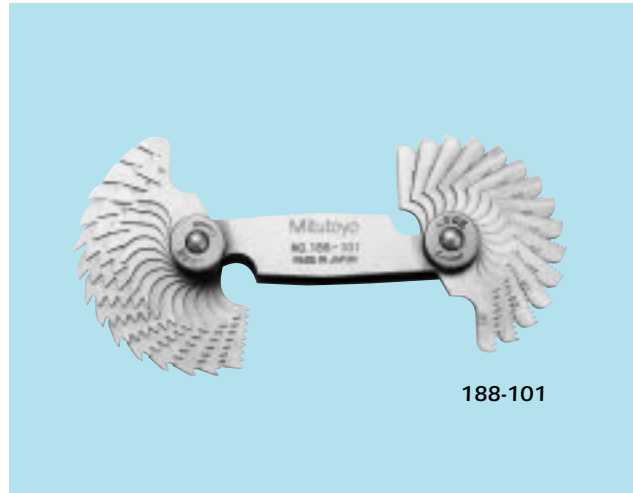
##### Inch

| Range                        | Order No.       | Composition of gages                              | Remarks  |
|------------------------------|-----------------|---|----------|
| 1/32" - 17/64"<br>(16 pairs) | <b>186-103</b>  | 1/32" - 17/64" by 64ths                           | 90° arc  |
| 1/32" - 1/4"<br>(15 pairs)   | <b>186-101</b>  | 1/32" - 1/4" by 64ths                             | 180° arc |
| 17/64" - 1/2"<br>(16 pairs)  | <b>186-102</b>  | 17/64" - 1/2" by 64ths                            | 180° arc |
| 9/32" - 33/64"<br>(16 pairs) | <b>186-104</b>  | 9/32" - 33/64" by 64ths                           | 90° arc  |
| 1/64" - 1/2"<br>(25 leaves)  | <b>186-901*</b> | 1/64" - 17/64" by 64ths,<br>9/32" - 1/2" by 32nds | —        |

\*Each gage has five measuring locations.

## Pitch Gages

### SERIES 188



#### FEATURES

- Thread pitch size is stamped on each gage.
- Metric, Unified, and Whitworth screw pitch gages.

#### SPECIFICATIONS

##### Metric Screw Pitch Gages

| Range                     | Order No.      | Composition of gages  |
|---------------------------|----------------|---|
| 0.35 - 6mm<br>(22 leaves) | <b>188-130</b> | 0.35, 0.4, 0.45, 0.5, 0.6, 0.7, 0.75, 0.8,<br>1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5,<br>5, 5.5, 6mm and 60° angle gage |
| 0.4 - 7mm<br>(21 leaves)  | <b>188-122</b> | 0.4, 0.5, 0.7, 0.75, 0.8, 0.9, 1, 1.25, 1.5,<br>1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5,<br>7mm                        |
| 0.4 - 7mm<br>(18 leaves)  | <b>188-121</b> | 0.4, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5,<br>3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7mm  |

##### Unified Screw Pitch Gages

| Range                     | Order No.      | Composition of gages  |
|---------------------------|----------------|---|
| 4 - 42 TPI<br>(30 leaves) | <b>188-111</b> | 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12,<br>13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28,<br>30, 32, 34, 36, 38, 40, 42 TPI |

Note: Metric and Unified Pitch Gage Set (**188-151**) is available. It consists of **188-122** (Metric) and **188-111** (Unified).

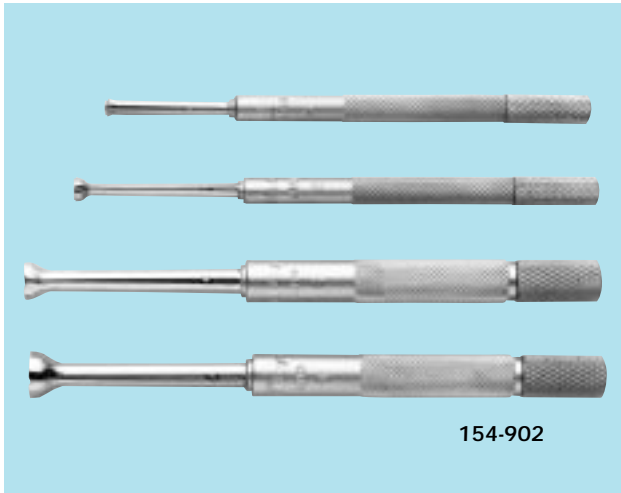
##### Whitworth Screw Pitch Gages

| Range                     | Order No.      | Composition of gages  |
|---------------------------|----------------|---|
| 4 - 42 TPI<br>(30 leaves) | <b>188-101</b> | 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 11½, 12,<br>13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28,<br>30, 32, 34, 36, 38, 40, 42 TPI |
| 4 - 60 TPI<br>(28 leaves) | <b>188-102</b> | 4, 4½, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16,<br>18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 34,<br>36, 40, 48, 60 TPI          |

3456  
1234

## Small Hole Gage Set

SERIES 154



### FEATURES

- Used with an outside micrometer for measuring inside diameter of bores.
- 4 sizes of gages are supplied in a fitted case.
- Extra long for gaging deep and shallow holes, slots, and similar workpieces.
- Gaging surface is fully hardened to insure long tool life.

### SPECIFICATIONS

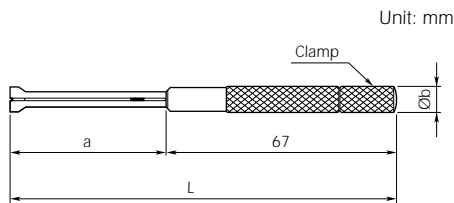
#### Metric

| Total range               | Order No.      | Assortment of gages   |
|---------------------------|----------------|---|
| Ø3 - 13mm<br>(4-gage set) | <b>154-902</b> | Ø3 - 5mm gage ( <b>154-101</b> )<br>Ø5 - 7.5mm gage ( <b>154-102</b> )<br>Ø7.5 - 10mm gage ( <b>154-103</b> )<br>Ø10 - 13mm gage ( <b>154-104</b> ) |

#### Inch

| Total range                      | Order No.      | Assortment of gages  |
|----------------------------------|----------------|--|
| .125" - .5" DIA.<br>(4-gage set) | <b>154-901</b> | .125" - .2" DIA. gage ( <b>154-105</b> )<br>.2" - .3" DIA. gage ( <b>154-106</b> )<br>.3" - .4" DIA. gage ( <b>154-107</b> )<br>.4" - .5" DIA. gage ( <b>154-108</b> ) |

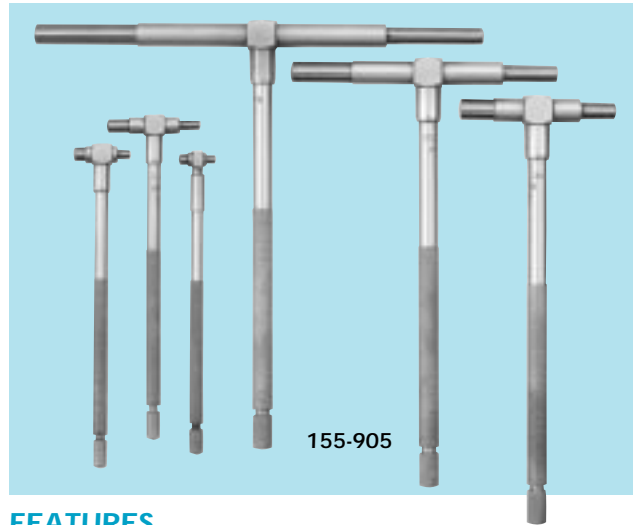
### Dimensions



| Order No.      | L     | a    | b   |
|----------------|-------|------|-----|
| <b>154-101</b> | 90    | 22.5 | 5.5 |
| <b>154-102</b> | 97.6  | 30   | 5.5 |
| <b>154-103</b> | 102.8 | 35   | 8.5 |
| <b>154-104</b> | 108   | 40   | 8.5 |

## Telescoping Gage Set

SERIES 155



### FEATURES

- Spring-loaded plunger expands within the bore (or groove), allowing determination of the internal diameter (or groove width).
- With a knurled clamp.

### SPECIFICATIONS

#### Metric

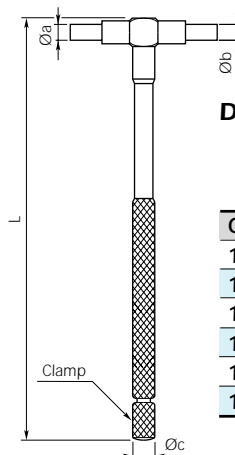
| Total range               | Order No.      | Assortment of gages  |
|---------------------------|----------------|--|
| 8 - 150mm<br>(6-gage set) | <b>155-905</b> | 8 - 12.7mm gage ( <b>155-127</b> )<br>12.7 - 19mm gage ( <b>155-128</b> )<br>19 - 32mm gage ( <b>155-129</b> )<br>32 - 54mm gage ( <b>155-130</b> )<br>54 - 90mm gage ( <b>155-131</b> )<br>90 - 150mm gage ( <b>155-132</b> ) |

#### Inch

| Total range                 | Order No.      | Assortment of gages   |
|-----------------------------|----------------|---|
| .313" - 6"<br>(6-gage set)* | <b>155-903</b> | .313" - .5" gage ( <b>155-121</b> )<br>.5" - .75" gage ( <b>155-122</b> )<br>.75" - 1.25" gage ( <b>155-123</b> )<br>1.25" - 2.125" gage ( <b>155-124</b> )<br>2.125" - 3.5" gage ( <b>155-125</b> )<br>3.5" - 6" gage ( <b>155-126</b> ) |

\*4-gage set (Total range: .313" - 2.125" (**155-907**)) and 5-gage set (Total range: .5" - 6" (**155-904**)) are also available.

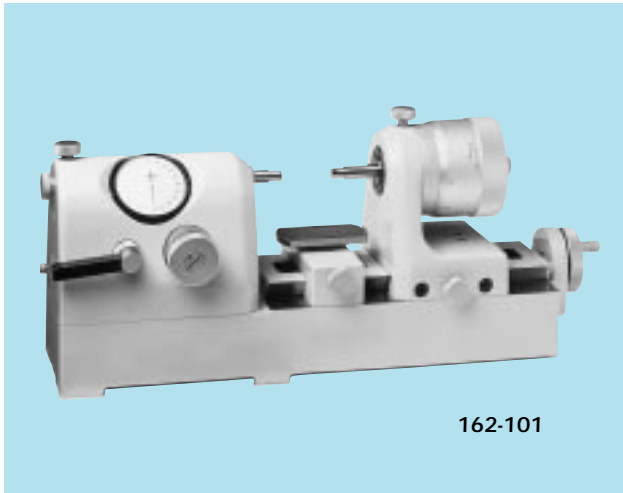
### Dimensions



| Order No.      | L   | a   | b   | c   |
|----------------|-----|-----|-----|-----|
| <b>155-127</b> | 110 | 4   | 3   | 5   |
| <b>155-128</b> | 110 | 5   | 3.5 | 5.5 |
| <b>155-129</b> | 110 | 5   | 3.5 | 5.5 |
| <b>155-130</b> | 150 | 7.5 | 6   | 8   |
| <b>155-131</b> | 150 | 7.5 | 6   | 8   |
| <b>155-132</b> | 150 | 7.5 | 6   | 8   |

## Bench Comparator

SERIES 162



162-101

### FEATURES

- 25mm/1" stroke micrometer head (Graduation: 0.001mm/.0001") is provided.
- Retractable anvil with dial indicator for high accuracy inspection of mass-produced parts.
- Anvil pressure is variable.
- Adjustable workpiece stage height.
- Dial Indicator is shockproof.
- Ø8mm (or 3/8") probe of Mitutoyo Mu-Checker can be attached for higher precision measurement if required.

### SPECIFICATIONS

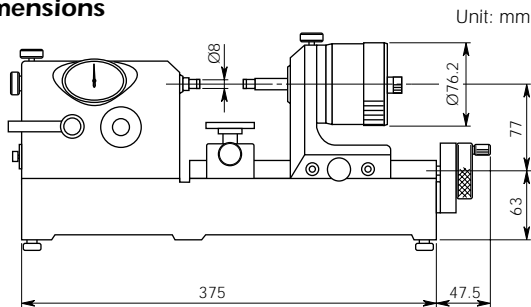
#### Metric

| Maximum workpiece height | Order No. | Dial Indicator |            | Mass |
|--------------------------|-----------|----------------|------------|------|
|                          |           | Range          | Graduation |      |
| 100mm                    | 162-101   | ±0.1mm         | 0.001mm    | 15kg |

#### Inch

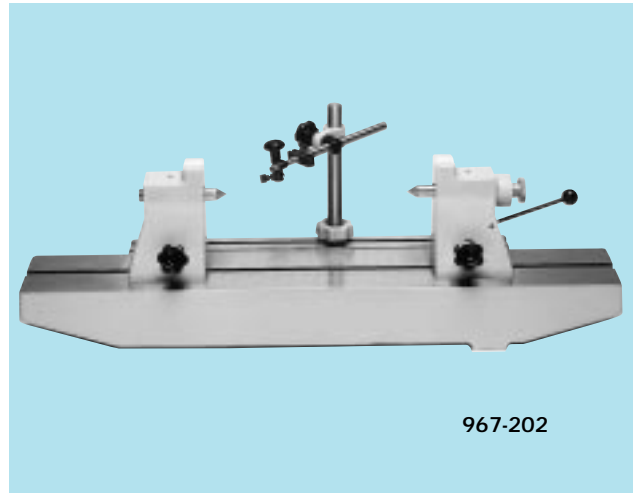
| Maximum workpiece height | Order No. | Dial Indicator |            | Mass    |
|--------------------------|-----------|----------------|------------|---------|
|                          |           | Range          | Graduation |         |
| 4"                       | 162-102   | ±.005"         | .0001"     | 33 lbs. |

### Dimensions



## Bench Centers

SERIES 967



967-202

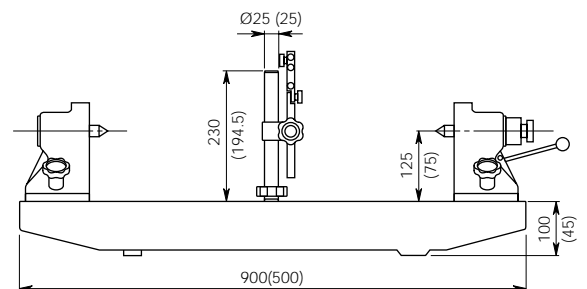
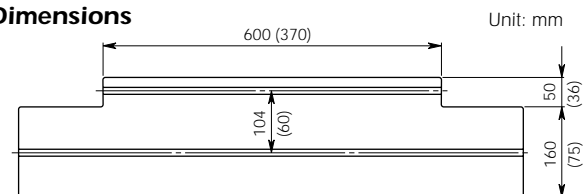
### FEATURES

- Used with a dial test indicator (optional), the Bench Center provides precision measurement of concentricity verification on cylindrical workpieces.
- With an indicator clamp. (Holding stem diameter: 8mm)

### SPECIFICATIONS

| Maximum workpiece height | Order No. | Maximum workpiece dia. | Mass |
|--------------------------|-----------|------------------------|------|
| 300mm                    | 967-201   | 150mm                  | 13kg |
| 600mm                    | 967-202   | 250mm                  | 70kg |

### Dimensions



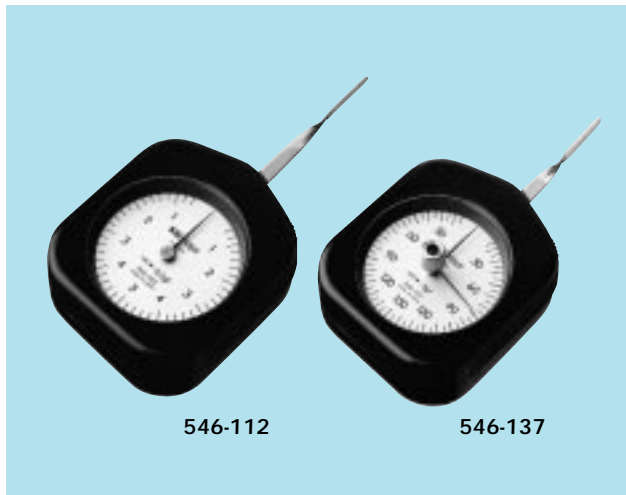
967-202 (967-201)





## Dial Tension Gages

### SERIES 546



546-112

546-137

#### FEATURES

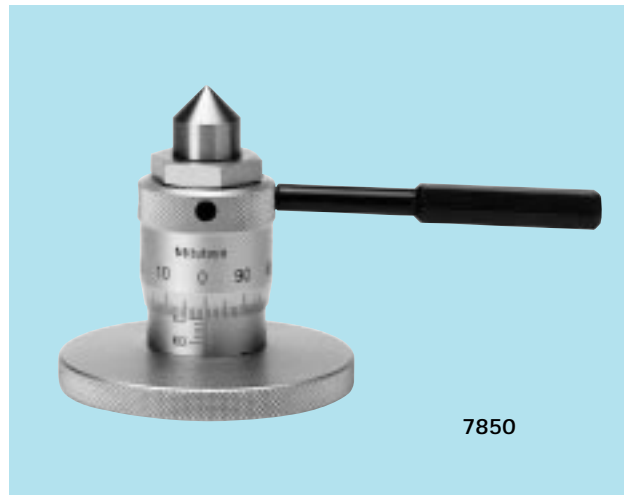
- Can measure dynamic tension in Newton (N) units.
- Dial Tension Gages are widely used to determine the contact force of other measuring instruments as well as that of electrical relays, micro-switches, valves and precision springs.
- Convenient peak-hold type gages are also available.

#### SPECIFICATIONS

| Range        | Minimum reading | Order No.     |                |
|--------------|-----------------|---------------|----------------|
|              |                 | Standard type | Peak-hold type |
| 6 - 50 mN    | 2 mN            | 546-112       | —              |
| 10 - 100 mN  | 5 mN            | 546-113       | 546-133        |
| 30 - 300 mN  | 10 mN           | 546-114       | 546-134        |
| 0.06 - 0.5 N | 0.02 N          | 546-115       | 546-135        |
| 0.1 - 1 N    | 0.05 N          | 546-116       | 546-136        |
| 0.15 - 1.5 N | 0.05 N          | 546-117       | 546-137        |
| 0.3 - 3 N    | 0.1 N           | 546-118       | 546-138        |
| 0.6 - 5 N    | 0.2 N           | 546-119       | 546-139        |

## Micro Jack

### SERIES 7



7850

#### FEATURES

- Used for accurate leveling of machines, surface plates, and other precision instruments.
- Easy adjustment under heavy load.

#### SPECIFICATIONS

##### Metric

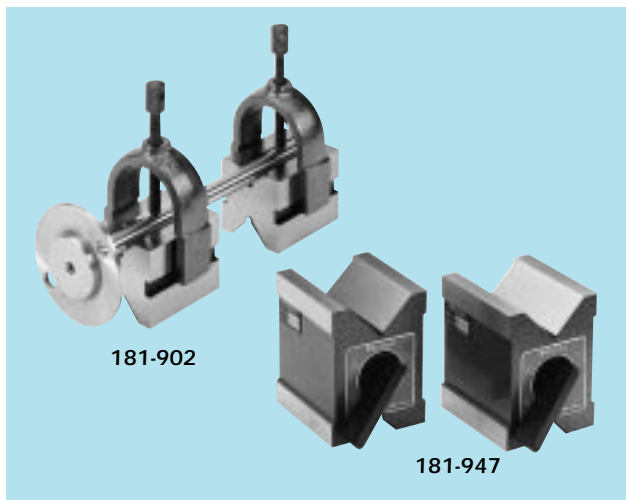
| Height adjustment | Order No. | Graduation | Maximum load |
|-------------------|-----------|------------|--------------|
| 60 - 75mm         | 7850      | 0.01mm     | 400kgf       |

##### Inch

| Height adjustment | Order No. | Graduation | Maximum load |
|-------------------|-----------|------------|--------------|
| 2.5" - 3"         | 7851      | .001"      | 880 lbs.     |

## V-Block Sets

### SERIES 181



181-902

181-947

#### FEATURES

- Two V-blocks per set.
- Magnetic type is available. (The magnetic type V-block is not provided with a workpiece clamp.)

#### SPECIFICATIONS

##### Metric

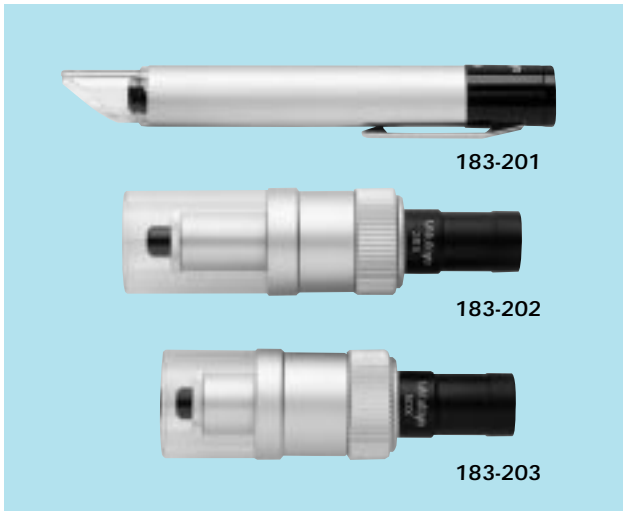
| Maximum workpiece dia. | Order No. | Mass  | Remarks       |
|------------------------|-----------|-------|---------------|
| 25mm                   | 181-902   | 0.3kg | With clamp    |
| 50mm                   | 181-947   | 4.2kg | Magnetic type |

##### Inch

| Maximum workpiece dia. | Order No. | Mass     | Remarks    |
|------------------------|-----------|----------|------------|
| 1"                     | 181-901   | .66 lbs. | With clamp |

## Pocket Magnifiers

### SERIES 183



#### FEATURES

- Suitable for inspecting metal surfaces.

#### SPECIFICATIONS

| Magnification | Order No. | Remarks    |
|---------------|-----------|------------|
| 25X           | 183-201   | Pen type   |
|               | 183-202   | With stand |
| 50X           | 183-203   | With stand |

## Zoom Loupe

### SERIES 183



#### FEATURES

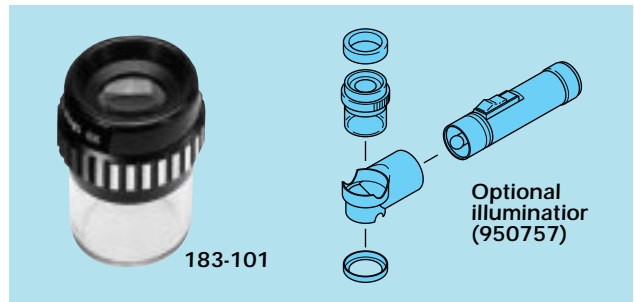
- Allows the user 8X-16X zoomable observation.
- Magnification indicator is provided for 8X, 10X, 12X, 14X, and 16X observation.
- Metric and inch scales are provided for measuring.
- Comes with a carrying case.

#### SPECIFICATIONS

| Magnification   | Order No. | Remarks  |
|-----------------|-----------|--|
| 8X - 16X (zoom) | 183-304   | With recicle (Scale graduation: 0.1mm, .0005") |

## Pocket Comparators

### SERIES 183



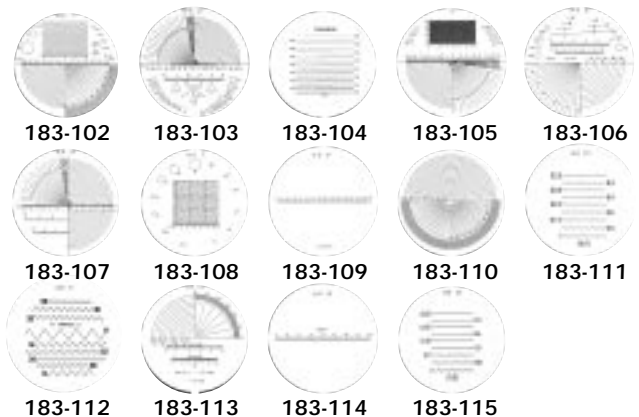
#### FEATURES

- By replacing optional reticles, dimensional, angle, and other types of measurements can be performed.
- Illuminator (950757) is available.

#### SPECIFICATIONS

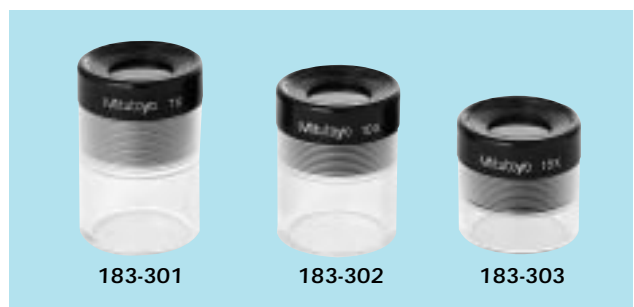
| Magnification | Order No. | Remarks                      |
|---------------|-----------|------------------------------|
| 8X            | 183-101   | Optional recicles available. |
| 9X            | 183-121   | Optional recicles available. |
| 10X           | 183-131   | Optional recicles available. |

#### Reticles



## Clear Loupe

### SERIES 183



#### SPECIFICATIONS

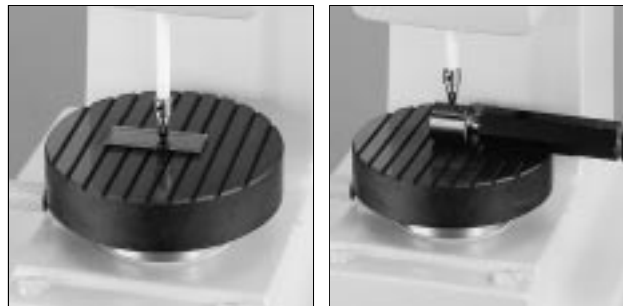
| Magnification | Order No. | Remarks            |
|---------------|-----------|--------------------|
| 7X            | 183-301   | Drawtube removable |
| 10X           | 183-302   | Drawtube removable |
| 15X           | 183-303   | Drawtube removable |

# Litematic

## SERIES 318



318-201



### FEATURES

- The Litematic is suitable for measuring easily-deformed workpieces and high-precision parts such as pin gages, thin-wall bearings, plastic parts, and springs.
- Extra-low measuring force of 0.01N (1gf).
- Ceramic anvil is free from corrosion and easy to maintain.
- Provided with an SPC output port.

### SPECIFICATIONS

#### Metric

|                       |  |
|-----------------------|--|
| Order No.             | 318-201 ■  |
| Range                 | 0 - 50mm   |
| Resolution            | 0.001mm, 0.0001mm (switchable)   |
| Accuracy              | 1μm  |
| Repeatability (σ)     | 0.08μm (normal measurement mode)   |
| Measuring force       | 0.01N (1gf)  |
| Spindle up/down speed | Normal feed: 3mm/s<br>Fast feed: 10mm/s  |
| Contact point         | Ø3mm carbide steel ball (interchangeable)  |
| Workpiece table       | Ø100mm ceramic (grooved replaceable)   |
| Display               | LED  |
| Functions             | Zero-setting, Presetting, MAX/MIN measurement, Runout (TIR) measurement, Data hold, Inch/mm conversion (on inch/mm model only) |
| Data output           | SPC  |
| Power supply          | 85 - 264V AC, 50/60Hz  |
| Mass                  | 19kg   |

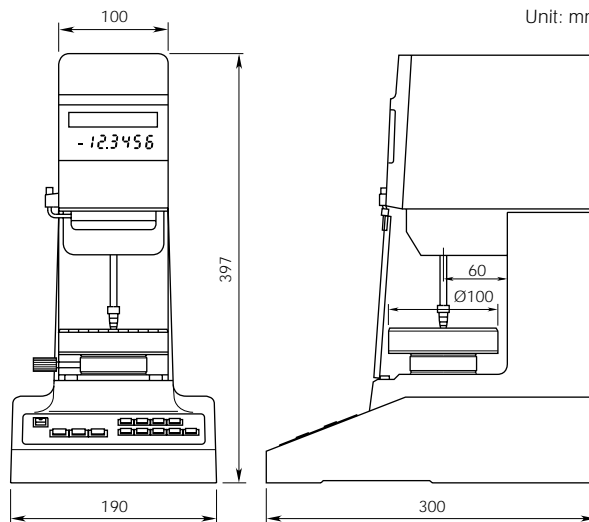
#### Inch / Metric

|                   |  |
|-------------------|--|
| Order No.         | 318-202 ■  |
| Range             | 0 - 2"   |
| Resolution        | .00005", .00001", 0.001mm, 0.0001mm (switchable) |
| Accuracy          | .00004"  |
| Repeatability (σ) | .000004" (normal measurement mode)               |

Note: To denote your AC line voltage fill the blank of order number with the following suffixes (e.g. 318-201A). A for 120V, D for 220V, E for 240V. No suffix is required for 100V.

### Dimensions

Unit: mm



### OPTIONAL ACCESSORIES

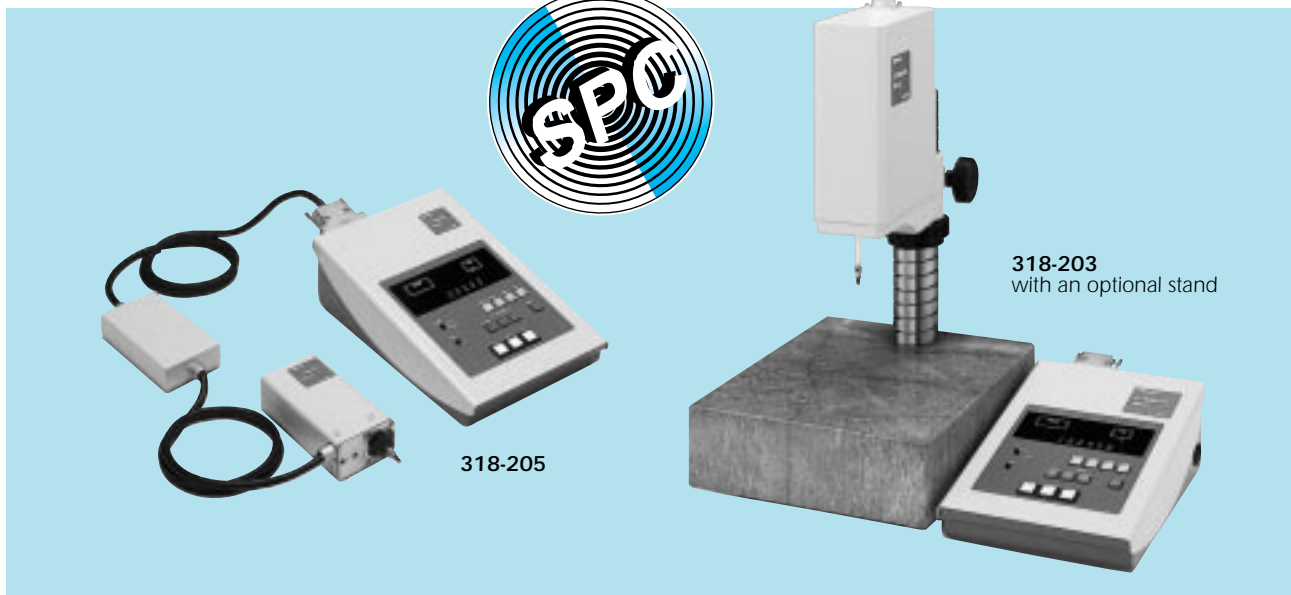
| Order No. | Description                                |
|-----------|--|
| 936937    | SPC cable (1m)                             |
| 965014    | SPC cable (2m)                             |
| 101118    | Contact point, Shell                       |
| 120066    | Contact point, Ø0.45mm needle (carbide)    |
| 120065    | Contact point, Ø1mm needle (carbide)       |
| 120064    | Contact point, Ø1.5mm needle (carbide)     |
| 137257    | Contact point, Ø2mm needle (carbide)       |
| 120059    | Contact point, Ø7mm spherical (carbide)    |
| 120060    | Contact point, Ø10.5mm spherical (carbide) |

Note: Measuring force varies (0.01N - 0.06N) according to the interchangeable contact point selected.

3456  
1234

## Litematic Head

### SERIES 318



318-205

318-203  
with an optional stand

### FEATURES

- Two-piece version of Mitutoyo's popular, low force table-top measuring instrument Litematic.
- The measuring unit can be mounted onto fixtures or an optional stand to allow great flexibility of use.

### SPECIFICATIONS

#### Metric

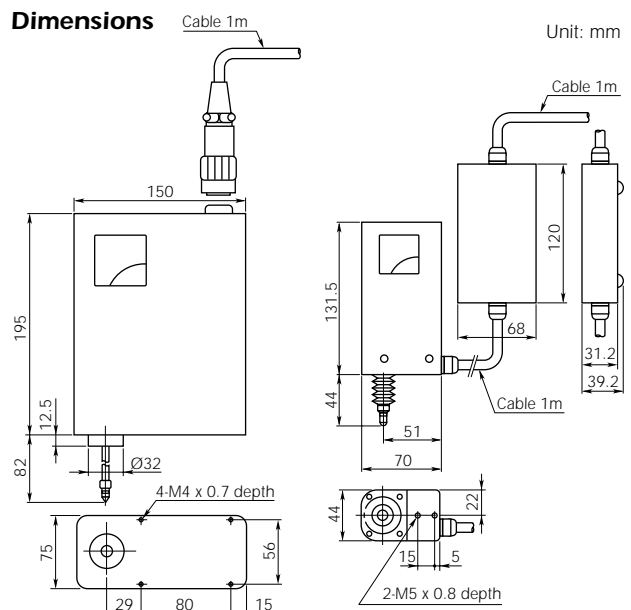
| Order No.             | 100V AC  | 318-203  | 318-205               |
|-----------------------|--|----------|-----------------------|
|                       | 120V AC  | 318-203A | 318-205A              |
|                       | 220V AC  | 318-203D | 318-205D              |
|                       | 240V AC  | 318-203E | 318-205E              |
| Range                 | 0 - 50mm   |          | 0 - 5mm               |
| Resolution            | 0.001mm, 0.0001mm (switchable)   |          |                       |
| Accuracy              | 1μm  |          |                       |
| Repeatability (σ)     | 0.08μm (normal measurement mode)   |          |                       |
| Measuring force       | 0.01N (1gf)  |          | 0.1N (10gf)           |
| Spindle up/down speed | Normal feed: 3mm/s   |          | Normal feed: 3mm/s    |
|                       | Fast feed: 10mm/s  |          | Fast feed: 18mm/s     |
| IP protection level   | (Not guaranteed)   |          | IP-64*                |
| Contact point         | Ø3mm carbide ball (interchangeable)  |          |                       |
| Display               | LED  |          |                       |
| Functions             | Zero-setting, Presetting, MAX/MIN measurement, Runout (TIR) measurement, Data hold, Inch/mm conversion (on inch/mm model only) |          |                       |
| Data output           | SPC  |          |                       |
| Power supply          | 85 - 264V AC, 50/60Hz  |          |                       |
| Mass                  | Measuring unit: 2.7kg  |          | Measuring unit: 1.7kg |
|                       | Display unit: 2.2kg  |          | Display unit: 2.2kg   |

\*Measuring unit only

#### Inch / Metric

| Order No.         | 100V AC  | 318-204  | 318-206  |
|-------------------|--|----------|----------|
|                   | 120V AC  | 318-204A | 318-206A |
|                   | 220V AC  | 318-204D | 318-206D |
|                   | 240V AC  | 318-204E | 318-206E |
| Range             | 0 - 2"   |          | 0 - .2"  |
| Resolution        | .00005", .00001", 0.001mm, 0.0001mm (switchable) |          |          |
| Accuracy          | .00004"  |          |          |
| Repeatability (σ) | .000004" (normal measurement mode)               |          |          |

### Dimensions



Measuring unit of 318-203

Measuring unit of 318-205

- Display unit: 180(W)x258(D)x84(H)mm

### OPTIONAL ACCESSORIES

| Order No. | Description  |
|-----------|--|
| 936937    | SPC cable (1m)   |
| 965014    | SPC cable (2m)   |
| 957460    | 300x250mm granite stand with bracket (957463)          |
| 957463    | Bracket for 0-50mm/2" type Litematic Head              |
| 215-155   | Granite comparator stand (Bracket 957463 is required.) |
| 101118    | Contact point, Shell                                   |
| 120066    | Contact point, Ø0.45mm needle (Carbide)                |
| 120065    | Contact point, Ø1mm needle (Carbide)                   |
| 120064    | Contact point, Ø1.5mm needle (Carbide)                 |
| 137257    | Contact point, Ø2mm needle (Carbide)                   |
| 120059    | Contact point, Ø7mm ball (Carbide)                     |
| 120060    | Contact point, Ø10.5mm ball (Carbide)                  |

Note: Measuring force varies according to the interchangeable contact point selected.



# Neo-Derm

## SERIES 179

### Electronic Coating Thickness Gage



179-701

### FEATURES

- Battery operated, compact coating thickness gage.
- A set of calibration films and a metallic base is provided for each Neo-Derm.
- Measures the thickness of nonmagnetic coating on magnetic substrata or a layer of nonconductive material on nonmagnetic substrata.

### SPECIFICATIONS

#### Neo-Derm Metric

| Order No.                          | 179-700  | 179-701  | 179-702  | 179-721  |
|------------------------------------|--|--|--|--|
| Applications                       | Nonmagnetic coatings on magnetic substrata       | Nonmagnetic coatings on magnetic substrata         | Nonmagnetic coatings on magnetic substrata         | Nonconductive coatings on nonmagnetic substrata* |
| Range                              | 0 - 50µm   | HIGH: 0 - 100µm<br>LOW: 50 - 500µm                 | HIGH: 0 - 600µm<br>LOW: 0.5 - 2mm                  | HIGH: 0 - 100µm<br>LOW: 0 - 500µm                |
| Accuracy                           | ±1µm (up to 20µm),<br>±5% of reading (over 20µm) | ±1.5µm (up to 30µm),<br>±5% of reading (over 30µm) | ±2.5µm (up to 50µm),<br>±5% of reading (over 50µm) | ±3% of full scale                                |
| Minimum coating area               | Ø5mm   | Ø5mm   | Ø5mm   | Ø8mm   |
| Minimum radius of curved workpiece | Convex: 3mm<br>Concave: 25mm                     | Convex: 3mm<br>Concave: 25mm                       | Convex: 3mm<br>Concave: 25mm                       | Convex: 7mm<br>Concave: 25mm                     |
| Calibration films provided         | 25µm, 50µm                                       | 25µm, 50µm, 100µm,<br>250µm, 250µm                 | 100µm, 250µm, 0.5mm,<br>1.0mm, 2.0mm               | 25µm, 50µm, 100µm,<br>250µm, 250µm               |
| Power supply                       | Battery (9V DC)/via AC adapter (optional)        |  |  |  |
| Dimensions (WxDxH)                 | 106x62x163mm                                     |  |  |  |
| Mass                               | 600g   |  |  |  |

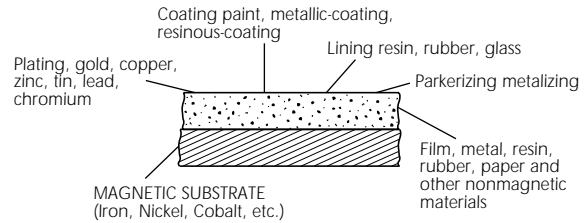
\* Measurement is impossible if the substrate is an austenitic stainless steel.

#### Inch/Metric

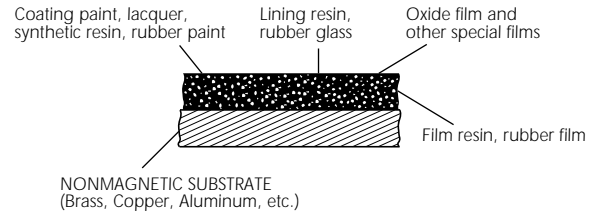
| Order No.    | — | 179-711  | 179-712   | — |
|--------------|---|--|---|---|
| Applications |   | Nonmagnetic coatings on magnetic substrata               | Nonmagnetic coatings on magnetic substrata              |   |
| Range        |   | HIGH: 0 - .004"/0 - 100µm<br>LOW: .002"-.02"/50-500µm    | HIGH: 0 - .025"/0 - 600µm<br>LOW: .02" - .08"/0.5 - 2mm |   |
| Accuracy     |   | ±.00006" (up to .0012"),<br>±5% of reading (over .0012") | ±.0001" (up to .002"),<br>±5% of reading (over .002")   |   |

### APPLICATIONS

#### Nonmagnetic coatings on magnetic substrata



#### Nonconductive coatings on nonmagnetic substrata



### OPTIONAL ACCESSORIES

| Order No. | Description                                       |
|-----------|---|
| 732135*   | Special probe for inside wall measurement of bore |
| 526688    | AC adapter (100V AC)                              |
| 526688A   | AC adapter (120V AC)                              |
| 526688D   | AC adapter (220V AC)                              |
| 526688E   | AC adapter (220/240V AC)                          |

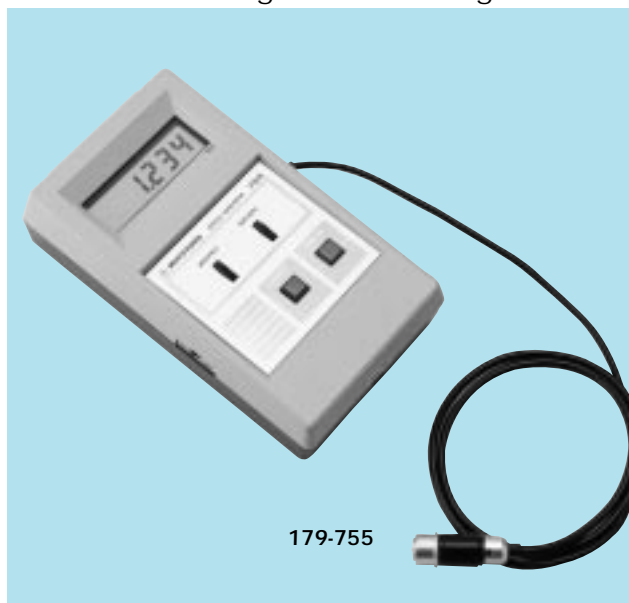
\*Cannot be used with 179-721.

3456  
1234

## Digi-Derm

### SERIES 179

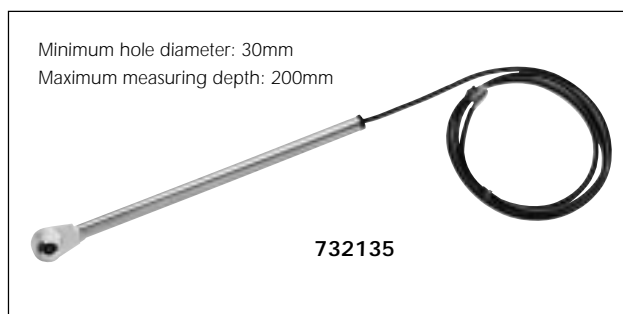
#### Electronic Coating Thickness Gage



179-755

#### FEATURES

- Measurements are displayed on the clear LCD screen and can be output for SPC data analysis.
- Battery powered for portable use and can also operate on AC power with an optional adapter.
- A set of calibration films and a metallic base is provided for each Digi-Derm.
- Special probe for measuring the coating thickness on the inside wall of bores is optional (732135).



Minimum hole diameter: 30mm  
Maximum measuring depth: 200mm

732135

#### SPECIFICATIONS

##### Digi-Derm Metric

| Order No.                       | 179-745*   | 179-755  |
|---------------------------------|--|--|
| Applications                    | Nonmagnetic coatings on magnetic substrata   | Nonconductive coatings on nonmagnetic substrata**  |
| Range                           | 0 - 1.5mm  | 0 - 1.0mm  |
| Resolution                      | 0.001mm  | 0.001mm  |
| Accuracy                        | ±2µm (up to 0.1mm),<br>±2% of readout (up to 1.1mm over 0.1mm),<br>±3% of readout (over 1.1mm) | ±2µm (up to 0.1mm),<br>±2% of readout (over 0.1mm) |
| Min. coating area               | Ø5mm   | Ø8mm   |
| Min. radius of curved workpiece | Convex: 3mm<br>Concave: 25mm   | Convex: 7mm<br>Concave: 25mm                       |
| Calibration films provided      | 25µm, 50µm, 100µm, 250µm, 0.5mm, 1.0mm, 1.5mm  | 25µm, 50µm, 100µm, 250µm, 0.5mm, 1.0mm             |
| Display                         | LCD  |  |
| Data output                     | SPC  |  |
| Power supply                    | 4 batteries (6V DC)/via AC adapter (optional)  |  |
| Dimensions (WxDxH)              | 100x44x180mm   |  |
| Mass                            | 500g   |  |

\*Economy model without SPC output (179-741) is also available.  
\*\*Measurement is impossible if the substrate is an austenitic stainless steel.

##### Inch/Metric

| Order No.    | 179-746  | 179-756  |
|--------------|--|--|
| Applications | Nonmagnetic coatings on magnetic substrata   | Nonconductive coatings on nonmagnetic substrata**        |
| Range        | 0 - .059"  | 0 - .039"  |
| Resolution   | .00005"/0.001mm  | .00005"/0.001mm  |
| Accuracy     | ±.00008" (up to .0039"),<br>±2% of readout (up to .043" over .0039"),<br>±3% of readout (over .043") | ±.00008" (up to .0039"),<br>±2% of readout (over .0039") |

\*\*Measurement is impossible if the substrate is an austenitic stainless steel.

#### OPTIONAL ACCESSORIES

| Order No. | Description                                       |
|-----------|---|
| 936937    | SPC cable (1m)                                    |
| 965014    | SPC cable (2m)                                    |
| 732135*   | Special probe for inside wall measurement of bore |
| 528041    | AC adapter (100V AC)                              |
| 528041A   | AC adapter (120V AC)                              |
| 528041D   | AC adapter (220V AC)                              |
| 528041E   | AC adapter (220/240V AC)                          |

\*Cannot be used with 179-755 or 179-756.

#### Consumables of Neo-Derm/Digi-Derm

| Order No. | Description  | Qty.  |
|-----------|--|-------|
| 527599    | Calibration film (25µm)  | 1 pc. |
| 527600    | Calibration film (50µm)  | 1 pc. |
| 527601    | Calibration film (100µm)   | 1 pc. |
| 527602    | Calibration film (250µm)   | 1 pc. |
| 527603    | Calibration film (0.5mm)   | 1 pc. |
| 527604    | Calibration film (1.0mm)   | 1 pc. |
| 527605    | Calibration film (2.0mm)   | 1 pc. |
| 685013    | Calibration film (1.5mm)   | 1 pc. |
| 933038    | Metallic base for calibration film (Magnetic)                        | 1 pc. |
| 937305    | Metallic base for calibration film (Nonmagnetic)                     | 1 pc. |
| 937287    | Calibration film set (25µm, 50µm)                                    | 1 set |
| 937288    | Calibration film set (25µm, 50µm, 100µm, 250µm, 250µm)               | 1 set |
| 937289    | Calibration film set (100µm, 250µm, 0.5mm, 1.0mm, 2.0mm)             | 1 set |
| 945014    | Calibration film set (25µm, 50µm, 100µm, 250µm, 0.5mm, 1.0mm, 1.5mm) | 1 set |
| 945049    | Calibration film set (25µm, 50µm, 100µm, 250µm, 0.5mm, 1.0mm)        | 1 set |

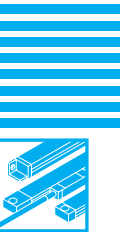
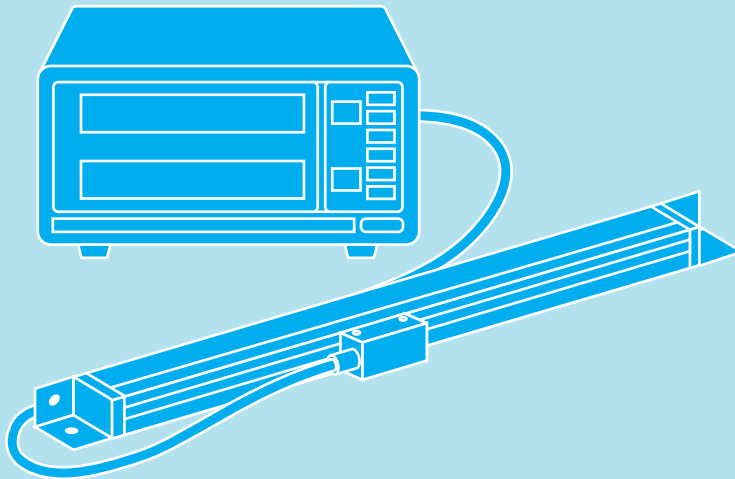
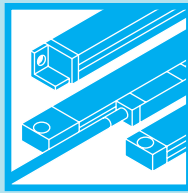




3456  
1234

# Digimatic Scale Units Pages 312 — 315

## Linear Scales Pages 316 — 330





# Digimatic Scale Units

## SERIES 572

### Simplified Key Function Type



### FEATURES

- The ORIGIN key allows setting of an absolute zero point to be used as reference in subsequent measurements. Once set, the ABS Digimatic Scale Unit is ready to show its true position whenever turned on rather than "0.00" as with standard models.
- The ZERO/ABS key allows the display to be zero-set at any slider position along the beam for incremental comparison measurements. This key will also allow return to the absolute coordinate with a display of the true position from the origin point.
- All units come with two mounting brackets, each located at either end of the scale.
- Add-on Data Hold Unit (959143) is optional.

### SPECIFICATIONS

#### Horizontal

##### Metric

| Resolution | Range | Order No.  | Accuracy | Mass |
|------------|-------|------------|----------|------|
| 0.01mm     | 100mm | 572-200-10 | 0.03mm   | 230g |
|            | 150mm | 572-201-10 | 0.03mm   | 250g |
|            | 200mm | 572-202-10 | 0.03mm   | 270g |
|            | 300mm | 572-203-10 | 0.04mm   | 370g |

##### Inch / Metric

| Resolution | Range       | Order No.  | Accuracy | Mass     |
|------------|-------------|------------|----------|----------|
| .0005"/    | 4" (100mm)  | 572-210-10 | .001"    | .51 lbs. |
| 0.01mm     | 6" (150mm)  | 572-211-10 | .001"    | .55 lbs. |
|            | 8" (200mm)  | 572-212-10 | .001"    | .59 lbs. |
|            | 12" (300mm) | 572-213-10 | .002"    | .81 lbs. |

#### Vertical

##### Metric

| Resolution | Range | Order No.  | Accuracy | Mass |
|------------|-------|------------|----------|------|
| 0.01mm     | 100mm | 572-300-10 | 0.03mm   | 250g |
|            | 150mm | 572-301-10 | 0.03mm   | 280g |
|            | 200mm | 572-302-10 | 0.03mm   | 310g |
|            | 300mm | 572-303-10 | 0.04mm   | 370g |

##### Inch / Metric

| Resolution | Range       | Order No.  | Accuracy | Mass     |
|------------|-------------|------------|----------|----------|
| .0005"/    | 4" (100mm)  | 572-310-10 | .001"    | .55 lbs. |
| 0.01mm     | 6" (150mm)  | 572-311-10 | .001"    | .62 lbs. |
|            | 8" (200mm)  | 572-312-10 | .001"    | .68 lbs. |
|            | 12" (300mm) | 572-313-10 | .002"    | .81 lbs. |

Mitutoyo's new ABSOLUTE Digimatic Scale Unit offers special functions which allow it to always remember its measuring position even after the gage has been switched off.

#### Technical Data

**Display:** LCD

**Functions:** Origin-set, zero-set, power on/off, inch/mm conversion (inch/mm type only), SPC data output, data hold (optional)

**Battery:** SR44 (938882) x 1pc.

**Battery life:** Approx. 3.5 years under normal use

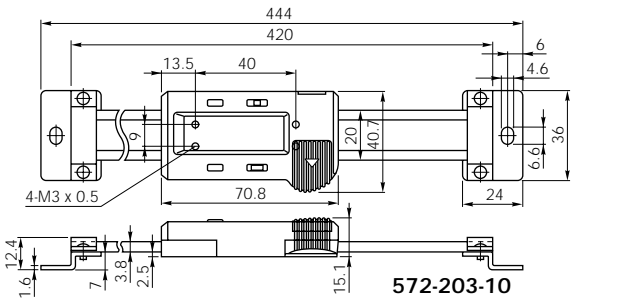
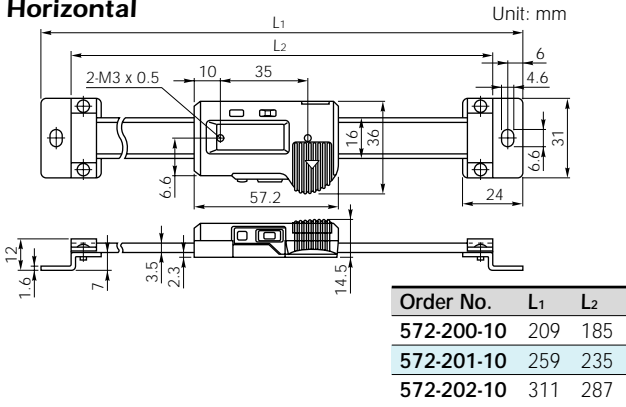
**Maximum response speed:** Unlimited

**Alarm:** Low battery voltage, scale contamination, counting value composition error

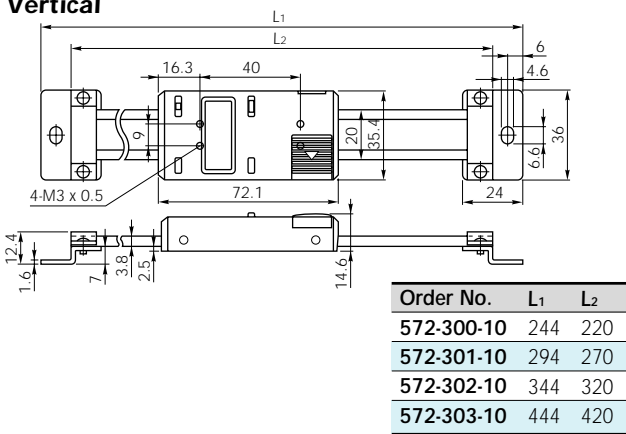
**Operating temperature:** 0°C to 40°C

## Dimensions

### Horizontal

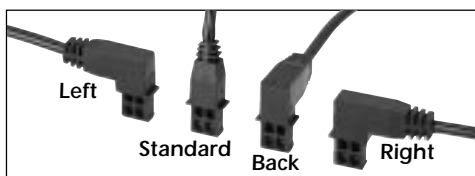


### Vertical



## OPTIONAL ACCESSORIES

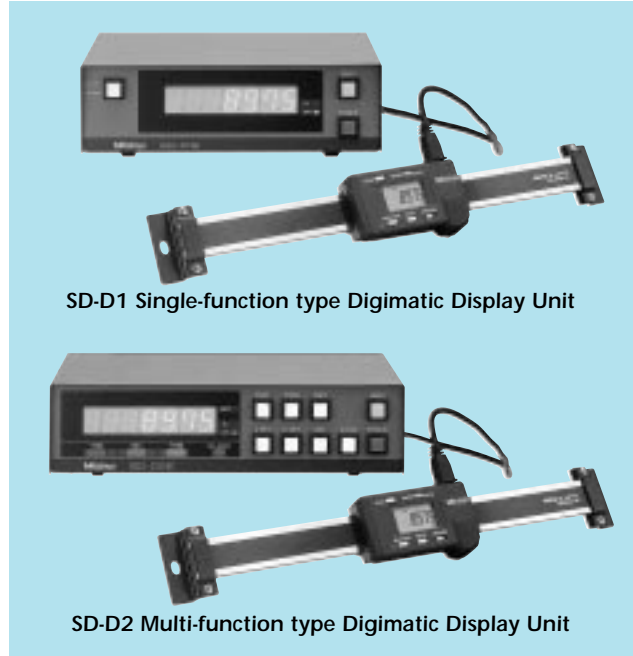
| Order No. | Description                     |
|-----------|---------------------------------|
| 959143    | Data Hold Unit                  |
| 905338    | SPC cable (1m, standard)        |
| 905409    | SPC cable (2m, standard)        |
| 905689    | SPC cable (1m, L-shape, back)   |
| 905690    | SPC cable (2m, L-shape, back)   |
| 905691    | SPC cable (1m, L-shape, right)  |
| 905692    | SPC cable (2m, L-shape, right)  |
| 905693    | SPC cable (1m, L-shape, left)   |
| 905694    | SPC cable (2m, L-shape, left)   |
| 959149    | SPC cable with data switch (1m) |
| 959150    | SPC cable with data switch (2m) |



## Digimatic Display Units

### SERIES 572

Remote Display Counters with Bright LED for Digimatic Scale Unit



The Digimatic Display Unit offers a large LED display for a Digimatic Scale Unit. The bright LED readout is ideal for low-light situations or when the scale unit must be inserted into an area where its own display cannot be viewed directly. Two types of single-function and multi-function are available on the Digimatic Display Unit.

## SPECIFICATIONS

### Metric

| Model No.        | SD-D1  | SD-D2  |
|------------------|--|--|
| Order No.        | 100V AC 572-001<br>110V AC 572-001A<br>120V AC 572-001D<br>240V AC 572-001E                                  | 572-021<br>572-021A<br>572-021D<br>572-021E  |
| Scale input port | 1  |  |
| Display          | 6-digit green LED  |  |
| Functions        | <ul style="list-style-type: none"> <li>Zero-setting</li> <li>SPC data output</li> <li>Error alarm</li> </ul> | <ul style="list-style-type: none"> <li>Zero-setting</li> <li>SPC data output</li> <li>Error alarm</li> <li>Presetting</li> <li>GO/±NG judgment</li> <li>GO/±NG output</li> <li>Counting direction switching</li> </ul> |
| Power supply     | 9V DC, 500mA (via AC adapter)  |  |
| Dimensions       | 200(W)X120(D)X66(H)mm  | 236(W)X120(D)X66(H)mm  |
| Mass             | 1.1kg  | 1.3kg  |

### Inch / Metric

| Model No. | SD-D1E  | SD-D2E                                      |
|-----------|---|---|
| Order No. | 100V AC 572-011<br>110V AC 572-011A<br>120V AC 572-011D<br>240V AC 572-011E | 572-031<br>572-031A<br>572-031D<br>572-031E |

# Digimatic Display Units

## SERIES 572

Multiple Key Function type



Mitutoyo's new ABSOLUTE Digimatic Scale Units can be installed on almost any equipment, offering the user precise linear measurement capability with the added benefits of LCD readout and output for recording data and SPC.

### FEATURES

- No rack, no pinion, no glass scale. Digimatic Scale Unit is safely embedded in the hardened stainless steel blade.
- Horizontal or vertical face according to the scale mounting direction.
- Once an absolute zero (origin) point is set, the Digimatic Scale Unit shows its absolute distance from the point whenever turned on rather than "0.00".
- Special type that is provided with diameter displaying function is available for lathes.
- All units come with two mounting brackets, each located at either end of the scale.
- With a data output for connection with an optional remote display counter (Digimatic Display Unit).

### SPECIFICATIONS

#### Metric

| Resolution | Range  | Order No.  |          | Accuracy | Mass  |
|------------|--------|------------|----------|----------|-------|
|            |        | Horizontal | Vertical |          |       |
| 0.01mm     | 100mm  | 572-460    | 572-560  | 0.03mm   | 250g  |
|            |        | 572-480*   | 572-580* |          |       |
|            | 150mm  | 572-461    | 572-561  | 0.03mm   | 280g  |
|            |        | 572-481*   | 572-581* |          |       |
|            | 200mm  | 572-462    | 572-562  | 0.03mm   | 310g  |
|            |        | 572-482*   | 572-582* |          |       |
|            | 300mm  | 572-463    | 572-563  | 0.04mm   | 370g  |
|            |        | 572-483*   | 572-583* |          |       |
|            | 450mm  | 572-464    | 572-564  | 0.04mm   | 760g  |
|            |        | 572-484*   | 572-584* |          |       |
|            | 600mm  | 572-465    | 572-565  | 0.05mm   | 900g  |
|            |        | 572-485*   | 572-585* |          |       |
|            | 800mm  | 572-466    | 572-566  | 0.06mm   | 1710g |
|            |        | 572-486*   | 572-586* |          |       |
|            | 1000mm | 572-467    | 572-567  | 0.07mm   | 2040g |
|            |        | 572-487*   | 572-587* |          |       |

\*Special type with diameter displaying function for lathe (Counting direction switching function is not provided.)

### Technical Data

**Display:** LCD

**Functions:** Origin-set, zero-set, ABS/INC coordinate switching, presetting, power on/off, counting direction switching (standard type only), inch/mm conversion (inch/mm type only), SPC data output, data hold, diameter display (special type only)

**Battery:** SR44 (938882) x 1pc.

**Battery life:** Approx. 5000 hours under normal use

**Maximum response speed:** Unlimited

**Alarm:** Low battery voltage, scale contamination error, counting value composition error, over flow error

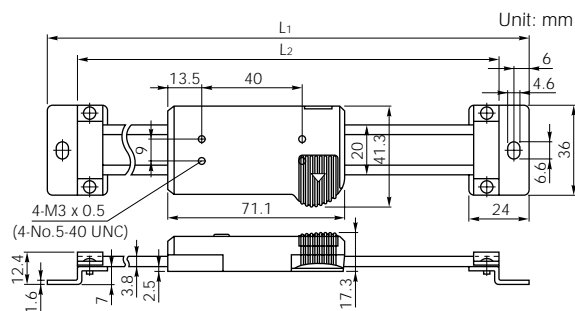
**Operating temperature:** 0°C to 40°C

## Inch / Metric

| Resolution         | Range       | Order No.  |          | Accuracy  | Mass      |
|--------------------|-------------|------------|----------|-----------|-----------|
|                    |             | Horizontal | Vertical |           |           |
| .0005" /<br>0.01mm | 4" (100mm)  | 572-470    | 572-570  | .001"     | 0.55 lbs. |
|                    |             | 572-490*   | 572-590* |           |           |
|                    | 6" (150mm)  | 572-471    | 572-571  | .001"     | 0.62 lbs. |
|                    |             | 572-491*   | 572-591* |           |           |
|                    | 8" (200mm)  | 572-472    | 572-572  | .001"     | 0.68 lbs. |
|                    |             | 572-492*   | 572-592* |           |           |
|                    | 12" (300mm) | 572-473    | 572-573  | .002"     | 0.81 lbs. |
|                    |             | 572-493*   | 572-593* |           |           |
|                    | 18" (450mm) | 572-474    | 572-574  | .002"     | 1.67 lbs. |
|                    |             | 572-494*   | 572-594* |           |           |
|                    | 24" (600mm) | 572-475    | 572-575  | .002"     | 1.98 lbs. |
|                    |             | 572-495*   | 572-595* |           |           |
|                    | 32" (800mm) | 572-476    | 572-576  | .0025"    | 3.76 lbs. |
|                    |             | 572-496*   | 572-596* |           |           |
| 40" (1000mm)       | 572-477     | 572-577    | .0025"   | 4.49 lbs. |           |
|                    | 572-497*    | 572-597*   |          |           |           |

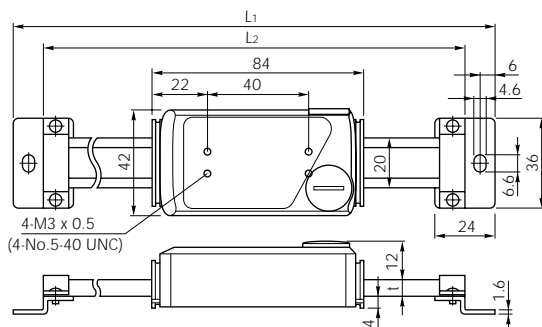
\*Special type with diameter displaying function for lathe (Counting direction switching function is not provided.)

## Dimensions



| Range | L <sub>1</sub> | L <sub>2</sub> |
|-------|----------------|----------------|
| 100mm | 244            | 220            |
| 150mm | 294            | 270            |
| 200mm | 344            | 320            |
| 300mm | 444            | 420            |

Note: The dimensions are different between the vertical model and the horizontal model. The figure shown left represents the dimensions of the horizontal Digimatic Scale Units.



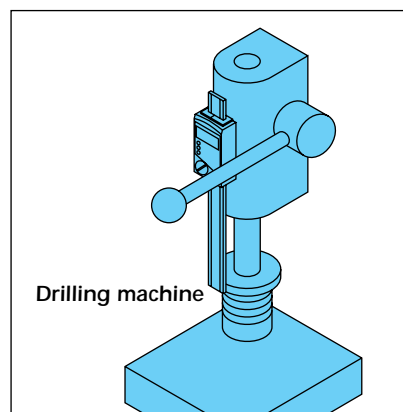
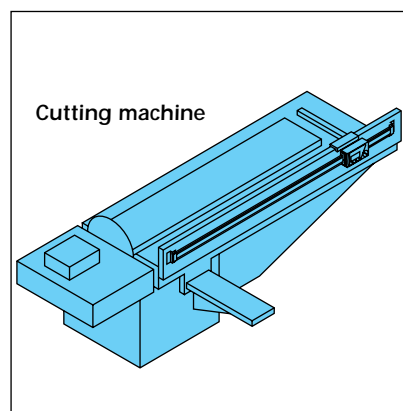
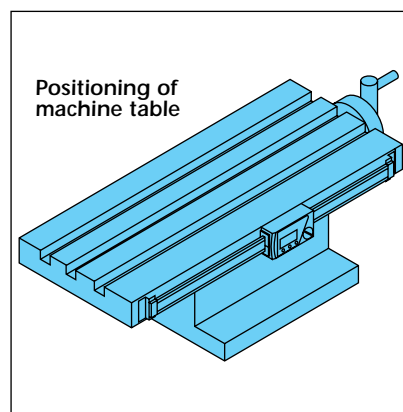
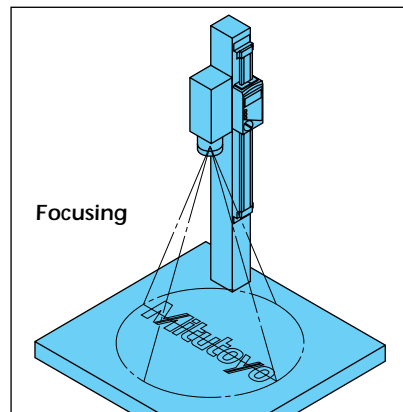
| Range  | L <sub>1</sub> | L <sub>2</sub> | t  |
|--------|----------------|----------------|----|
| 450mm  | 594            | 570            | 6  |
| 600mm  | 774            | 750            | 6  |
| 800mm  | 974            | 950            | 10 |
| 1000mm | 1174           | 1150           | 10 |

Note: The dimensions are compatible for both vertical and horizontal models in any of the standard type and the special type.

## OPTIONAL ACCESSORIES

| Order No.       | Description             |
|-----------------|-------------------------|
| (See page 313.) | SPC cables              |
| (See page 313.) | Digimatic Display Units |

## APPLICATIONS



# Linear Scale

## Digital Readout System



The Mitutoyo Linear Scale is a digital readout system that accurately detects and displays the displacement of machine tools or measuring equipment. The optimum system, to meet your specific application, can be selected from a wide range

of scale sizes and a wide variety of counters. High-precision Linear Scales and their interface units for the feedback system of NC machine tools, and custom-tailored scale for special applications are also available.

### Scale Units

**AT115**  
Economy Type Slim Spars  
Ranging from 100mm up to 1500mm

**AT102**  
Standard-size Spars  
Ranging from 100mm up to 6000mm

**AT111**  
Slim Spars  
Ranging from 100mm up to 1500mm

**AT112**  
Super Slim Spars  
Ranging from 50mm up to 1020mm

**AT181**  
Plunger Type  
Ranging from 100mm up to 600mm

### Display Units

**KL Counter**  
Standard Type  
for Milling Machine

**KLL Counter**  
Standard Type for Lathe

**KM Counter**  
Multi-function Type

**KC Counter**  
Multi-function Type  
with Data Output

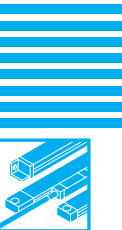
**KS Counter**  
Standard Type for Lathe

**KLD Counter**  
Special purpose Type  
with Limit Signal Output

## Display Unit Functions

| Functions                                 | KL Counter | KLL Counter | KM Counter | KC Counter | KS Counter | KLD Counter |
|---|------------|-------------|------------|------------|------------|-------------|
| Zero-setting                              | ●          | ●           | ●          | ●          | ●          | ●           |
| Zero-set remote controller                | —          | —           | ○          | ○          | ○          | —           |
| Preset                                    | ●          | ●           | ●          | ●          | ●          | ●           |
| Resolution setting                        | ●          | ●           | ●          | ●          | ●          | ●           |
| Counting direction setting                | ●          | ●           | ●          | ●          | ●          | ●           |
| mm/inch conversion                        | ●          | ●           | ●          | ●          | ●          | ●           |
| 1/2 calculation                           | ●          | ●           | ●          | ●          | ●          | ●           |
| ABS/INC coordinate selection              | ●          | ●           | ●          | ●          | ●          | —           |
| Lower digit blanking out                  | ●          | ●           | ●          | ●          | ●          | ●           |
| Memory backup                             | ●          | ●           | ●          | ●          | —          | ●           |
| Expansion/contraction coefficient setting | —          | —           | ●          | ●          | —          | ●           |
| Zero approach machining (ABS mode)        | —          | —           | ●          | ●          | —          | —           |
| Zero approach machining (INC mode)        | ●          | ●           | ●          | ●          | —          | —           |
| Bolt-hole circle machining                | ●          | —           | ●          | ●          | —          | —           |
| Touch-signal probe                        | ○          | —           | ○          | ○          | —          | ○           |
| Scale reference point setting             | ●          | ●           | ●          | ●          | —          | ●           |
| Addition/subtraction                      | —          | —           | ●          | ●          | —          | —           |
| Maximum/minimum value hold                | —          | —           | —          | —          | —          | ●           |
| Diameter display                          | ●          | ●           | ●          | ●          | ●          | ●           |
| Addition of 2-scale data                  | ●          | ●           | ●          | ●          | ●          | —           |
| Direct data entry with Digimatic gage     | —          | —           | ●          | ●          | —          | —           |
| Cutting tool selection                    | —          | ●           | ●          | ●          | —          | —           |
| Coordinate data copy                      | —          | —           | ●          | ●          | —          | —           |
| One-touch macro keys                      | —          | —           | ●          | ●          | —          | —           |
| Part-program setting                      | —          | —           | ●          | ●          | —          | —           |
| Programmable remote controller            | —          | —           | ○          | ○          | —          | —           |
| Linearity error compensation              | ●          | ●           | ●          | ●          | ●          | ●           |
| Pitch error compensation                  | —          | —           | ●          | ●          | —          | —           |
| Lost motion compensation                  | —          | —           | ●          | ●          | —          | —           |
| Smoothing                                 | —          | ●           | ●          | ●          | ●          | ●           |
| RS-232C Interface Unit                    | ○          | ○           | —          | ○          | ○          | ○           |
| Limit signal output via RS-232C           | —          | —           | —          | ○          | —          | —           |
| BCD Code Out                              | —          | —           | —          | ○          | —          | ○           |
| Digimatic Code Out                        | —          | —           | —          | ○          | —          | —           |
| GP-IB Interface                           | —          | —           | —          | ○          | —          | —           |
| Limit signal output                       | —          | —           | —          | ○          | —          | ●           |

●: Provided as standard, ○: Optional accessory, —: Not available



## KL Counter

### SERIES 174

Standard Type for Milling Machine



174-163

Even at an affordable price the KL Counter offers a variety of easy-to-use functions, including zero-setting, presetting, ABS/INC coordinate switching, mm/inch conversion, radius/diameter display, touch-signal probe input, zero approach machining, bolt-hole-circle machining, and memory backup.

#### FEATURES

- Resolution can be selected among 0.005mm, 0.001mm, and 0.01mm by parameter setting.
- RS-232C data output is optional.

#### SPECIFICATIONS

##### KL Counter

###### Inch/Metric

| Order No.             | 100V AC   | 174-161  | 174-163  | 174-165  |
|-----------------------|---|----------|----------|----------|
|                       | 120V AC   | 174-161A | 174-163A | 174-165A |
|                       | 230V AC   | 174-161D | 174-163D | 174-165D |
|                       | 240V AC*  | 174-161E | 174-163E | 174-165E |
|                       | 240V AC**   | 174-161F | 174-163F | 174-165F |
| Scale input ports     | 1   | 2        | 3        |          |
| Resolution            | 0.001mm, 0.005mm, 0.01mm, .0001", .0005", .001"   |          |          |          |
| Display               | 7-digit LED and a negative [-] sign   |          |          |          |
| Functions             | Zero-setting, preset, counting direction setting, mm/inch conversion, 1/2 calculation, ABS/INC coordinate selection, diameter display, addition of 2-scale data, zero approach machining, bolt-hole circle machining, touch-signal probe input, memory backup |          |          |          |
| Power supply          | 100V-240V AC, 50/60Hz   |          |          |          |
| Operating temperature | 0°C to 40°C   |          |          |          |
| Dimensions (WxDxH)    | 276x100x177mm   |          |          |          |
| Mass                  | 2.4kg   |          |          |          |

\*For UK/\*\* For Australia

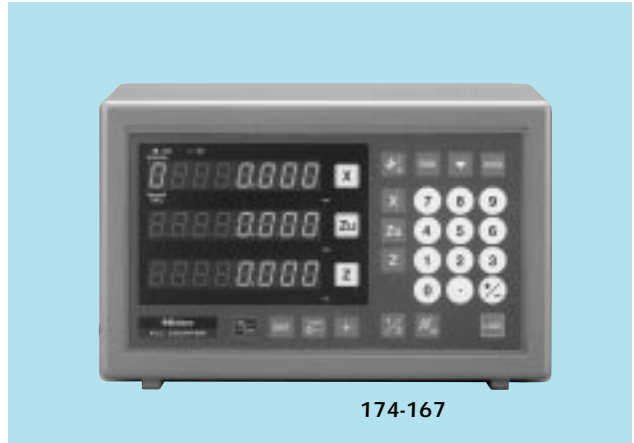
#### OPTIONAL ACCESSORIES

| Order No. | Description                               |
|-----------|---|
| 09CAA954  | RS-232C Interface Unit                    |
| 938140    | Touch-signal probe (shank diameter: 20mm) |
| 935094    | Touch-signal probe (shank diameter: 32mm) |

## KLL Counter

### SERIES 174

Standard Type for Lathe



174-167

With its design based on the KL Counter, the KLL Counter is a dedicated lathe-machining counter with convenient functions.

#### FEATURES

- By the 2-scale data addition function, a total value of readings by the two scales is displayed as a displacement on the Z-axis; one scale is attached on the fine-feed table and the other to the coarse-feed table.
- Can store offset values of a maximum of 10 different kinds of cutting tools in the memory. This eliminates tedious value inputs when changing tools.

#### SPECIFICATIONS

##### KLL Counter

###### Inch/Metric

| Order No.             | 100V AC   | 174-167B |
|-----------------------|---|----------|
|                       | 120V AC   | 174-167A |
|                       | 230V AC   | 174-167D |
|                       | 240V AC*  | 174-167E |
|                       | 240V AC**   | 174-167F |
| Scale input ports     | 3   |          |
| Resolution            | 0.001mm, 0.002mm, 0.005mm, 0.01mm, .0001", .0002", .0005", .001"  |          |
| Display               | 7-digit LED and a negative [-] sign   |          |
| Functions             | Zero-setting, preset, counting direction setting, mm/inch conversion, 1/2 calculation, ABS/INC coordinate selection, diameter display, addition of 2-scale data, zero approach machining, cutting tool selection (up to 10 tools), smoothing, memory backup |          |
| Power supply          | 100V-240V AC, 50/60Hz   |          |
| Operating temperature | 0°C to 40°C   |          |
| Dimensions (WxDxH)    | 276x100x177mm   |          |
| Mass                  | 2.4kg   |          |

\*For UK/\*\* For Australia

#### OPTIONAL ACCESSORIES

| Order No. | Description            |
|-----------|------------------------|
| 09CAA954  | RS-232C Interface Unit |

## KM Counter

### SERIES 174

Display Unit for Linear Scale



174-113

## KC Counter

### SERIES 174

Display Unit for Linear Scale



174-125

### FEATURES

- Frequently used functions can be registered to one-touch macro keys for easy use with various applications, including milling, turning, and grinding.
- Suitable for use with a variety of machine tools.
- A Mitutoyo SPC gage, such as the Digimatic Micrometer, Digimatic Caliper, etc., can be connected for direct data entry. This function facilitates turning operation.
- Zero-setting remote controller is optional.

### FEATURES

- In addition to having the same functions of the KM Counter, the KC Counter allows connection to an external devices, such as a printer, personal computer, etc., with the optional data output unit.
- All the data output units are factory-installed-option. Specify the type of Interface Unit or Code Out Unit required when ordering a KC Counter.

### SPECIFICATIONS

#### KM Counter

##### Metric

| Order No.             | 100V AC   | 174-111                                     | 174-113  | 174-115  |
|-----------------------|-----------|---|----------|----------|
|                       | 120V AC   | 174-111A                                    | 174-113A | 174-115A |
|                       | 230V AC   | 174-111D                                    | 174-113D | 174-115D |
|                       | 240V AC*  | 174-111E                                    | 174-113E | 174-115E |
|                       | 240V AC** | 174-111F                                    | 174-113F | 174-115F |
| Scale input ports     |           | 1   | 2        | 3        |
| Resolution            |           | 0.0005mm, 0.001mm, 0.002mm, 0.005mm, 0.01mm |          |          |
| Display               |           | 8-digit LED and a negative [-] sign         |          |          |
| Functions             |           | (See page 317.)                             |          |          |
| Power supply          |           | 100-120V/200-240V AC, 50/60Hz               |          |          |
| Operating temperature |           | 0°C to 40°C                                 |          |          |
| Dimensions (WxDxH)    |           | 335x203x158mm                               |          |          |
| Mass                  |           | 3.3kg                                       | 3.4kg    | 3.5kg    |

\*For UK/\*\*For Australia

##### Inch/Metric

| Order No.         | 100V AC   | 174-112  | 174-114  | 174-116  |
|-------------------|-----------|--|----------|----------|
|                   | 120V AC   | 174-112A   | 174-114A | 174-116A |
|                   | 230V AC   | 174-112D   | 174-114D | 174-116D |
|                   | 240V AC*  | 174-112F   | 174-114F | 174-116F |
|                   | 240V AC** | 174-112E   | 174-114E | 174-116E |
| Scale input ports |           | 1  | 2        | 3        |
| Resolution        |           | .00002", .00005", .0001", .0002", .0005", .001", 0.0005mm, 0.001mm, 0.002mm, 0.005mm, 0.01mm |          |          |

\*For UK/\*\*For Australia

### SPECIFICATIONS

#### KC Counter

##### Metric

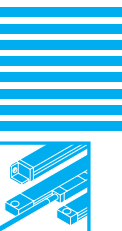
| Order No.             | 100V AC   | 174-121                                     | 174-123  | 174-125  |
|-----------------------|-----------|---|----------|----------|
|                       | 120V AC   | 174-121A                                    | 174-123A | 174-125A |
|                       | 230V AC   | 174-121D                                    | 174-123D | 174-125D |
|                       | 240V AC*  | 174-121E                                    | 174-123E | 174-125E |
|                       | 240V AC** | 174-121F                                    | 174-123F | 174-125F |
| Scale input ports     |           | 1   | 2        | 3        |
| Resolution            |           | 0.0005mm, 0.001mm, 0.002mm, 0.005mm, 0.01mm |          |          |
| Display               |           | 8-digit LED and a negative [-] sign         |          |          |
| Functions             |           | (See page 317.)                             |          |          |
| Power supply          |           | 100-120V/200-240V AC, 50/60Hz               |          |          |
| Operating temperature |           | 0°C to 40°C                                 |          |          |
| Dimensions (WxDxH)    |           | 335x203x158mm                               |          |          |
| Mass                  |           | 3.5kg                                       | 3.6kg    | 3.7kg    |

\*For UK/\*\*For Australia

##### Inch/Metric

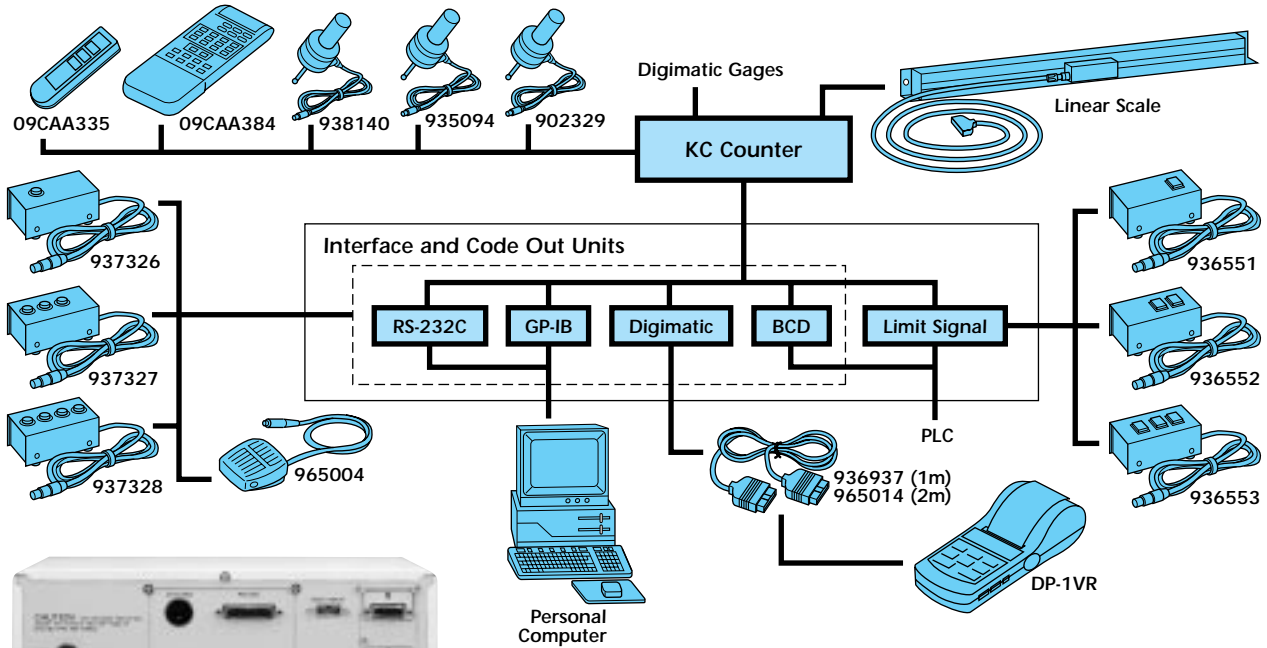
| Order No.         | 100V AC   | 174-122  | 174-124  | 174-126  |
|-------------------|-----------|--|----------|----------|
|                   | 120V AC   | 174-122A   | 174-124A | 174-126A |
|                   | 230V AC   | 174-122D   | 174-124D | 174-126D |
|                   | 240V AC*  | 174-122E   | 174-124E | 174-126E |
|                   | 240V AC** | 174-122F   | 174-124F | 174-126F |
| Scale input ports |           | 1  | 2        | 3        |
| Resolution        |           | .00002", .00005", .0001", .0002", .0005", .001", 0.0005mm, 0.001mm, 0.002mm, 0.005mm, 0.01mm |          |          |

\*For UK/\*\*For Australia





SYSTEM DIAGRAM



RS-232C Interface Unit



GP-IB Interface Unit



Parallel BCD (3-axis) Code Out



Digimatic Code Out



Limit Signal Output

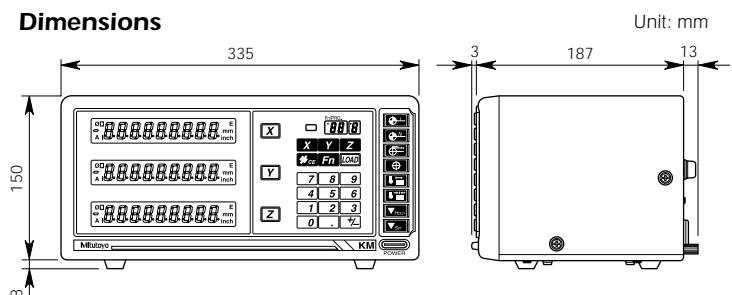
Data Output Units for KC Counter (Factory-installed-option)

| Order No. | Description                         |
|-----------|-------------------------------------|
| 09CAA402  | RS-232C Interface Unit              |
| 09CAA412  | Parallel BCD Code Out Unit (1-axis) |
| 09CAA424  | Parallel BCD Code Out Unit (2-axis) |
| 09CAA430  | Parallel BCD Code Out Unit (3-axis) |
| 09CAA452  | GP-IB Interface Unit                |
| 09CAA462  | Digimatic Code Out Unit             |
| 09CAA472  | Limit Signal Output Unit            |

OPTIONAL ACCESSORIES

| Order No. | Description                               |
|-----------|---|
| 09CAA335  | Zero-set remote controller                |
| 09CAA384  | Programmable remote controller            |
| 938140    | Touch-signal probe (shank diameter: 20mm) |
| 935094    | Touch-signal probe (shank diameter: 32mm) |
| 902329    | Touch-signal probe (shank diameter: .5")  |
| 937326    | External load box (1-axis)                |
| 937327    | External load box (2-axis)                |
| 937328    | External load box (3-axis)                |
| 965004    | External load foot switch (for all axes)  |
| 936551    | External zero-set box (1-axis)            |
| 936552    | External zero-set box (2-axis)            |
| 936553    | External zero-set box (3-axis)            |
| 936937    | SPC cable (1m)                            |
| 965014    | SPC cable (2m)                            |

Dimensions



Note: The dimensions are compatible between KM Counter and KC Counter.

## KS Counter

### SERIES 174

Display Unit for Linear Scale



### FEATURES

- The most basic and affordable display unit for AT100 Series Linear Scales.
- Suitable for use with measuring machines.
- Zero-setting remote controller is optional.
- RS-232C interface unit is available as optional accessory. (Not available on the 3-axis readout type.)

### SPECIFICATIONS

#### KS Counter

##### Metric

| Order No.             | 100V AC                             | 174-101-1     | 174-103-1     | 174-105  |
|-----------------------|-------------------------------------|---------------|---------------|----------|
|                       | 120V AC                             | 174-101-1A    | 174-103-1A    | 174-105A |
|                       | 230V AC                             | 174-101-1D    | 174-103-1D    | 174-105D |
|                       | 240V AC*                            | 174-101-1E    | 174-103-1E    | 174-105E |
|                       | 240V AC**                           | 174-101-1F    | 174-103-1F    | 174-105F |
| Scale input ports     |                                     | 1             | 2             | 3        |
| Resolution            | 0.0005mm, 0.001mm, 0.002mm, 0.005mm |               |               |          |
| Display               | 8-digit LED and a negative [-] sign |               |               |          |
| Functions             | <b>(See page 317.)</b>              |               |               |          |
| Power supply          | 100-120V/200-240V AC, 50/60Hz       |               |               |          |
| Operating temperature | 0°C to 40°C                         |               |               |          |
| Dimensions (WxDxH)    | 235x100x115mm                       | 235x100x115mm | 235x100x158mm |          |
| Mass                  | 1.9kg                               | 2kg           | 2.2kg         |          |

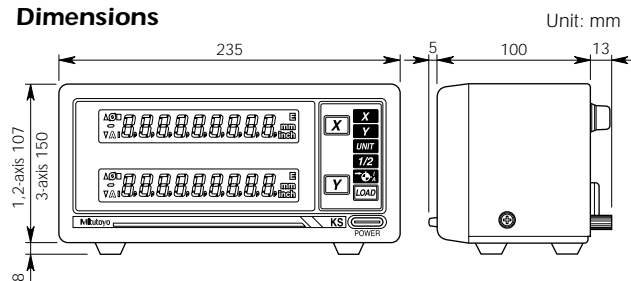
\*For UK/\*\*For Australia

##### Inch/Metric

| Order No.         | 100V AC   | 174-102-1  | 174-104-1  | 174-106  |
|-------------------|---|------------|------------|----------|
|                   | 120V AC   | 174-102-1A | 174-104-1A | 174-106A |
|                   | 230V AC   | 174-102-1D | 174-104-1D | 174-106D |
|                   | 240V AC*  | 174-102-1E | 174-104-1E | 174-106E |
|                   | 240V AC**   | 174-102-1F | 174-104-1F | 174-106F |
| Scale input ports |   | 1          | 2          | 3        |
| Resolution        | .00002", .00005", .0001", .0002", .0005", 0.0005mm, 0.001mm, 0.002mm, 0.005mm |            |            |          |

\*For UK/\*\*For Australia

### Dimensions

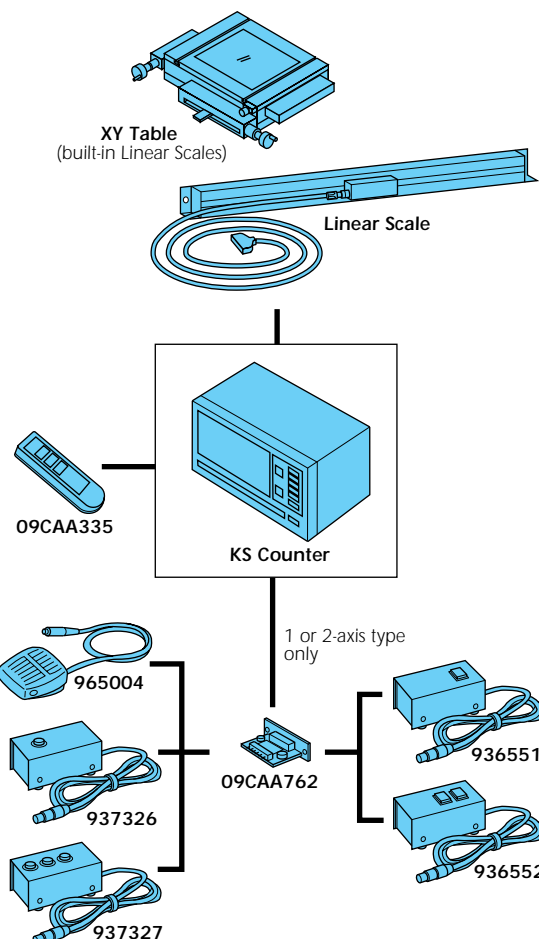


### OPTIONAL ACCESSORIES

| Order No. | Description                              |
|-----------|--|
| 09CAA335  | Zero-set remote controller               |
| 990841    | MICROPAK5 connecting kit†                |
| 09CAA762  | RS-232C Interface Unit†                  |
| 937326    | External load box (1-axis)               |
| 937327    | External load box (2-axis)               |
| 965004    | External load foot switch (for all axes) |
| 936551    | External zero-set box (1-axis)           |
| 936552    | External zero-set box (2-axis)           |

†Factory-installed-option

### SYSTEM DIAGRAM



# KLD Counter

## SERIES 174

Special Purpose Type with Limit Signal Output



4-step limit setting type

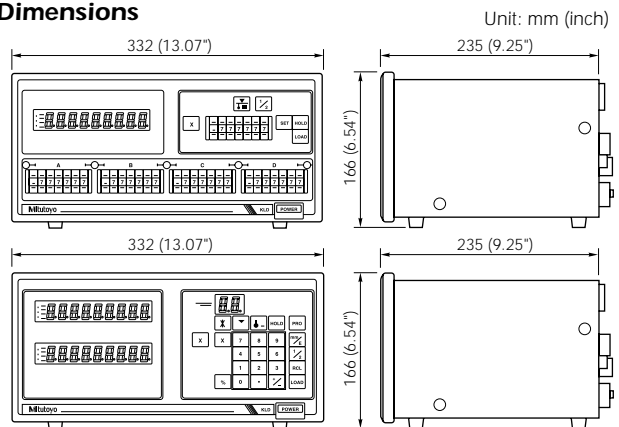


8-step limit setting type

### FEATURES

- A 1-axis counter dedicated to sending signals when a linear scale displacement value and a preset limit value coincide.
- Three types of limit settings are available: 2 steps, 4 steps, and 8 steps.
- For controlling a vertical position of an EDM or a grinding machine.
- Can be connected to a personal computer or a sequencer by installing an RS-232C Interface Unit or a BCD Code Out Unit.  
(Both interface units are optional accessories.)

### Dimensions



### SPECIFICATIONS

#### KLD Counter

Inch / Metric

| Order No.                  | 100V AC  | 174-141        | 174-143        | 174-145      |
|----------------------------|--|----------------|----------------|--------------|
|                            | 120V AC  | 174-141A       | 174-143A       | 174-145A     |
|                            | 220V AC  | 174-141D       | 174-143D       | 174-145D     |
|                            | 240V AC  | 174-141E       | 174-143E       | 174-145E     |
| Limit signal output        |  | 1-step         | 4-step         | 8-step       |
| Scale input ports          | 1  |                |                |              |
| Resolution                 | 0.0005mm, 0.001mm, 0.002mm, 0.005mm, 0.01mm, .00002", .00005", .0001", .0002", .0005", .001" |                |                |              |
| Display                    | 9-digit LED and a negative [-] sign  |                |                |              |
| Limit value setting method |  | Digital switch | Digital switch | Ten-keyboard |
| Functions                  | <b>(See page 317.)</b>   |                |                |              |
| Power supply               | 100-120V/200-240V AC, 50/60Hz  |                |                |              |
| Operating temperature      | 0°C to 40°C  |                |                |              |
| Dimensions (WxDxH)         | 332x165.5x235mm (13.07"x6.52"x9.25")   |                |                |              |
| Mass                       | 4.5kg (9.9 lbs.)   |                |                |              |

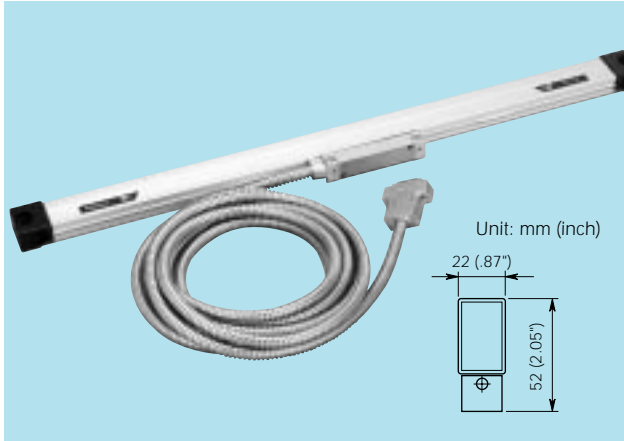
### OPTIONAL ACCESSORIES

| Order No. | Description                           |
|-----------|---------------------------------------|
| 907569    | RS-232C Interface Unit                |
| 907570    | BCD Code Out Unit                     |
| 965004    | External load foot switch*            |
| 937326    | External load box*                    |
| 936551    | External zero-set box                 |
| 938140    | Touch-signal probe (shank dia.: 20mm) |
| 935094    | Touch-signal probe (shank dia.: 32mm) |
| 902329    | Touch-signal probe (shank dia.: 1/2") |

## AT115 Linear Scales

### SERIES 539

Economy Type Slim Spars



### FEATURES

- Suitable for milling machines, XY tables, jigs, etc.
- Dimensionally compatible with AT111 linear scale units.
- Provided with scale reference points at a 50mm pitch over the entire scale. Even after the power is turned off, the datum point for machining can be easily determined by using these reference points.

### Technical Data

**Sectional dimensions:** 22x52mm  
**Scale grating pitch:** 20μm  
**Scale reference point pitch:** 50mm  
**Maximum response speed:** 50m/min.  
**Dust/water protection level:** Conforming to IP-53  
**Operating temperature:** 0°C to 45°C

### SPECIFICATIONS

#### AT115 Linear Scales

| Effective range<br>L <sub>0</sub> | Order No. | Signal cable<br>length | Mass  |
|-----------------------------------|-----------|------------------------|-------|
| 100mm (4")                        | 539-271   | 3.5m                   | 1.0kg |
| 150mm (6")                        | 539-272   | 3.5m                   | 1.0kg |
| 200mm (8")                        | 539-273   | 3.5m                   | 1.0kg |
| 250mm (10")                       | 539-274   | 3.5m                   | 1.1kg |
| 300mm (12")                       | 539-275   | 3.5m                   | 1.1kg |
| 350mm (14")                       | 539-276   | 3.5m                   | 1.1kg |
| 400mm (16")                       | 539-277   | 3.5m                   | 1.2kg |
| 450mm (18")                       | 539-278   | 3.5m                   | 1.2kg |
| 500mm (20")                       | 539-279   | 3.5m                   | 1.2kg |
| 600mm (24")                       | 539-281   | 3.5m                   | 1.3kg |
| 700mm (28")                       | 539-283   | 3.5m                   | 1.3kg |
| 750mm (30")                       | 539-284   | 3.5m                   | 1.3kg |
| 800mm (32")                       | 539-285   | 3.5m                   | 1.4kg |
| 900mm (36")                       | 539-286   | 3.5m                   | 1.4kg |
| 1000mm (40")                      | 539-287   | 5m                     | 1.8kg |
| 1100mm (44")                      | 539-288   | 5m                     | 1.8kg |
| 1200mm (48")                      | 539-289   | 5m                     | 1.9kg |
| 1300mm (52")                      | 539-290   | 5m                     | 1.9kg |
| 1400mm (56")                      | 539-291   | 5m                     | 2.0kg |
| 1500mm (60")                      | 539-292   | 5m                     | 2.0kg |

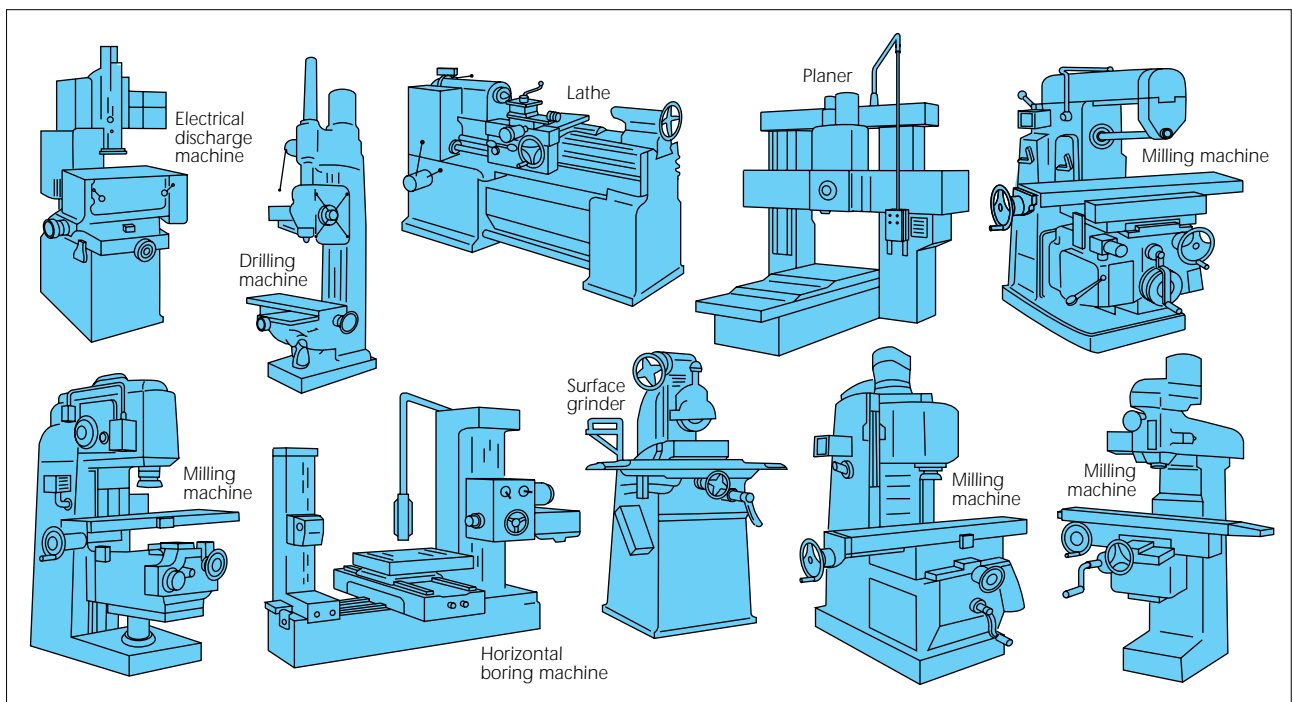
### Accuracy at 20°C

•  $(5+5L_0/1000)\mu\text{m}^*$  \*L<sub>0</sub>= Effective range (mm)

### OPTIONAL ACCESSORIES

| Order No. | Description                    |
|-----------|--------------------------------|
| 09AAA720A | Extension cable for AT115 (2m) |
| 09AAA720B | Extension cable for AT115 (5m) |
| 09AAA720C | Extension cable for AT115 (7m) |

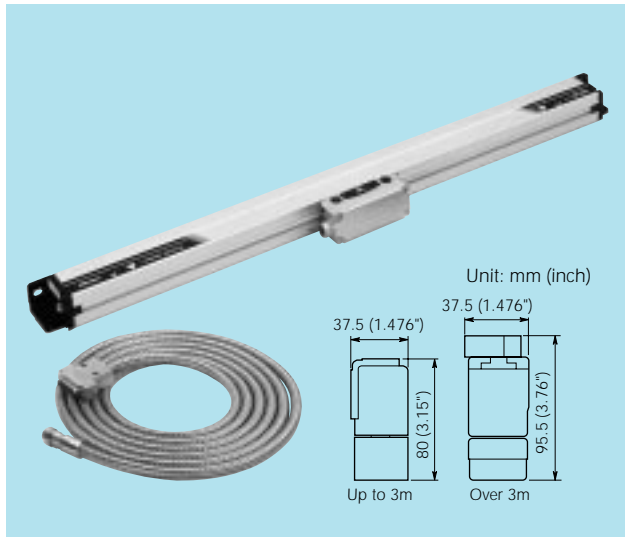
### APPLICATIONS OF LINEAR SCALES



# AT102 Linear Scales

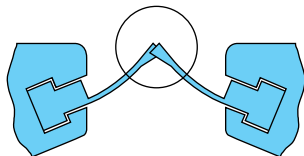
## SERIES 539

Standard-size Spars



### FEATURES

- Enhanced vibration-resistance and durability.
- The innovative rubber lips keep out contaminants on a machine shop.



- An armored signal cable is used to connect the scale unit to the DRO counter for safe operation in harsh shop environment.
- The signal cable outlet can be positioned on either side of the detecting head so the signal cable can be connected from either direction.

### Technical Data

- Scale grating pitch: 20µm
- Scale reference point pitch: 50mm
- Maximum response speed:
  - 72m/min. for scales up to 3000mm
  - 50m/min. for 3250mm scale and over
- Dust/water protection level: Conforming to IP-53
- Operating temperature: 0°C to 45°C

### OPTIONAL ACCESSORIES

(Common to AT102, AT111 and AT112)



| Order No. | Description          |
|-----------|----------------------|
| 09AAA033A | Extension cable (2m) |
| 09AAA033B | Extension cable (5m) |
| 09AAA033C | Extension cable (7m) |

### SPECIFICATIONS

#### AT102 Linear Scales

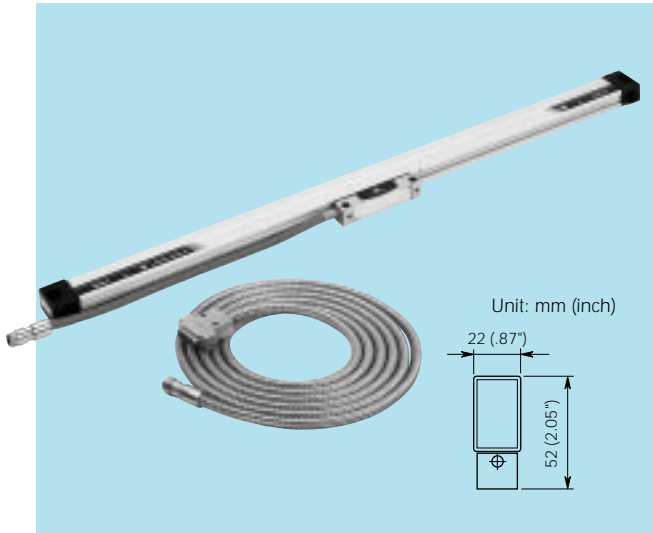
| Effective range<br>Lo | Order No.        |                       | Signal<br>cable<br>length |
|-----------------------|------------------|-----------------------|---------------------------|
|                       | Standard<br>type | High-accuracy<br>type |                           |
| 100mm (4")            | 539-111          | 539-111-10            | 3m                        |
| 150mm (6")            | 539-112          | 539-112-10            | 3m                        |
| 200mm (8")            | 539-113          | 539-113-10            | 3m                        |
| 250mm (10")           | 539-114          | 539-114-10            | 3m                        |
| 300mm (12")           | 539-115          | 539-115-10            | 3m                        |
| 350mm (14")           | 539-116          | 539-116-10            | 3m                        |
| 400mm (16")           | 539-117          | 539-117-10            | 3m                        |
| 450mm (18")           | 539-118          | 539-118-10            | 3m                        |
| 500mm (20")           | 539-119          | 539-119-10            | 3m                        |
| 600mm (24")           | 539-121          | 539-121-10            | 3m                        |
| 700mm (28")           | 539-123          | 539-123-10            | 3m                        |
| 750mm (30")           | 539-124          | 539-124-10            | 3m                        |
| 800mm (32")           | 539-125          | 539-125-10            | 3m                        |
| 900mm (36")           | 539-126          | 539-126-10            | 3m                        |
| 1000mm (40")          | 539-127          | 539-127-10            | 5m                        |
| 1100mm (44")          | 539-128          | 539-128-10            | 5m                        |
| 1200mm (48")          | 539-129          | 539-129-10            | 5m                        |
| 1300mm (52")          | 539-130          | 539-130-10            | 5m                        |
| 1400mm (56")          | 539-131          | 539-131-10            | 5m                        |
| 1500mm (60")          | 539-132          | 539-132-10            | 5m                        |
| 1600mm (64")          | 539-133          | 539-133-10            | 5m                        |
| 1700mm (68")          | 539-134          | 539-134-10            | 5m                        |
| 1800mm (72")          | 539-135          | 539-135-10            | 5m                        |
| 2000mm (80")          | 539-136          | 539-136-10            | 5m                        |
| 2200mm (88")          | 539-137          | —                     | 5m                        |
| 2400mm (96")          | 539-138          | —                     | 7m                        |
| 2500mm (100")         | 539-139          | —                     | 7m                        |
| 2600mm (104")         | 539-140          | —                     | 7m                        |
| 2800mm (112")         | 539-141          | —                     | 7m                        |
| 3000mm (120")         | 539-142          | —                     | 7m                        |
| 3250mm (130")         | 539-143          | —                     | 10m                       |
| 3500mm (140")         | 539-144          | —                     | 10m                       |
| 3750mm (150")         | 539-145          | —                     | 10m                       |
| 4000mm (160")         | 539-146          | —                     | 10m                       |
| 4250mm (170")         | 539-147          | —                     | 10m                       |
| 4500mm (180")         | 539-148          | —                     | 10m                       |
| 4750mm (190")         | 539-149          | —                     | 15m                       |
| 5000mm (200")         | 539-150          | —                     | 15m                       |
| 5250mm (210")         | 539-151          | —                     | 15m                       |
| 5500mm (220")         | 539-152          | —                     | 15m                       |
| 5750mm (230")         | 539-153          | —                     | 15m                       |
| 6000mm (240")         | 539-154          | —                     | 15m                       |

#### Accuracy at 20°C

| Effective range<br>Lo | Standard<br>type | High-accuracy<br>type |
|-----------------------|------------------|-----------------------|
| 100 to 2000mm         | (5+5Lo/1000)µm   | (3+3Lo/1000)µm        |
| 2200 to 3000mm        | (5+5Lo/1000)µm   | —                     |
| 3250 to 6000mm        | (5+8Lo/1000)µm   | —                     |

## AT111 Linear Scales

SERIES 539  
Slim Spars



### Technical Data

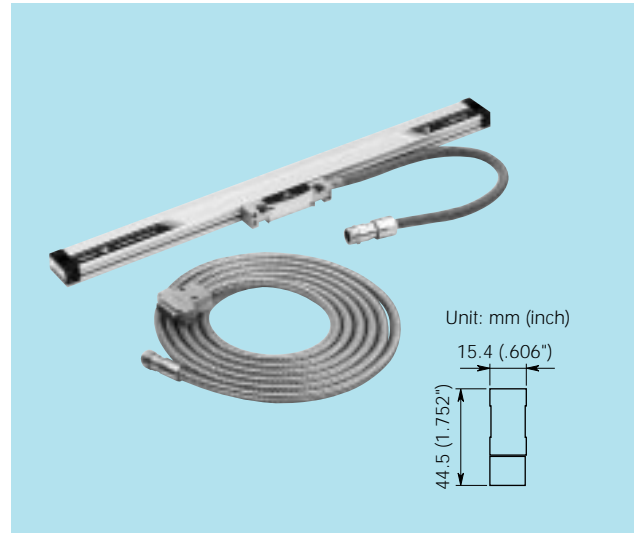
Scale grating pitch: 20µm  
Scale reference point pitch: 50mm  
Maximum response speed: 72m/min.  
Dust/water protection level: Conforming to IP-53  
Operating temperature: 0°C to 45°C

### Accuracy at 20°C

| Effective range | Standard type  | High-accuracy type |
|-----------------|----------------|--------------------|
| Lo              |                |                    |
| 100 to 1500mm   | (5+5Lo/1000)µm | (3+3Lo/1000)µm     |

## AT112 Linear Scales

SERIES 539  
Super Slim Spars



### Technical Data

Scale grating pitch: 20µm  
Scale reference point pitch: 50mm  
Maximum response speed: 72m/min.  
Dust/water protection level: Conforming to IP-53  
Operating temperature: 0°C to 45°C

### Accuracy at 20°C

| Effective range | Standard type  | High-accuracy type |
|-----------------|----------------|--------------------|
| Lo              |                |                    |
| 50 to 1020mm    | (5+5Lo/1000)µm | (3+3Lo/1000)µm     |

## SPECIFICATIONS

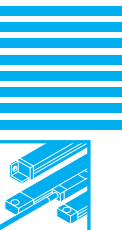
### AT111 Linear Scales

| Effective range | Order No.     |                    | Signal cable length |
|-----------------|---------------|--------------------|---------------------|
|                 | Standard type | High-accuracy type |                     |
| Lo              |               |                    |                     |
| 100mm (4")      | 539-201       | 539-201-10         | 3m                  |
| 150mm (6")      | 539-202       | 539-202-10         | 3m                  |
| 200mm (8")      | 539-203       | 539-203-10         | 3m                  |
| 250mm (10")     | 539-204       | 539-204-10         | 3m                  |
| 300mm (12")     | 539-205       | 539-205-10         | 3m                  |
| 350mm (14")     | 539-206       | 539-206-10         | 3m                  |
| 400mm (16")     | 539-207       | 539-207-10         | 3m                  |
| 450mm (18")     | 539-208       | 539-208-10         | 3m                  |
| 500mm (20")     | 539-209       | 539-209-10         | 3m                  |
| 600mm (24")     | 539-211       | 539-211-10         | 3m                  |
| 700mm (28")     | 539-213       | 539-213-10         | 3m                  |
| 750mm (30")     | 539-214       | 539-214-10         | 3m                  |
| 800mm (32")     | 539-215       | 539-215-10         | 3m                  |
| 900mm (36")     | 539-216       | 539-216-10         | 3m                  |
| 1000mm (40")    | 539-217       | 539-217-10         | 5m                  |
| 1100mm (44")    | 539-218       | 539-218-10         | 5m                  |
| 1200mm (48")    | 539-219       | 539-219-10         | 5m                  |
| 1300mm (52")    | 539-220       | 539-220-10         | 5m                  |
| 1400mm (56")    | 539-221       | 539-221-10         | 5m                  |
| 1500mm (60")    | 539-222       | 539-222-10         | 5m                  |

## SPECIFICATIONS

### AT112 Linear Scales

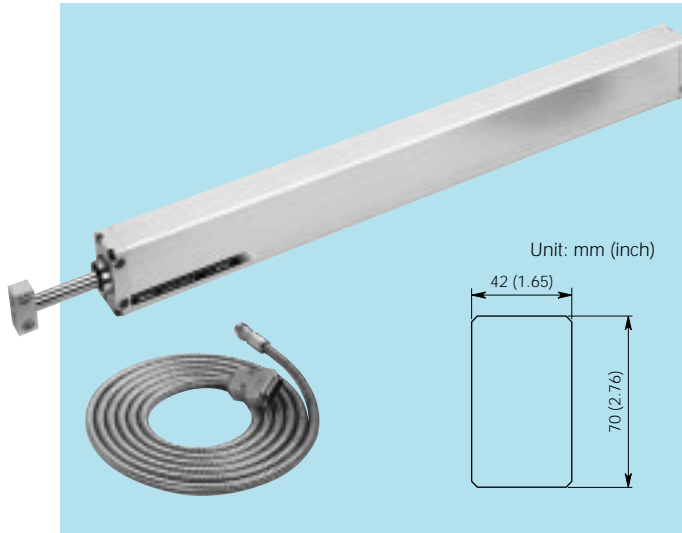
| Effective range | Order No.     |                    | Signal cable length |
|-----------------|---------------|--------------------|---------------------|
|                 | Standard type | High-accuracy type |                     |
| Lo              |               |                    |                     |
| 50mm (1.5")     | 539-251       | 539-251-10         | 3m                  |
| 70mm (2.5")     | 539-252       | 539-252-10         | 3m                  |
| 120mm (4.5")    | 539-253       | 539-253-10         | 3m                  |
| 170mm (6.5")    | 539-254       | 539-254-10         | 3m                  |
| 220mm (8.5")    | 539-255       | 539-255-10         | 3m                  |
| 270mm (10.5")   | 539-256       | 539-256-10         | 3m                  |
| 320mm (12.5")   | 539-257       | 539-257-10         | 3m                  |
| 370mm (14.5")   | 539-258       | 539-258-10         | 3m                  |
| 420mm (16.5")   | 539-259       | 539-259-10         | 3m                  |
| 470mm (18.5")   | 539-260       | 539-260-10         | 3m                  |
| 520mm (20")     | 539-261       | 539-261-10         | 3m                  |
| 570mm (22")     | 539-262       | 539-262-10         | 3m                  |
| 620mm (24")     | 539-263       | 539-263-10         | 3m                  |
| 670mm (26")     | 539-264       | 539-264-10         | 3m                  |
| 720mm (28")     | 539-265       | 539-265-10         | 3m                  |
| 770mm (30")     | 539-266       | 539-266-10         | 3m                  |
| 820mm (32")     | 539-267       | 539-267-10         | 3m                  |
| 920mm (36")     | 539-268       | 539-268-10         | 3m                  |
| 1020mm (40")    | 539-269       | 539-269-10         | 3m                  |



# AT181 Linear Scales

SERIES 539

Plunger Type (High Water-proof Design)



**Technical Data**

- Scale grating pitch: 20µm
- Scale reference point pitch: 50mm
- Maximum response speed: 50m/min.
- Dust/water protection level: Conforming to IP-54
- Operating temperature: 0°C to 45°C

**SPECIFICATIONS**

**AT181 Linear Scales**

| Effective range<br>Lo | Order No.     |                    | Signal cable length |
|-----------------------|---------------|--------------------|---------------------|
|                       | Standard type | High-accuracy type |                     |
| 100mm (4")            | 539-301       | 539-301-10         | 3m                  |
| 150mm (6")            | 539-302       | 539-302-10         | 3m                  |
| 200mm (8")            | 539-303       | 539-303-10         | 3m                  |
| 250mm (10")           | 539-304       | 539-304-10         | 3m                  |
| 300mm (12")           | 539-305       | 539-305-10         | 3m                  |
| 350mm (14")           | 539-306       | 539-306-10         | 3m                  |
| 400mm (16")           | 539-307       | 539-307-10         | 3m                  |
| 450mm (18")           | 539-308       | 539-308-10         | 3m                  |
| 500mm (20")           | 539-309       | 539-309-10         | 3m                  |
| 550mm (22")           | 539-310       | 539-310-10         | 3m                  |
| 600mm (24")           | 539-311       | 539-311-10         | 3m                  |

**Accuracy at 20°C**

| Effective range<br>Lo | Standard type  | High-accuracy type |
|-----------------------|----------------|--------------------|
| 100 to 600mm          | (5+5Lo/1000)µm | (3+3Lo/1000)µm     |

**OPTIONAL ACCESSORIES**

| Order No. | Description          |
|-----------|----------------------|
| 09AAA033A | Extension cable (2m) |
| 09AAA033B | Extension cable (5m) |
| 09AAA033C | Extension cable (7m) |

# PSU-200

SERIES 539

Pulse Signal Conversion Interface



**FEATURES**

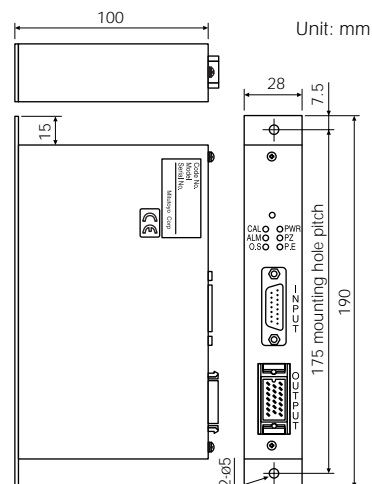
- Applicable with Linear Scales with the sinusoidal signal output.
- Quadrature signal output (conforming to EIA standard RS422-A).
- Alarm function for detecting broken wires or short circuits in the detector, over-speed and fluctuation errors in the input signal from the detector.

**SPECIFICATIONS**

**PSU-200**

| Order No.             | 539-005   |
|-----------------------|---|
| Number of axes        | 1   |
| Number of deviation   | 4, 8, 10, 20, 40, 80, 100 or 200 (switchable)   |
| Functions             | Division setting, Min. edge interval setting, LED for alarm indication, Alarm output mode switching, LED for origin detection, LED for low-level power supply voltage warning |
| Power supply          | 5VDC±5% on the power terminal   |
| Consumption           | 200mA (except the scale)  |
| Operating temperature | 0°C to 40°C   |
| Mass                  | Approx. 620g (1.4 lbs.)   |

**Dimensions**



# Accessories for Linear Scale

## Zero-set Remote Controller



### FEATURES

- Allows the displayed value to be remotely zero set.

## Programmable Remote Controller



### FEATURES

- The programming function of KM/KC Counter facilitates the repeated machining of multiple workpieces. The Programmable Remote Controller can be used to edit the programs by deleting or inserting machining operations.

## Touch-signal Probes



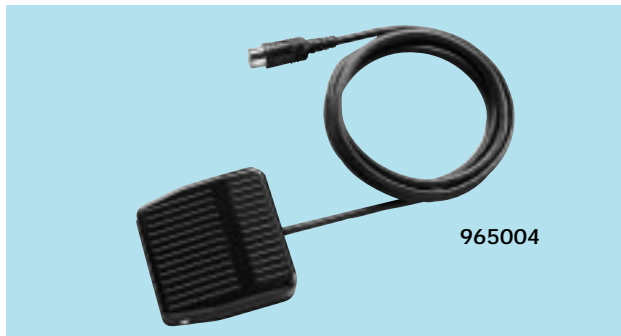
### FEATURES

- Makes it easy to perform such operations as datum point setting (detecting the workpiece edge and setting the counter display to zero), workpiece centering, and dimensional measurement (detecting the workpiece end point and holding the counter display).

### SPECIFICATIONS

| Shank diameter | Order No. | Contact point diameter | Connecting cable length |
|----------------|-----------|------------------------|-------------------------|
| 20mm           | 938140    | 10±0.002mm             | 3m                      |
| 32mm           | 935094    | 10±0.002mm             | 3m                      |
| .5"            | 902329    | .2"                    | 9.8 feet                |

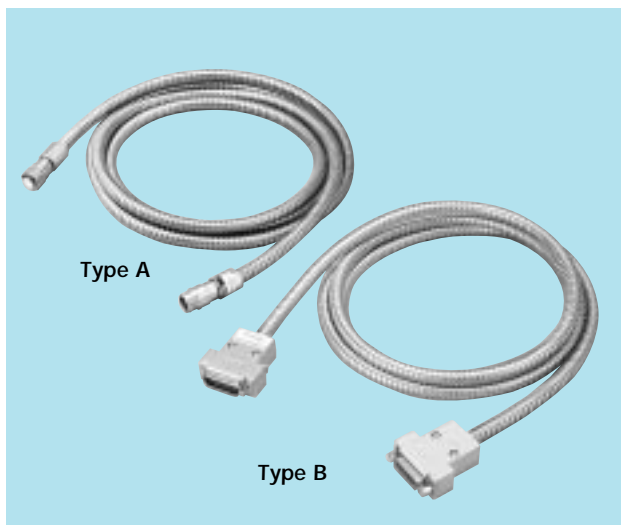
## External Load Foot Switch



### FEATURES

- Connected to the optional EXT.LOAD connector of KS or KC Counter, the foot switch can output the displayed data in this order X-Y-Z (on 3-axis model).

## Extension Cables



### FEATURES

- Use the extension cable to extend the cable attached to the Linear Scale main unit, when the Linear Scale and the counter are placed far apart.
- The Type A extension cable is provided with a water-proof connector. (The Type A is not available with the AT115 Series scale units.)

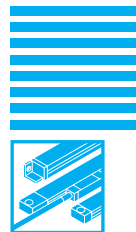
### SPECIFICATIONS

#### Extension Cables Type A

| Cable length   | Order No. | Mass   | Remarks         |
|----------------|-----------|--------|-----------------|
| 2m (6.5 feet)  | 09AAA033A | 0.35kg | Conduit armored |
| 5m (16.4 feet) | 09AAA033B | 0.75kg | Conduit armored |
| 7m (22.9 feet) | 09AAA033C | 1.01kg | Conduit armored |

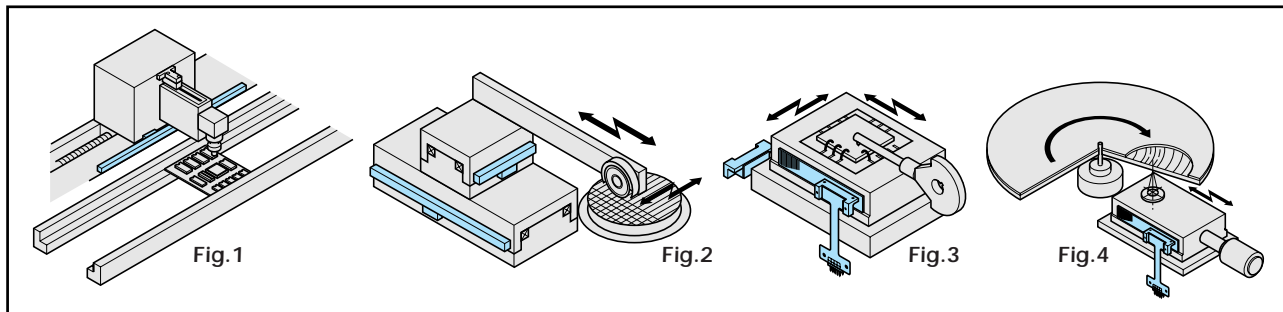
#### Extension Cables Type B

| Cable length   | Order No. | Mass   | Remarks         |
|----------------|-----------|--------|-----------------|
| 2m (6.5 feet)  | 09AAA720A | 0.35kg | Conduit armored |
| 5m (16.4 feet) | 09AAA720B | 0.75kg | Conduit armored |
| 7m (22.9 feet) | 09AAA720C | 1.01kg | Conduit armored |





# Linear Scales for Numerical Motion Control System



The Linear Scales for the Numerical Motion Control System are high-accuracy linear measurement systems for a wide range of applications. These types of linear scales are designed to be integrated into precision machines and instruments including measuring machines and instruments, as well as machine tools, optics, data equipment, industrial robots, etc..

Two types of linear scales for the Numerical Motion Control System are available: the AT series have the high-accuracy glass scale and the detector head encased together in an aluminum casing for improved durability and resistance against

vibration; the ultra-portable and lighter ST series have the scale and the detector head separately.

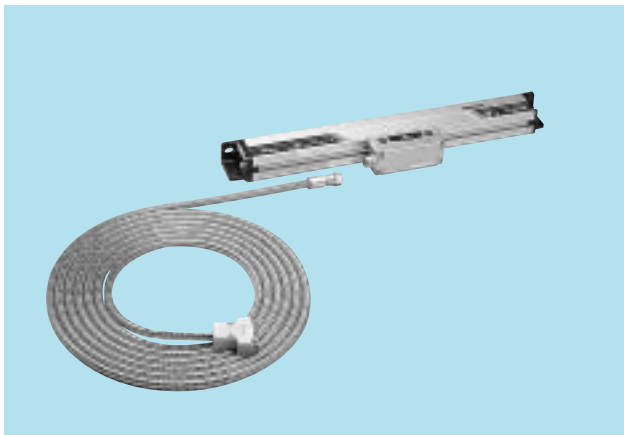
### APPLICATIONS

- High-speed, high-accuracy installation of electronics in industrial robots (Fig.1)
- Positioning dicing saw in semiconductor production process (Fig.2)
- Positioning IC tip for wire-bonding (Fig.3)
- Improving seek-time of disk drive system (Fig.4)

## AT202 Linear Scales

### SERIES 539

Sealed Type Linear Encoder



### FEATURES

- Sealed type incremental linear scales suitable for feedback system of NC machine tools.
- Direct connection with NC machine tools are possible.

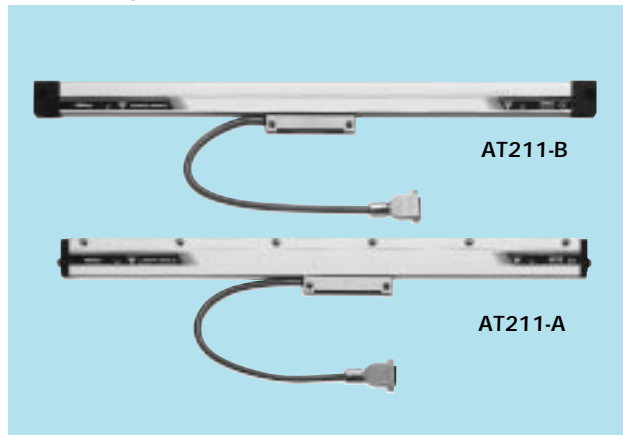
#### Technical Data

**Resolution:** 0.1μm, 0.2μm, 0.5μm, 1μm, 2.5μm, or 5μm  
**Effective range Lo:** 100mm - 1500mm (20 sizes)  
**Accuracy (at 20°C):** (3+3Lo/1000)μm (standard type)  
**Max. response speed:** 2000mm/s (depending on resolution)  
**Dust/Water protection level:** Conforming to IP-53

## AT211 Linear Scales

### SERIES 539

Sealed Type Linear Encoder



### FEATURES

- High-resolution, high-accuracy sealed type linear scales. Most ideal for feedback control in positioning a semiconductor manufacturing system, CNC machine tool, etc.
- Two types of models are available: the AT211-A, the multiple-point installation type designed for improved resistance against vibration and shock, and the AT211-B, which attaches to a machine at both ends. The AT211-B is compatible with the AT111 slim type in size.

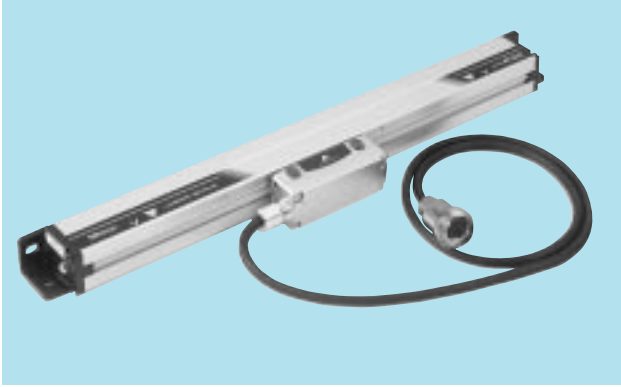
#### Technical Data

**Resolution:** 0.1μm, 0.2μm, 0.5μm, 1μm, 2.5μm, or 5μm  
**Effective range Lo:** 100mm - 1500mm (20 sizes)  
**Accuracy (at 20°C):** (3+3Lo/1000)μm (standard type)  
**Max. response speed:** 2000mm/s (depending on resolution)  
**Dust/Water protection level:** Conforming to IP-53

## AT332 Linear Scales

SERIES 539

Sealed Type Linear Encoder



### FEATURES

- Sealed type absolute linear scales suitable for feedback system of high-speed NC machine tools.
- Direct connection with FANUC NC controller is possible.

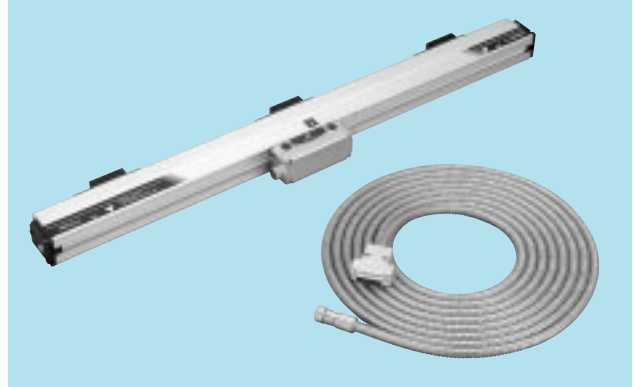
#### Technical Data

**Resolution:** 0.1 $\mu$ m, 0.2 $\mu$ m, 0.5 $\mu$ m, 1 $\mu$ m, 2.5 $\mu$ m, or 5 $\mu$ m  
**Effective range Lo:** 100mm - 1500mm (20 sizes)  
**Accuracy (at 20°C):** (3+3Lo/1000) $\mu$ m (standard type)  
**Max. response speed:** 2000mm/s (depending on resolution)  
**Dust/Water protection level:** Conforming to IP-53

## AT353 Linear Scales

SERIES 539

Sealed Type Linear Encoder



### FEATURES

- Sealed type absolute linear scales with very fine resolution up to 0.05 $\mu$ m.
- Direct connection with FANUC NC controller is possible.

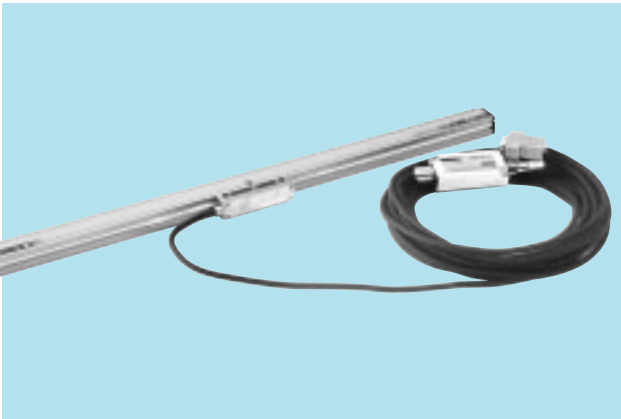
#### Technical Data

**Resolution:** 0.1 $\mu$ m, 0.2 $\mu$ m, 0.5 $\mu$ m, 1 $\mu$ m, 2.5 $\mu$ m, or 5 $\mu$ m  
**Effective range Lo:** 100mm - 1500mm (20 sizes)  
**Accuracy (at 20°C):** (3+3Lo/1000) $\mu$ m (standard type)  
**Max. response speed:** 2000mm/s (depending on resolution)  
**Dust/Water protection level:** Conforming to IP-53

## AT553 Linear Scales

SERIES 539

Sealed Type Linear Encoder



### FEATURES

- Slim spar design sealed type absolute linear scales with very fine resolution up to 0.05 $\mu$ m.
- Direct connection with FANUC NC controller is possible.

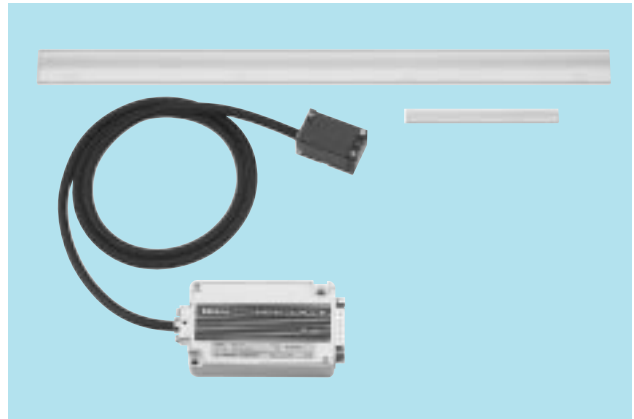
#### Technical Data

**Resolution:** 0.1 $\mu$ m, 0.2 $\mu$ m, 0.5 $\mu$ m, 1 $\mu$ m, 2.5 $\mu$ m, or 5 $\mu$ m  
**Effective range Lo:** 100mm - 1500mm (20 sizes)  
**Accuracy (at 20°C):** (3+3Lo/1000) $\mu$ m (standard type)  
**Max. response speed:** 2000mm/s (depending on resolution)  
**Dust/Water protection level:** Conforming to IP-53

## ST34C Linear Scales

SERIES 579

Exposed Type Linear Encoder

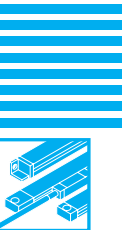


### FEATURES

- High-resolution, high-accuracy and portable model designed for exposed installation.
- Outputs two-phase sine wave signal (signal pitch 4 $\mu$ m) and two-phase pulse signal simultaneously.
- High-reliability with stable signal output.
- Equipped with a compact interface box.

#### Technical Data

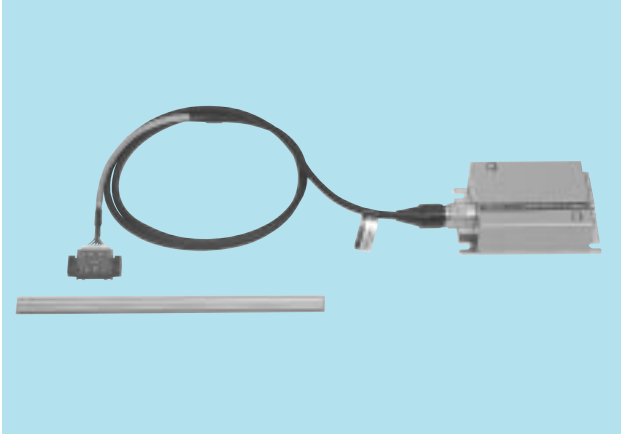
**Resolution:** 0.02 $\mu$ m, 0.05 $\mu$ m, or 0.1 $\mu$ m  
**Effective range Lo:** 10mm - 500mm (13 sizes)  
**Accuracy (at 20°C):**  $\pm$ 0.5 $\mu$ m (up to 300mm) or  $\pm$ 1.0 $\mu$ m (from 350mm up to 500mm)  
**Max. response speed:** 720mm/s (depending on resolution)



## ST322/323 Linear Scales

SERIES 579

Exposed Type Linear Encoder



### FEATURES

- Ultra compact design exposed type incremental linear scales adopting very thin and compact detector head.
- Suitable for installation on various testing equipment, compact/high-density mounting devices.

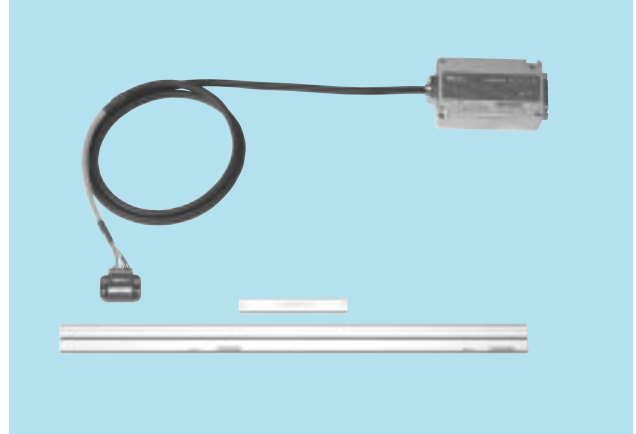
#### Technical Data

**Resolution:** 0.1 $\mu$ m, 0.2 $\mu$ m, 0.5 $\mu$ m, 1 $\mu$ m, 2.5 $\mu$ m, or 5 $\mu$ m  
**Effective range Lo:** 100mm - 1500mm (20 sizes)  
**Accuracy (at 20°C):** (3+3Lo/1000) $\mu$ m (standard type)  
**Max. response speed:** 2000mm/s (depending on resolution)  
**Dust/Water protection level:** Conforming to IP-53

## ST422 Linear Scales

SERIES 579

Exposed Type Linear Encoder



### FEATURES

- Compact design exposed type incremental linear scales.
- Maximum of up to 5000mm/s high response speed.
- Provided with alarm LED error indication with fault detection signal output for over speed and sinusoidal signal anomaly errors.

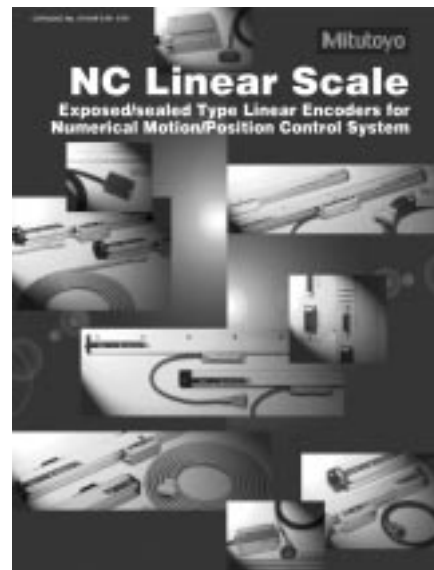
#### Technical Data

**Resolution:** 0.1 $\mu$ m, 0.2 $\mu$ m, 0.5 $\mu$ m, 1 $\mu$ m, 2.5 $\mu$ m, or 5 $\mu$ m  
**Effective range Lo:** 100mm - 1500mm (20 sizes)  
**Accuracy (at 20°C):** (3+3Lo/1000) $\mu$ m (standard type)  
**Max. response speed:** 2000mm/s (depending on resolution)  
**Dust/Water protection level:** Conforming to IP-53

The following catalogs of DRO system are available separately.  
 Contact the nearest Mitutoyo sales office.



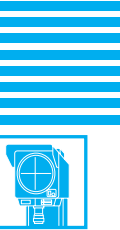
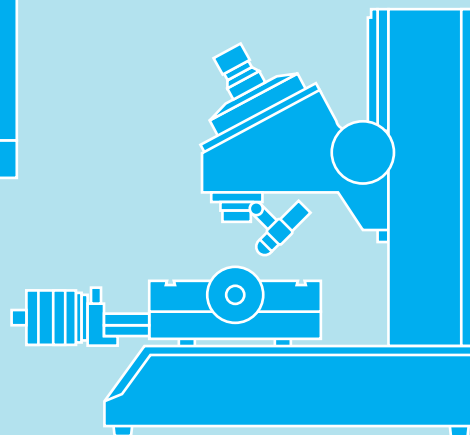
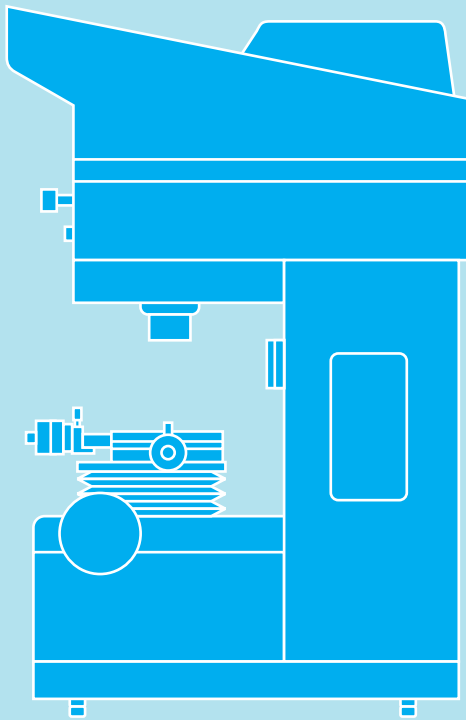
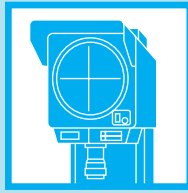
Catalog No. E4072



Catalog No. E4189

# Profile Projectors Pages 332 — 353

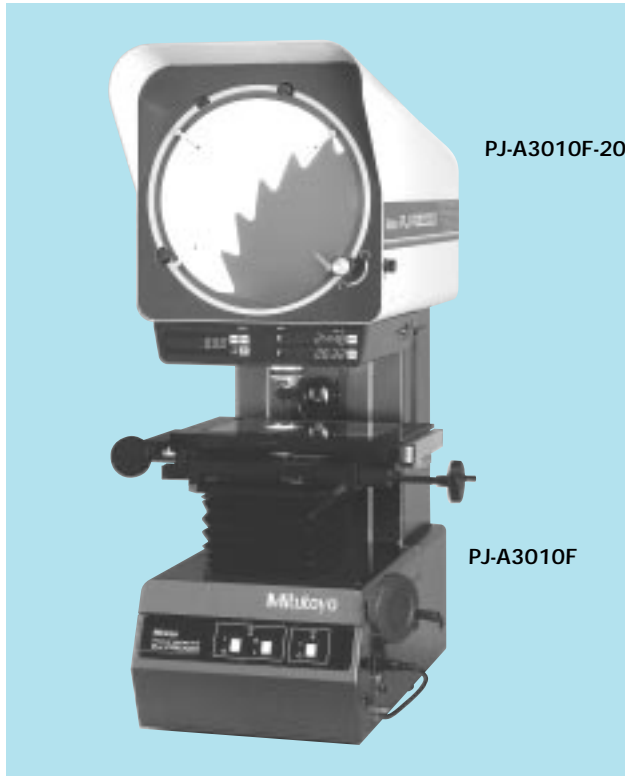
# Microscopes Pages 354 — 378



# PJ-A3000

## SERIES 302

### Profile Projectors



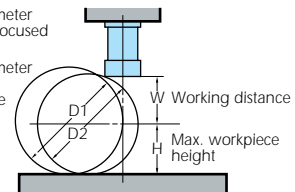
### FEATURES

- The PJ-A3000 Series profile projectors are medium-size models that feature high versatility and easy operation.
- Easy-to-read digital XY counter is located near the projection screen to minimize eye movement.
- Digital readout protractor screen facilitates angle measurement.



### Projection Capacity

D1: Max. workpiece diameter whose edge line can be focused on the screen center  
 D2: Max. workpiece diameter whose edge line can be focused on the screen line



Unit: mm

| Magnification       | 10X       | 20X      | 50X   | 100X  |
|---------------------|-----------|----------|-------|-------|
| View field diameter | 31.5      | 15.7     | 6.3   | 3.1   |
| W                   | 66 (20)   | 32.5 (2) | 12.6  | 5     |
| H                   | 123.5     | 123.5    | 123.5 | 123.5 |
| (PJ-A3010F-100)     | 91        | 91       | 91    | 91    |
| (PJ-13005F-150)     | 103.5     | 103.5    | 103.5 | 103.5 |
| (PJ-13010F-200)     | 92.5      | 92.5     | 92.5  | 92.5  |
| D1                  | 224 (198) | 87 (61)  | 27    | 10    |
| (PJ-A3010F-100)     | 182       | 87 (61)  | 27    | 10    |
| (PJ-13005F-150)     | 207 (198) | 87 (61)  | 27    | 10    |
| (PJ-13010F-200)     | 185       | 87 (61)  | 27    | 10    |
| D2                  | 154 (120) | 69 (23)  | 25    | 10    |

( ): surface illumination

### SPECIFICATIONS

#### PJ-A3000 Profile Projectors

##### Metric

| Model No.               | PJ-A3010F-200   | PJ-A3005F-150 | PJ-A3010F-200E | PJ-A3005F-150E | PJ-A3010F-100E | PJ-A3000  | PJ-A3010F-100              | PJ-A3005D-50 | PJ-A3005D-50E | PJ-A3005R-50 |
|-------------------------|---|---------------|----------------|----------------|----------------|-----------|----------------------------|--------------|---------------|--------------|
| Order No.               | 302-701 ■   | 302-702 ■     | 302-705 ■      | 302-706 ■      | 302-707 ■      | 302-700 ■ | 302-703 ■                  | 302-704 ■    | 302-708 ■     | 302-709 ■    |
| XY range                | 200x100mm   | 150x50mm      | 200x100mm      | 150x50mm       | 100x100mm      | -         | 100x100mm                  | 50x50mm      | 50x50mm       | 50x50mm      |
| Effective area of table | 266x170mm   | 184x82mm      | 266x170mm      | 184x82mm       | 142x142mm      | ∅70       | 142x142mm                  | 82x82mm      | 82x82mm       | 82x82mm      |
| Measuring unit          | Built-in linear scales  |               |                |                |                |           | Digimatic micrometer heads |              |               |              |
| Resolution              | 0.001mm   |               |                |                |                |           |                            |              |               |              |
| Protractor screen       | Effective diameter: 315mm<br>Digital angle display: ±370°<br>Angle reading: 0.01° or 1° (switchable)<br>Functions: ±direction switching, SPC output, Zero setting(PJ-A3010F-200E,-100E, A3005F-150)             |               |                |                |                |           |                            |              |               |              |
| Projection lens         | 10X lens set (172-202)  |               |                |                |                |           |                            |              |               |              |
| Magnification accuracy  | Contour illumination: ±0.1% or less<br>Surface illumination: ±0.15% or less   |               |                |                |                |           |                            |              |               |              |
| Contour illumination    | <ul style="list-style-type: none"> <li>• Light source: Halogen bulb (24V, 150W)</li> <li>• Optical system: Telecentric system</li> <li>• Functions: 2-stage brightness switch, Heat-absorbing filter</li> </ul> |               |                |                |                |           |                            |              |               |              |
| Surface illumination    | <ul style="list-style-type: none"> <li>• Light source: Halogen bulb (24V, 150W)</li> <li>• Optical system: Vertical illumination with a half-reflection mirror</li> </ul>                                       |               |                |                |                |           |                            |              |               |              |
| Power supply            | 100/110/120/220/240V AC (switchable), 50/60Hz   |               |                |                |                |           |                            |              |               |              |
| Mass                    | 140kg   | 116kg         | 112kg          | 116kg          | 112kg          | 109kg     | 112kg                      | 107kg        | 107kg         | 106kg        |

##### Inch/Metric

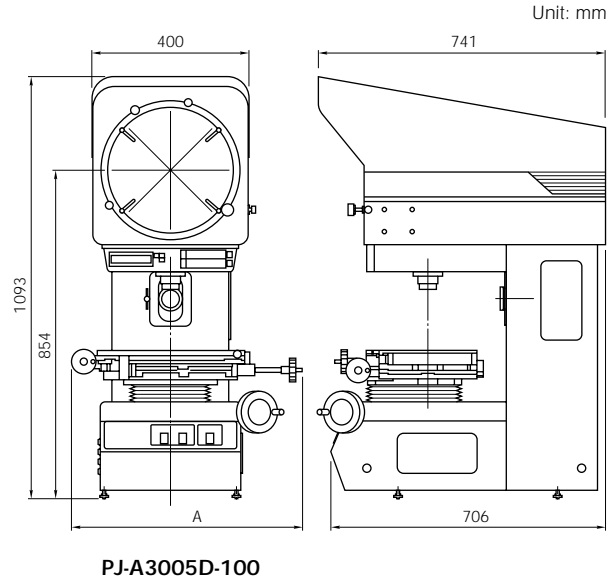
| Model No.               | PJ-A3010F-200          | PJ-A3005F-150 | PJ-A3010F-100              | PJ-A3005D-50 | PJ-A3005D-50E | PJ-A3005R-50 |
|-------------------------|------------------------|---------------|----------------------------|--------------|---------------|--------------|
| Order No.               | 302-711 ■              | 302-712 ■     | 302-713 ■                  | 302-714 ■    | 302-718 ■     | 302-719 ■    |
| XY range                | 8"x4"                  | 4"x4"         | 4"x4"                      | 2"x2"        | 2"x2"         | 2"x2"        |
| Effective area of table | 14.96"x9.84"           | 19.84"x9.84"  | 5.6"x5.6"                  | 3.23"x3.23"  | 3.23"x3.23"   | 3.23x3.23"   |
| Measuring unit          | Built-in linear scales |               | Digimatic micrometer heads |              |               |              |
| Resolution              | .0001"/0.001mm         |               |                            |              |               |              |

■ To denote your AC line receptacle/cable add the following suffixes (e.g. 302-711A). A for UL/CSA type, C for Japan type, D for CEE type, E for BS type.

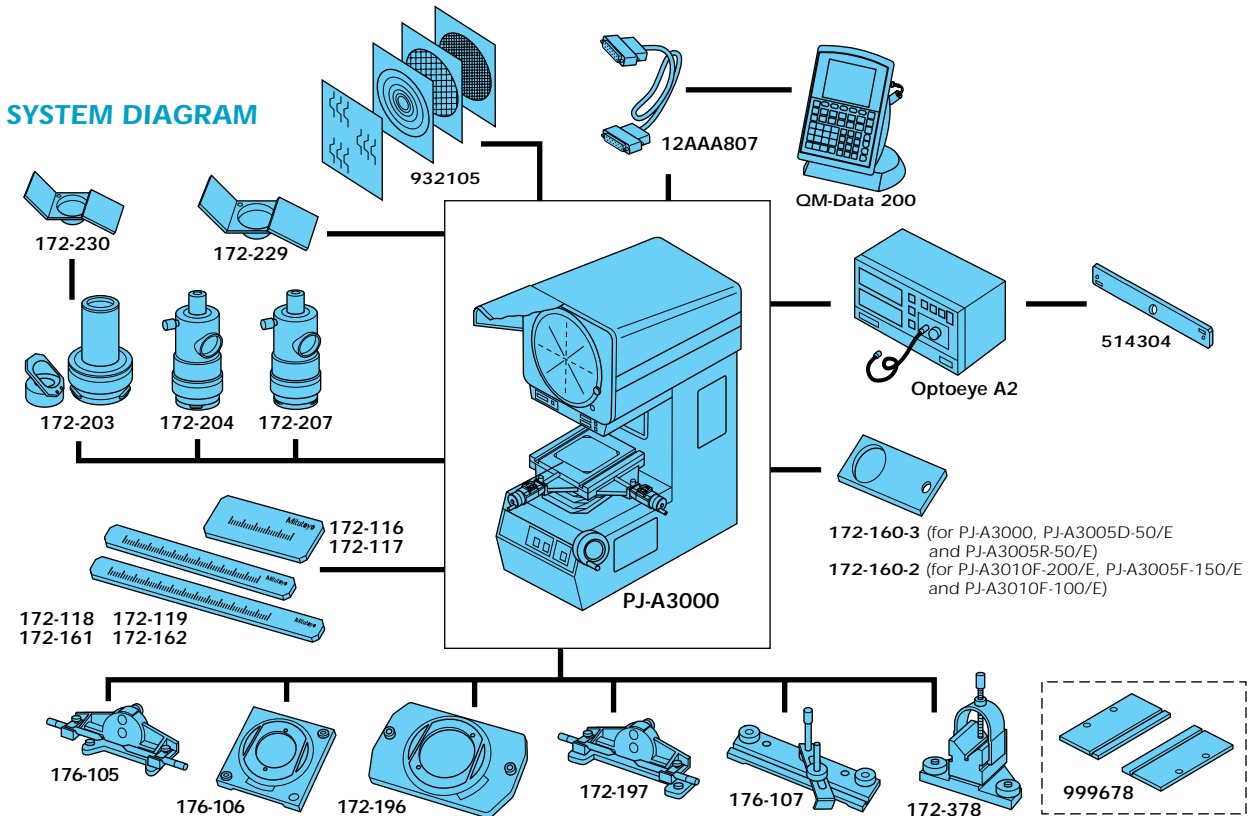
## OPTIONAL ACCESSORIES

| Order No.       | Description   |
|-----------------|---|
| 172-203         | 20X projection lens set   |
| 172-204         | 50X projection lens   |
| 172-207         | 100X projection lens  |
| 172-229         | Oblique illumination mirror for 10X lens  |
| 172-230         | Oblique illumination mirror for 20X lens  |
| 172-116         | Standard scale (50mm)   |
| 172-117         | Standard scale (2")   |
| 172-118         | Reading scale (200mm)   |
| 172-161         | Reading scale (300mm)   |
| 932105          | Overlay chart set   |
| 172-160-2       | Green filter (for PJ-A3000, 3005D-50,3005R, -A3010F-200, 3005F-150 and 3010F-100) |
| 172-160-3       | Green filter (for all models except PJ-A3010F-200, -200E)                         |
| 176-106         | Rotary table (Effective diameter: 66mm)   |
| 172-196         | Rotary table (Effective diameter: 100mm)  |
| 176-105         | Swivel center support (Max. workpiece dia.: 70mm)                                 |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm)                                 |
| 176-107         | Holder with clamp   |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)                                    |
| 999678          | Fixture mount adapter (required for PJ-A3010F-200)                                |
| 514304          | OPTOEYE A2 detector attachment  |
| 965012          | SPC cable (2m) for angle display output   |
| (See page 350.) | <b>OPTOEYE A2 image edge sensor</b>   |
| (See page 348.) | <b>QM-Data200 2-D data processor</b>  |

## Dimensions



## SYSTEM DIAGRAM



|  | 176-106 | 172-196 | 176-105 | 172-197 | 176-107 | 172-378 |
|--|---------|---------|---------|---------|---------|---------|
| PJ-A3005, PJ-A3005R-50, PJ-A3005D-50/E           | ✓       |         | ✓       |         | ✓       | ✓       |
| PJ-A3005F-150/E, PJ-3010F-100/E, PJ-A3010F-200/E | ---     | ✓*      | ---     | ✓*      | ✓*      | ✓*      |

\*Fixture mount adapter (999678) is required for PJ-A3010F-200/E.

# PJ-H3000

## SERIES 303

Profile Projectors



PJ-H3010FT2-200



PJ-H3005T1-50



PJ-H3005FT1/2/4-100



PJ-H3010FT1/2/4-200



PJ-H3010FT1/2/4-300

By separating axial motion, and stabilizing the XY measuring table in the vertical direction, high measuring accuracy of  $(3+L/25)\mu\text{m}$  has been achieved on the PJ-H3000 Series Profile Projectors. Focusing is accomplished by moving the screen head itself up & down with the hand wheel or motorized unit. The power focusing type (T2 and T4) provides higher performance.

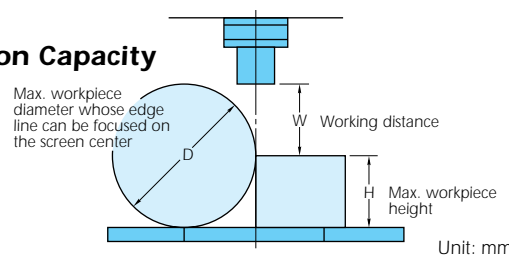
### FEATURES

- Newly designed lenses with a high NA provide drastically brighter and clearer screen images during surface illumination.
- The three-lens mounting turret includes a 10X lens as standard. Four types of projection lenses (5X, 20X, 50X, 100X) are available.
- The Type T4 of PJ-H3000 incorporates an OPTOEYE image edge sensor, eliminating the need for visual alignment.

### Selection Guide

| PJ-H3000 Series                          | Type T1 | Type T2  | Type T4  |
|--|---------|----------|----------|
| Power focus*<br>(*Manual feed available) | —       | Provided | Provided |
| OPTOEYE image edge sensor (built-in)     | —       | —        | Provided |

### Projection Capacity



Unit: mm

| Illumination        | Contour or Surface |      |      |     |      |
|---------------------|--------------------|------|------|-----|------|
|                     | 5X                 | 10X  | 20X  | 50X | 100X |
| Magnification       |                    |      |      |     |      |
| View field diameter | 61.2               | 30.6 | 15.3 | 6   | 3    |
| W                   | 66                 | 70.5 | 56.5 | 50  | 50   |
| H                   | 105                | 105  | 105  | 105 | 105  |
| D                   | 188                | 206  | 186  | 177 | 182  |

## SPECIFICATIONS

### PJ-H3000 Profile Projectors

|                        |  |
|------------------------|--|
| Protractor screen      | Effective diameter: 306mm<br>Digital angle display: ±370°<br>Angle reading: 0.01° or 1' (switchable)<br>Functions: Zero-setting, ABS/INC switching           |
| Lens mount             | 3-mount turret type  |
| Projection lens        | 10X (172-472)  |
| Magnification accuracy | Contour illumination: ±0.1% or less<br>Surface illumination: ±0.15% or less  |
| Contour illumination   | <ul style="list-style-type: none"> <li>Light source: Halogen bulb (24V, 150W)</li> <li>Telecentric system</li> <li>High/low brightness switchable</li> </ul> |
| Surface illumination   | <ul style="list-style-type: none"> <li>Light source: Halogen bulb (24V, 150W)</li> <li>Vertical/oblique illumination switchable</li> </ul>                   |
| Data output            | SPC (X, Y coordinate data only)  |
| Power supply           | 100V-240V AC, 50/60Hz  |

#### Metric Basic Version (Type T1)

| Model No.               | PJ-H3005F-50 | PJ-H3005F-100 | PJ-H3010F-200 | PJ-H3010F-300 |          |
|-------------------------|--------------|---------------|---------------|---------------|----------|
| Order No.               | 100V AC      | 303-980       | 303-981       | 303-984       | 303-987  |
|                         | 110V AC      | 303-980C      | 303-981C      | 303-984C      | 303-987C |
|                         | 120V AC      | 303-980A      | 303-981A      | 303-984A      | 303-987A |
|                         | 230V AC      | 303-980D      | 303-981D      | 303-984D      | 303-987D |
|                         | 240V AC      | 303-980E      | 303-981E      | 303-984E      | 303-987E |
| XY range                | 50x50mm      | 100x50mm      | 200x100mm     | 300x100mm     |          |
| Effective area of table | Ø118mm       | Ø178mm        | 280x180mm     | 364x180mm     |          |
| Resolution              | 0.001mm      |               |               |               |          |

#### Metric Power Focus Version (Type T2)

| Model No.               | PJ-H3005F-100 | PJ-H3010F-200 | PJ-H3010F-300 |          |
|-------------------------|---------------|---------------|---------------|----------|
| Order No.               | 100V AC       | 303-982       | 303-985       | 303-988  |
|                         | 110V AC       | 303-982C      | 303-985C      | 303-988C |
|                         | 120V AC       | 303-982A      | 303-985A      | 303-988A |
|                         | 230V AC       | 303-982D      | 303-985D      | 303-988D |
|                         | 240V AC       | 303-982E      | 303-985E      | 303-988E |
| XY range                | 100x50mm      | 200x100mm     | 300x100mm     |          |
| Effective area of table | Ø178mm        | 280x180mm     | 364x180mm     |          |
| Resolution              | 0.001mm       |               |               |          |

#### Metric High Performance Version (Type T4)

| Model No.               | PJ-H3005F-100 | PJ-H3010F-200 | PJ-H3010F-300 |          |
|-------------------------|---------------|---------------|---------------|----------|
| Order No.               | 100V AC       | 303-983       | 303-986       | 303-989  |
|                         | 110V AC       | 303-983C      | 303-986C      | 303-989C |
|                         | 120V AC       | 303-983A      | 303-986A      | 303-989A |
|                         | 230V AC       | 303-983D      | 303-986D      | 303-989D |
|                         | 240V AC       | 303-983E      | 303-986E      | 303-989E |
| XY range                | 100x50mm      | 200x100mm     | 300x100mm     |          |
| Effective area of table | Ø178mm        | 280x180mm     | 364x180mm     |          |
| Resolution              | 0.001mm       |               |               |          |

#### Inch/Metric Basic Version (Type T1)

| Model No.               | PJ-H3005F-50   | PJ-H3005F-100 | PJ-H3010F-200 | PJ-H3010F-300 |          |
|-------------------------|----------------|---------------|---------------|---------------|----------|
| Order No.               | 100V AC        | 303-990       | 303-991       | 303-994       | 303-997  |
|                         | 120V AC        | 303-990A      | 303-991A      | 303-994A      | 303-997A |
|                         | 230V AC        | 303-990D      | 303-991D      | 303-994D      | 303-997D |
|                         | 240V AC        | 303-990E      | 303-991E      | 303-994E      | 303-997E |
| XY range                | 2"x2"          | 4"x2"         | 8"x4"         | 12"x4"        |          |
| Effective area of table | Ø4.65"         | Ø7"           | 11.02"x7.09"  | 14.33"x7.09"  |          |
| Resolution              | .0001"/0.001mm |               |               |               |          |

#### Inch/Metric Power Focus Version (Type T2)

| Model No.               | PJ-H3005F-100  | PJ-H3010F-200 | PJ-H3010F-300 |          |
|-------------------------|----------------|---------------|---------------|----------|
| Order No.               | 100V AC        | 303-992       | 303-995       | 303-998  |
|                         | 120V AC        | 303-992A      | 303-995A      | 303-998A |
|                         | 230V AC        | 303-992D      | 303-995D      | 303-998D |
|                         | 240V AC        | 303-992E      | 303-995E      | 303-998E |
| XY range                | 4"x2"          | 8"x4"         | 12"x4"        |          |
| Effective area of table | Ø7"            | 11.02"x7.09"  | 14.33"x7.09"  |          |
| Resolution              | .0001"/0.001mm |               |               |          |

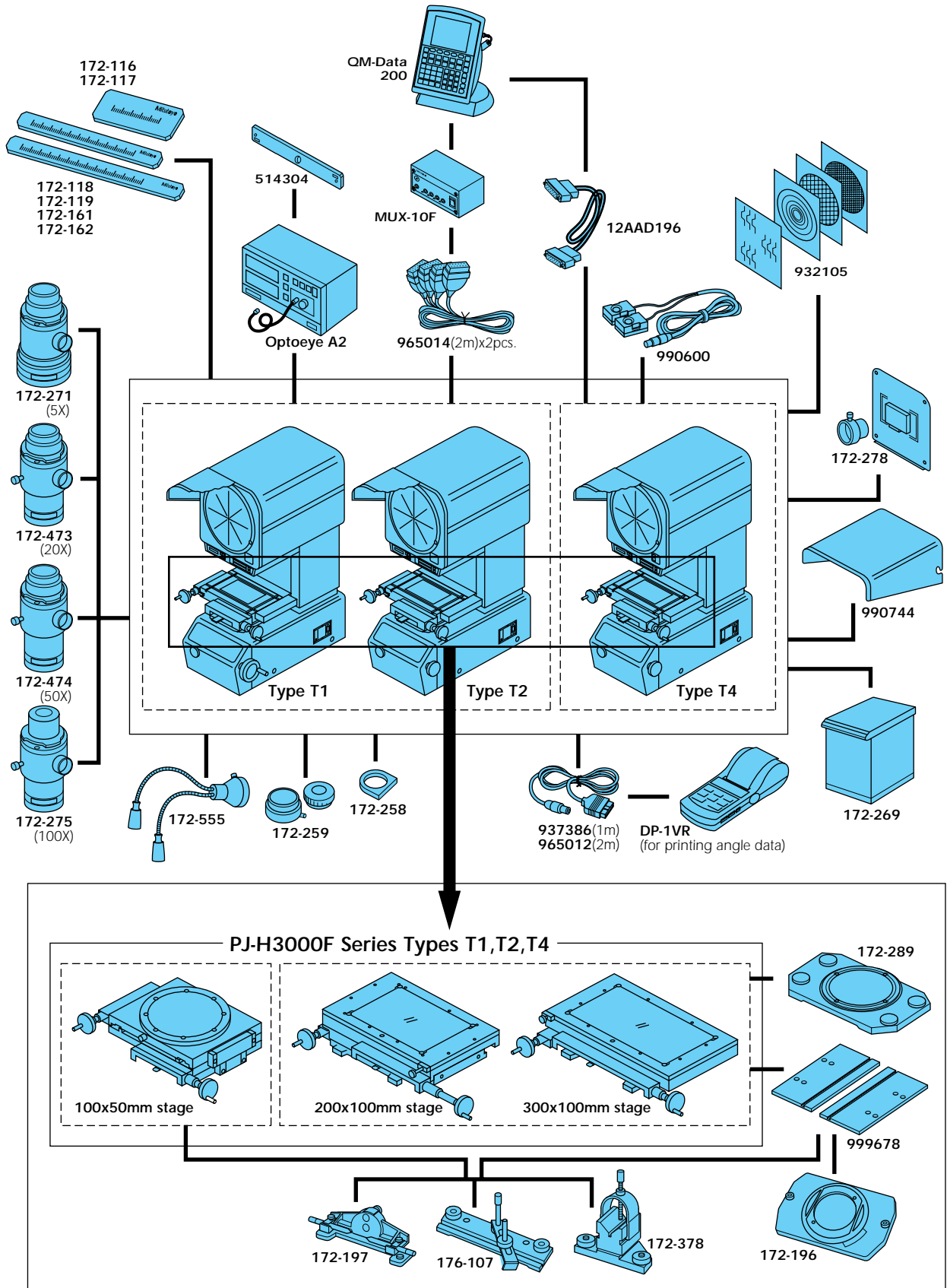
#### Inch/Metric High Performance Version (Type T4)

| Model No.               | PJ-H3005F-100  | PJ-H3010F-200 | PJ-H3010F-300 |          |
|-------------------------|----------------|---------------|---------------|----------|
| Order No.               | 100V AC        | 303-993       | 303-996       | 303-999  |
|                         | 120V AC        | 303-993A      | 303-996A      | 303-999A |
|                         | 230V AC        | 303-993D      | 303-996D      | 303-999D |
|                         | 240V AC        | 303-993E      | 303-996E      | 303-999E |
| XY range                | 4"x2"          | 8"x4"         | 12"x4"        |          |
| Effective area of table | Ø7"            | 11.02"x7.09"  | 14.33"x7.09"  |          |
| Resolution              | .0001"/0.001mm |               |               |          |



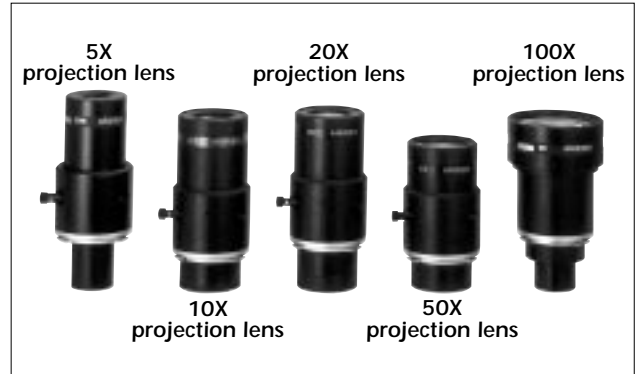


SYSTEM DIAGRAM

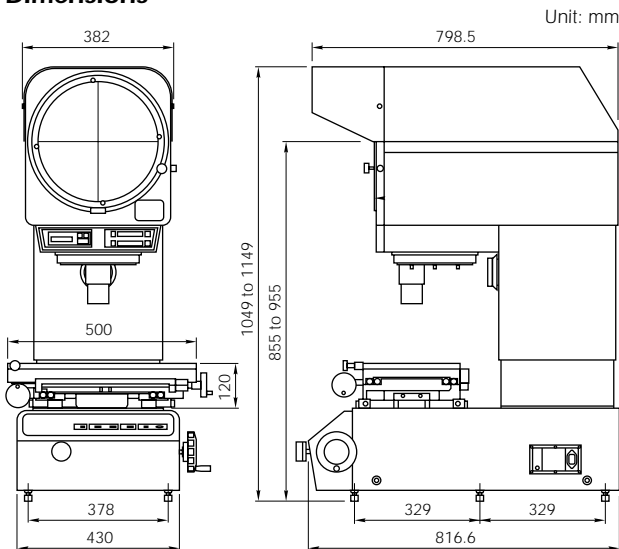


## OPTIONAL ACCESSORIES

| Order No.       | Description                                       |
|-----------------|---|
| 172-271         | 5X projection lens                                |
| 172-473         | 20X projection lens                               |
| 172-474         | 50X projection lens                               |
| 172-275         | 100X projection lens                              |
| 172-555         | Oblique illumination adapter                      |
| 172-116         | Standard scale (50mm)                             |
| 172-117         | Standard scale (2")                               |
| 172-118         | Reading scale (200mm)                             |
| 172-161         | Reading scale (300mm)                             |
| 172-119         | Reading scale (8")                                |
| 172-162         | Reading scale (12")                               |
| 932105          | Overlay chart set                                 |
| 172-258         | Green filter                                      |
| 172-259         | Polarizing unit                                   |
| 172-196         | Rotary table (Effective diameter: 100mm)          |
| 172-289         | Rotary table (Effective diameter: 200mm)          |
| 176-105         | Swivel center support (Max. workpiece dia.: 70mm) |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm) |
| 176-107         | Holder with clamp                                 |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)    |
| 999678          | Fixture mount adapter                             |
| 990744          | Hood (lager type)                                 |
| 172-269         | Machine stand                                     |
| 172-278         | Polaroid photography attachment                   |
| 514304          | OPTOEYE A2 detector attachment                    |
| 936937          | SPC cable (1m)                                    |
| 965014          | SPC cable (2m)                                    |
| 12AAD196        | QM-Data200 connecting kit (for Type T4 only)      |
| (See page 350.) | <b>OPTOEYE A2 image edge sensor</b>               |
| (See page 348.) | <b>QM-Data200 2-D data processor</b>              |



## Dimensions



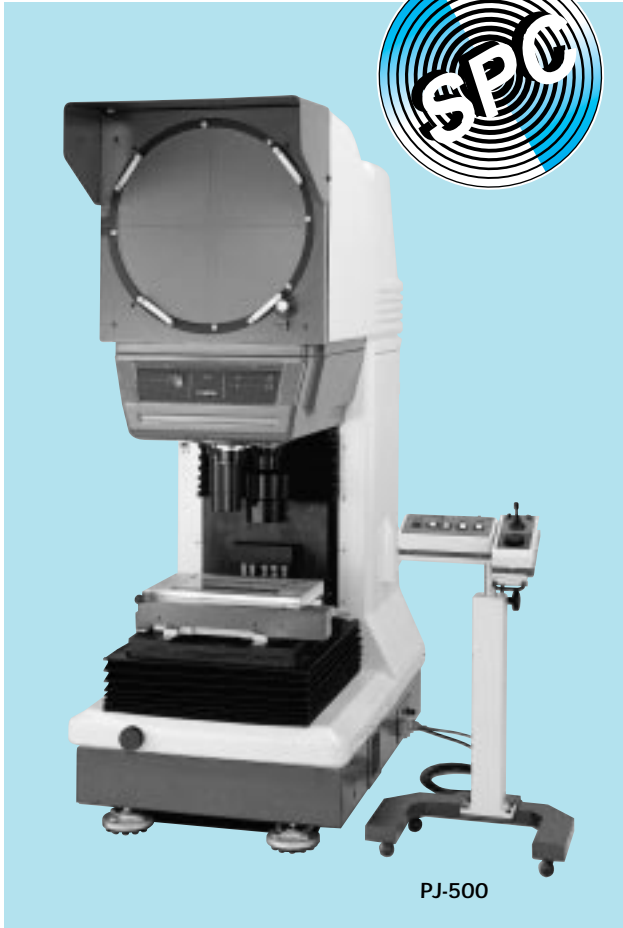
PJ-H3010F-300



# PJ-500

## SERIES 303

### Profile Projector



PJ-500

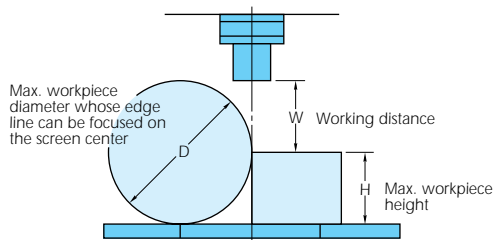


Digital angle and XY counters



Control Box

### Projection Capacity



Unit: mm

| Illumination        | Contour or Surface |      |      |       |      |
|---------------------|--------------------|------|------|-------|------|
|                     | 5X                 | 10X  | 20X  | 50X   | 100X |
| View field diameter | 101.6              | 50.8 | 25.4 | 10.16 | 5.08 |
| W                   | 156.8              | 101  | 90   | 82    | 69   |
| H                   | 98.2               | 205  | 205  | 205   | 205  |
| D                   | 186.4              | 287  | 308  | 260   | 193  |

### FEATURES

- Large-diameter (508mm) screen with staggered cross hairs minimizes errors in aligning the image of a workpiece.
- Digital readout protractor and built-in XY counter for efficient measurement.
- Motor-controlled XY table for speedy measurement.
- Three-lens mount turret includes 10X and 20X projection lens as standard.
- Projection lens has a long working distance for efficient inspection.
- Provided with SPC data output ports.

### SPECIFICATIONS

#### PJ-500 Profile Projectors

##### Metric

| Model No.               | PJ-500   |          |
|-------------------------|--|----------|
| Order No.               | 100V AC  | 303-801  |
|                         | 110V AC  | 303-801C |
|                         | 120V AC  | 303-801A |
|                         | 220V AC  | 303-801D |
|                         | 240V AC  | 303-801E |
| XY range                | 200x100mm  |          |
| Resolution              | 0.001mm  |          |
| Measuring unit          | Built-in linear scales   |          |
| Table size (WxD)        | 430x254mm  |          |
| Effective area of table | 270x170mm  |          |
| Protractor screen       | Effective diameter: 508mm<br>Digital angle display: ±370°<br>Angle reading: 0.01° or 1' (switchable)<br>Functions: Zero-setting, ABS/INC switching                 |          |
| Projection lens         | 10X lens (172-281) and 20X lens (172-282)  |          |
| Magnification accuracy  | Contour illumination: ±0.1% or less<br>Surface illumination: ±0.15% or less  |          |
| Contour illumination    | <ul style="list-style-type: none"> <li>• Light source: Halogen bulb (24V, 150W)</li> <li>• Telecentric system</li> <li>• High/low brightness switchable</li> </ul> |          |
| Surface illumination    | <ul style="list-style-type: none"> <li>• Light source: Halogen bulb (24V, 150W)</li> <li>• Vertical illumination</li> </ul>  |          |
| Data output             | SPC (X, Y coordinate data only)  |          |
| Power supply            | 100/110/120/220/240V AC, 50/60Hz   |          |
| Dimensions              | 775(W)x1375(D)x1905(H)mm   |          |
| Screen center height    | 1595mm   |          |
| Mass                    | 660kg  |          |

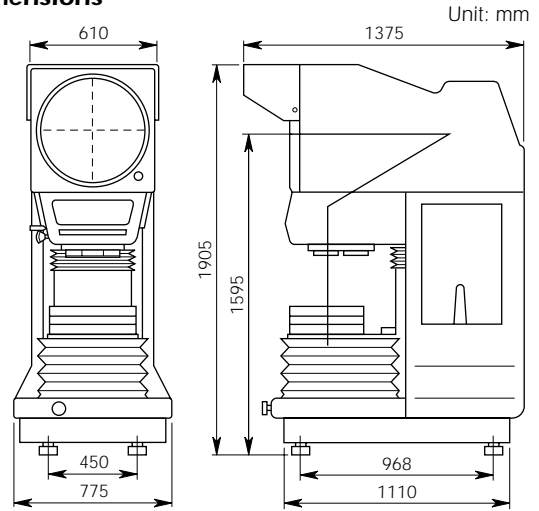
##### Inch/Metric

| Model No.               | PJ-500                 |          |
|-------------------------|------------------------|----------|
| Order No.               | 100V AC                | 303-811  |
|                         | 120V AC                | 303-811A |
|                         | 220V AC                | 303-811D |
|                         | 240V AC                | 303-811E |
| XY range                | 8"x4"                  |          |
| Resolution              | .0001"/0.001mm         |          |
| Measuring unit          | Built-in linear scales |          |
| Table size (WxD)        | 16.93"x10"             |          |
| Effective area of table | 10.63"x6.69"           |          |

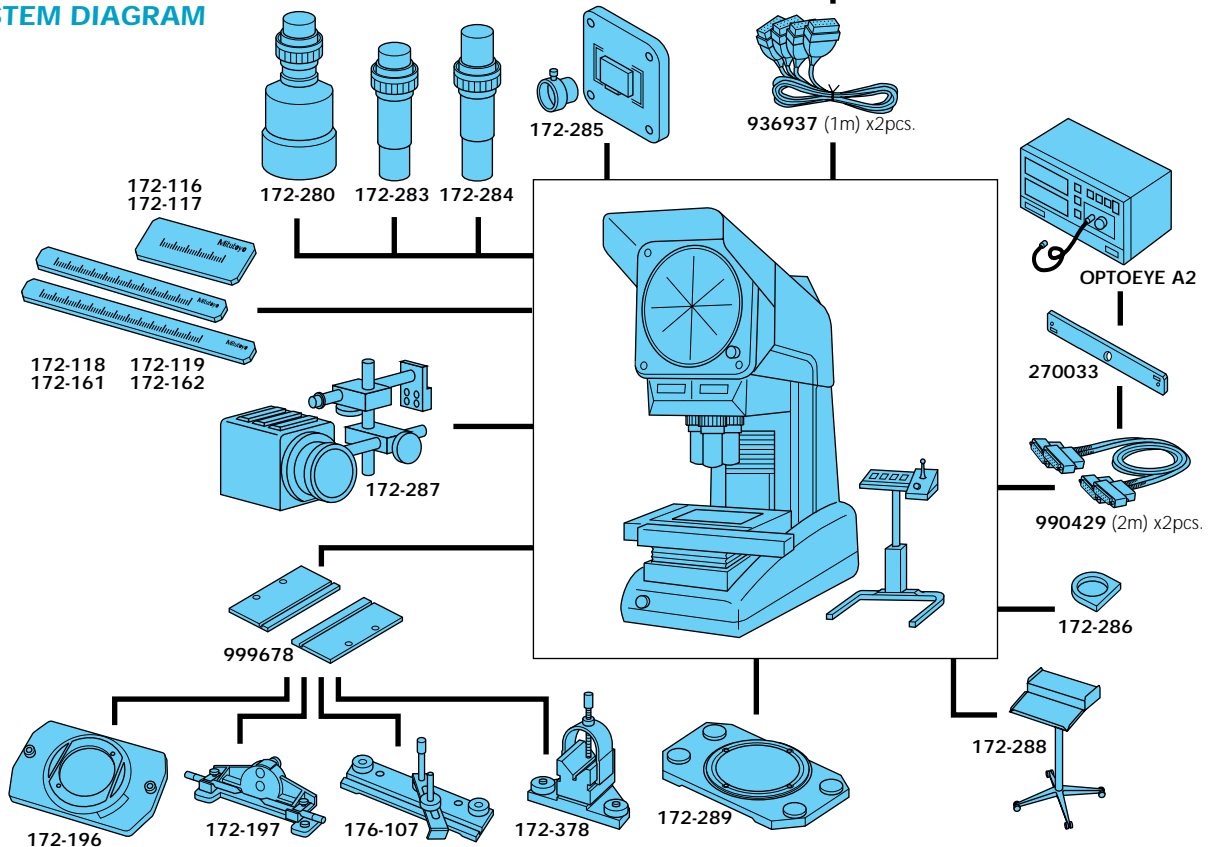
## OPTIONAL ACCESSORIES

| Order No.       | Description                                       |
|-----------------|---|
| 172-280         | 5X projection lens                                |
| 172-283         | 50X projection lens                               |
| 172-284         | 100X projection lens                              |
| 172-287         | Oblique surface illumination unit                 |
| 172-116         | Standard scale (50mm)                             |
| 172-117         | Standard scale (2")                               |
| 172-118         | Reading scale (200mm)                             |
| 172-161         | Reading scale (300mm)                             |
| 172-119         | Reading scale (8")                                |
| 172-162         | Reading scale (12")                               |
| 172-286         | Green filter                                      |
| 999678          | Fixture mount adapter                             |
| 172-196         | Rotary table (Effective diameter: 100mm)          |
| 172-289         | Rotary table (Effective diameter: 200mm)          |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm) |
| 176-107         | Holder with clamp                                 |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)    |
| 172-285         | Polaroid Photographic Attachment                  |
| 172-288         | Controller stand                                  |
| 270033          | Detector attachment board                         |
| 990429          | Signal cable                                      |
| 936937          | SPC cable (1m)                                    |
| 965014          | SPC cable (2m)                                    |
| (See page 350.) | <b>OPTOEYE A2</b> image edge sensor               |
| (See page 348.) | <b>QM-Data200</b> 2-D data processor              |

## Dimensions



## SYSTEM DIAGRAM



# PV-5000

## SERIES 304

### Profile Projector



PV-5000 with optional accessories

### FEATURES

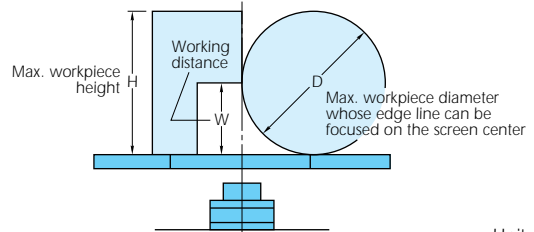
- Floor model that uses a downward illumination system.
- Digital readout protractor screen (including zero-setting, ABS/INC coordinate switching functions) for easy and error-free angle measurement.
- Angled screen allows projected images to be easily traced or compared with a template.
- The optional oblique surface illumination unit (172-418) provides clear and bright images, allowing easy inspection of non-reflection workpieces such as plastic parts or printed materials.

### SPECIFICATIONS

#### PV-5000 Profile Projector

|                        |  |
|------------------------|--|
| Model No.              | PV-5000  |
| Order No.              | 100V AC 304-201-1  |
|                        | 110V AC 304-201-1C   |
|                        | 120V AC 304-201-1A   |
|                        | 220V AC 304-201-1D   |
|                        | 240V AC 304-201-1E   |
| XY table               | (Optional)   |
| Protractor screen      | Effective diameter: 508mm<br>Digital angle display: ±370°<br>Angle reading: 0.01° or 1' (switchable)<br>Functions: Zero-setting, ABS/INC switching |
| Projection lens        | (Optional)   |
| Magnification accuracy | Contour illumination: ±0.1% or less<br>Surface illumination: ±0.15% or less  |
| Contour illumination   | • Light source: Halogen bulb (24V, 150W)<br>• Telecentric system<br>• High/low brightness switchable   |
| Surface illumination   | (Optional)   |
| Power supply           | 100/110/120/230/240V AC, 50/60Hz   |
| Dimensions             | 738(W)x1021(D)x1520(H)mm   |
| Mass                   | 180kg  |

### Projection Capacity

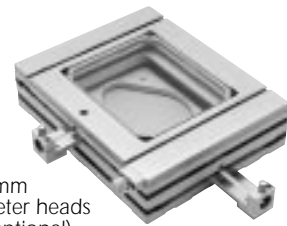


Unit: mm

| Illumination        | Contour or Surface |            |            |      |      |
|---------------------|--------------------|------------|------------|------|------|
|                     | 5X                 | 10X        | 20X        | 50X  | 100X |
| View field diameter | 100                | 50         | 25         | 10   | 5    |
| W                   | 57<br>(32)         | 57<br>(57) | 57<br>(57) | 32.4 | 22.5 |
| H                   | 125                | 181        | 206        | 87   | 87   |
| D                   | 114                | 114        | 114        | 64.8 | 45   |

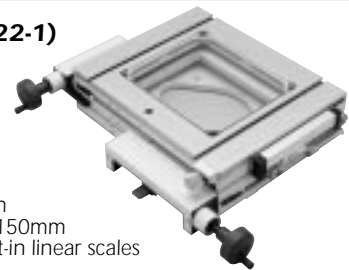
( ): When using surface illumination  
Note: Surface illumination is not available at 50X and 100X magnifications.

#### XY Table (319-209)



XY range: 100x50mm  
Effective area: 180x150mm  
Measuring unit: Micrometer heads (optional)

#### XY Table (319-222-1)



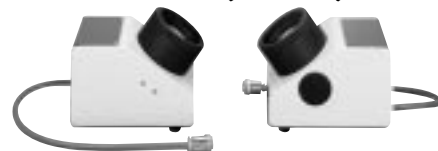
XY range: 100x50mm  
Effective area: 180x150mm  
Measuring unit: Built-in linear scales

#### XY Table (319-225-1)



XY range: 200x100mm  
Effective area: 266x170mm  
Measuring unit: Built-in linear scales

#### Surface Illumination Unit (172-418)



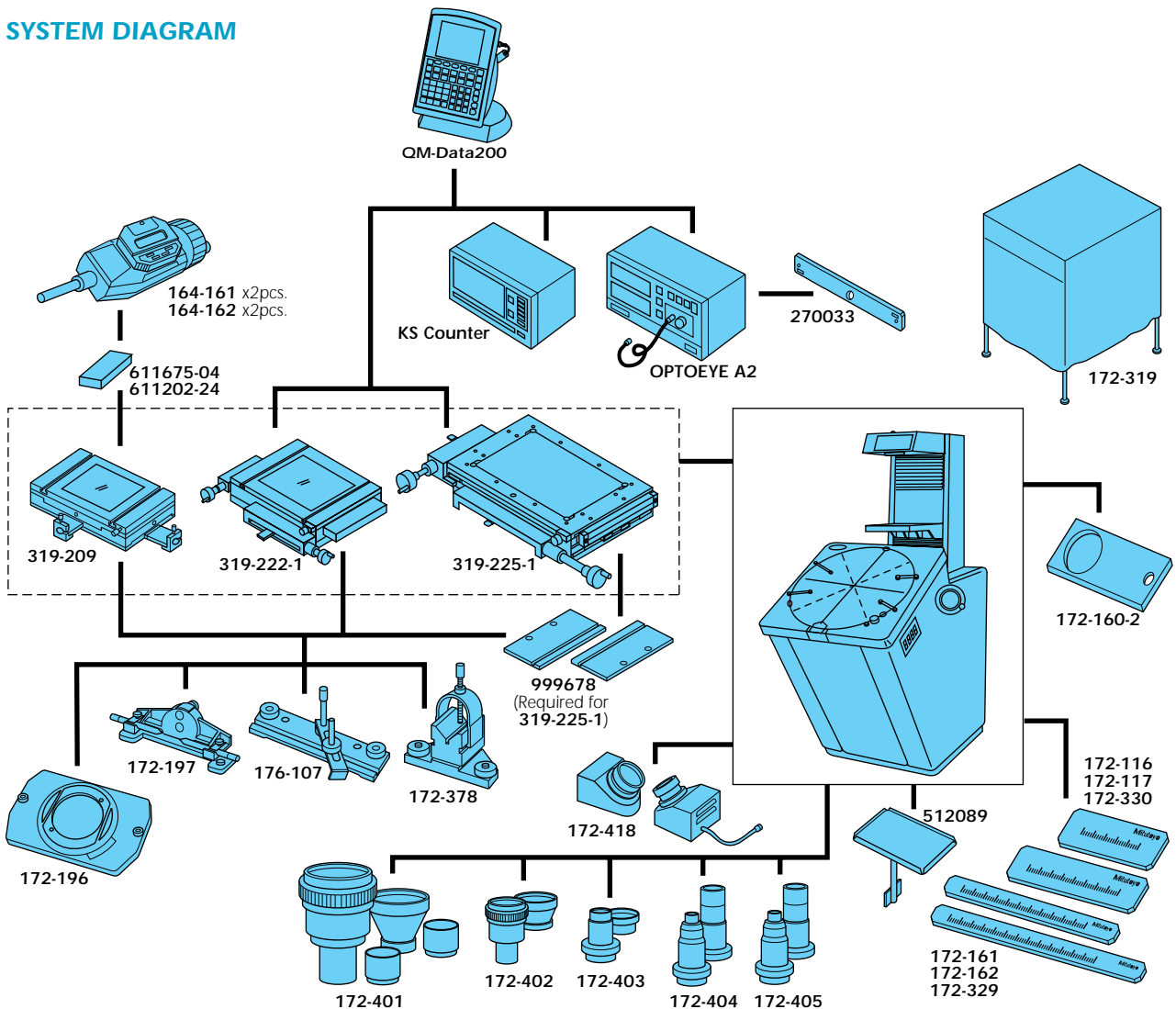
Method: Twin-bulb type oblique illumination  
Light source: Halogen bulbs (24V, 150W)  
Note: 5X, 10X, 20X magnifications only available.

## OPTIONAL ACCESSORIES

| Order No. | Description               |
|-----------|---------------------------|
| 172-401   | 5X projection lens set    |
| 172-402   | 10X projection lens set   |
| 172-403   | 20X projection lens set   |
| 172-404   | 50X projection lens set   |
| 172-405   | 100X projection lens set  |
| 172-418   | Surface illumination unit |
| 172-116   | Standard scale (50mm)     |
| 172-330   | Standard scale (80mm)     |
| 172-117   | Standard scale (2")       |
| 172-161   | Reading scale (300mm)     |
| 172-329   | Reading scale (600mm)     |
| 172-162   | Reading scale (12")       |
| 512089    | Digital counter stand     |
| 172-160-2 | Green filter              |
| 172-319   | Canopy                    |

| Order No.       | Description                                       |
|-----------------|---|
| 319-209         | XY table, 100x50mm                                |
| 319-222-1       | XY table, 100x50mm (with built-in linear scales)  |
| 319-225-1       | XY table, 200x100mm (with built-in linear scales) |
| 164-161         | Digimatic micrometer head (0.001mm)               |
| 164-162         | Digimatic micrometer head (.00005"/0.001mm)       |
| 611675-04       | Rectangular gauge block (50mm)                    |
| 611202-24       | Rectangular gauge block (2")                      |
| 172-196         | Rotary table (Effective diameter: 100mm)          |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm) |
| 176-107         | Holder with clamp                                 |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)    |
| 999678          | Fixture mount adapter                             |
| 270033          | Detector attachment board                         |
| 937387          | SPC cable (1m)                                    |
| 965013          | SPC cable (2m)                                    |
| (See page 321.) | <b>KS Counter</b>                                 |
| (See page 350.) | <b>OPTOEYE A2 image edge sensor</b>               |
| (See page 348.) | <b>QM-Data200 2-D data processor</b>              |

## SYSTEM DIAGRAM



# PV-600A

## SERIES 305

### Profile Projector



### FEATURES

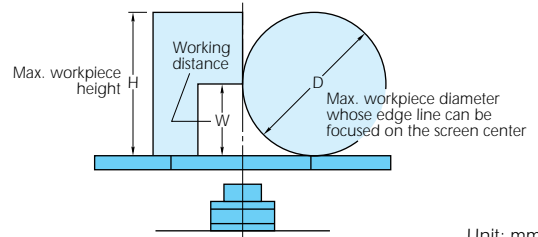
- Floor model that uses a downward illumination system.
- Large diameter (600mm) screen for efficient inspection.
- Angled screen allows projected images to be easily traced or compared with a template.
- The optional oblique surface illumination unit (172-418) provides clear and bright images, allowing easy inspection of non-reflection workpieces such as plastic parts or printed materials.

### SPECIFICATIONS

#### PV-600A Profile Projector

|                        |  |          |
|------------------------|--|----------|
| Model No.              | PV-600A  |          |
| Order No.              | 100V AC  | 305-103  |
|                        | 110V AC  | 305-103C |
|                        | 120V AC  | 305-103A |
|                        | 220V AC  | 305-103D |
|                        | 240V AC  | 305-103E |
| XY table               | (Optional)   |          |
| Protractor screen      | (Optional)   |          |
| Projection lens        | (Optional)   |          |
| Magnification accuracy | Contour illumination: $\pm 0.1\%$ or less<br>Surface illumination: $\pm 0.15\%$ or less                                  |          |
| Contour illumination   | <ul style="list-style-type: none"> <li>• Light source: Halogen bulb (24V, 150W)</li> <li>• Telecentric system</li> </ul> |          |
| Surface illumination   | (Optional)   |          |
| Power supply           | 100/110/120/230/240V AC, 50/60Hz   |          |
| Dimensions             | 1010(W)x1150(D)x1750(H)mm  |          |
| Mass                   | 200kg  |          |

### Projection Capacity

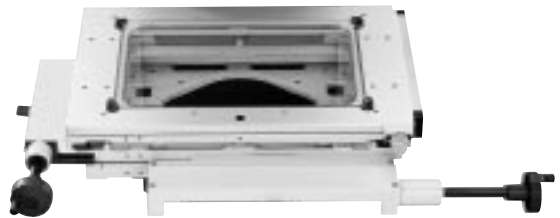


Unit: mm

| Illumination        | Contour or Surface |            |            |     |      |
|---------------------|--------------------|------------|------------|-----|------|
|                     | 5X                 | 10X        | 20X        | 50X | 100X |
| View field diameter | 120                | 60         | 30         | 12  | 6    |
| W                   | 37<br>(12)         | 37<br>(37) | 37<br>(37) | —   | —    |
| H                   | 140                | 182        | 257        | 76  | 76   |
| D                   | 94                 | 94         | 94         | 14  | 6    |

( ): When using surface illumination

### XY Table (319-225-1)



XY range: 200x100mm  
Effective area: 266x170mm  
Measuring unit: Built-in linear scales

### Surface Illumination Unit (172-418)

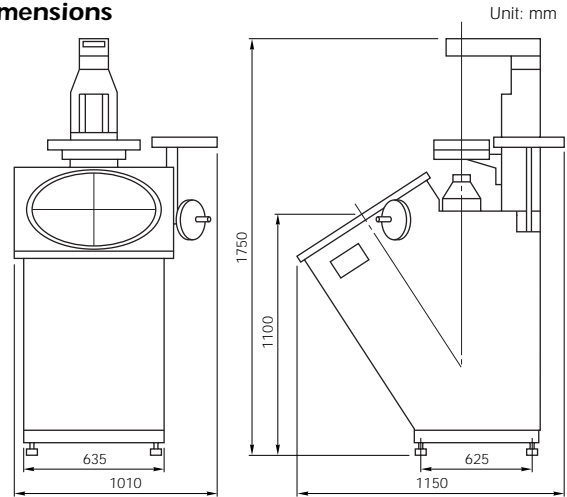


Method: Twin-bulb type oblique illumination  
Light source: Halogen blubs (24V, 150W)  
Note: Vertical illumination when using 50X, 100X magnifications.

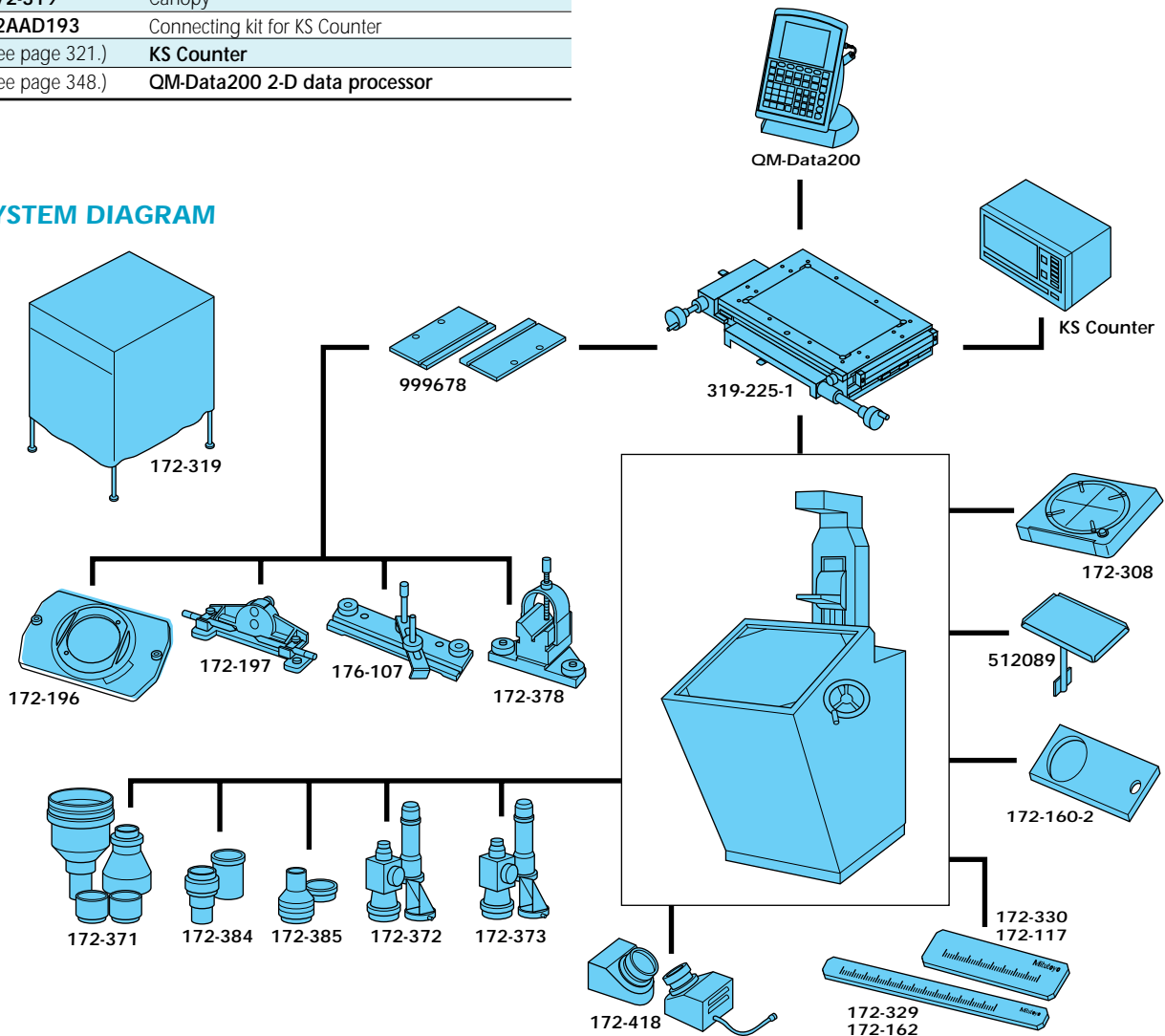
## OPTIONAL ACCESSORIES

| Order No.       | Description                                       |
|-----------------|---|
| 172-308         | Protractor screen (Effective diameter: 600mm)     |
| 172-371         | 5X projection lens set                            |
| 172-384         | 10X projection lens set                           |
| 172-385         | 20X projection lens set                           |
| 172-372         | 50X projection lens set                           |
| 172-373         | 100X projection lens set                          |
| 319-225-1       | XY table, 200x100mm (with built-in linear scales) |
| 172-418         | Surface illumination unit                         |
| 172-330         | Standard scale (80mm)                             |
| 172-117         | Standard scale (2")                               |
| 172-329         | Reading scale (600mm)                             |
| 172-162         | Reading scale (12")                               |
| 512089          | Digital counter stand                             |
| 172-160-2       | Green filter                                      |
| 172-196         | Rotary table (Effective diameter: 100mm)          |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm) |
| 176-107         | Holder with clamp                                 |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)    |
| 999678          | Fixture mount adapter                             |
| 172-319         | Canopy  |
| 12AAD193        | Connecting kit for KS Counter                     |
| (See page 321.) | <b>KS Counter</b>                                 |
| (See page 348.) | <b>QM-Data200 2-D data processor</b>              |

## Dimensions



## SYSTEM DIAGRAM





# PH-3515F

## SERIES 172

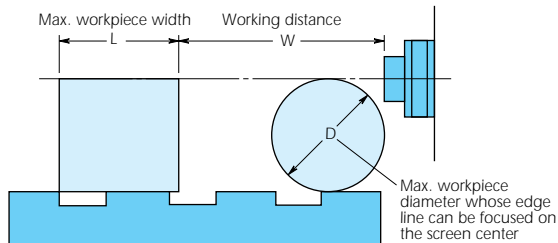
### Profile Projector



### FEATURES

- Heavy-duty, bench-top model that uses horizontal optical system.
- Erect image on the day-bright screen.
- Suitable for thread pitch measurements—blurred or distorted images will not be produced when workpiece is angled.
- 356mm diameter protractor screen with cross-hairs and staggered lines for easy alignment.
- Digital angle measurement to 1' or 0.01°.
- Floating-type workpiece table incorporates linear scales for fast, accurate measurement.
- Built-in XY counter.

### Projection Capacity (PH-3515F)



Unit: mm

| illumination        | Contour or Surface |            |            |                |      |
|---------------------|--------------------|------------|------------|----------------|------|
| Magnification       | 5X                 | 10X        | 20X        | 50X            | 100X |
| View field diameter | 71.2               | 35.6       | 17.8       | 7.12           | 3.5  |
| W                   | 160<br>(64)        | 93<br>(41) | 40<br>(40) | 14.6<br>(14.6) | 9.5  |
| L                   | 175                | 235        | 235        | 80             | 109  |
| D                   | 152.4              | 152.4      | 116        | 30.4           | 19   |

( ): When using surface illumination

### SPECIFICATIONS

#### PH-3515F Profile Projector

##### Metric

|                        |  |          |
|------------------------|--|----------|
| Model No.              | PH-3515F                                   |          |
| Order No.              | 100V                                       | 172-847  |
|                        | 110V                                       | 172-847C |
|                        | 120V                                       | 172-847A |
|                        | 220V                                       | 172-847D |
|                        | 240V                                       | 172-847E |
| XY range               | Horizontal                                 | 254mm    |
|                        | Vertical                                   | 152mm    |
| Resolution             | 0.001mm                                    |          |
| Measuring unit         | Linear scales                              |          |
| Table size (WxD)       | 450x146mm                                  |          |
| Swivel range           | ±10°                                       |          |
| Max. workpiece weight  | 45kg                                       |          |
| Protractor screen      | Effective diameter: 356mm                  |          |
|                        | Digital angle display: ±370°               |          |
|                        | Angle reading: 0.01°/1' (switchable)       |          |
|                        | Functions: Zero-setting, ABS/INC switching |          |
| Projection lens        | 10X (172-184)                              |          |
| Magnification accuracy | Contour illumination: ±0.1% or less        |          |
|                        | Surface illumination: ±0.15% or less       |          |
| Contour illumination   | • Light source: Halogen bulb (24V, 150W)   |          |
|                        | • Telecentric system                       |          |
|                        | • High/low brightness switchable           |          |
| Surface illumination   | • Light source: Halogen bulb (24V, 200W)   |          |
|                        | • Fiber-optic oblique illumination         |          |
| Data output            | SPC (X, Y coordinate data only)            |          |
| Power supply           | 100/110/120/220/240V AC, 50/60Hz           |          |
| Dimensions (WxDxH)     | 460x1115x1150mm                            |          |
| Mass                   | 150kg                                      |          |

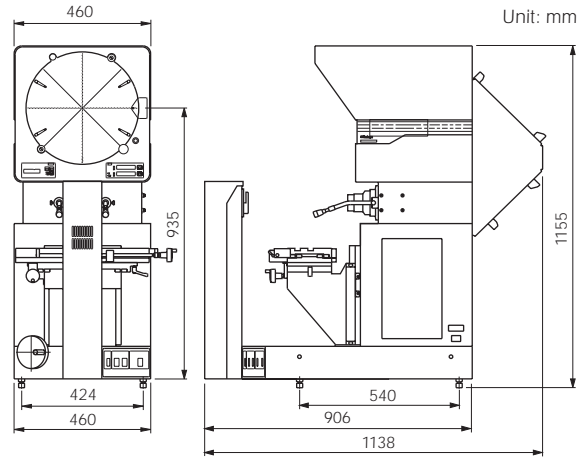
##### Inch / Metric

|                  |                |          |
|------------------|----------------|----------|
| Model No.        | PH-3515F       |          |
| Order No.        | 100V           | 172-857  |
|                  | 120V           | 172-857A |
|                  | 220V           | 172-857D |
|                  | 240V           | 172-857E |
| XY range         | Horizontal     | 10"      |
|                  | Vertical       | 6"       |
| Resolution       | .0001"/0.001mm |          |
| Measuring unit   | Linear scales  |          |
| Table size (WxD) | 17.72"x5.75"   |          |

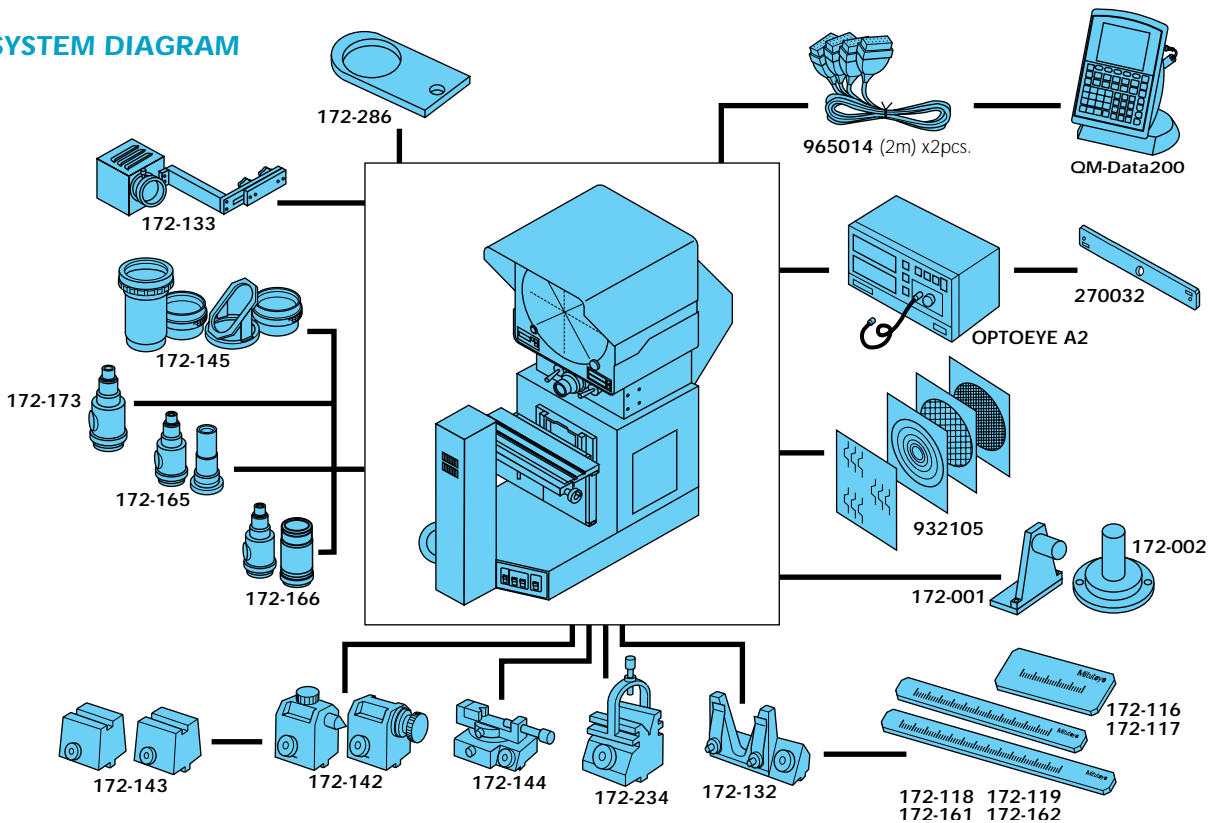
## OPTIONAL ACCESSORIES

| Order No.       | Description                                    |
|-----------------|--|
| 172-145         | 5X projection lens set                         |
| 172-173         | 20X projection lens set                        |
| 172-165         | 50X projection lens set                        |
| 172-166         | 100X projection lens set                       |
| 12AAB988        | Half mirror for 100X projection lens           |
| 172-133         | Vertical surface illumination unit             |
| 172-116         | Standard scale (50mm)                          |
| 172-117         | Standard scale (2")                            |
| 172-118         | Reading scale (200mm)                          |
| 172-161         | Reading scale (300mm)                          |
| 172-119         | Reading scale (8")                             |
| 172-162         | Reading scale (12")                            |
| 172-286         | Green filter                                   |
| 932105          | Overlay chart set                              |
| 172-142         | Center support                                 |
| 172-143         | Center support riser                           |
| 172-144         | Rotary vise (Max. workpiece diameter: 60mm)    |
| 172-234         | V-block with clamp (Max. workpiece dia.: 50mm) |
| 172-132         | Vertical holder                                |
| 172-001         | Chipping saw blade measuring jig               |
| 172-002         | Cutting saw blade measuring jig                |
| 270032          | OPTOEYE A2 detector attachment                 |
| (See page 350.) | <b>OPTOEYE A2 image edge sensor</b>            |
| (See page 348.) | <b>QM-Data200 2-D data processor</b>           |

## Dimensions



## SYSTEM DIAGRAM



# Accessories for Profile Projectors

## Standard Scales



- Used for checking magnification accuracy.

### SPECIFICATIONS

#### Standard Scales

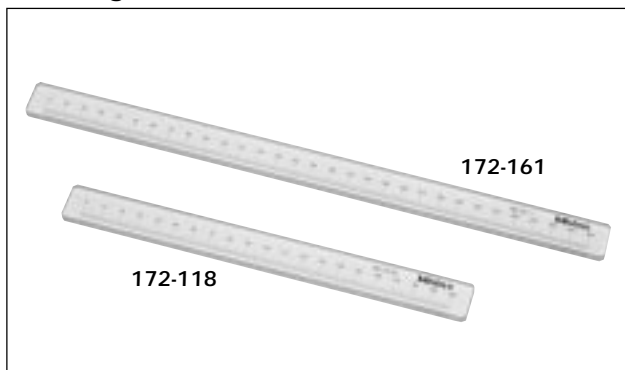
##### Metric

| Graduation | Range | Order No. | Accuracy | Mass |
|------------|-------|-----------|----------|------|
| 0.1mm      | 50mm  | 172-116   | 3.25µm   | 10g  |
|            | 80mm  | 172-330   | 3.4µm    | 18g  |

##### Inch

| Graduation | Range | Order No. | Accuracy | Mass     |
|------------|-------|-----------|----------|----------|
| .01"       | 2"    | 172-117   | .00013"  | .02 lbs. |

## Reading Scales



- Specially designed for inspecting the magnified image of a standard scale on the projection screen.

### SPECIFICATIONS

#### Reading Scales

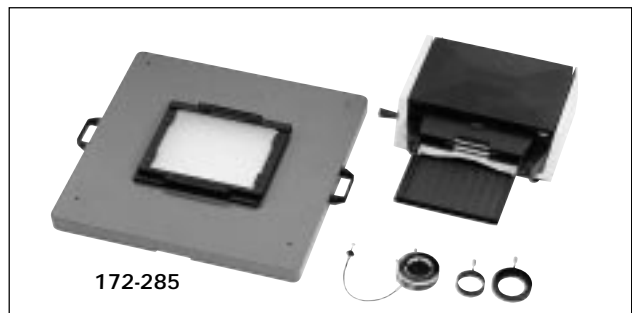
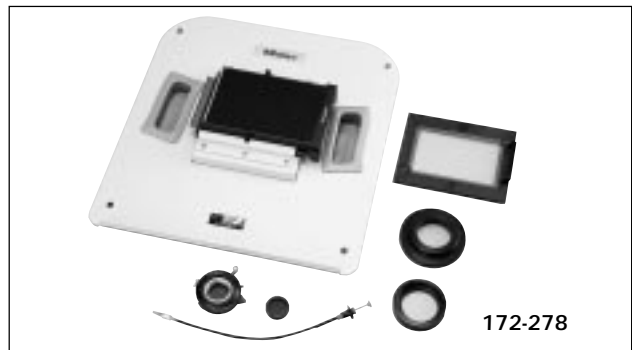
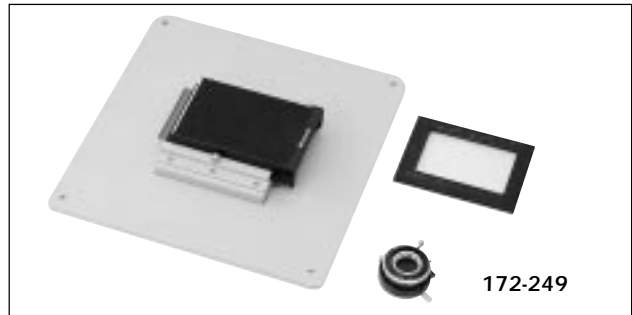
##### Metric

| Graduation | Range | Order No. | Accuracy | Mass |
|------------|-------|-----------|----------|------|
| 0.5mm      | 200mm | 172-118   | 18µm     | 65g  |
|            | 300mm | 172-161   | 19.5µm   | 100g |
|            | 600mm | 172-329   | 24µm     | 720g |

##### Inch

| Graduation | Range | Order No. | Accuracy | Mass     |
|------------|-------|-----------|----------|----------|
| .02"       | 8"    | 172-119   | .00071"  | .14 lbs. |
|            | 12"   | 172-162   | .00077"  | .22 lbs. |

## Polaroid Photographic Attachments



- The Polaroid film eliminates the need for developing in a dark room. By using this unit, the workpiece's surface image projected on the screen can be recorded easily.
- The focus can be adjusted after loading the film.
- Films: Polaroid #669 (color film) or Polaroid #665 (monochrome film)

### SPECIFICATIONS

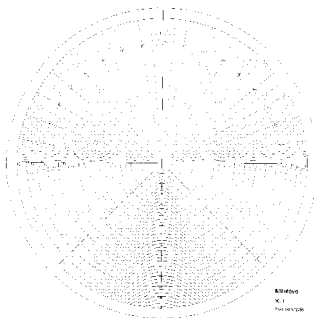
| Order No. | Applicable profile projectors |
|-----------|-------------------------------|
| 172-249   | PJ-3000, PJ-A3000 Series      |
| 172-278   | PJ-H3000 Series               |
| 172-285   | PJ-500                        |
| 172-238   | PV-350H                       |

## Overlay Chart Set

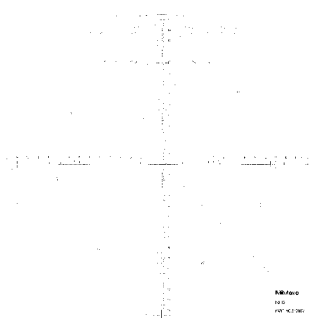
- Makes inspection of projected images an easy process.
- Twelve different patterns are available in set.
- Designed for use with profile projectors whose screen diameter is 300mm or larger.

## SPECIFICATIONS

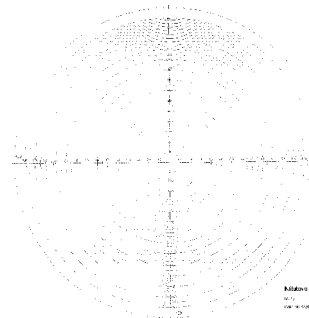
| Order No.               | 932105   |
|-------------------------|--|
| No. of sheets           | 12   |
| Included chart patterns | <p><b>512066:</b> Protractor (1°-grad. radial index) and radius (1mm-radius increment concentric semicircles)</p> <p><b>512067:</b> Radius (0.1cm-reading scales and 5mm-radius increment concentric circles)</p> <p><b>512068:</b> Radius (1X, 10X, 20X, 50X)</p> <p><b>512069:</b> 1mm-reading scales (20X, 50X)</p> <p><b>512070:</b> 10x10mm sections</p> <p><b>512071:</b> 0.5mm-reading scales</p> <p><b>512072:</b> 1x1mm sections</p> <p><b>512073:</b> Protractor (1°-grad. diametrical index)</p> <p><b>512074:</b> 1mm-reading vertical scale</p> <p><b>512075:</b> Protractor (1°-grad. diametrical index) and radius (1mm-radius increment concentric circles)</p> <p><b>512076:</b> Metric, Unified, and Whitworth screw threads (20X)</p> <p><b>512077:</b> Metric screw thread (100X) and 20° and 14.5° gear teeth (20X)</p> |



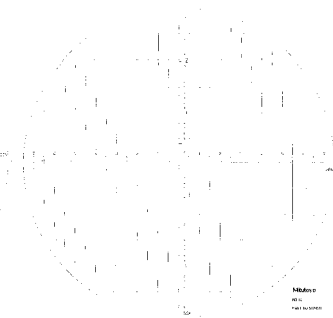
512066



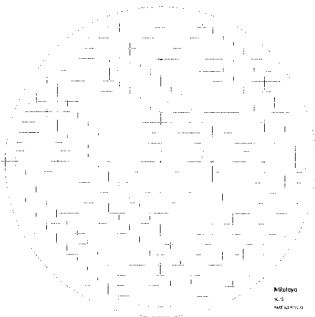
512067



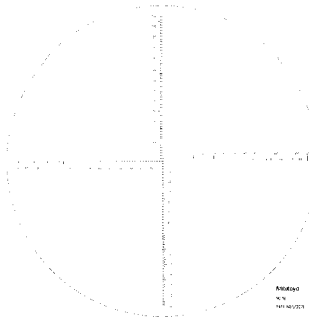
512068



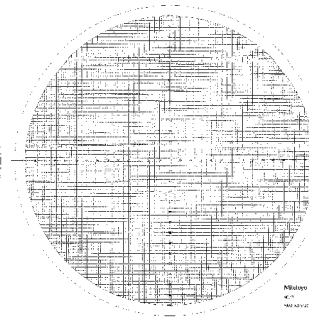
512069



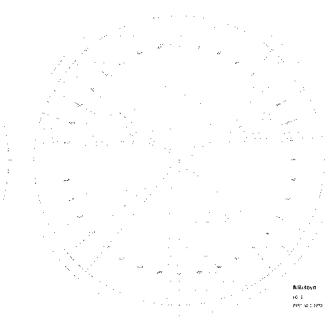
512070



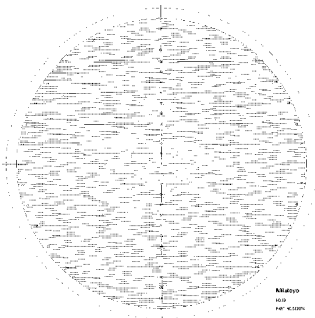
512071



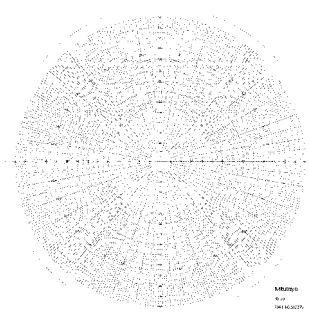
512072



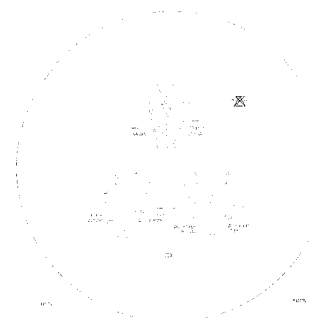
512073



512074



512075



512076



512077



# QM-Data200

## SERIES 264



QM-Data 200

The comprehensive key panels for the QM-Data 200 make it easy for any operator to use. Measurement of combined elements such as circle-to-circle distance, etc., can be measured via one-touch operation. Furthermore, the measurement procedure navigation display, which indicates the next data entry position during a measurement, makes it possible even for a beginner to know at a glance where the next measuring position is.

### FEATURES

- Various graphic displays on the large LCD screen for easy measurement operations.
- One-key operation for combined measurements that are often used (circle-circle distance, etc.)
- The AI measurement function (automatic identification of measuring item) eliminates switching between the measurement command keys.
- Equipped with the measurement procedure teaching function and the measuring position navigation in Repeat mode.
- The user menu function allows user to register measurement commands or part programs to create his/her own menu.
- Tolerance zone measurement of data processing result and various statistical processing for each item are available.
- Measurement result output to "MS-Excel<sup>®</sup>" in spreadsheet (CSV) format.
- The measurement procedure and measurement result can be saved, using the optional floppy disk drive unit.
- Two models are available: a stand-alone type with tilt system and a flexible arm type that can be mounted on a Profile Projector.

### SPECIFICATIONS

#### QM-Data 200

| Order No.                      | 100V  | 264-140  | 264-141        |
|--------------------------------|---|----------|----------------|
|                                | 110V  | 264-140C | 264-141C       |
|                                | 120V  | 264-140A | 264-141A       |
|                                | 220V  | 264-140D | 264-141D       |
|                                | 240V  | 264-140E | 264-141E       |
| Type                           | Stand-mount type  |          | Arm-mount type |
| Display language               | Japanese/English/German/French/Italian/Spanish/Portuguese   |          |                |
| Resolution                     | 0.0001mm  |          |                |
| Program functions              | Part program creation, execution, editing   |          |                |
| Statistical processing         | Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram  |          |                |
| Element memory                 | Maximum of 1000 elements  |          |                |
| Element recall                 | Point, line, circle, distance, ellipse, rectangular hole, slotted hole, intersection and intersecting angle   |          |                |
| Element key-in                 | Point, line, circle   |          |                |
| Display system                 | Monographic LCD (320 x 240 dots, with back light)   |          |                |
| Measurement result file output | RS-232C output (CSV format, MUX-10 format)  |          |                |
| Data input                     | FS-232C (For connecting the measuring instrument's counter), X, Y, Z (Linear scale input for the no-counter type), FS (for connecting the footswitch) |          |                |
| Data output                    | RS-232C (for connecting PC), Printer (for connecting a receipt printer or an external printer), FD (for connecting the floppy disk drive unit)        |          |                |
| Power supply                   | 100V AC to 240V AC  |          |                |
| Mass                           | 2.2kg   | 2.1kg    |                |

### OPTIONAL ACCESSORIES

| Order No. | Description                       |
|-----------|-----------------------------------|
| 12AAA799  | Floppy disk drive unit            |
| 12AAD033  | Receipt printer (for 230V)        |
| 12AAD034  | Receipt printer (for 120V)        |
| 908353    | Printer paper for receipt printer |
| 12AAA804  | Printer cable (2m)                |
| 937179T   | Foot switch                       |
| 172-270   | Adjustable stand                  |
| 12AAD193  | Connection cable B                |
| 12AAD194  | Connection cable C                |
| 12AAD195  | Connection cable D                |
| 12AAD196  | Connection cable E                |
| 12AAA807  | RS-232C cable (2m)                |

### • For optical instruments

The QM-Data200 is a geometric readouts/analysis unit for optical instruments like a profile projectors. This features powerful 2-D coordinate measurement capabilities with unmatched simple key operation. The QM-Data200 improves operator productivity, minimizes errors and save a total measurement time and production cost.

### • Graphic display

Measurement information and data are visualized on the back-lit LCD display with graphical interfaces. The geometric feature that you selected is displayed with the probing navigator. The measurements map and blink indication show you the probing points and sequences. Simply probe points and click by following the blink indicator the measurement can be easily completed even a beginner. This improves operation accuracy and reduces errors and time.



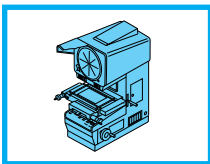
### • Intuitive panel design

With rich experiences in the precision measurement with optical instruments, Mitutoyo employs the "Geometry Keys" to accelerate the measurement process. The probing routine of standard geometric features and combinations are designed with Geometry Keys on the front panel. Click of a key that you need and capture features you can complete the measurement quickly and accurately. This improves operator productivity, reduce errors and save operation time and cost. To easily integrate into the existing workflow, the QM-Data200 provides an another way of measurement style. Capture the individual geometry features, then manage the data for geometry combination.



## SYSTEM DIAGRAM

#### Main unit with SPC output

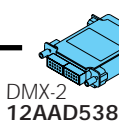


PJ-2505D/F, PJ-3000, PJ-A3000, PJ-H3000, PH-3515F (172-847), PJ-500, TF-500

SPC cable 936937 (1m) x2pcs.



MUX-10F 264-002

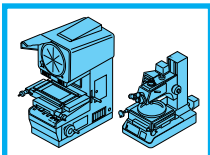


DMX-2 12AAD538

#### Main unit without counter

All profile projectors with the linear scale XY stage can be connected directly.

#### Main unit with RS-232C output

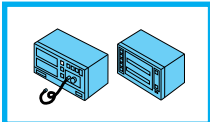


PJ-A3000D/F, MF/MF-A, MF-UN/MF-UA

RS-232C cable (2m) 12AAA807

Connecting cable D 12AAD195

Connecting cable C 12AAD194



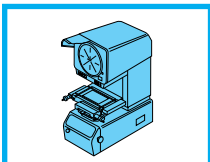
KC Counter, KS Counter, Optoeye A2

Connecting cable B 12AAD193

For RS-232C input (Connected to the measuring instrument counter)

For RS-232C output (Connected to PC)

#### Main unit with built-in Optoeye



PJ-H3000F4

Connecting cable E 12AAD196



For linear scale input  
For footswitch input

# OPTOEYE A2

## Image Edge Sensor

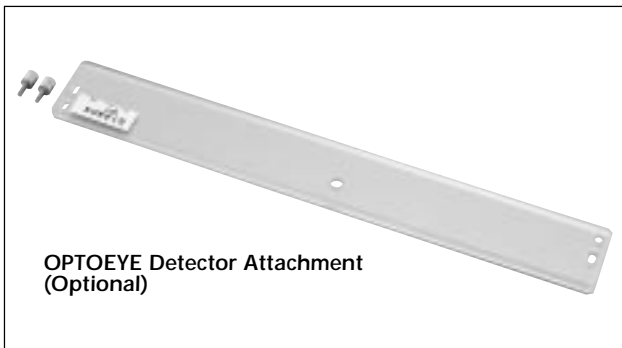
SERIES 332



The OPTOEYE A2 Image Edge Sensor eliminates human errors which may be involved in visual alignment, ensuring speedy, accurate, and consistent measurements, regardless of operator's skill.

### FEATURES

- Can be attached to the screen of any Mitutoyo profile projector by using optional detector attachments.
- Easy and efficient operation.
- Non-directional edge finding allows measurements of complex-shaped workpieces.
- X and Y coordinate data of an edge can be displayed on the digital counters when it is detected.
- Sophisticated data processing is available by connecting the OPTOEYE A2 to QM-Data200 2-D data processor via optional RS-232C interface unit and signal cables.



### SPECIFICATIONS

#### OPTOEYE A2 Image Edge Sensor

##### Metric

|                                    |   |            |
|------------------------------------|---|------------|
| Order No.                          | 100V AC   | 332-115-1  |
|                                    | 120V AC   | 332-115-1A |
|                                    | 220V AC   | 332-115-1D |
|                                    | 240V AC   | 332-115-1E |
| No. of scale inputs                | 2   |            |
| Resolution                         | 0.001mm   |            |
| Display                            | 9-digit fluorescent tubes   |            |
| Conditions to detect an image edge | Angle characteristics: Non-directional<br>Detecting condition: Contour illumination<br>Minimum diameter of image: 10mm*<br>Minimum width of image: 2mm* |            |
| Functions                          | Zero-setting, counting direction switching, data hold, inch/mm conversion, edge detection signal output   |            |
| Data output                        | Available via optional interface units  |            |
| Power supply                       | 85-132V/170-264V AC, 50/60Hz  |            |
| Dimensions                         | 340(W)x180(D)x183(H)mm  |            |
| Mass                               | 6kg   |            |

\*On screen

##### Inch/Metric

|                     |                 |            |
|---------------------|-----------------|------------|
| Order No.           | 100V AC         | 332-125-1  |
|                     | 120V AC         | 332-125-1A |
|                     | 220V AC         | 332-125-1D |
|                     | 240V AC         | 332-125-1E |
| No. of scale inputs | 2               |            |
| Resolution          | .00005"/0.001mm |            |

### OPTIONAL ACCESSORIES

| Order No. | Description   |
|-----------|---|
| 514304    | Detector attachment (PJ-2500/PJ-3000/PJ-A3000/PJ-H3000) |
| 514305    | Detector attachment (PV-350H*)                          |
| 270032    | Detector attachment (PV-350H**, PH-3515F)               |
| 270033    | Detector attachment (PJ-500, PV-5000)                   |
| 270034    | Detector attachment (PV-600A)                           |
| 12AAD197  | Connecting kit  |
| 939298    | GP-IB interface unit                                    |
| 939474    | Parallel BCD output unit                                |

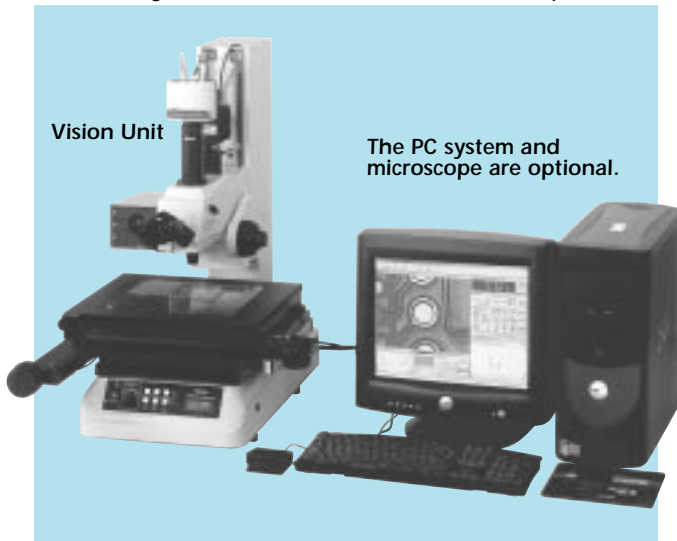
\*When using a protractor screen (172-155)

\*\*When using a plain screen (172-146)

## Vision Unit

### SERIES 359

Vision System Retrofit for Microscopes



### FEATURES

- The automatic edge-detection tools and various macro icons allow measurement in one easy step.
- The graphics and measurement navigation functions facilitate operation.
- Image data input/storage function.
- Measurement results are output to MS-Excel®. This lets the user generate an inspection table on the same computer.
- Allows the tolerance zone measurement of measurement results and various types of statistical processing for each item.
- Combined use with the focus pilot provides high-accuracy in height measurements. (patent pending)
- A series of measuring operation can be performed using just one screen display.
- The auto-brightness control function faithfully reproduces the type and degree of illumination used. (This function is limited to the MF-A/MF-UA series.)

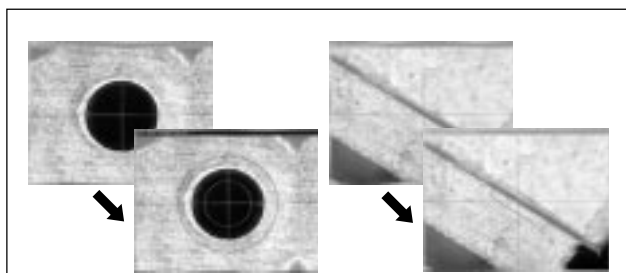
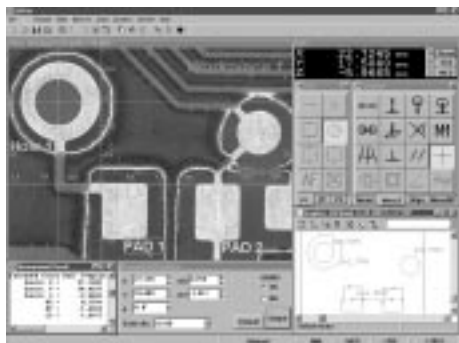
### SPECIFICATIONS

#### Vision Unit

| Order No.*             | 359-670 (for MF-A), 359-675 (for MF-UA)  |
|------------------------|--|
| CCD camera unit        | <ul style="list-style-type: none"> <li>• Image sensor: 1/3" color CCD camera</li> <li>• Resolution: 0.0001mm</li> <li>• Magnifications on 17" monitor:                             <ul style="list-style-type: none"> <li>21X (when using 1X objective),</li> <li>63X (when using 3X objective),</li> <li>105X (when using 5X objective),</li> <li>210X (when using 10X objective)</li> </ul> </li> <li>• Dimensions (WxDxH): 100x58x92mm</li> <li>• Mass: 0.4kg</li> <li>• Operating software: QSPak</li> </ul> |
| Adapter unit           | <ul style="list-style-type: none"> <li>• Magnification: 0.5X</li> <li>• Dimensions: Ø45x123mm</li> <li>• Mass: 0.3kg</li> </ul>  |
| Standard accessory     | Foot switch ( <b>937179T</b> )   |
| Applicable microscopes | Mitutoyo MF-A/MF-UA Series   |

\*Order number differs when the Vision Unit is used with other microscopes than Mitutoyo MF-A/UA series. QSPak software package is not included.

#### QSPak Measurement Window



#### One-click Edge Detection

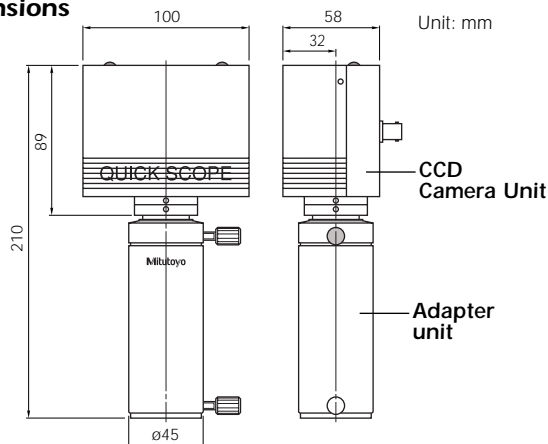
Just by clicking the mouse near the edge of a workpiece, QSPak automatically scans the edge and detects it, showing its coordinates. This function also works with the point tool, box tool, circle tool and auto-focus tool.



#### Graphic Window

The measurement results and measured elements are plotted in the graphic window in real-time. By using this function the user can check the current measuring position at a glance. The graphic window can be used for geometrical calculation.

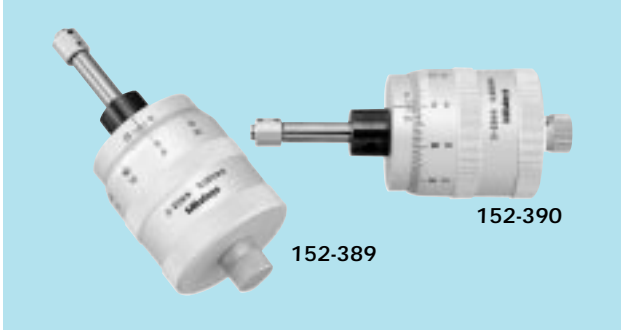
#### Dimensions





# Micrometer Heads for Profile Projectors and Toolmaker's Microscopes

## Micrometer Heads for XY Stages



### FEATURES

- Non-rotating device is provided.
- The thimble reading can be zero-set at any spindle position.
- Black and red figures of the bidirectional graduation allow easy reading in both directions.
- Clamping stem diameter: 18mm

### SPECIFICATIONS

#### Metric

| Graduation | Range | Order No. | Accuracy | Remarks     |
|------------|-------|-----------|----------|-------------|
| 0.005mm    | 25mm  | 152-390   | ±2μm     | X-axis type |
|            |       | 152-389   | ±2μm     | Y-axis type |

\*Obtained by using vernier.

#### Inch

| Graduation | Range | Order No. | Accuracy | Remarks     |
|------------|-------|-----------|----------|-------------|
| .0001"     | 1"    | 152-391   | ±.0001"  | X-axis type |
|            |       | 152-392   | ±.0001"  | Y-axis type |

## Digimatic Micrometer Heads



### FEATURES

- Large LCD digits for error-free reading.
- The display rotates 330° for easy viewing.
- The spindle does not rotate.
- With SPC data output.

### SPECIFICATIONS

#### Metric

| Resolution | Range | Order No. | Accuracy |
|------------|-------|-----------|----------|
| 0.001mm    | 50mm  | 164-161   | ±3μm     |

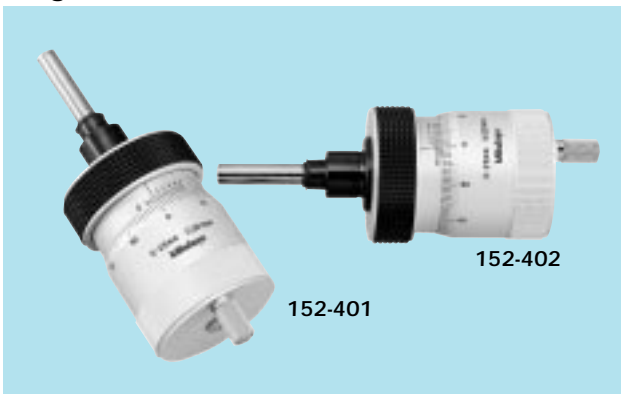
#### Inch/Metric

| Resolution      | Range     | Order No. | Accuracy |
|-----------------|-----------|-----------|----------|
| .00005"/0.001mm | 2" (50mm) | 164-162   | ±.00015" |

### Technical Data

**Display:** LCD  
**Functions:** Zero-setting (ABS/INC coordinate switching), preset, power on/off, counting direction switching, inch/mm conversion (inch/mm type only), SPC data output  
**Quantizing error:** ±1 count  
**Measuring face:** Carbide-tipped  
**Battery:** SR44 (938882) x 2 pcs.  
**Battery life:** Approx. 1.8 years under normal use  
**Alarm:** Low battery voltage, over-speed error, over-flow error  
**Operating temperature:** 5°C to 40°C  
**Mass:** 500g

## Adjustable Micrometer Heads for XY Stages



### FEATURES

- The adjustable spindle can be fed under the thimble clamped at any reading, allowing easy reference point setting.
- The spherical measuring face is carbide-tipped.
- Clamping stem diameter: 18mm

### SPECIFICATIONS

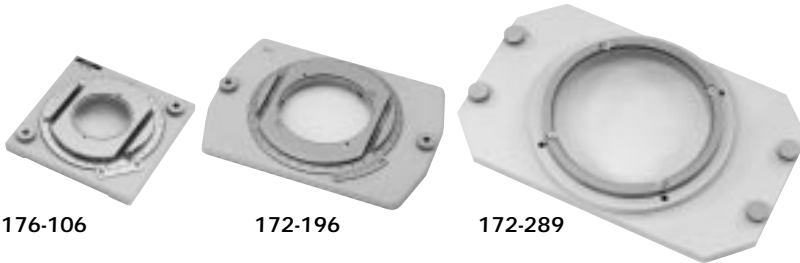
#### Metric

| Graduation | Range | Order No. | Accuracy | Remarks     |
|------------|-------|-----------|----------|-------------|
| 0.001mm*   | 25mm  | 152-402   | ±2μm     | X-axis type |
|            |       | 152-401   | ±2μm     | Y-axis type |

\*Obtained by using vernier.

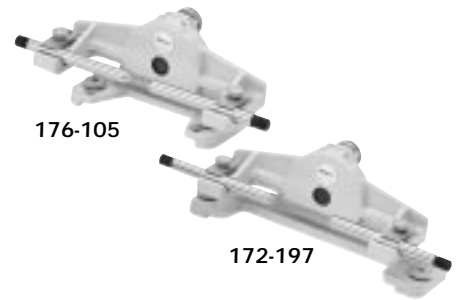
## Workpiece Fixtures for Profile Projectors and Measuring Microscopes

### Rotary Tables



| Order No.                | 176-106                                     | 172-196 | 172-289 |
|--------------------------|---|---------|---------|
| Effective glass diameter | 66mm  | 100mm   | 200mm   |
| Angle reading            | 6'  | 2'      | —       |
| Mass                     | 1.7kg                                       | 2.5kg   | 14kg    |
| Remarks                  | Holder with clamp (176-107) can be mounted. |         | —       |

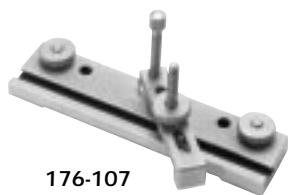
### Swivel Center Supports



| Order No.                | 176-105      | 172-197      |
|--------------------------|--------------|--------------|
| Maximum workpiece dia.   | 70mm (45mm)* | 80mm (65mm)* |
| Maximum workpiece length | 140mm        | 140mm        |
| Swivel range             | ±10°         | ±10°         |
| Mass                     | 2.4kg        | 2.5kg        |

\*When swiveled 10°

### Holder with Clamp



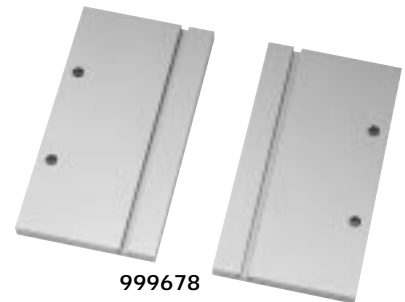
| Order No.                | 176-107 |
|--------------------------|---------|
| Maximum workpiece height | 35mm    |
| Mass                     | 0.42kg  |

### V-Blocks with Clamp



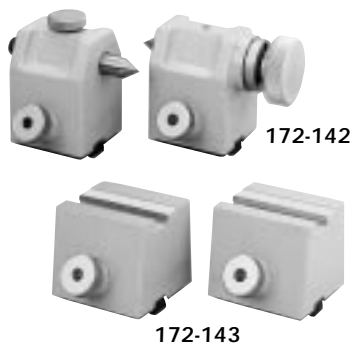
| Order No.              | 172-234      | 172-378    |
|------------------------|--------------|------------|
| Maximum workpiece dia. | 50mm         | 25mm       |
| Width of block         | 60mm         | 41mm       |
| Mass                   | 1.24kg       | 0.8kg      |
| Remarks                | For PH-3515F | For PJ, PV |

### Fixture Mount Adapter



- Secures any of the following fixtures on the large type XY table.
- Fixtures: Rotary table (172-196), swivel center support (172-197), holder with clamp (176-107), and V-block with clamp (172-378).

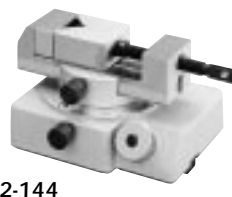
### Center Support



| Order No.              | 172-142        |
|------------------------|----------------|
| Maximum workpiece dia. | 120mm (240mm)* |
| Mass                   | 3.3kg          |
| Remarks                | For PH-3515F   |

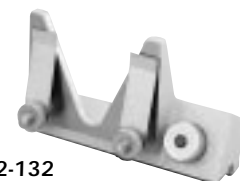
\*When using a center support riser (172-143)

### Rotary Vise



| Order No.              | 172-144      |
|------------------------|--------------|
| Maximum workpiece dia. | 60mm         |
| Width of jaw           | 40mm         |
| Angle reading          | 5°           |
| Mass                   | 2.5kg        |
| Remarks                | For PH-3515F |

### Vertical Holder



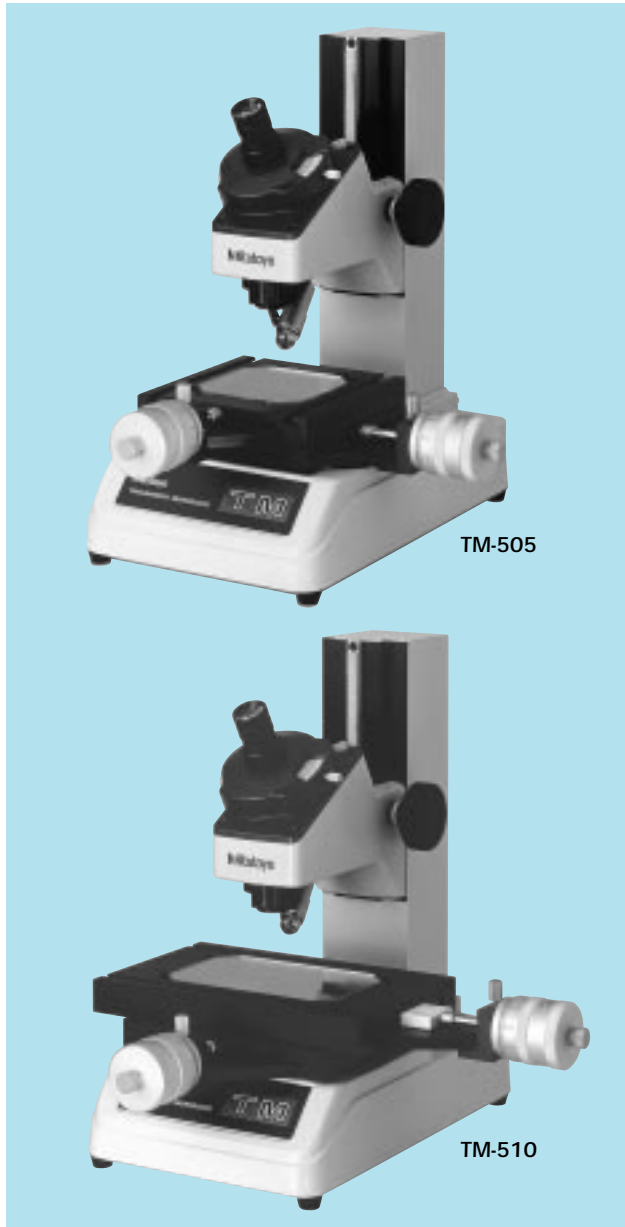
| Order No. | 172-132      |
|-----------|--------------|
| Mass      | 1.3kg        |
| Remarks   | For PH-3515F |



# TM-500

## SERIES 176

Toolmaker's Microscopes



TM-505

TM-510

The Mitutoyo TM Series is a toolmaker's microscope well suited for measuring dimensions and angles of machined metals. It can also be used to check the shape of screws and gears by attaching an optional reticle. The compact body makes it ideal for use on shop-floors with limited space.

### FEATURES

- Angle measurement is performed easily by turning the angle scale disc to align the cross-hair reticle with the workpiece image.
- Illumination intensity can be adjusted.



### SPECIFICATIONS

#### TM-500

| Model No.                    | TM-505   | TM-510   |
|------------------------------|--|--|
| Order No.                    | 100V <b>176-811</b><br>110V <b>176-811C</b><br>120V <b>176-811A</b><br>220V <b>176-811D</b><br>240V <b>176-811E</b>  | <b>176-812</b><br><b>176-812C</b><br><b>176-812A</b><br><b>176-812D</b><br><b>176-812E</b> |
| XY range                     | 50x50mm  | 100x50mm   |
| Effective area of table      | 96x96mm  | 150x92mm   |
| Max. workpiece height        | 115mm  | 107mm  |
| Max. workpiece weight        | 5kg  |  |
| Measuring unit               | <b>(Optional)</b>  |  |
| Optical tube                 | <ul style="list-style-type: none"> <li>• Monocular (diopter adjustable)</li> <li>• Depression angle: 30°</li> <li>• With broken cross-hair reticle (<b>176-126</b>)</li> </ul> |  |
| Angle scale disc             | <ul style="list-style-type: none"> <li>• Rotation: 360°</li> <li>• Minimum reading: 6' (by vernier)</li> </ul>   |  |
| Eyepiece ( <b>176-116</b> )  | 15X (View field diameter: 13mm)  |  |
| Objective ( <b>176-138</b> ) | 2X (Working distance: 67mm)  |  |
| Total magnification          | 30X  |  |
| Transmitted illumination     | <ul style="list-style-type: none"> <li>• Light source: Tungsten bulb (24V, 2W)</li> <li>• With green filter</li> <li>• Light intensity adjustable</li> </ul>                   |  |
| Reflected illumination       | <ul style="list-style-type: none"> <li>• Light source: Tungsten bulb (24V, 2W)</li> <li>• Light intensity adjustable</li> </ul>  |  |
| Power supply                 | 100/110/120/220/240V AC, 50/60Hz   |  |
| Dimensions                   | 210x333x391mm  | 240x333x391mm  |
| Mass                         | 13.5g  | 14.5g  |

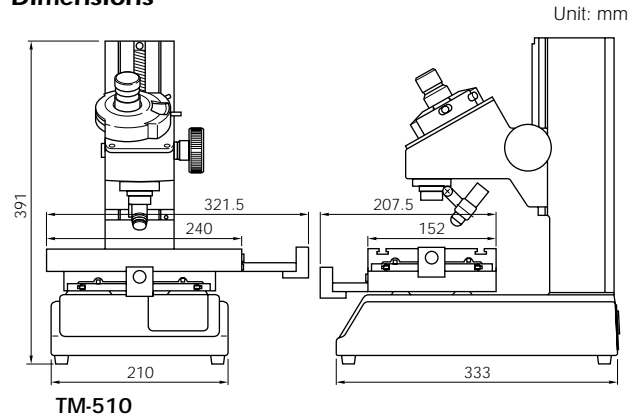
### Optional Reticles

| Order No.      | Templet patterns                                |
|----------------|---|
| <b>176-111</b> | Concentric circles (0.1mm-radius increment)     |
| <b>176-135</b> | Concentric circles (.01"-radius increment)      |
| <b>176-113</b> | 55° angle                                       |
| <b>176-114</b> | 60° angle                                       |
| <b>176-109</b> | Metric screw threads (Pitch= 0.25 - 1mm)        |
| <b>176-110</b> | Metric screw threads (Pitch= 1.25 - 2mm)        |
| <b>176-140</b> | ISO metric screw threads (Pitch= 0.075 - 0.7mm) |
| <b>176-141</b> | ISO metric screw threads (Pitch= 0.75 - 2mm)    |
| <b>176-142</b> | ISO unified screw threads (80 - 28TPI)          |
| <b>176-143</b> | ISO unified screw threads (24 - 14TPI)          |
| <b>176-144</b> | ISO unified screw threads (13 - 10TPI)          |
| <b>176-123</b> | Unified screw threads (80 - 28TPI)              |
| <b>176-124</b> | Unified screw threads (24 - 14TPI)              |
| <b>176-125</b> | Unified screw threads (13 - 10TPI)              |
| <b>176-120</b> | Whitworth screw threads (60 - 26TPI)            |
| <b>176-121</b> | Whitworth screw threads (24 - 18TPI)            |
| <b>176-122</b> | Whitworth screw threads (16 - 11TPI)            |
| <b>176-127</b> | NF screw threads (80 - 28TPI)                   |
| <b>176-128</b> | NF screw threads (24 - 14TPI)                   |
| <b>176-129</b> | NF screw threads (13 - 10TPI)                   |
| <b>176-130</b> | 14.5° involute gear teeth (normal rack type)    |
| <b>176-112</b> | 20° involute gear teeth (normal rack type)      |

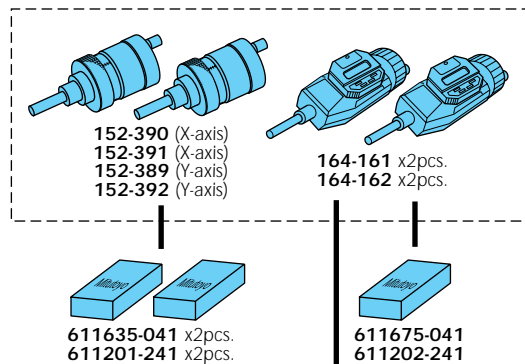
## OPTIONAL ACCESSORIES

| Order No.       | Description                                       |
|-----------------|---|
| 176-115         | 10X eyepiece (View field diameter: 13mm)          |
| 176-117         | 20X eyepiece (View field diameter: 10mm)          |
| 176-139         | Objective, 5X (W.D.: 33mm, N.A.: 0.10)            |
| 176-137         | Objective, 10X (W.D.: 14mm, N.A.: 0.14)           |
| 164-161         | Digimatic micrometer head (mm)                    |
| 164-162         | Digimatic micrometer head (inch/mm)               |
| 152-390         | Micrometer head (0.005mm reading, X-axis type)    |
| 152-389         | Micrometer head (0.005mm reading, Y-axis type)    |
| 152-391         | Micrometer head (.0001" reading, X-axis type)     |
| 152-392         | Micrometer head (.0001" reading, Y-axis type)     |
| 611635-041      | Rectangular gauge block (25mm)                    |
| 611675-041      | Rectangular gauge block (50mm)                    |
| 611201-241      | Rectangular gauge block (1")                      |
| 611202-241      | Rectangular gauge block (2")                      |
| 990561          | Workpiece clip (2pcs./set)                        |
| 176-203         | Twin-bulb reflected illumination unit             |
| 175-204         | Dial indicator attachment                         |
| 176-106         | Rotary table (Effective diameter: 66mm)           |
| 172-196         | Rotary table (Effective diameter: 100mm)          |
| 176-105         | Swivel center support (Max. workpiece dia.: 70mm) |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm) |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)    |
| 176-107         | Holder with clamp                                 |
| 937387          | SPC cable (1m)                                    |
| 965013          | SPC cable (2m)                                    |
| (See listing.)  | <b>Reticles</b>                                   |
| (See page 363.) | <b>Bifurcated fiber illuminator</b>               |
| (See page 363.) | <b>Fiber-optic ring light illuminator</b>         |

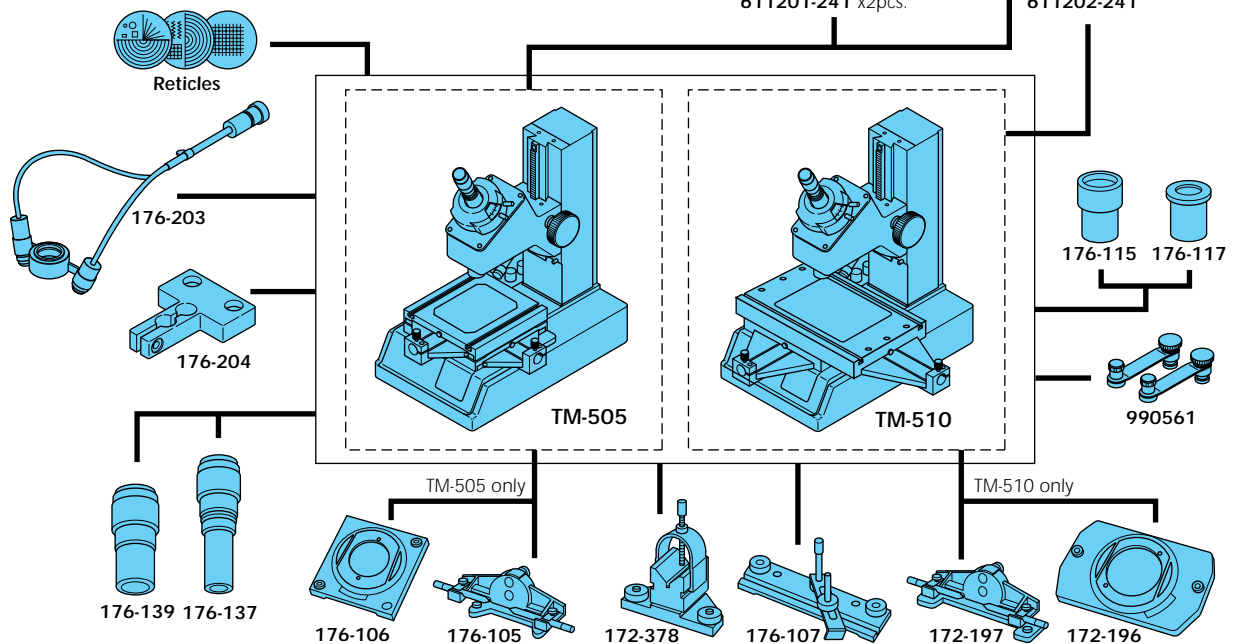
## Dimensions



TM-510



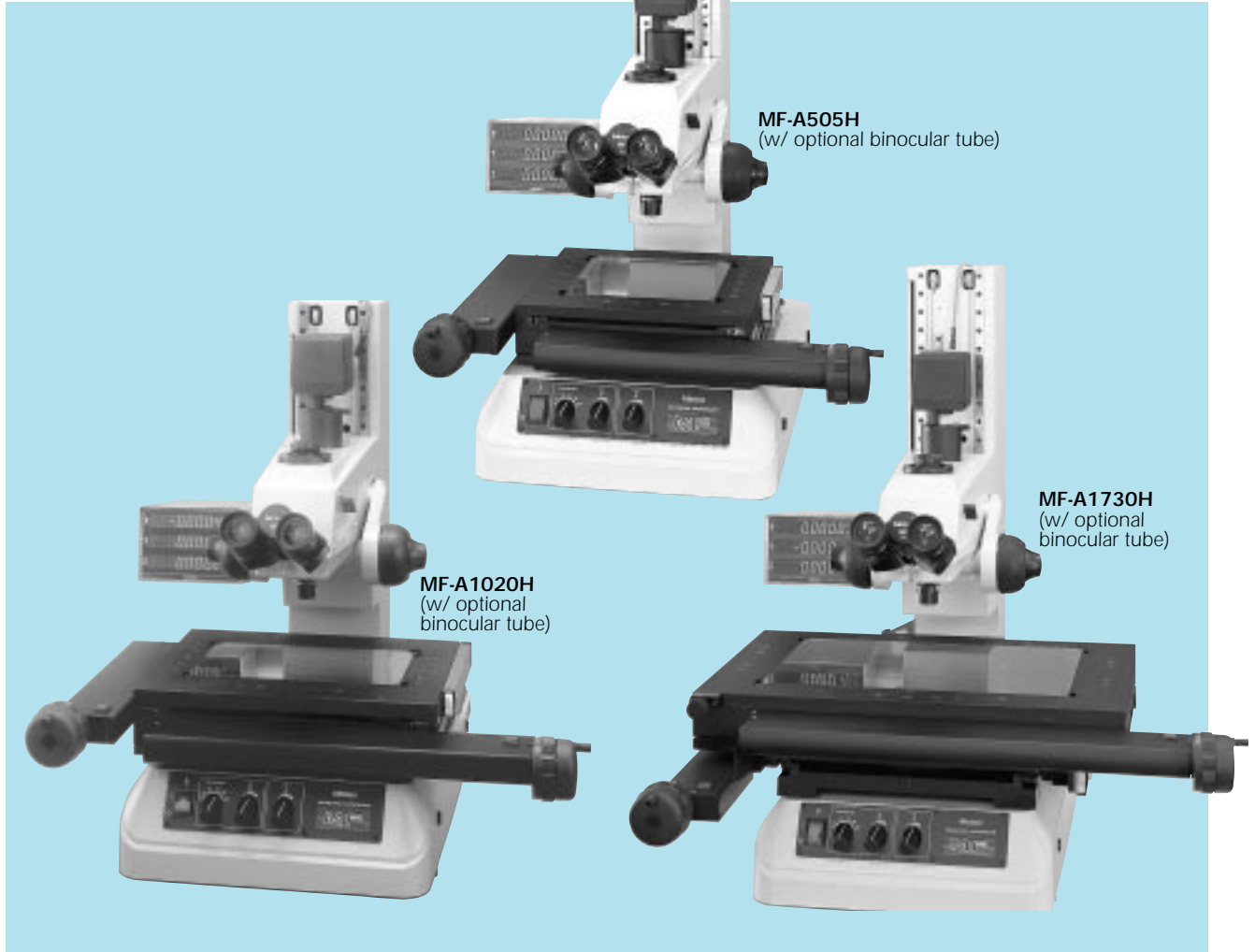
## SYSTEM DIAGRAM



## MF-A500/1000

### SERIES 176

#### Measuring Microscopes



**MF-A505H**  
(w/ optional binocular tube)

**MF-A1730H**  
(w/ optional binocular tube)

**MF-A1020H**  
(w/ optional binocular tube)

The MF-A/MF-UA measuring microscopes' expandability, such as when used in combination with Mitutoyo's vision unit to boost its performance or data management on a PC, promises further improved measuring efficiency.

#### FEATURES

- Bright field observation, clear and flare less erect image, wide field of view.
- Long working distance objectives, up to 100x magnification (total: 2000x).
- Aperture diaphragms in the transmitted illumination and reflected illumination system as standard feature.
- The quick-release system, which is especially useful in long-stroke measurements.
- Focus and measure using the fine/coarse movement handle with the large-size grips on both sides of the column.
- Built in X- and Y-axis Zero-set switches (Z-axis has a non-built-in Zero set switch)
- Available with the Vision Unit for upgrading to a vision measuring system.

Aperture stop is equipped for the surface illumination.



Coarse and fine focusing wheels for quick operation





## SPECIFICATIONS

### MF-A500/1000

#### Metric

| Model No.                    | MF-A 505   | MF-A 505H | MF-A 1010         | MF-A 1010H | MF-A 1020         | MF-A 1020H | MF-A 1720         | MF-A 1720H | MF-A 1730         | MF-A 1730H |          |
|------------------------------|--|-----------|-------------------|------------|-------------------|------------|-------------------|------------|-------------------|------------|----------|
| Order No.                    | 100V AC  | 176-521A  | 176-525A          | 176-522A   | 176-526A          | 176-529A   | 176-530A          | 176-523A   | 176-527A          | 176-524A   | 176-528A |
|                              | 110V AC  | 176-521C  | 176-525C          | 176-522C   | 176-526C          | 176-529C   | 176-530C          | 176-523C   | 176-527C          | 176-524C   | 176-528C |
|                              | 220V AC  | 176-521D  | 176-525D          | 176-522D   | 176-526D          | 176-529D   | 176-530D          | 176-523D   | 176-527D          | 176-524D   | 176-528D |
|                              | 240V AC  | 176-521E  | 176-525E          | 176-522E   | 176-526E          | 176-529E   | 176-530E          | 176-523E   | 176-527E          | 176-524E   | 176-528E |
| XY range                     | 50 x 50mm  |           | 100 x 100mm       |            | 200 x 100mm       |            | 200 x 170mm       |            | 300 x 170mm       |            |          |
| Digital counter              | 2-axis   | 3-axis    | 2-axis            | 3-axis     | 2-axis            | 3-axis     | 2-axis            | 3-axis     | 2-axis            | 3-axis     |          |
| Resolution                   | 0.001mm/0.0005mm/0.001mm (switchable)  |           |                   |            |                   |            |                   |            |                   |            |          |
| Measuring accuracy*(at 20°C) | (3+0.02L)µm L= Measuring length (mm) when not loaded   |           |                   |            |                   |            |                   |            |                   |            |          |
| Measuring unit               | Built-in linear scales   |           |                   |            |                   |            |                   |            |                   |            |          |
| XY travel range              | 50 x 50mm  |           | 100 x 100mm       |            | 200 x 100mm       |            | 200 x 170mm       |            | 300 x 170mm       |            |          |
| Table top dimensions         | 280 x 280mm  |           | 280 x 280mm       |            | 350 x 280mm       |            | 410 x 342mm       |            | 510 x 342mm       |            |          |
| Effective glass size         | 170 x 170mm  |           | 170 x 170mm       |            | 240 x 140mm       |            | 260 x 230mm       |            | 360 x 230mm       |            |          |
| Swiveling                    | —  |           | —                 |            | —                 |            | ±5° (left)        |            | ±5° (left)        |            |          |
| Max. Workpiece weight        | 5kg  |           | 5kg               |            | 10kg              |            | 20kg              |            | 20kg              |            |          |
| Max. Workpiece height        | 150mm  |           |                   |            |                   |            |                   |            |                   |            |          |
| Optical tube                 | Choice between Monocular and Binocular tube (depression angle: 25°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/CCD camera: 50/50 fixed) |           |                   |            |                   |            |                   |            |                   |            |          |
| Eyepiece lens (optional)     | 10X (field No.: 24mm), 15X (field No.: 16), 20X (field No.: 12)  |           |                   |            |                   |            |                   |            |                   |            |          |
| Objective                    | 1X, 3X*, 5X, 10X, 20X, 50X, 100X *Standard accessory   |           |                   |            |                   |            |                   |            |                   |            |          |
| Transmitted illumination     | Koehler illumination with adjustable aperture diaphragms, 12V/50W halogen lamp (non-stepped brightness adjustment)   |           |                   |            |                   |            |                   |            |                   |            |          |
| Reflected illumination       | Telecentric illumination with adjustable aperture diaphragm, 12V/50W halogen lamp (non-stepped brightness adjustment)  |           |                   |            |                   |            |                   |            |                   |            |          |
| Data output                  | Via RS-232C interface  |           |                   |            |                   |            |                   |            |                   |            |          |
| Power supply                 | 100/110/120/220/230/240V AC, 50/60Hz, 160W   |           |                   |            |                   |            |                   |            |                   |            |          |
| Dimensions (WxDxH)           | 555 X 741 X 630mm  |           | 555 X 741 X 630mm |            | 626 X 887 X 750mm |            | 626 X 887 X 750mm |            | 676 X 887 X 750mm |            |          |
| Mass                         | 55kg   |           | 55kg              |            | 59kg              |            | 130kg             |            | 138kg             |            |          |

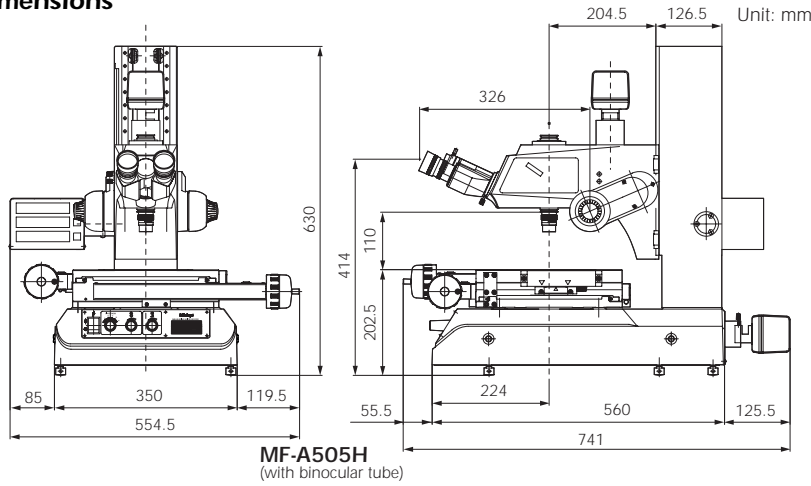
#### Inch/Metric

| Model No.                    | MF-A 505   | MF-A 505H | MF-A 1010       | MF-A 1010H | MF-A 1020       | MF-A 1020H | MF-A 1720       | MF-A 1720H | MF-A 1730      | MF-A 1730H |          |
|------------------------------|--|-----------|-----------------|------------|-----------------|------------|-----------------|------------|----------------|------------|----------|
| Order No.                    | 100V AC  | 176-531A  | 176-535A        | 176-532A   | 176-536A        | 176-539A   | 176-540A        | 176-533A   | 176-537A       | 176-534A   | 176-538A |
|                              | 110V AC  | 176-531C  | 176-535C        | 176-532C   | 176-536C        | 176-539C   | 176-540C        | 176-533C   | 176-537C       | 176-534C   | 176-538C |
|                              | 220V AC  | 176-531D  | 176-535D        | 176-532D   | 176-536D        | 176-539D   | 176-540D        | 176-533D   | 176-537D       | 176-534D   | 176-538D |
|                              | 240V AC  | 176-531E  | 176-535E        | 176-532E   | 176-536E        | 176-539E   | 176-540E        | 176-533E   | 176-537E       | 176-534E   | 176-538E |
| XY range                     | 2" x 2"  |           | 4" x 4"         |            | 8" x 4"         |            | 8" x 7"         |            | 12" x 7"       |            |          |
| Digital counter              | 2-axis   | 3-axis    | 2-axis          | 3-axis     | 2-axis          | 3-axis     | 2-axis          | 3-axis     | 2-axis         | 3-axis     |          |
| Resolution                   | .0001"/.00005"/.00001"*(switchable)                  |           |                 |            |                 |            |                 |            |                |            |          |
| Measuring accuracy*(at 20°C) | (3+0.02L)µm L= Measuring length (mm) when not loaded |           |                 |            |                 |            |                 |            |                |            |          |
| Measuring unit               | Built-in linear scales                               |           |                 |            |                 |            |                 |            |                |            |          |
| XY travel range              | 2" x 2"  |           | 4" x 4"         |            | 8" x 4"         |            | 8" x 7"         |            | 12" x 7"       |            |          |
| Table top dimensions         | 11.02" x 11.02"                                      |           | 11.02" x 11.02" |            | 13.78" x 11.02" |            | 16.14" x 13.46" |            | 14.17" x 9.05" |            |          |
| Effective glass size         | 6.69" x 6.69"  |           | 6.69" x 6.69"   |            | 9.45" x 5.51"   |            | 10.23" x 9.05"  |            | 14.17" x 9.05" |            |          |
| Swiveling                    | —  |           | —               |            | —               |            | ±5° (left)      |            | ±5° (left)     |            |          |
| Max. Workpiece weight        | 11 lbs.  |           | 11 lbs.         |            | 22 lbs.         |            | 44 lbs.         |            | 44 lbs.        |            |          |
| Max. Workpiece height        | 6"   |           |                 |            |                 |            |                 |            |                |            |          |
| Mass                         | 121 lbs.   |           | 121 lbs.        |            | 129 lbs.        |            | 286 lbs.        |            | 303 lbs.       |            |          |

\*Not included the z-axis measuring accuracy.



Dimensions

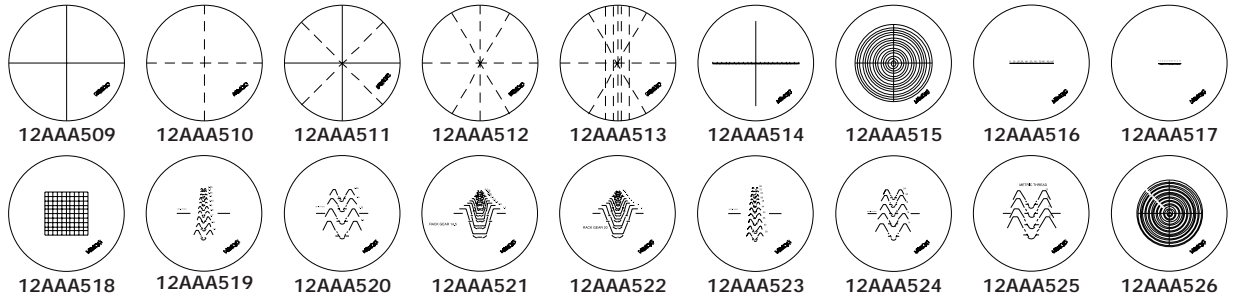


Optional Reticles†

| Order No. | Templet patterns                                |
|-----------|---|
| 12AAA509  | Cross-hair                                      |
| 12AAA510  | Broken cross-hair                               |
| 12AAA511  | Cross-hair and 45° angle                        |
| 12AAA512  | Broken cross-hair and 60° angle                 |
| 12AAA513  | Zeiss type chart                                |
| 12AAA514  | 20mm scale (0.1mm reading)                      |
| 12AAA515  | Concentric circle (Ø1.2-Ø18mm)                  |
| 12AAA516  | 10mm scale (0.1mm reading)                      |
| 12AAA517  | 5mm scale (0.05mm reading)                      |
| 12AAA518  | 10x10mm section (1mm min.)                      |
| 12AAA519  | Metric screw thread (P= 0.25-1.0)               |
| 12AAA520  | Metric screw thread (P= 1.25-2.0)               |
| 12AAA521  | Involute gear tooth (14.5°),<br>module= 0.1-1.0 |
| 12AAA522  | Involute gear tooth (20°),<br>module= 0.1-1.0   |
| 12AAA523  | Unified screw thread (80 - 28TPI)               |
| 12AAA524  | Unified screw thread (24 - 14TPI)               |
| 12AAA525  | Unified screw thread (13 - 10TPI)               |
| 12AAA526  | Concentric circle (Ø.01"-Ø.2")                  |



Reticle with mount



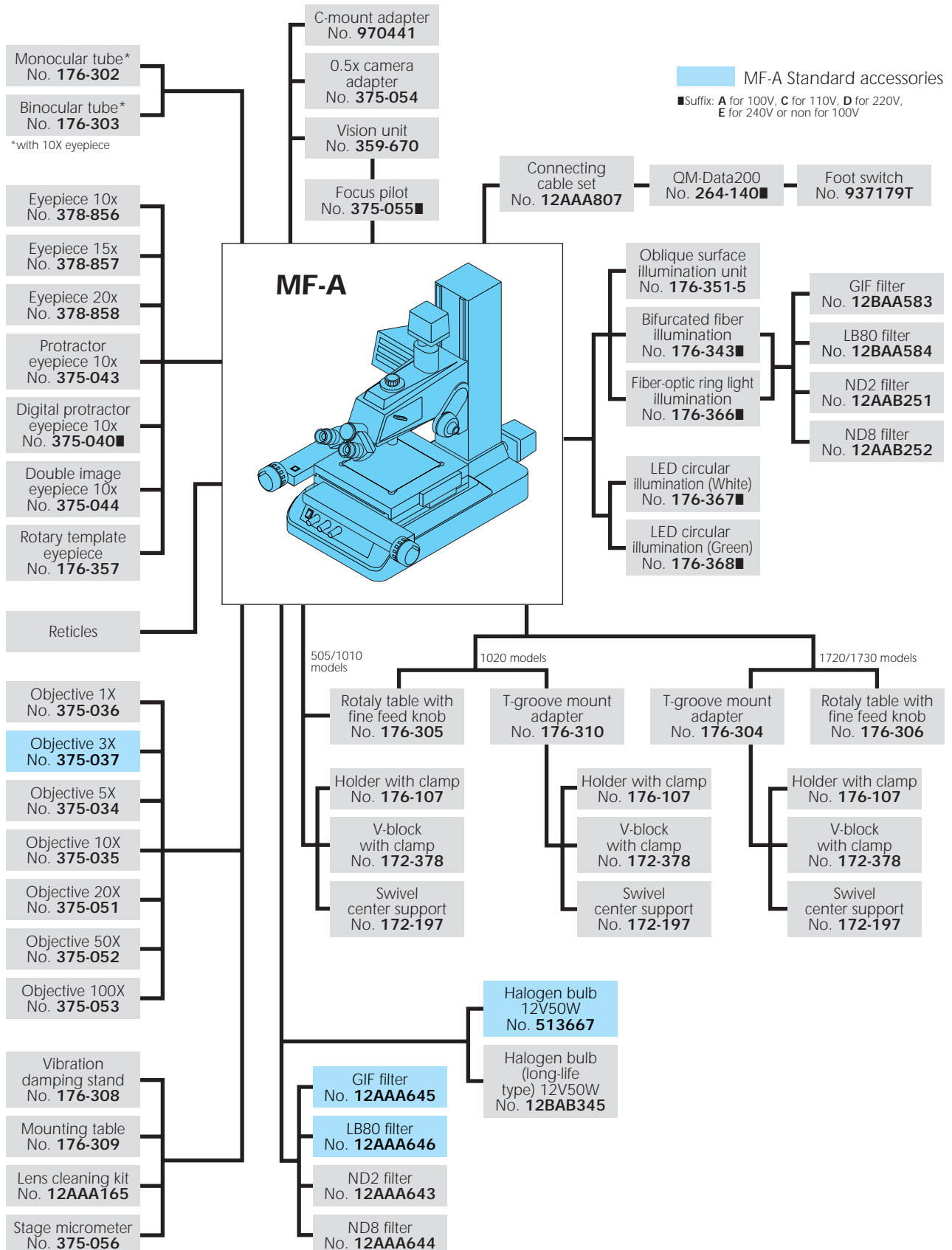
† Use with 3X eyepiece. Reticle mount is provided.

OPTIONAL ACCESSORIES

| Order No. | Description                                  |
|-----------|--|
| 176-302   | Monocular tube                               |
| 176-303   | Binocular tube                               |
| 378-857   | 15X eyepiece set (View field diameter: 16mm) |
| 378-858   | 20X eyepiece set (View field diameter: 12mm) |
| 375-036   | 1X objective (W.D.: 59mm, N.A.: 0.07)        |
| 375-034   | 5X objective (W.D.: 59.9mm, N.A.: 0.11)      |
| 375-035   | 10X objective (W.D.: 44mm, N.A.: 0.18)       |
| 375-051   | 20X objective (W.D.: 20mm, N.A.: 0.42)       |
| 375-052   | 50X objective (W.D.: 13mm, N.A.: 0.55)       |
| 375-053   | 100X objective (W.D.: 6mm, N.A.: 0.7)        |
| 375-040   | Digital protractor eyepiece (10X)            |
| 375-043   | Protractor eyepiece (10X)                    |
| 375-044   | Double-image eyepiece (10X)                  |
| 176-357   | Templet eyepiece (10X)                       |
| 176-351-5 | Oblique surface illumination unit            |
| 176-367   | LED ring optics illuminator (White)          |
| 176-368   | LED ring optics illuminator (Green)          |
| 173-343   | Twin fiber optics illuminator                |
| 176-366   | Ring fiber optics illuminator                |
| 12AAB251  | ND2 filter (for light source)                |
| 12AAB252  | ND8 filter (for light source)                |
| 12BAA583  | GIF filter (for light source)                |

| Order No.       | Description  |
|-----------------|--|
| 12BAA584        | LB80 filter for light source)                          |
| 12AAA643        | Color filter (ND2)                                     |
| 12AAA644        | Color filter (ND8)                                     |
| 375-054         | 0.5X camera adapter (with C-mount adapter)             |
| 970441          | C-mount adapter  |
| 176-107         | Holder with clamp                                      |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)         |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm)      |
| 176-304         | Stage adapter  |
| 176-305         | Rotary stage with fine feed knob (small)               |
| 176-306         | Rotary stage with fine feed knob (large)               |
| 176-308         | Bivration damping stand                                |
| 176-309         | Mounting stand   |
| 375-056         | Stage micrometer                                       |
| 12AAA165        | Lens cleaning kit                                      |
| 937179T         | Foot switch  |
| 12AAA807        | Connecting cable set for QM-Data200<br>(See page 351.) |
|                 | <b>Vision Unit</b>                                     |
| (See page 348.) | <b>QM-Data200 2-D data processor</b>                   |
| (See page 363.) | <b>Focus pilot FP-05</b>                               |

## SYSTEM DIAGRAM

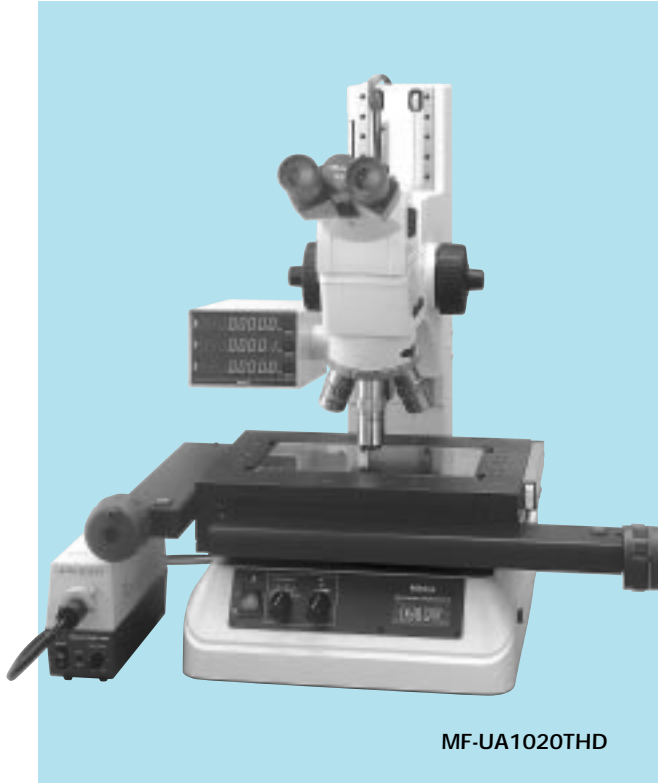




## MF-UA500/1000

## SERIES 176

High-magnification Measuring Microscopes



MF-UA1020THD

## FEATURES

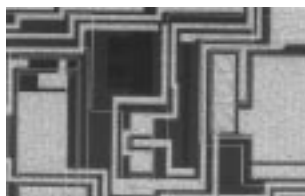
- Bright field observation, clear and flare less erect image, wide field of view.
- Long working distance objectives, up to 200x magnification (total: 4000x).
- Infinity-correction optical system same as that of high power inspection microscopes (FS series).
- Bright/Dark-field observations, Polarized observation and Differential Interference Contrast (DIC) observation.
- Focus and measure using the fine/coarse movement handle with the large-size grips on both sides of the column.
- Built in X- and Y-axis Zero-set switches (Z-axis has a non-built-in Zero set switch)
- Inward type revolver with 4 lens mount.
- Improved eye level lens for fatigue free use.

## OPTIONAL ACCESSORIES

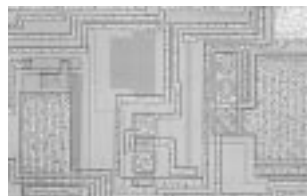
| Order No.       | Description  |
|-----------------|--|
| 378-857         | 15X eyepiece set (View field diameter: 16mm)                 |
| 378-858         | 20X eyepiece set (View field diameter: 12mm)                 |
| (See page 371.) | <b>M Plan Apo objective</b>                                  |
| (See page 371.) | <b>M Plan Apo SL objective</b>                               |
| (See page 372.) | <b>G Plan Apo objective</b>                                  |
| (See page 372.) | <b>BD Plan Apo objective</b>                                 |
| (See page 373.) | <b>BD Plan Apo SL objective</b>                              |
| 378-018         | Manual BF revolver   |
| 378-016         | Power BF revolver  |
| 176-211         | Manual BF/DF revolver  |
| 176-210         | Power BF/DF revolver   |
| 12AAA646        | Color filter (LB80)  |
| 12AAA643        | Color filter (ND2)   |
| 12AAA644        | Color filter (ND8)   |
| 176-343         | Twin fiber optics illuminator                                |
| 12AAB251        | ND2 filter (for light source)                                |
| 12AAB252        | ND8 filter (for light source)                                |
| 12BAA583        | GIF filter (for light source)                                |
| 12BAA584        | L80 filter f(for light source)                               |
| 378-092         | Polarization unit  |
| 378-076         | Differential interference contrast unit (100X, SL80X, SL50X) |
| 378-078         | Differential interference contrast unit (50X, SL20X)         |
| 378-079         | Differential interference contrast unit (20X)                |
| 378-080         | Differential interference contrast unit (10X, 5X)            |
| 375-054         | 0.5X camera adapter (with C-mount adapter)                   |
| 378-042         | C-mount adapter  |
| 375-065         | Focus pilot FP-05  |
| 176-107         | Holder with clamp  |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm)               |
| 172-197         | Swivel center support (Max. workpiece dia.: 80mm)            |
| 176-304         | Stage adapter  |
| 176-305         | Rotary stage with fine feed knob (small)                     |
| 176-306         | Rotary stage with fine feed knob (large)                     |
| 176-308         | Vibration damping stand                                      |
| 176-309         | Mounting stand   |
| 375-056         | Stage micrometer   |
| 12AAA165        | Lens cleaning kit  |
| 937179T         | Foot switch  |
| 12AAA807        | Connecting cable set for QM-Data200                          |
| (See page 351.) | <b>Vision Unit</b>   |
| (See page 348.) | <b>QM-Data200 2-D data processor</b>                         |
| (See page 363.) | <b>Focus pilot FP-05</b>                                     |

**Polarized light observation:**

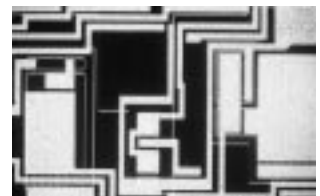
Observing only the filtered light that vibrates in one direction. Used for observing materials with special optical characteristics, such as mineral and liquid crystal.

**Differential interference observation:**

Effective in detecting fine scratches and steps on the surface of metal, liquid crystal, and semiconductors.

**Bright field observation:**

Most common method of observation. Observing directly the light reflected on the surface of workpiece.

**Dark field observation:**

Observing only the scattered light by shutting down the direct light to the objectives. The scratches and dust that cannot be viewed in the bright view field can be observed by a high-contrast.

## SPECIFICATIONS

### MF-UA500/1000 (Binocular Version)

#### Metric

| Model No.                       | MF-UA 505TH  | MF-UA 505THD | MF-UA 1010TH      | MF-UA 1010THD | MF-UA 1020TH      | MF-UA 1020THD | MF-UA 1720TH      | MF-UA 1720THD | MF-UA 1730TH      | MF-UA 1730THD |          |
|---------------------------------|--|--------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|----------|
| Order No.                       | 100V AC  | 176-541A     | 176-545A          | 176-542       | 176-546           | 176-549       | 176-550           | 176-543       | 176-547           | 176-544       | 176-548  |
|                                 | 110V AC  | 176-541C     | 176-545C          | 176-542A      | 176-546A          | 176-549A      | 176-550A          | 176-543A      | 176-547A          | 176-544A      | 176-548A |
|                                 | 220V AC  | 176-541D     | 176-545D          | 176-542D      | 176-546D          | 176-549D      | 176-550D          | 176-543D      | 176-547D          | 176-544D      | 176-548D |
|                                 | 240V AC  | 176-541E     | 176-545E          | 176-542E      | 176-546E          | 176-549E      | 176-550E          | 176-543E      | 176-547E          | 176-544E      | 176-548E |
| Observation type*               | B  | B/D          | B                 | B/D           | B                 | B/D           | B                 | B/D           | B                 | B/D           |          |
| XY range                        | 50 x 50mm  |              | 100 x 100mm       |               | 200 x 100mm       |               | 200 x 170mm       |               | 300 x 170mm       |               |          |
| Digital counter                 | 3-axis   |              |                   |               |                   |               |                   |               |                   |               |          |
| Resolution                      | .0.001mm/0.0005mm/0.0001 (switchable)  |              |                   |               |                   |               |                   |               |                   |               |          |
| Measuring accuracy**(at 20°C)   | (3+0.02L)µm L= Measuring length (mm) when not loaded   |              |                   |               |                   |               |                   |               |                   |               |          |
| Measuring unit                  | Built-in linear scales   |              |                   |               |                   |               |                   |               |                   |               |          |
| XY travel range                 | 50 x 50mm  |              | 100 x 100mm       |               | 200 x 100mm       |               | 200 x 170mm       |               | 300 x 170mm       |               |          |
| Table top dimensions            | 280 x 280mm  |              | 280 x 280mm       |               | 350 x 280mm       |               | 410 x 342mm       |               | 510 x 342mm       |               |          |
| Effective glass size            | 170 x 170mm  |              | 170 x 170mm       |               | 240 x 140mm       |               | 260 x 230mm       |               | 360 x 230mm       |               |          |
| Swiveling                       | —  |              | —                 |               | —                 |               | ±5° (left)        |               | ±5° (left)        |               |          |
| Max. Workpiece weight           | 5kg  |              | 5kg               |               | 10kg              |               | 20kg              |               | 20kg              |               |          |
| Max. Workpiece height           | 150mm  |              |                   |               |                   |               | 220mm             |               |                   |               |          |
| Optical tube                    | Siedentoph type, Pupil distance adjustment (51 to 76mm), 1X tube lens, Binocular eyepiece (depression angle: 20°)m Reticle projection method, with TV mount, Optical pass ratio (eyepiece/CCD camera: 50/50 fixed) |              |                   |               |                   |               |                   |               |                   |               |          |
| Eyepiece lens (optional)        | 10X (field No.: 24mm), 15X (field No.: 16), 20X (field No.: 12)  |              |                   |               |                   |               |                   |               |                   |               |          |
| Applicable objective (optional) | for TH type: M Plan Apo, M Plan Apo SL, G Plan Apo for THD type: BD Plan Apo, BD Plan Apo SL   |              |                   |               |                   |               |                   |               |                   |               |          |
| Applicable revolver (optional)  | for THD type: Standard BF/DF revolver 176-211, Power BF/DF revolver 176-210  |              |                   |               |                   |               |                   |               |                   |               |          |
| Transmitted illumination        | Koehler illumination with adjustable aperture diaphragms, 12V100W halogen lamp (non-stepped brightness adjustment)   |              |                   |               |                   |               |                   |               |                   |               |          |
| Reflected illumination          | Telecentric illumination with adjustable aperture diaphragm, 12V50W halogen lamp (non-stepped brightness adjustment)   |              |                   |               |                   |               |                   |               |                   |               |          |
| Data output                     | Via RS-232C interface  |              |                   |               |                   |               |                   |               |                   |               |          |
| Power supply                    | 100/110/120/220/230/240V AC, 50/60Hz, 160W   |              |                   |               |                   |               |                   |               |                   |               |          |
| Dimensions (WxDxH)              | 555 X 741 X 630mm  |              | 555 X 741 X 630mm |               | 626 X 887 X 750mm |               | 626 X 887 X 750mm |               | 676 X 887 X 750mm |               |          |
| Mass                            | 55kg   |              | 55kg              |               | 59kg              |               | 130kg             |               | 138kg             |               |          |

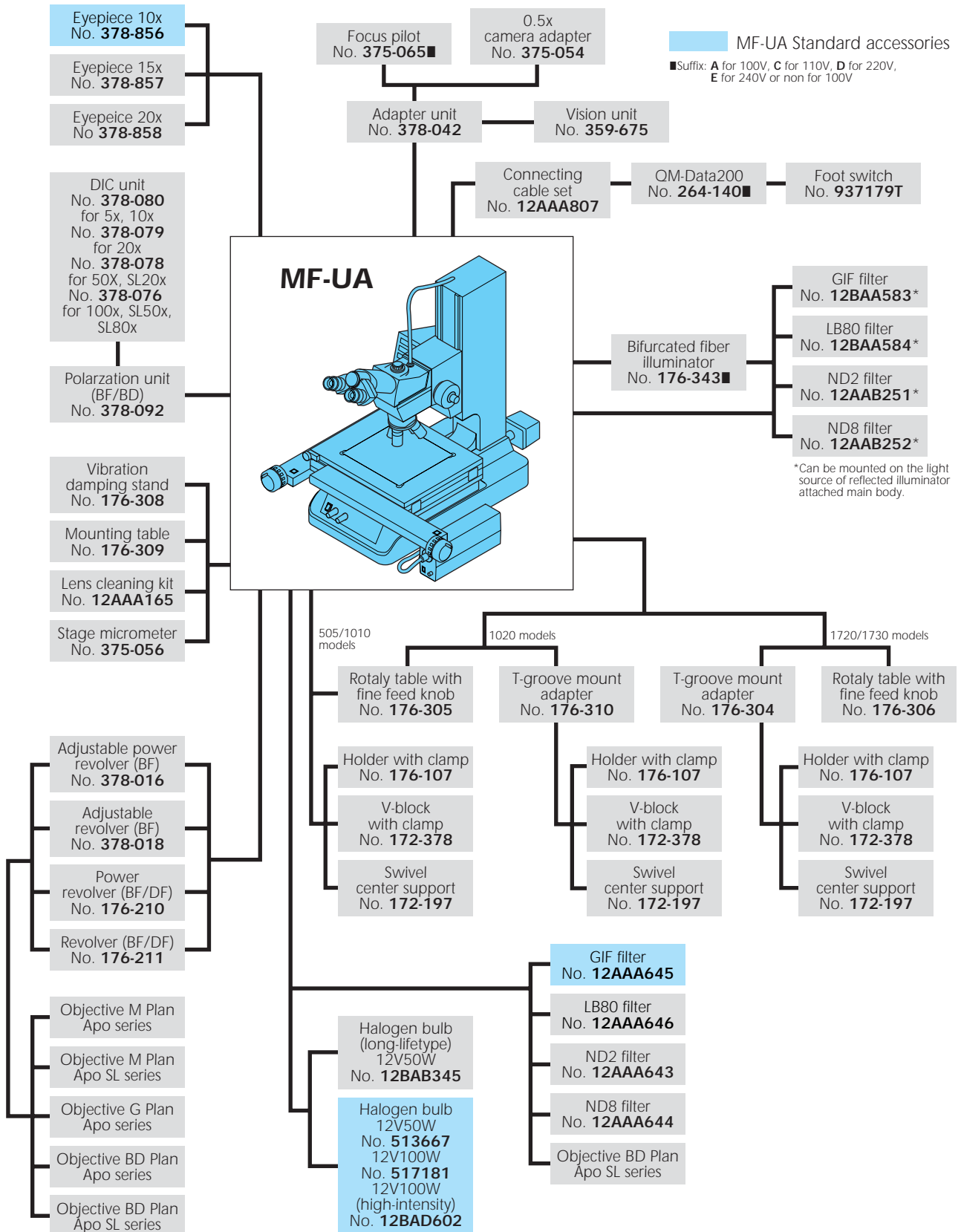
#### Inch/Metric

| Model No.                     | MF-UA 505TH  | MF-UA 505THD | MF-UA 1010TH    | MF-UA 1010THD | MF-UA 1020TH    | MF-UA 1020THD | MF-UA 1720TH    | MF-UA 1720THD | MF-UA 1730TH   | MF-UA 1730THD |          |
|-------------------------------|--|--------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|----------|
| Order No.                     | 100V AC  | 176-551A     | 176-555A        | 176-552       | 176-556         | 176-559       | 176-560         | 176-553       | 176-557        | 176-554       | 176-558  |
|                               | 110V AC  | 176-551C     | 176-555C        | 176-552A      | 176-556A        | 176-559A      | 176-550A        | 176-553A      | 176-557A       | 176-554A      | 176-558A |
|                               | 220V AC  | 176-551D     | 176-555D        | 176-552D      | 176-556D        | 176-559D      | 176-550D        | 176-553D      | 176-557D       | 176-554D      | 176-558D |
|                               | 240V AC  | 176-551E     | 176-555E        | 176-552E      | 176-556E        | 176-559E      | 176-560E        | 176-553E      | 176-557E       | 176-554E      | 176-558E |
| Observation type*             | B  | B/D          | B               | B/D           | B               | B/D           | B               | B/D           | B              | B/D           |          |
| XY range                      | 2" x 2"  |              | 4" x 4"         |               | 8" x 4"         |               | 8" x 7"         |               | 12" x 7"       |               |          |
| Digital counter               | 3-axis   |              |                 |               |                 |               |                 |               |                |               |          |
| Resolution                    | .0001"/.00005"/.00001" (switchable)                  |              |                 |               |                 |               |                 |               |                |               |          |
| Measuring accuracy**(at 20°C) | (3+0.02L)µm L= Measuring length (mm) when not loaded |              |                 |               |                 |               |                 |               |                |               |          |
| Measuring unit                | Built-in linear scales                               |              |                 |               |                 |               |                 |               |                |               |          |
| XY travel range               | 2" x 2"  |              | 4" x 4"         |               | 8" x 4"         |               | 8" x 7"         |               | 12" x 7"       |               |          |
| Table top dimensions          | 11.02" x 11.02"                                      |              | 11.02" x 11.02" |               | 13.78" x 11.02" |               | 16.14" x 13.46" |               | 14.17" x 9.05" |               |          |
| Effective glass size          | 6.69 x 6.69"   |              | 6.69 x 6.69"    |               | 9.45" x 5.51"   |               | 10.23" x 9.05"  |               | 14.17" x 9.05" |               |          |
| Swiveling                     | —  |              | —               |               | —               |               | ±5° (left)      |               | ±5° (left)     |               |          |
| Max. Workpiece weight         | 11 lbs.  |              | 11 lbs.         |               | 22 lbs.         |               | 44 lbs.         |               | 44 lbs.        |               |          |
| Max. Workpiece height         | 6"   |              |                 |               |                 |               | 9"              |               |                |               |          |
| Mass                          | 121 lbs.   |              | 121 lbs.        |               | 129 lbs.        |               | 286 lbs.        |               | 303 lbs.       |               |          |

\*B: Bright field observation B/D: Bright/Dark field observation  
 \*\*Not included the z-axis measuring accuracy.

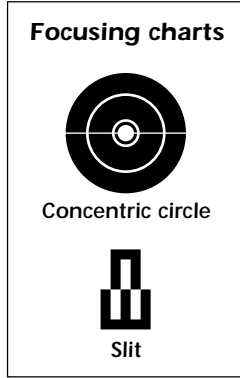


SYSTEM DIAGRAM



# Accessories for Measuring Microscopes

## Focus Pilot FP-05



- By installing this system on the camera mount of an MF series measuring microscope and projecting the focusing chart on the workpiece surface, the focal point can be detected with high-accuracy and high-repeatability.
- Two types of chart patterns are available. Select the pattern in accordance with the type of the workpiece surface texture.
- The brightness of the chart can be adjusted.
- A wide view field observation on the monitor is made possible with the use of a CCD camera (C-mount adapter is included.)

### SPECIFICATIONS

| Order No.              | 100V AC                           | 375-055  | 375-065*           |
|------------------------|-----------------------------------|----------|--------------------|
|                        | 110V AC                           | 375-055C | 375-065C*          |
|                        | 120V AC                           | 375-055A | 375-065A*          |
|                        | 220V AC                           | 375-055D | 375-065D*          |
|                        | 240V AC                           | 375-055E | 375-065E*          |
| Applicable microscopes | MF/MF-A models                    |          | MF-UN/MF-UA models |
| Magnification          | 0.5X                              |          |                    |
| Camera adapter         | C-mount (provided)                |          |                    |
| CCD camera             | 2/3-inch (optional)               |          |                    |
| Dimensions (WxDxH)     | 90x178.5x78.3mm (Lamp house unit) |          |                    |
| Mass                   | 1.8kg                             |          |                    |

\*Factory-set-option

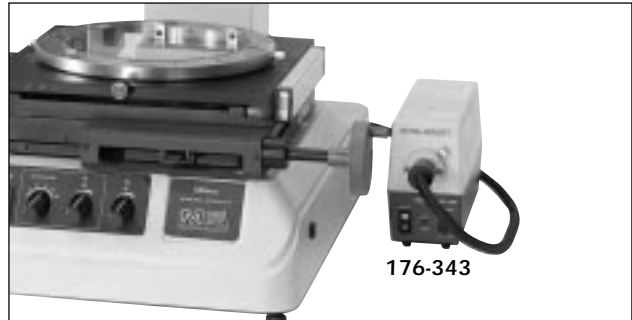
## Stage Micrometer



### SPECIFICATIONS

| Order No.          | 375-056                           |
|--------------------|-----------------------------------|
| Range              | 1mm                               |
| Graduations        | 0.01mm                            |
| Accuracy (at 20°C) | (1+L)μm, L= Measuring length (mm) |
| Dimensions (WxD)   | 76x26xmm                          |
| Mass               | 16g                               |

## Bifurcated Fiber Illuminator



- The Bifurcated fiber illuminator offers two light sources to illuminate the workpiece at the same time.

### SPECIFICATIONS

| Order No.              | 100V AC                    | 176-343  | 176-344               |
|------------------------|----------------------------|----------|-----------------------|
|                        | 110V AC                    | 176-343C | 176-344C              |
|                        | 120V AC                    | 176-343A | 176-344A              |
|                        | 220V AC                    | 176-343D | 176-344D              |
|                        | 240V AC                    | 176-343E | 176-344E              |
| Applicable microscopes | MF/MF-UN/MF-A/MF-UA models |          | TM models, MSM models |
| Length of fiber cable  | 1800mm                     |          | 600mm                 |
| Light source           | Halogen bulb (12V, 100W)   |          |                       |
| Dimensions (WxDxH)     | 235x76x120mm               |          | 235x76x120mm          |
| Mass                   | 2.5kg                      |          | 2kg                   |

Color filters (ND2: 12AAB251, ND8: 12AAB252, GIF: 12BAA583, LB80: 12BAA584) are available.

## Fiber-optic Ring Light Illuminator



- With the Fiber-optic ring light illuminator, the workpiece is clearly illuminated and the surface is free from distracting shadows.

### SPECIFICATIONS

| Order No.              | 100V AC                  | 176-366  |
|------------------------|--------------------------|----------|
|                        | 110V AC                  | 176-366C |
|                        | 120V AC                  | 176-366A |
|                        | 220V AC                  | 176-366D |
|                        | 240V AC                  | 176-366E |
| Applicable microscopes | MF models*, TM models    |          |
| Light source           | Halogen bulb (12V, 100W) |          |
| Length of fiber        | 1000mm                   |          |
| Dimensions (WxDxH)     | 235x76x120mm             |          |
| Mass                   | 2kg                      |          |

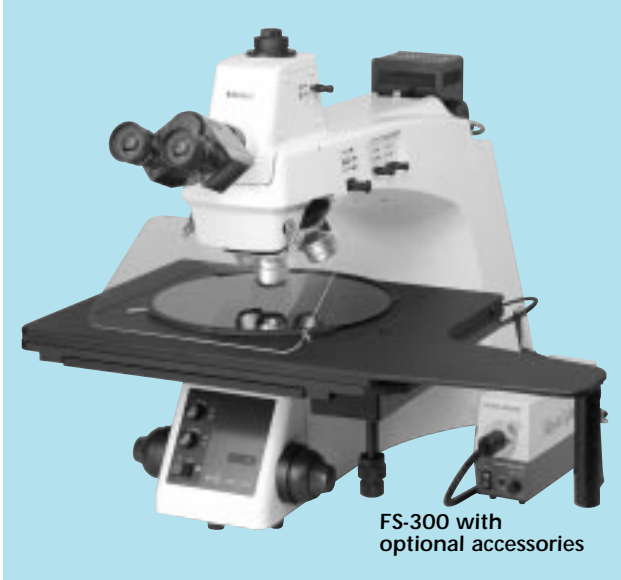
\*Not available when using 20X, 50X, 100X objectives. Color filters (ND2: 12AAB251, ND8: 12AAB252, GIF: 12BAA583, LB80: 12BAA584) are available.



# FS-300

## SERIES 378

### High Power Inspection Microscope



FS-300 with optional accessories

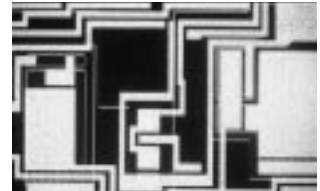
The FS-300 is designed for inspecting microcomponents such as IC chips and video head parts. The optical system features ultra-long working distance objectives, wide view field eyepieces, and independent correction for lateral chromatic aberration.

### FEATURES

- The complete system of FS-300 can be composed of a variety of parts for meeting diverse applications.
- Available with or without a transmitted illuminator.
- Ultra-long working distance objectives provide easy manipulation of workpieces.
- Easy switching between the bright-field illumination and the dark-field illumination.
- Optional accessories widen the range of applications.



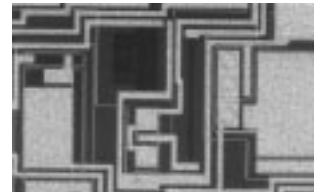
**Bright field observation:**  
Most common method of observation. Observing directly the light reflected on the surface of workpiece.



**Dark field observation:**  
Observing only the scattered light by shutting down the direct light to the objectives. The scratches and dust that cannot be viewed in the bright view field can be observed by a high-contrast.



**Polarized light observation:**  
Observing only the filtered light that vibrates in one direction. Used for observing materials with special optical characteristics, such as mineral and liquid crystal.



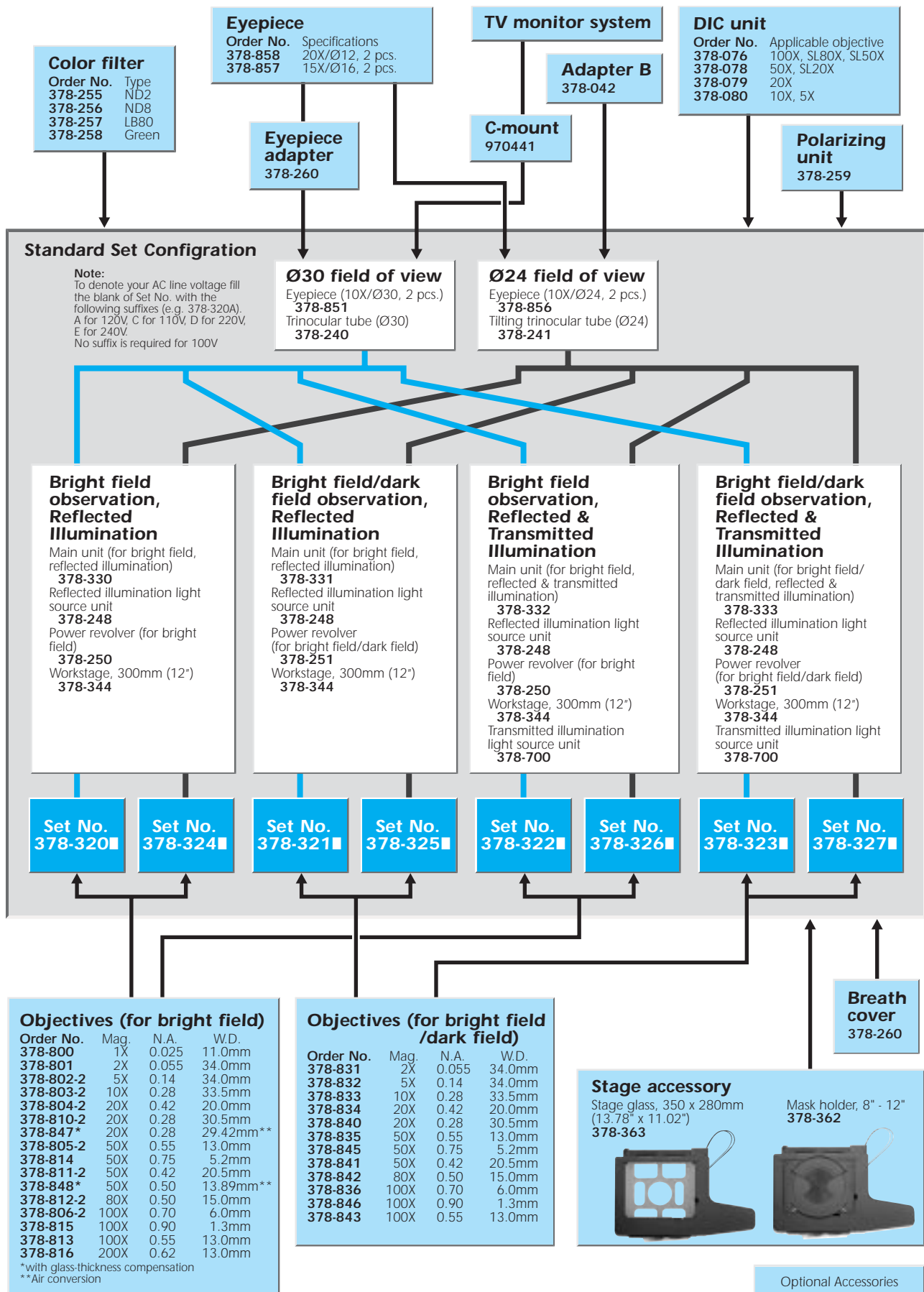
**Differential interference observation:**  
Effective in detecting fine scratches and steps on the surface of metal, liquid crystal, and semiconductors.

### SPECIFICATIONS

#### FS-300 High Power Inspection Microscope

|                   |  |   |  |
|-------------------|--|---|--|
| Main unit         | Observation system   | Bright field (BF): <b>378-320, 378-322, 378-324, 378-326</b><br>Bright/dark field (BF/DF): <b>378-321, 378-323, 378-325, 378-327</b>  |  |
|                   | Reflected illumination   | Koehler illumination With aperture diaphragm (centering mechanism) and field stop<br>12V/100W halogen lamp (non-stepped brightness adjustment) With filter mounting slot (2-slot)<br>With BF/DF switching slide ( <b>378-321, 378-323, 378-325, 378-327</b> only) |  |
|                   | Transmitted illumination   | 12V/100W fiber illumination (non-stepped brightness adjustment) With aperture diaphragm<br>( <b>378-321, 378-323, 378-325, 378-327</b> only)  |  |
|                   | Focus adjustment   | With concentric coarse and fine focusing wheels (right and left)<br>Fine adjustment: 0.1mm/rev. for 32mm travel range<br>Coarse adjustment: 3.8mm/rev. for 32mm travel range  |  |
| Power revolver    | Inward type with 4 lens mounts   |   |  |
| Workstage         | Travel stroke: 356 x 306mm with X-/Y-axis fine feed knobs and coarse travel handle |   |  |
| Optical tube      | Type   | Trinocular tube (erect image)   |  |
|                   | Field number   | 30: <b>378-320, 378-321, 378-322, 378-323</b><br>24: <b>378-324, 378-325, 378-326, 378-327</b>  |  |
|                   | Depression angle   | Fixed 20°: <b>378-320, 378-321, 378-322, 378-323</b><br>Adjustable 0° to 20°: <b>378-324, 378-325, 378-326, 378-327</b>   |  |
|                   | Intermediate image mag.  | 1X  |  |
|                   | Optical pass ratio   | Switchable (eyepiece/CCD camera=100/0 or 0/100)   |  |
|                   | Pupil distance   | Siedentopf type, adjustment range: 51 - 76mm  |  |
| Eyepiece          | Field of view  | 10X/Ø30: <b>378-320, 378-321, 378-322, 378-323</b><br>10X/Ø24: <b>378-324, 378-325, 378-326, 378-327</b>  |  |
|                   |  | Applicable objective (optional)   | M Plan Apo, M Plan Apo SL, G Plan Apo: <b>378-320, 378-322, 378-324, 378-326</b><br>BD Plan Apo, BD Plan Apo SL: <b>378-321, 378-323, 378-325, 378-327</b> |
| Dimensions        | Main unit  | 360 x 803 x 568.5mm   |  |
|                   | Workstage  | 712 x 456.5mm   |  |
| Power supply      | 100 to 240VAC, 50/60Hz   |   |  |
| Power consumption | Approx. 150W: <b>378-320, 378-321, 378-324, 378-325</b>                            |   |  |
|                   | Approx. 300W: <b>378-322, 378-323, 378-326, 378-327</b>                            |   |  |
| Mass              | Approx. 50kg including workstage   |   |  |

## SYSTEM DIAGRAM



# FS-70

## SERIES 378

Microscope Unit  
for Semiconductor Inspection



### FEATURES

- The optical system that has originally developed for the best seller FS 60 models was further enhanced for the FS70 models. It is ideal as a microscope unit of a prober station for semiconductors. (All models CE marked.)
- The FS70L supports three types of YAG laser wavelength ranges (1064nm, 532nm and 355nm), while the FS70L4 supports two types of wavelength ranges (532nm and 266nm), thus expanding a scope of laser applications, allowing laser-cutting of thin-films used in semiconductors and liquid crystal substrates. However, Mitutoyo assumes no responsibility whatsoever for the performance and/or safety of the laser system used with Mitutoyo microscopes. a careful examination is recommended in selecting a laser-emission unit.
- Bright field, Differential Interference Contrast (DIC) and polarized observations are standard with the FS70Z. The FS70L and FS70L4 do not support the DIC method.
- By employing an inward revolver, the long working distance objectives provide excellent operatability.
- An ergonomic design with superb operatability: the FS70 employs the erect-image optical system (the image in the field of view has the same orientation as the specimen) and enlarged fine focus adjustment wheel with rubber grip coarse adjustment knob.

### SPECIFICATIONS

| Model No.<br>Order No.                         | FS70<br>378-184-1   | FS70-TH<br>378-184-3        | FS70Z<br>378-185-1   | FS70Z-TH<br>378-185-3       | FS70L<br>378-186-1   | FS70L-TH<br>378-186-3  | FS70L4<br>378-187-1                              | FS70L4-TH<br>378-187-3  |
|--|---|-----------------------------|----------------------|-----------------------------|--|------------------------|--|-------------------------|
| Model No.<br>Order No.                         | FS70-S<br>378-184-2   | FS70-THS<br>378-184-4       | FS70Z-S<br>378-185-2 | FS70Z-THS<br>378-185-4      | FS70L-S<br>378-186-2   | FS70L-THS<br>378-186-4 | FS70L4-S<br>378-187-2                            | FS70L4-THS<br>378-187-4 |
| Focus adjustment                               | With concentric coarse and fine focusing wheels (right and left)<br>(50mm travel range, 0.1mm/rev. for fine adjustment, 3.8mm/rev. for coarse adjustment) |                             |                      |                             |  |                        |  |                         |
| Trinocular tube Image                          | Erect image   |                             |                      |                             |  |                        |  |                         |
| Pupil distance                                 | Siedentopf type, adjustment range: 51 - 76mm  |                             |                      |                             |  |                        |  |                         |
| Field number                                   | 24  |                             |                      |                             |  |                        |  |                         |
| Tilt angle                                     | 0° - 20° (only -TH, -THS models)  |                             |                      |                             |  |                        |  |                         |
| Optical pass ratio                             | 50/50 <sup>1</sup>  | 100/0 or 0/100 <sup>2</sup> | 50/50 <sup>1</sup>   | 100/0 or 0/100 <sup>2</sup> | 100/0 or 0/100 <sup>2</sup>                                  |                        |  |                         |
| Protective filter                              | —   |                             |                      |                             | Built-in laser beam filter                                   |                        |  |                         |
| Main unit Tube lens                            | 1x  |                             | 1x -2x zoom          |                             | 1x   |                        |  |                         |
| Applicable YAG laser                           | 1064/532/355nm<br>(when using optional tube)  |                             | —                    |                             | 1064/532/355nm   |                        | 1064/532/355nm                                   |                         |
| Camera mount                                   | Adapter B (C-mount) <sup>3</sup>  |                             | —                    |                             | —<br>(use a laser with the TV port.)                         |                        | C-mount receptacle<br>(with green filter switch) |                         |
| Illumination system                            | Reflective illumination for bright field (Koehler illumination, with aperture diaphragm)  |                             |                      |                             |  |                        |  |                         |
| Light source                                   | 12V100W fiber optics, (non-stepped adjustment), light guide length 1.5m, power consumption 150W   |                             |                      |                             |  |                        |  |                         |
| Objectives <sup>3</sup><br>For observation     | M Plan Apo <sup>4</sup> , M Plan Apo SL, G Plan Apo   |                             |                      |                             |  |                        |  |                         |
| For laser-cutting                              | —   |                             |                      |                             | M/LCD Plan NIR <sup>5</sup> ,<br>M/LCD Plan NUV <sup>5</sup> |                        | M Plan UV  |                         |
| Loading weight<br>on optical tube <sup>6</sup> | 14.5kg  | 13.6kg                      | 14.1kg               | 13.2kg                      | 14.5kg   | 13.6kg                 | 14.1kg   | 13.2kg                  |
| Mass (main unit)                               | 6.1kg   | 7.1kg                       | 6.6kg                | 7.5kg                       | 6.1kg  | 7.1kg                  | 6.6kg  | 7.5kg                   |

-1: Eyepiece/CCD camera

-2: Eyepiece/laser

-3: Optional

-4: M Plan Apo 1x should be used together with the the polarizer (378-092).

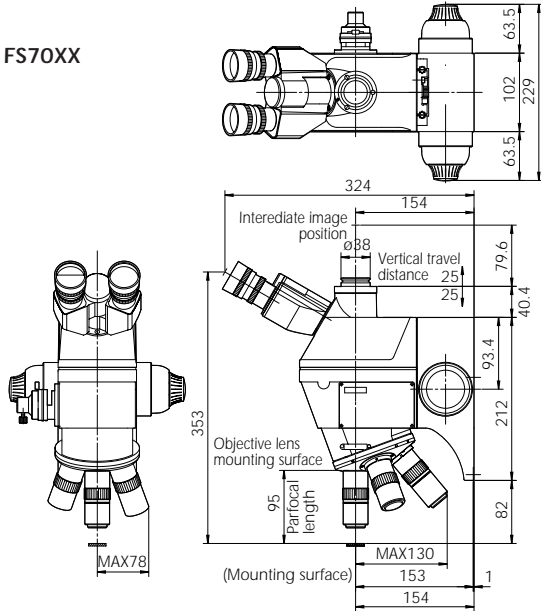
-5: Select model depending on the type of laser wavelength.

-6: Weight of objective lenses and eyepieces not included.

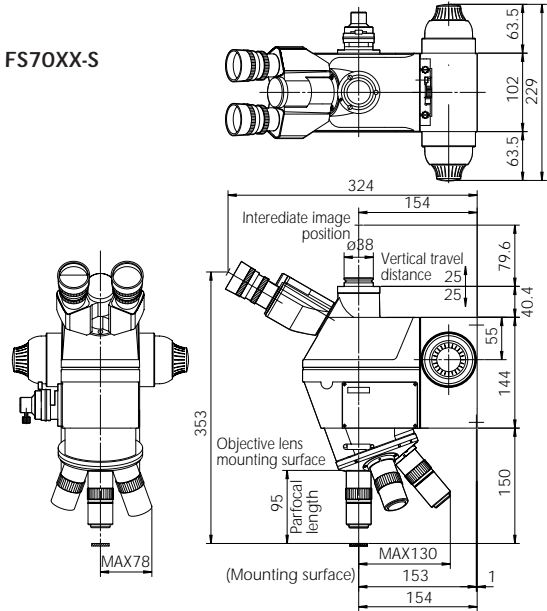
## Dimensions

Unit: mm

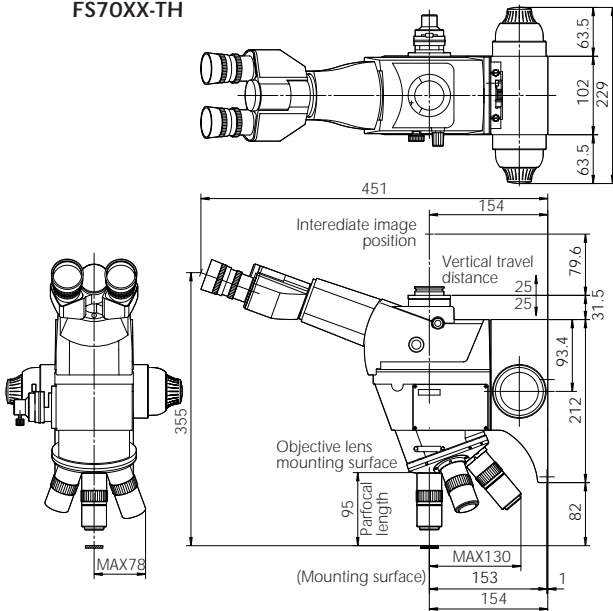
FS70XX



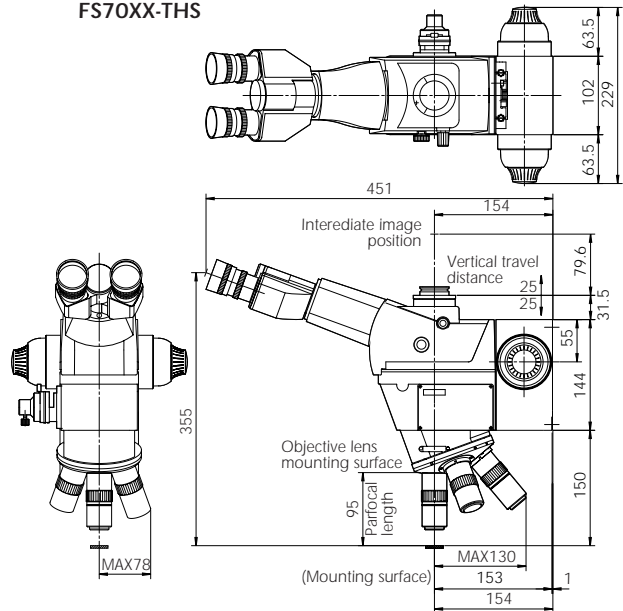
FS70XX-S



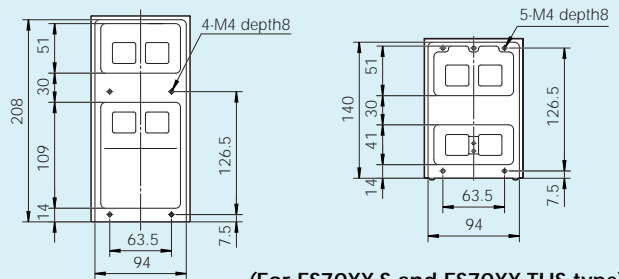
FS70XX-TH



FS70XX-THS



Mounting-screw hole positions on the base (for all models)



(For FS70XX-S and FS70XX-THS type)



# VM-ZOOM40

## SERIES 378

### Assembly Type Microscope Unit



The VM-ZOOM40 is an assembly type microscope unit that has drastically improved operability and the quality of visual images by combining the main unit, which has a high-magnification zooming system, with a newly developed high-resolution objective, which has a long working distance. If the VM-ZOOM40 is used with an analysis probe and various other laser repair equipment, it will greatly aid in development, manufacturing, and inspection of semiconductors and LCD panels.

### FEATURES

- High-ratio 40X zoom with excellent operability.
- High-resolution objective (10X) supplied as standard.
- Various optional bright-field objectives attachable.
- The slide type lens mount allows quick change between the monitoring and laser beam cutting objectives.
- Three wavelength (near infrared, visible, near ultraviolet, ultraviolet) lasers supported.
- C-mount attached as standard.
- The manual or power type system selectable according to the purpose.

### SPECIFICATIONS

#### VM-ZOOM40 Microscope Unit

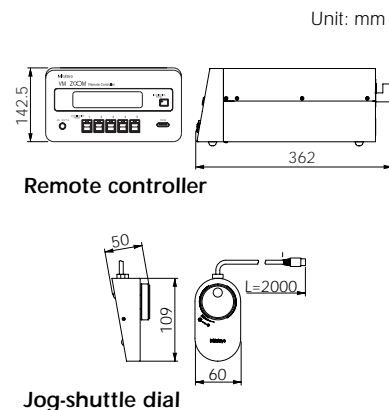
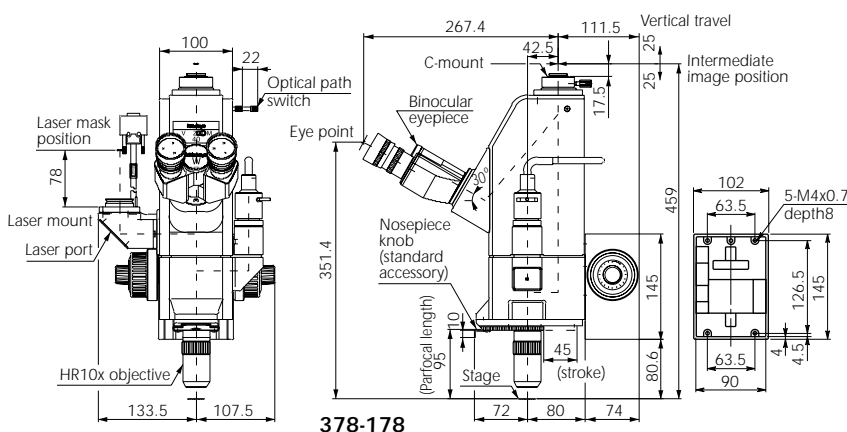
|                        |  |
|------------------------|--|
| Total magnification    | 100X - 4,000X (when using 1/2-inch CCD camera and 14-inch monitor)   |
| Magnification of tube  | 0.25X - 10X (Zoom ratio 1:40)  |
| Objective              | M Plan Apo HR 10X  |
| Field of view          | <ul style="list-style-type: none"> <li>• 1/2-inch CCD camera (optional): 2.56x1.92mm - 0.064x0.048mm</li> <li>• Binocular: Ø3.2mm - Ø0.08mm</li> </ul>                     |
| Reflected illumination | <ul style="list-style-type: none"> <li>• Koehler system (with aperture stop)</li> <li>• Fiber-optic illuminator (378-088) is required for the manual zoom type.</li> </ul> |
| Light source           | Halogen bulb (21V, 150W)   |
| Focusing unit          | Concentric coarse and fine wheels  |
| Power supply           | 100V - 240V AC, 50/60Hz  |
| Mass                   | Main unit: Approx. 7kg<br>Binocular unit: 1kg<br>Remote controller unit: Approx. 7kg   |

### Selection Guide of System Configuration

| Order No.   | 378-171 | 378-172 | 378-173 | 378-174 | 378-175 | 378-176 | 378-177 | 378-178 | 378-181 | 378-182 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| (Depends on each system configuration)                                |         |         |         |         |         |         |         |         |         |         |
| ■: A for 120V AC, D for 220V AC, E for 240V AC, no suffix for 100V AC |         |         |         |         |         |         |         |         |         |         |
| • Manual zoom function  | ●       | ●       | ●       | ●       |         |         |         |         |         |         |
| • Power zoom function*  |         |         |         |         | ●       | ●       | ●       | ●       | ●       | ●       |
| • Single-objective mount  | ●       |         |         |         | ●       |         |         |         |         |         |
| • Double-objective mount**  |         | ●       | ●       | ●       |         | ●       | ●       | ●       | ●       | ●       |
| • Binocular unit***   |         | ●       |         | ●       |         | ●       |         | ●       |         | ●       |
| • YAG laser (1064/532/355nm) mount                                    |         |         | ●       | ●       |         |         | ●       | ●       |         |         |
| • YAG laser (532/266nm) mount   |         |         |         |         |         |         |         |         | ●       | ●       |
| • Focusing unit   | ●       | ●       | ●       | ●       | ●       | ●       | ●       | ●       | ●       | ●       |
| • CCD camera mount  | ●       | ●       | ●       | ●       | ●       | ●       | ●       | ●       | ●       | ●       |
| • M Plan Apo HR 10X Objective   |         |         |         | ●       |         | ●       | ●       | ●       |         | ●       |

●: Included in the set.  
\*Fiber-optic illumination controller is also provided.  
\*\*The objective can be switched due to the sliding mechanism.  
\*\*\*10X eyepieces (378-856) are provided.

### Dimensions



## VMU

### SERIES 378

#### Video Microscope Unit



**378-505**  
(Objective is optional.)

The VMU is a compact, light-weight, and easy-to-install microscope unit for CCD camera monitoring in semiconductor fabrications.

#### FEATURES

- The optical system features ultra-long working distance objectives and correction for the wide range of radiation.
- The fiber-optic reflected illumination keeps the workpiece free from thermal expansion caused by heat. The fiber-optic illuminator is required for the light source.
- Also available with a laser mount or revolving nosepiece (objective mount).

#### Selection Guide of System Configuration

| Order No.<br>(Depends on each system configuration)                                    | 378-505 | 378-506 | 378-507 | 378-508 |
|--|---------|---------|---------|---------|
| • Vertical CCD camera mount  | ●       |         |         | ●       |
| • Horizontal CCD camera mount  |         | ●       | ●       |         |
| • YAG laser mount  |         |         | ●       |         |
| • Fiber-optic illumination unit  | ▲       | ▲       | ▲       | ▲       |
| • M Plan Apo, M Plan Apo SL, G Plan Apo objectives for bright field observation        | ▲       | ▲       | ▲       | ▲       |
| • M Plan NIR, LCD Plan NIR, M Plan NUV and LCD Plan NUV objectives for laser machining |         |         | ▲       |         |
| • M Plan UV objectives for laser machining   |         |         |         | ▲       |

●: Provided, ▲: Available as optional accessory

#### SPECIFICATIONS

##### VMU Video Microscope Unit

|                        |   |
|------------------------|---|
| Magnification of tube  | 1X  |
| Applicable wavelength  | <b>378-505, 378-506</b><br>Near-infrared and visible radiation  |
|                        | <b>378-507</b><br>Near-infrared —visible— near-ultraviolet radiation  |
|                        | <b>378-508</b><br>Visible and ultraviolet radiation   |
| Objective              | <b>(Optional)</b>   |
| Reflected illumination | <ul style="list-style-type: none"> <li>• Koehler system</li> <li>• Fiber-optic illuminator (optional) is required.</li> </ul> |
| Light source           | Halogen bulb (21V, 150W)  |
| Mass                   | <b>378-505:</b> 570g<br><b>378-506:</b> 590g<br><b>378-507:</b> 980g<br><b>378-508:</b> 1010g                                 |

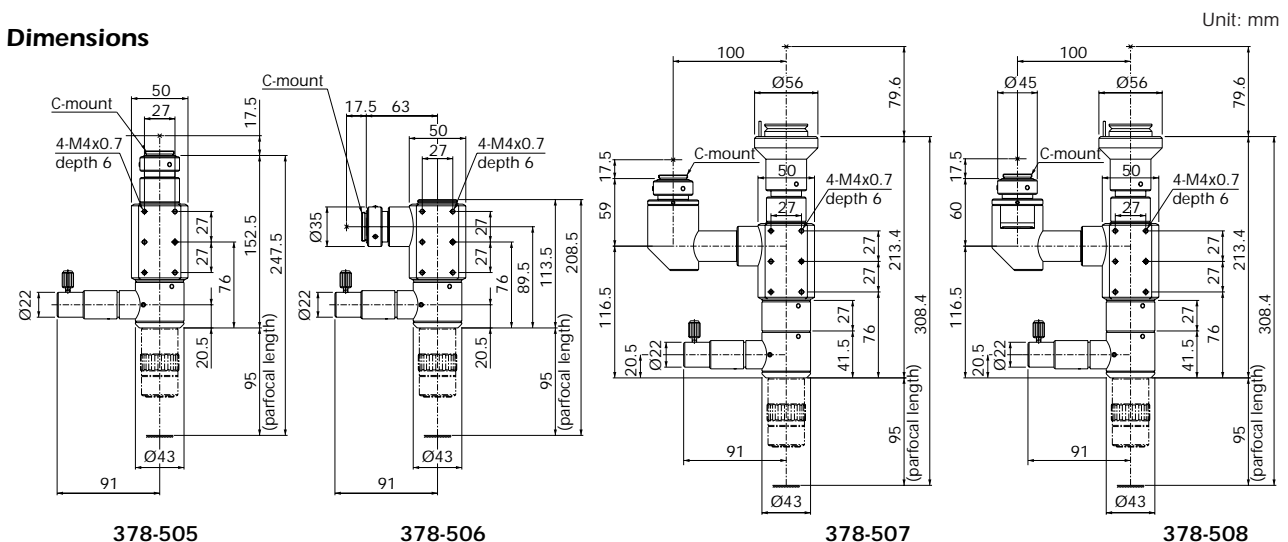
#### Fiber-optic Illuminator

- 378-700** (100V AC)
- 378-700C** (110V AC)
- 378-700A** (120V AC)
- 378-700D** (220V AC)
- 378-700E** (240V AC)

- Light source:  
Halogen bulb (12V, 100W)



#### Dimensions



# Eyepiece

## SERIES 378



### SPECIFICATIONS

| Order No. (2pcs. set) | Magnification | Field number | Mass | Individual order No. |
|-----------------------|---------------|--------------|------|----------------------|
| 378-856               | 10X           | 24           | 85g  | 378-856-5            |
| 378-857               | 15X           | 16           | 40g  | 378-857-5            |
| 378-858               | 20X           | 12           | 55g  | 378-858-8            |

### Reticles (optional)

| Order No. | Description   |
|-----------|---|
| 516848    | Cross-hair  |
| 516576    | Broken cross hair (90° and 60°)                     |
| 516578    | Concentric circle (Diametric increment: 1.2mm)      |
| 516577    | 20mm scale (Minimum reading: 0.1mm) with cross hair |
| 516849    | 10mm scale (Minimum reading: 0.1mm)                 |
| 516850    | 5mm scale (Minimum reading: 0.05mm)                 |
| 516851    | 10x10mm section (Minimum section: 1x1mm)            |

### FEATURES

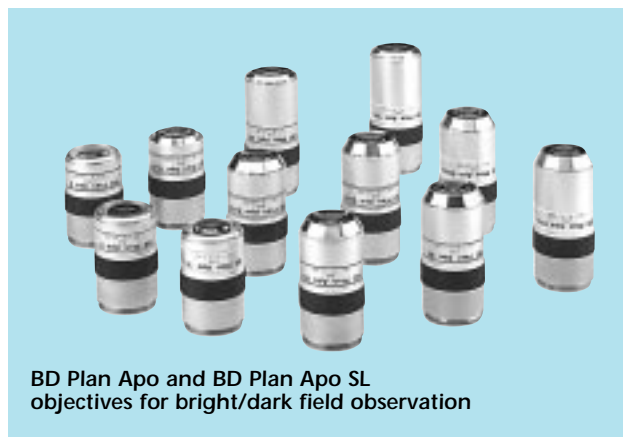
- The field of view is extra wide.
- Optional reticles are available.

# Objectives

## SERIES 378



M Plan Apo and M Plan Apo SL objectives for bright field observation



BD Plan Apo and BD Plan Apo SL objectives for bright/dark field observation

The Mitutoyo 378 Series objectives have the world's longest working distance and an infinite tube system. These objectives provide flexible observation at high magnifications and independent correction of lateral chromatic aberration.

### FEATURES

- The long working distance type objectives provide a wide space between the lens surface and the workpiece surface in focus, making it possible to observe workpieces which are usually hard-to-focus because of their projections like a step.
- The metallurgical plan apochromatic (M Plan Apo) objective is an excellent optical system. This objective provides a flat, chromatic aberration free image with little color aberration throughout the field of view, making it suitable for any type of microscope.
- Specially designed objectives are also available with correction for near-infrared radiation, near-ultraviolet radiation, and ultraviolet radiation, or various thickness of LCD screen glasses.
- The mounting screw threads of objectives are designed to conform to JIS B-7141-1988.



Near-infrared radiation corrected M Plan NIR objective



Near-ultraviolet radiation corrected M Plan NUV objectives



Ultraviolet radiation corrected M Plan UV objectives

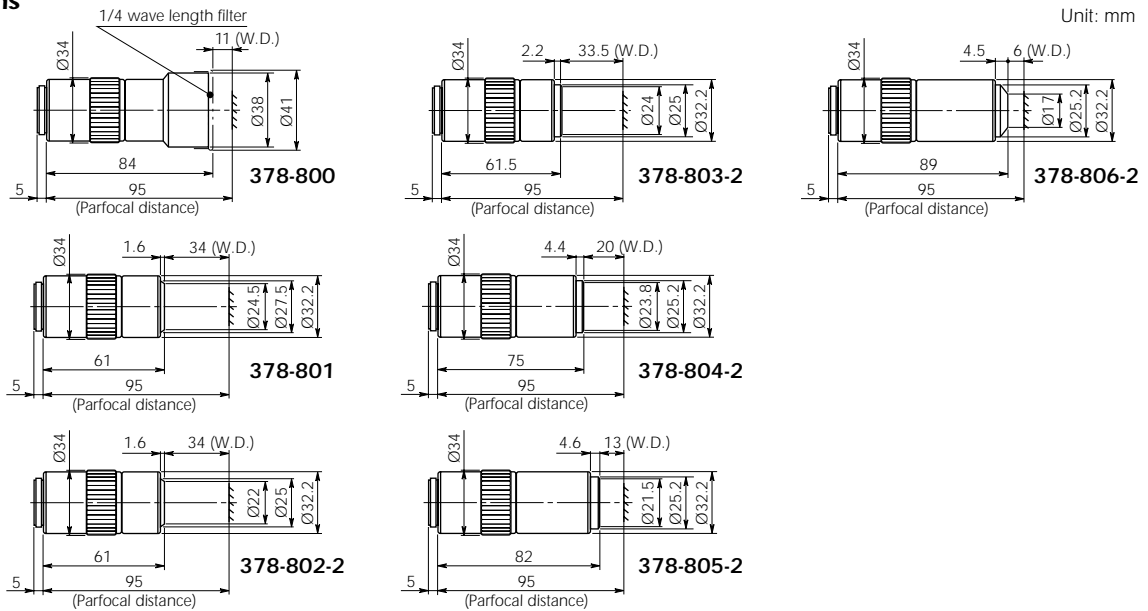
## SPECIFICATIONS

### M Plan Apo for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-800   | 1X            | 0.025                     | 11.0mm                  | 200mm              | 11.0µm              | 440µm              | Ø24mm          | 4.8x6.4mm       | 300g |
| 378-801   | 2X            | 0.055                     | 34.0mm                  | 100mm              | 5.0µm               | 91µm               | Ø12mm          | 2.4x3.2mm       | 220g |
| 378-802-2 | 5X            | 0.14                      | 34.0mm                  | 40mm               | 2.0µm               | 14.0µm             | Ø4.8mm         | 0.96x1.28mm     | 230g |
| 378-803-2 | 10X           | 0.28                      | 33.5mm                  | 20mm               | 1.0µm               | 3.5µm              | Ø2.4mm         | 0.48x0.64mm     | 230g |
| 378-804-2 | 20X           | 0.42                      | 20.0mm                  | 10mm               | 0.7µm               | 1.6µm              | Ø1.2mm         | 0.24x0.32mm     | 270g |
| 378-805-2 | 50X           | 0.55                      | 13.0mm                  | 4mm                | 0.5µm               | 0.9µm              | Ø0.48mm        | 0.10x0.13mm     | 290g |
| 378-806-3 | 100X          | 0.70                      | 6.0mm                   | 2mm                | 0.4µm               | 0.6µm              | Ø0.24mm        | 0.05x0.06mm     | 320g |

Note: Polarizing unit (378-074) is required when using 1X objective.

### Dimensions

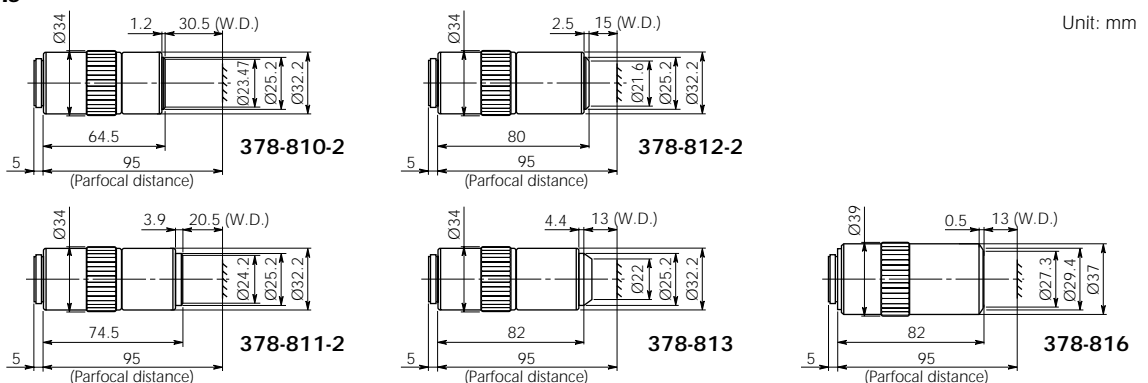


### M Plan Apo SL for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-810-3 | 20X           | 0.28                      | 30.5mm                  | 10mm               | 1.0µm               | 3.5µm              | Ø1.2mm         | 0.24x0.32mm     | 240g |
| 378-811-3 | 50X           | 0.42                      | 20.5mm                  | 4mm                | 0.7µm               | 1.6µm              | Ø0.48mm        | 0.10x0.13mm     | 275g |
| 378-812-3 | 80X           | 0.50                      | 15.0mm                  | 2.5mm              | 0.6µm               | 1.1µm              | Ø0.3mm         | 0.06x0.08mm     | 280g |
| 378-813   | 100X          | 0.55                      | 13.0mm                  | 2mm                | 0.5µm               | 0.9µm              | Ø0.24mm        | 0.05x0.06mm     | 290g |
| 378-816   | 200X          | 0.62                      | 13.0mm                  | 1mm                | 0.4µm               | 0.7µm              | Ø0.12mm        | 0.025x0.03mm    | 490g |

Note: These objectives offer extra-long working distance.

### Dimensions



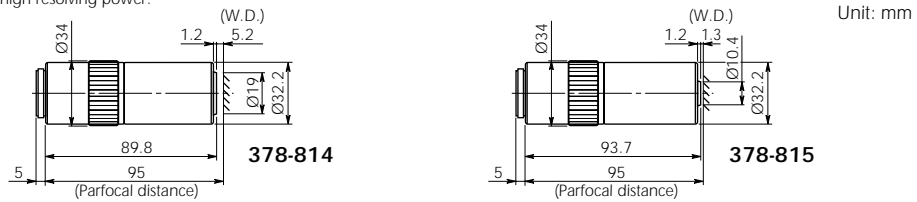
SPECIFICATIONS

M Plan Apo HR for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-788   | 10X           | 0.42                      | 15mm                    | 20mm               | 0.8µm               | 1.55µm             | Ø1.2mm         | 0.24x0.32mm     | 460g |
| 378-814   | 50X           | 0.75                      | 5.2mm                   | 4mm                | 0.4µm               | 0.48µm             | Ø0.48mm        | 0.10x0.13mm     | 330g |
| 378-815   | 100X          | 0.90                      | 1.3mm                   | 2mm                | 0.3µm               | 0.34µm             | Ø0.24mm        | 0.05x0.06mm     | 410g |

Note: These objectives offer extra-high resolving power.

Dimensions



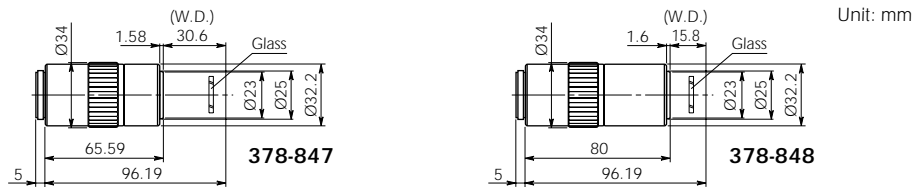
Glass Thickness (t=3.5mm) Corrected G Plan Apo for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-847   | 20X           | 0.28                      | 29.42mm*                | 10mm               | 1.0µm               | 3.5µm              | Ø1.2mm         | 0.24x0.32mm     | 270g |
| 378-848-3 | 50X           | 0.50                      | 13.89mm*                | 4mm                | 0.6µm               | 1.1µm              | Ø0.48mm        | 0.10x0.13mm     | 320g |

\*In air

Note: The LCD Plan Apo Series are designed for observing a workpiece through LCD glass (thickness = 3.5mm).

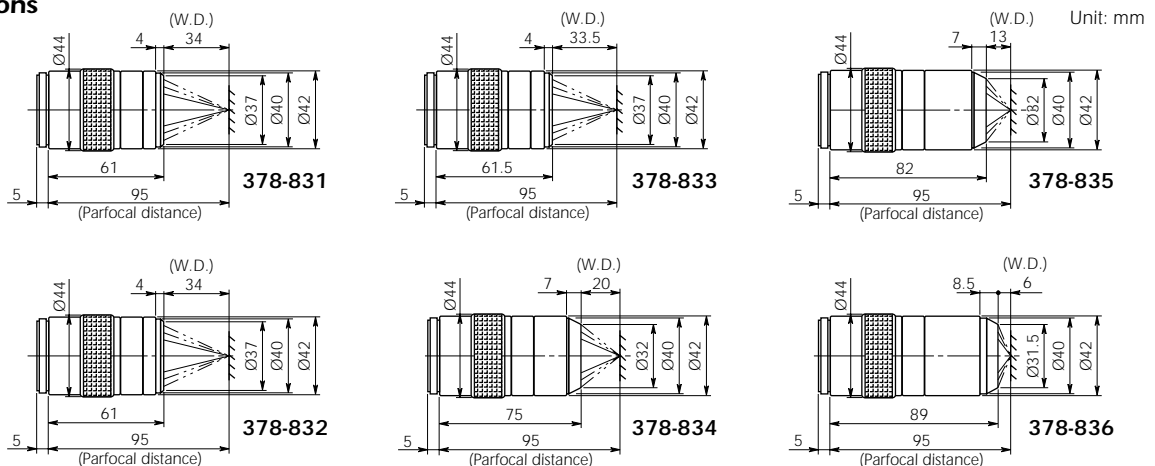
Dimensions



BD Plan Apo for Bright/Dark Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-831   | 2X            | 0.055                     | 34.0mm                  | 100mm              | 5.0µm               | 91µm               | Ø12mm          | 2.4x3.2mm       | 230g |
| 378-832   | 5X            | 0.14                      | 34.0mm                  | 40mm               | 2.0µm               | 14.0µm             | Ø4.8mm         | 0.96x1.28mm     | 240g |
| 378-833   | 10X           | 0.28                      | 33.5mm                  | 20mm               | 1.0µm               | 3.5µm              | Ø2.4mm         | 0.48x0.64mm     | 240g |
| 378-834   | 20X           | 0.42                      | 20.0mm                  | 10mm               | 0.7µm               | 1.6µm              | Ø1.2mm         | 0.24x0.32mm     | 300g |
| 378-835   | 50X           | 0.55                      | 13.0mm                  | 4mm                | 0.5µm               | 0.9µm              | Ø0.48mm        | 0.10x0.13mm     | 320g |
| 378-836   | 100X          | 0.70                      | 6.0mm                   | 2mm                | 0.4µm               | 0.6µm              | Ø0.24mm        | 0.05x0.06mm     | 350g |

Dimensions

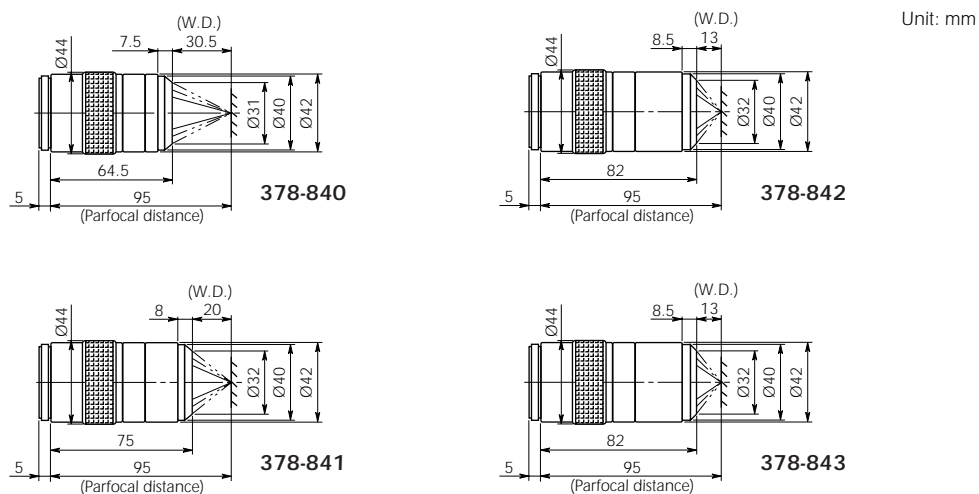


## BD Plan Apo SL for Bright/Dark Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-840   | 20X           | 0.28                      | 30.5mm                  | 10mm               | 1.0µm               | 3.5µm              | Ø1.2mm         | 0.24x0.32mm     | 240g |
| 378-841   | 50X           | 0.42                      | 20.0mm                  | 4mm                | 0.7µm               | 1.6µm              | Ø0.48mm        | 0.10x0.13mm     | 310g |
| 378-842   | 80X           | 0.50                      | 13.0mm                  | 2mm                | 0.6µm               | 1.1µm              | Ø0.3mm         | 0.06x0.08mm     | 310g |
| 378-843   | 100X          | 0.55                      | 13.0mm                  | 2mm                | 0.5µm               | 0.9µm              | Ø0.24mm        | 0.05x0.06mm     | 320g |

Note: These objectives offer extra-long working distance.

### Dimensions

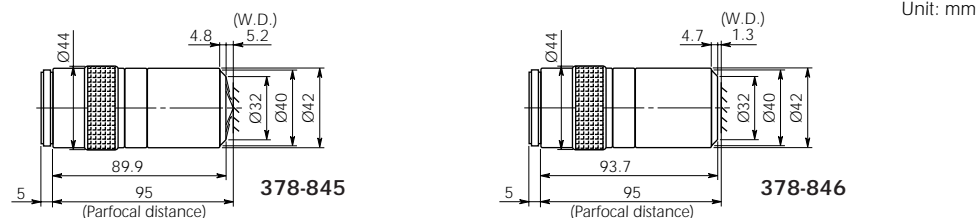


## BD Plan Apo HR for Bright/Dark Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-845   | 50X           | 0.75                      | 5.2mm                   | 4mm                | 0.4µm               | 0.48µm             | Ø0.48mm        | 0.10x0.13mm     | 370g |
| 378-846   | 100X          | 0.90                      | 1.3mm                   | 2mm                | 0.3µm               | 0.24µm             | Ø0.24mm        | 0.05x0.06mm     | 435g |

Note: These objectives offer extra-high resolving power.

### Dimensions



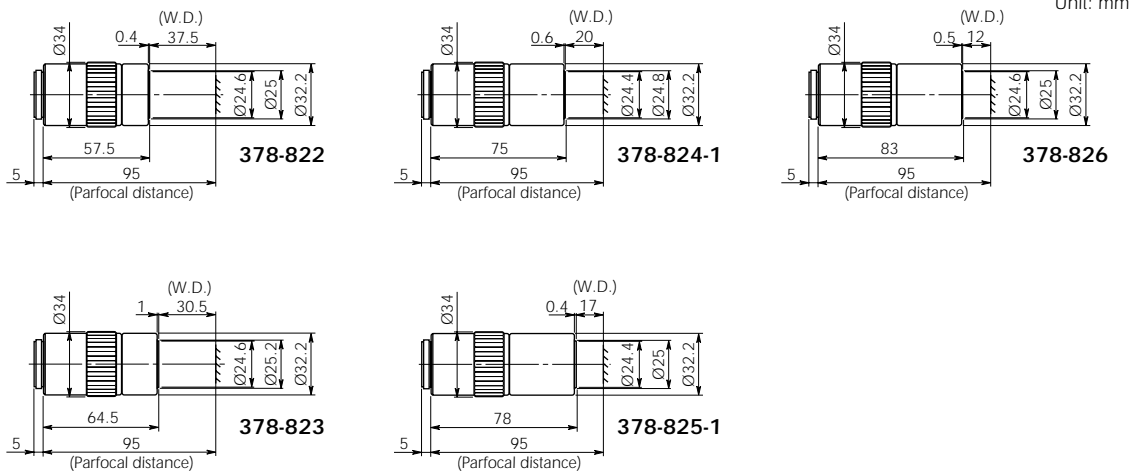
SPECIFICATIONS

Near-infrared Radiation Corrected  
M Plan NIR for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-822   | 5X            | 0.14                      | 37.5mm                  | 40mm               | 2.0µm               | 14.0µm             | Ø4.8mm         | 0.96x1.28mm     | 220g |
| 378-823   | 10X           | 0.26                      | 30.5mm                  | 20mm               | 1.1µm               | 4.1µm              | Ø2.4mm         | 0.48x0.64mm     | 250g |
| 378-824-1 | 20X           | 0.40                      | 20.0mm                  | 10mm               | 0.7µm               | 1.7µm              | Ø1.2mm         | 0.24x0.32mm     | 300g |
| 378-825-3 | 50X           | 0.42                      | 17.0mm                  | 4mm                | 0.7µm               | 1.6µm              | Ø0.48mm        | 0.10x0.13mm     | 315g |
| 378-826-3 | 100X          | 0.50                      | 12.0mm                  | 2mm                | 0.6µm               | 1.1µm              | Ø0.24mm        | 0.05x0.06mm     | 335g |

Note: These objectives are designed that a workpiece's image can be focused within the focal depth even when the wavelength used is changed anywhere from the visible range (λ=480nm) up to near-infrared range (λ=1800nm). Therefore the M Plan NIR Series are suitable for laser repair. However, when the wavelength used exceeds 1100nm, the focussing position may slightly deviate from that in the visible light range due to changes in the glass dispersion and the refractive index.

Dimensions

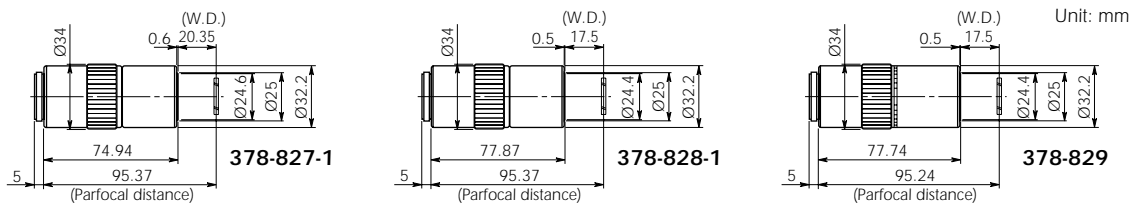


Near-Infrared Radiation and LCD Glass Thickness (t=1.1mm or 0.7mm) Corrected  
LCD Plan NIR for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-827-1 | 20X           | 0.40                      | 19.98mm*                | 10mm               | 0.7µm               | 1.7µm              | Ø1.2mm         | 0.24x0.32mm     | 305g |
| 378-828-3 | 50X           | 0.42                      | 17.13mm*                | 3.9mm              | 0.7µm               | 1.6µm              | Ø0.48mm        | 0.10x0.13mm     | 320g |
| 378-829-3 | 50X           | 0.42                      | 17.26mm*                | 3.9mm              | 0.7µm               | 1.6µm              | Ø0.48mm        | 0.10x0.13mm     | 320g |

\*In air  
Note: These near-infrared (λ= 1800nm) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1mm (378-827-1, 378-828-1) or 0.7mm (378-829)) and for laser repair.

Dimensions



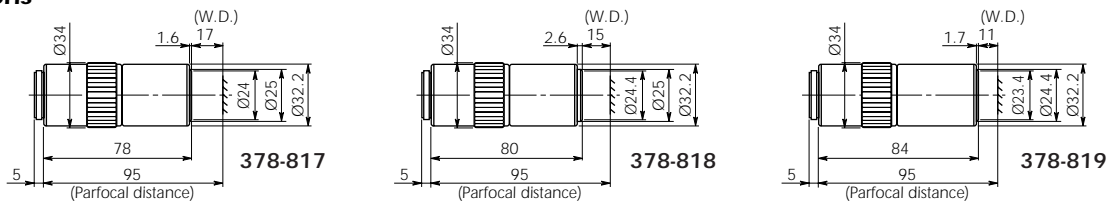
## Near-ultraviolet Radiation Corrected M Plan NUV for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-817   | 20X           | 0.40                      | 17.0mm                  | 10mm               | 0.7µm               | 1.7µm              | Ø1.2mm         | 0.24x0.32mm     | 340g |
| 378-818   | 50X           | 0.42                      | 15.0mm                  | 4mm                | 0.7µm               | 1.6µm              | Ø0.48mm        | 0.10x0.13mm     | 350g |
| 378-819   | 100X          | 0.50                      | 11.0mm                  | 2mm                | 0.6µm               | 1.1µm              | Ø0.24mm        | 0.05x0.06mm     | 380g |

Note: These objectives are designed that a workpiece's image can be focused within the focal depth even the wavelength used is changed anywhere from the visible range ( $\lambda=620\text{nm}$ ) to the near-ultraviolet range ( $\lambda=355\text{nm}$ ). Therefore The M Plan NUV Series are suitable for laser repair using high frequency laser beam.

### Dimensions

Unit: mm



## Near-ultraviolet Radiation and LCD Glass Thickness (t=0.7mm) Corrected LCD Plan NUV for Bright Field Observation

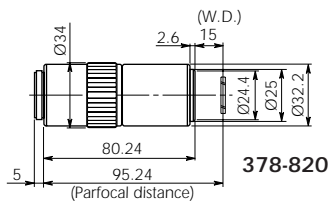
| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-820   | 50X           | 0.42                      | 14.76mm*                | 4mm                | 0.7µm               | 1.6µm              | Ø0.48mm        | 0.10x0.13mm     | 310g |

\*In air

Note: This near-ultraviolet ( $\lambda=355\text{nm}$ ) corrected objective is designed for observing a workpiece through LCD glass (thickness = 0.7mm) and for laser repair.

### Dimensions

Unit: mm



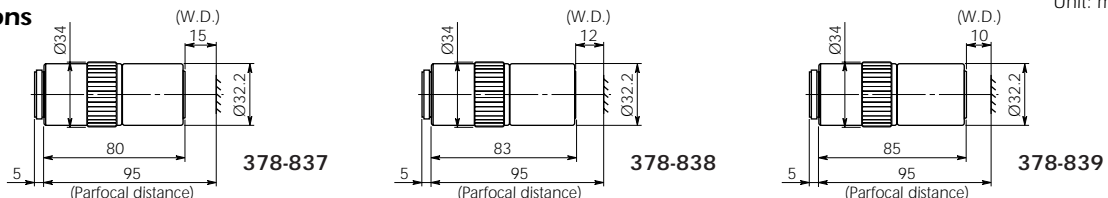
## Ultraviolet Radiation Corrected M Plan UV for Bright Field Observation

| Order No. | Magnification | Numerical aperture (N.A.) | Working distance (W.D.) | Focal distance (f) | Resolving power (R) | Focal depth (D.F.) | Field of view  |                 | Mass |
|-----------|---------------|---------------------------|-------------------------|--------------------|---------------------|--------------------|----------------|-----------------|------|
|           |               |                           |                         |                    |                     |                    | Ø24mm eyepiece | 1/2" CCD camera |      |
| 378-837-3 | 20X           | 0.36                      | 15.0mm                  | 10mm               | 0.8µm               | 2.1µm              | Ø1.2mm         | 0.24x0.32mm     | 330g |
| 378-838-3 | 50X           | 0.40                      | 12.0mm                  | 4mm                | 0.7µm               | 1.7µm              | Ø0.48mm        | 0.10x0.13mm     | 400g |
| 378-839-3 | 80X           | 0.55                      | 11.0mm                  | 2.5mm              | 0.5µm               | 0.9µm              | Ø0.3mm         | 0.06x0.08mm     | 380g |

Note: These ultraviolet corrected objectives are designed that a workpiece's image can be focused within the focal depth even when the wavelength used is changed anywhere from the visible range ( $\lambda=550\text{nm}$ ) to the ultraviolet range ( $\lambda=266\text{nm}$ ). Therefore The M Plan UV Series are suitable for laser repair using high frequency laser beam.

### Dimensions

Unit: mm

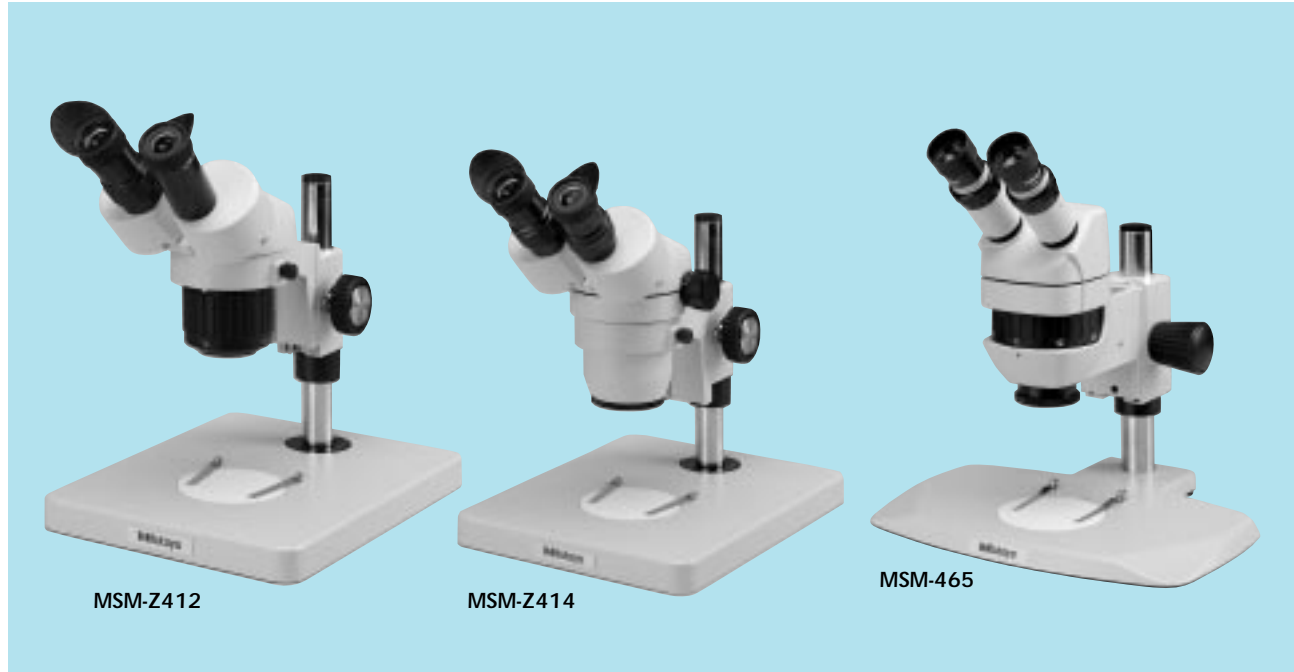




# MSM-400

## SERIES 377

### Stereo Microscopes



#### FEATURES

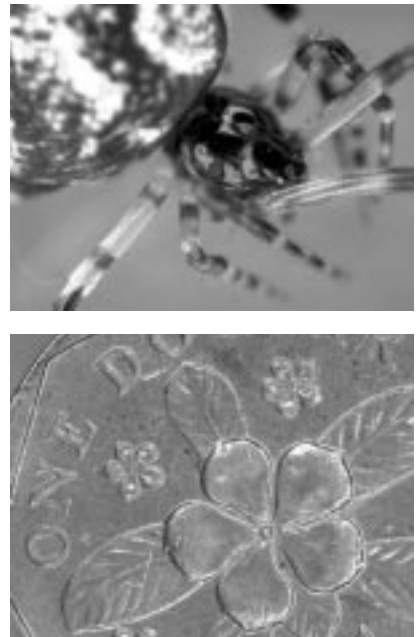
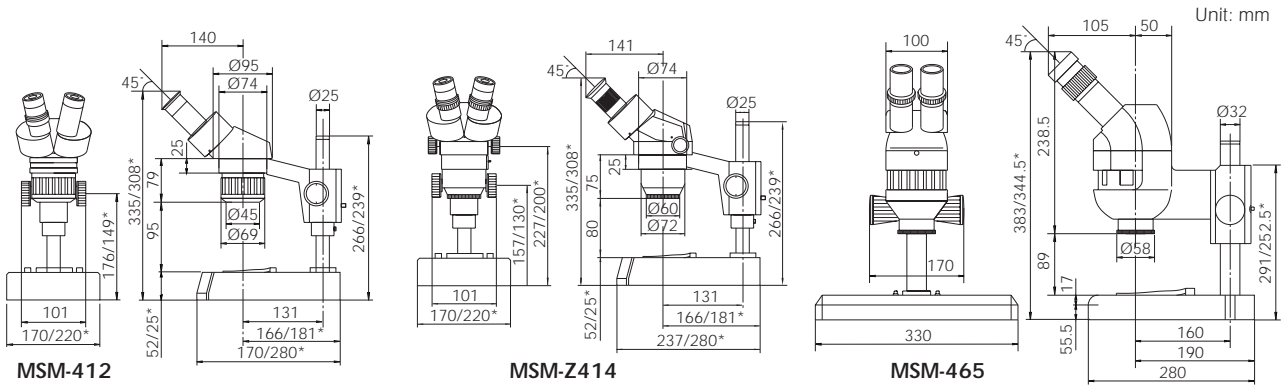
- Bright, sharp images with real depth are recreated with high resolution and excellent faithfulness to color, thus minimizing eye fatigue while increasing inspection efficiency and productivity.
- The MSM series provides a full range of advanced functions at an affordable price.
- User-friendly turret types (**MSM-412, MSM-Z414**) and a zoom type (**MSM-465**) are available.
- Continuous zooming, a standard feature, allows you to enlarge the object by 10 to 40 times in total magnification.
- The microscopes can be connected to a digital camera or CCD camera to save captured images of the object or for simultaneous observation through different media.
- The extended depth of focus, long working distance and wide field of view increase work efficiency. The system is ideal for inspecting various objects such as electronic components, metal components, plants, mineral compositions and biological cells.
- Various attachments expand applications and use. Extended MSM units can be used for appearance inspections, on processing lines, inside inspection systems or in teaching environments.

#### SPECIFICATIONS

##### MSM-400 Stereo Microscopes

| Model No.                     | MSM-412                   | MSM-Z414                  | MSM-465                   |
|-------------------------------|---------------------------|---------------------------|---------------------------|
| Order No.                     | 100V AC                   | <b>377-925K</b>           | <b>377-945K</b>           |
|                               | 110V AC                   | <b>377-926C</b>           | <b>377-946C</b>           |
|                               | 220V AC                   | <b>377-926D</b>           | <b>377-946D</b>           |
|                               | 240V AC                   | <b>377-926E</b>           | <b>377-946E</b>           |
| Total magnification           | 10X, 20X                  | 10X to 40X                | 6X, 12X, 25X, 50X         |
| Optical tube                  | Binocular                 | Binocular                 | Binocular                 |
| Pupil distance                | 54 - 76mm (adjustable)    |                           |                           |
| Eyepiece                      | WF10X, WF5X, WF15X, WF20X |                           |                           |
| Objective                     | 1X, 2X                    | 1X to 4X                  | 0.6X, 1.2X, 2.5X, 5X      |
| Working distance of objective | 95mm                      | 80mm                      | 89mm                      |
| Focusing travel               | 44mm                      | 44mm                      | 50mm                      |
| Maximum workpiece height      | 93mm                      | 95mm                      | 95mm*                     |
| Workstage size                | Ø95mm                     | Ø95mm                     | Ø95mm                     |
| Dimensions                    | 151x285x343mm             | 151x285x343mm             | 151x285x343mm             |
| Mass                          | 4.9kg ( <b>377-925K</b> ) | 5.3kg ( <b>377-945K</b> ) | 4.8kg ( <b>377-965K</b> ) |
|                               | 4.7kg                     | 5.1kg                     | 6.3kg                     |

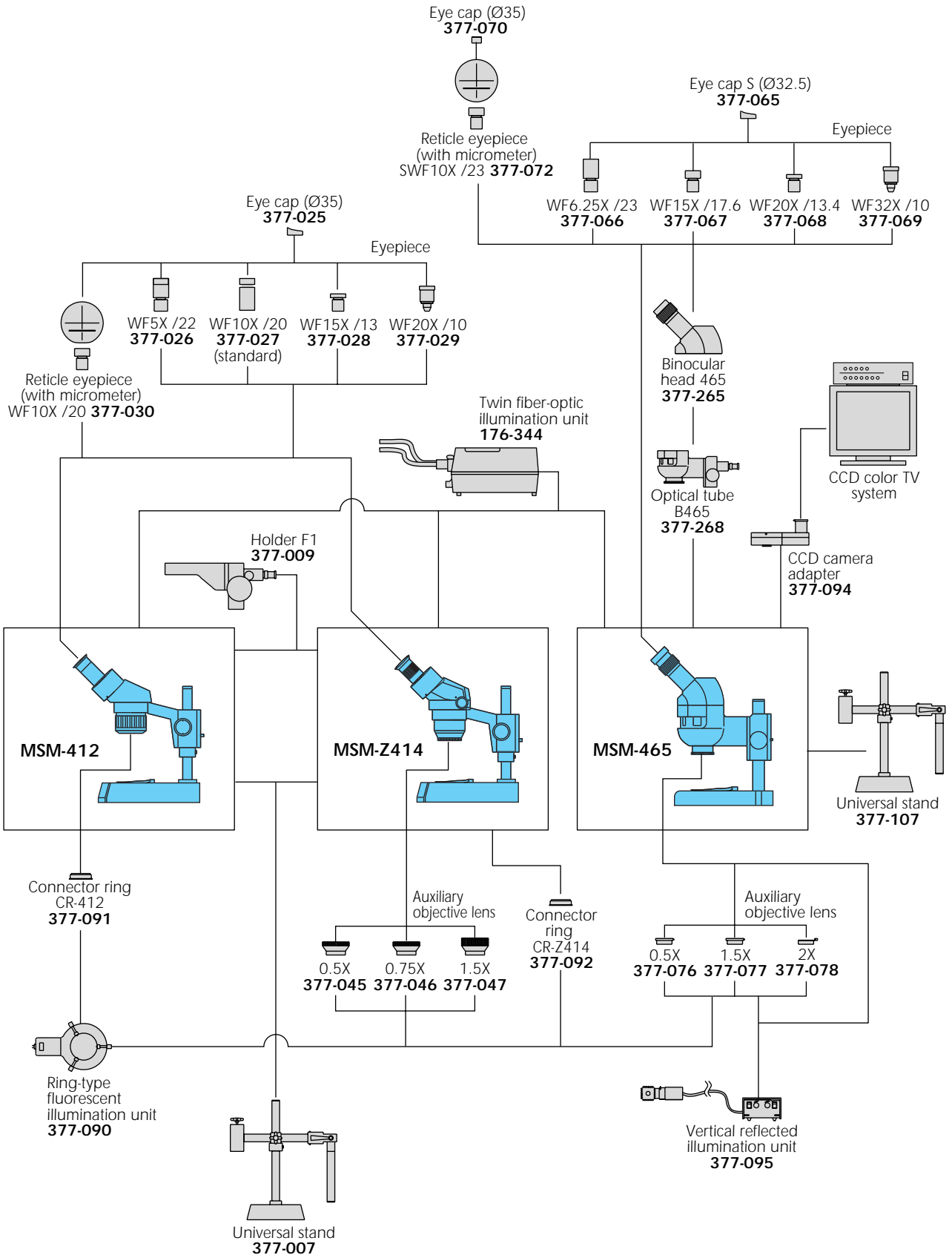
## Dimension



## OPTIONAL LENSES



SYSTEM DIARAM



# QUICK GUIDE TO PRECISION MEASUREMENT

## Optical Instrument Terminology

### Focal Point

The point to which rays that are initially parallel to the axis of a lens, mirror, or other optical system are converged or from which they appear to diverge.

### Focal Length (Focal Distance)

The distance from the focal point of a lens or curved mirror to the principal point; for a thin lens it is approximately the distance from the focal point to the lens.

### Focus

To move an optical lens toward or away from a screen or film to obtain the sharpest possible image of a desired object.

### Depth of Focus (Focal Depth)

The depth of the region at which the sharpest possible image of a desired object is obtained.

### Magnification (Lateral Magnification)

The ratio of some linear dimension, perpendicular to the optical axis, of an image formed by an optical system, to the corresponding linear dimension of the object.

### Aperture Diaphragm

A circular mechanical device, whose diameter can be varied continuously, which controls the cross section of a beam of light passing through it, to control light intensity, reduce aberration, or increase depth of focus.

### Telecentric System

A telescopic system whose aperture stop is located at one of foci of the objective lens.

### Kohler Illumination

A method of illumination for the optical microscope used with coiled filaments; an image of the filament large enough to fill the iris opening is focused on the condenser which is focused so that the image of the iris diaphragm on the lamp is in focus with the specimen, and the lamp iris is opened only enough to fill the field of view; the iris of the microscope is opened only enough to illuminate the back aperture of the objective; no ground glass is used.

### Erect Image

An image in which directions are the same as those in the object, in contrast to an inverted image.

### Numerical Aperture

A measure of the resolving power of a microscope objective, equal to the product of the refractive index of the medium in front of the objective and the sine of the angle between the outermost ray entering the objective and the optical axis.

### Resolving Power

A quantitative measure of the ability of an optical instrument to produce separable images of different points on an object.

### Working Distance

The distance between the front end of a microscope objective and the plane at which the sharpest possible image of a desired object is obtained.

### Field Number

The view field diameter of an eyepiece, expressed in millimeters.

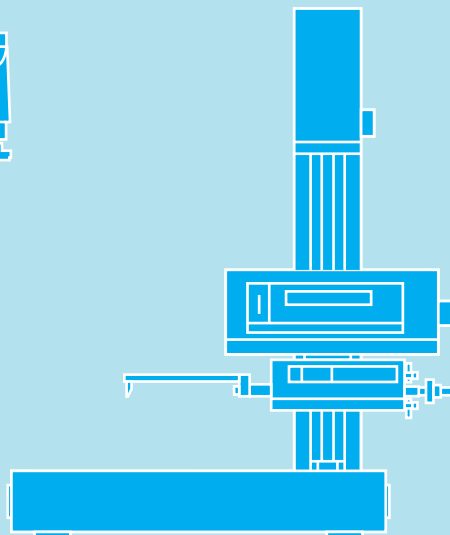
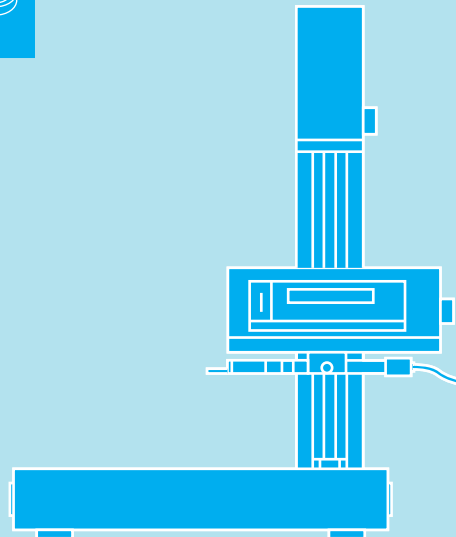
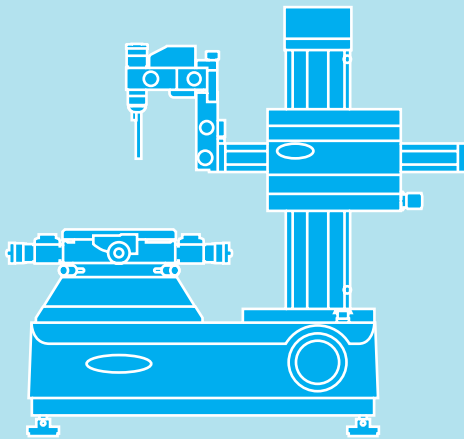
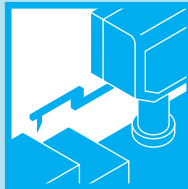




Contracer Pages 382— 403

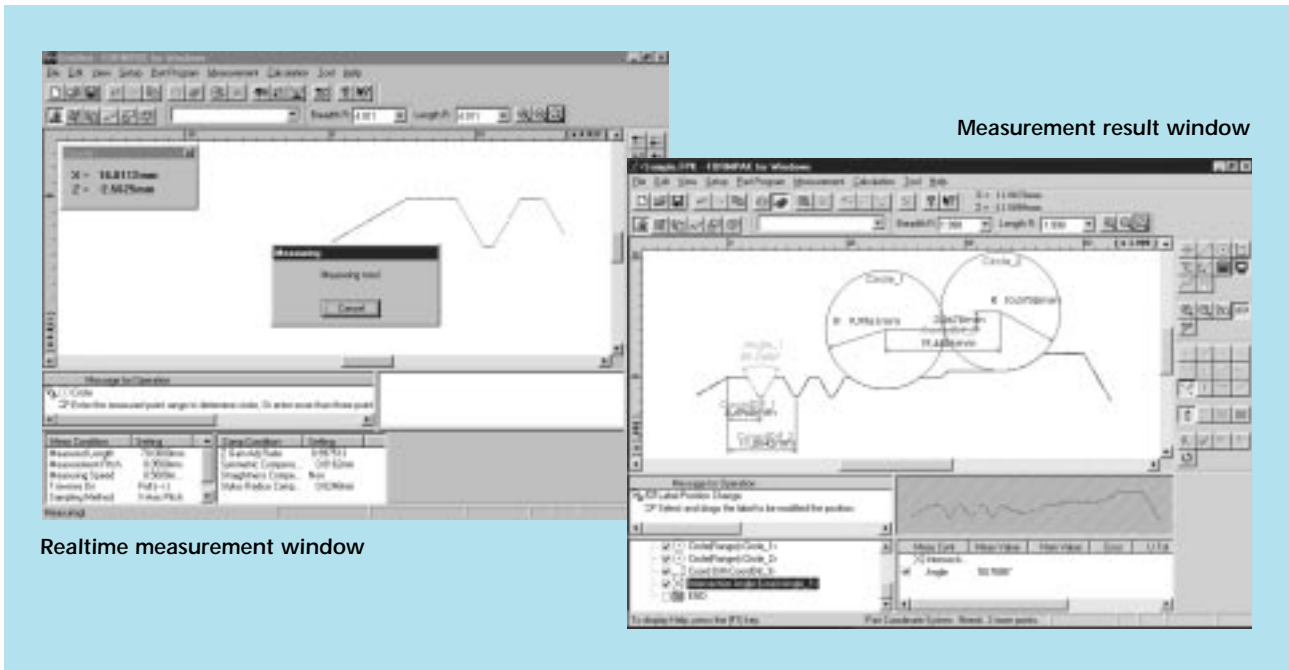
Surftest Pages 404 — 425

Roundtest Pages 426 — 436



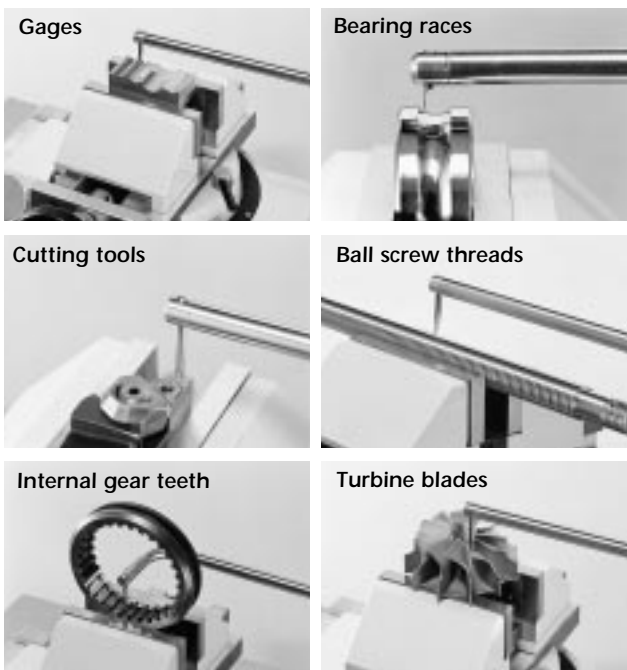
# FORMPAK®-1000

Data Analysis Software for Contracer & Formtracer



FORMPAK®-1000 is a dedicated PC software for Mitutoyo contour measuring instruments such as Contracer CV-3000/4000 and Formtracer SV-C3000/4000. It is Windows®-based, and has an enhanced user interface, including mouse operation, a variety of graphic displays, and comprehensive online help. In addition to dimensional measurement capabilities (angles, radii, and distances measurements), the contour tolerancing function for evaluating "form" and report creation function for outputting measurement results in a specified format are provided as standard. FORMPAK®-1000 is also available on the Contracer CP-1000/2000 as an optional accessory. This software allows the data management in a constant format, from the work site to the laboratory.

## APPLICATIONS OF CONTRACER



## SPECIFICATIONS

### FORMPAK®-1000

|                      |   |
|----------------------|---|
| Measurement mode     | <ul style="list-style-type: none"> <li>Standard measurement (One or multiple elements of measured data can be saved in one file.)</li> <li>Calibration measurement</li> </ul>   |
| Calculation commands | <p><b>Point:</b> Point, peak, contact, intersection, bisector-point</p> <p><b>Line:</b> Line, tangent line, perpendicular, parallel line, bisector</p> <p><b>Circle:</b> Circle (multi-point, range, center and radius), intersection of circles</p> <p><b>Position/difference:</b> Coordinate difference, true position judgment</p> <p><b>Distance/angle:</b> Distance, groove length, step, pitch, distance reference, angle</p> <p><b>Coordinate system setup</b></p> <p><b>Calculation/statistics:</b> Arithmetic calculation, absolute value, square root, maximum value, minimum value, mean, sum, standard deviation, unbiased standard deviation, area</p> <p><b>Editing of measured points:</b> Deletion, translation, rotation, mirror image, positioning, combination, separation, projection</p> |
| Contour tolerancing  | <ul style="list-style-type: none"> <li>Reference data creation (function specification, CAD data input (IGES or DXF format), measured data conversion, text file conversion)</li> <li>Reference coordinate system translation/rotation</li> <li>Best-fit</li> <li>Nominal value tolerancing</li> <li>Results display (list, graphics)</li> </ul>  |
| Special functions    | <ul style="list-style-type: none"> <li>Calculation procedure storage</li> <li>Measured data/conditions storage</li> <li>Report creation</li> <li>External output of files (CSV format)</li> <li>Part programming</li> <li>Polar coordinate development display</li> </ul>   |

## Functions of FORMPAK®-1000

### Data combination

By combining partial data collected separately from a workpiece, the entire data set can then be handled and analyzed as one complete contour. Analysis results are displayed as an image representing the complete workpiece contour.



### Online help

Help windows displaying operating procedures, the definition of icons, etc., can be opened as required. This function reduces the time and effort required to find information in the operation manual.



### Multiple data compensation

The following physical errors can be compensated digitally: arc, stylus radius, symmetry, straightness.

### User customization

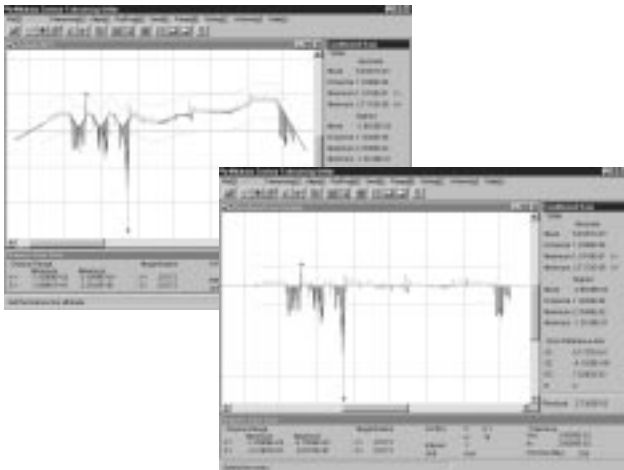
The size and position of operation icons on a window can be modified as desired. This function allows the counter display, each window, the location of analysis command icons, or the display color of measured data and auxiliary lines to be modified.

### External output

Calculation results and tolerancing results can be output in a readable format to commercial spreadsheet software such as Microsoft-Excel™. This function increases processing capabilities including statistical calculation, saving, and management of measurement results. It also allows measured point group data to be output in a text data.

### Contour tolerancing

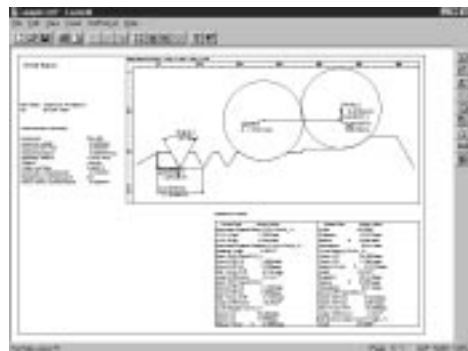
The contour tolerancing function compares measured from data, displays the deviation, and then stores it. Form data is different from dimensional measurement of angle, radius, etc. In addition to values obtained from an ideal contour in a CAD drawing, nominal values can also be created by converting the measured data of a master.



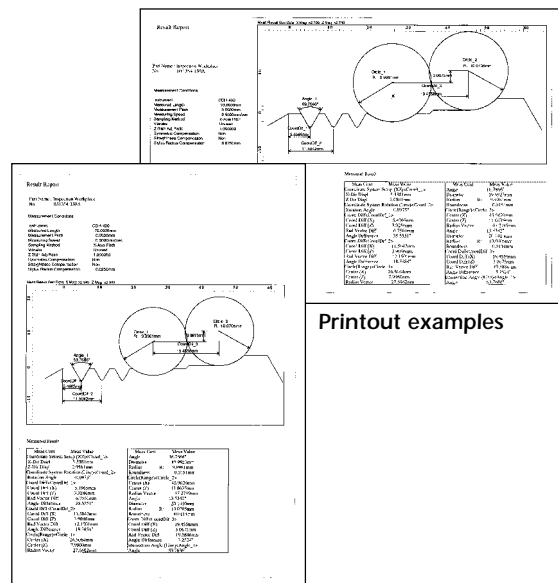
Developed error display window

### Report creation

Geometric data, measurement conditions, contour tolerancing results, and comments can be laid out as desired and printed out in a report. Once a layout has been saved, it can be reused as a template if the same measurement is made. A report can be printed in A3 size or A4 size from a color printer (option).



Layout edit window



Printout examples

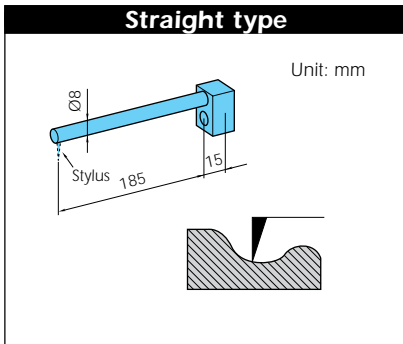




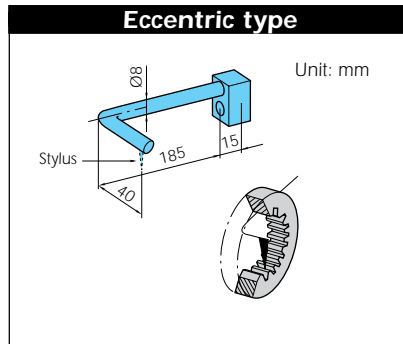
# Arms and Styli for CONTRACER

— ARMS —

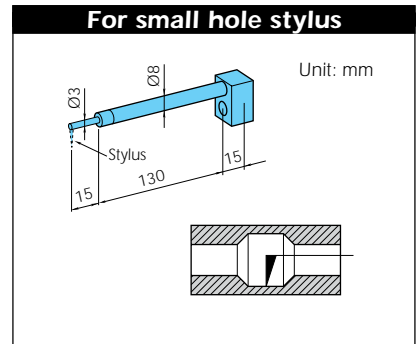
For CV-3000/4000



- 996504 for 6mm (.24") high stylus
  - 996505 for 12mm (.47") high stylus
  - 996506\* for 20mm (.79") high stylus
  - 996507 for 30mm (1.18") high stylus
  - 996508 for 42mm (1.65") high stylus
- \*Standard accessory

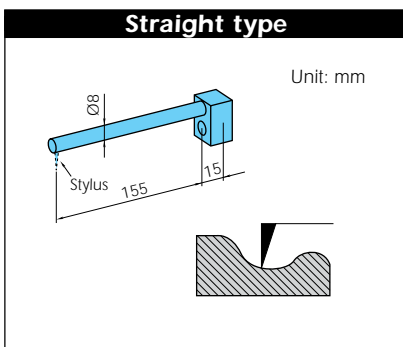


- 996509 for 6mm (.24") high stylus
- 996510 for 12mm (.47") high stylus
- 996511 for 20mm (.79") high stylus
- 996512 for 30mm (1.18") high stylus
- 996513 for 42mm (1.65") high stylus

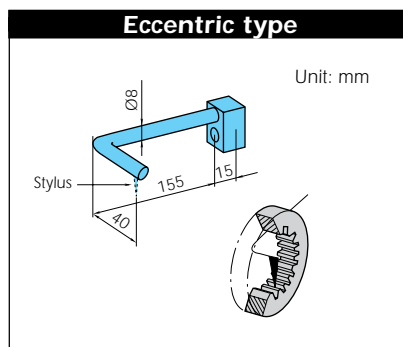


- 996514

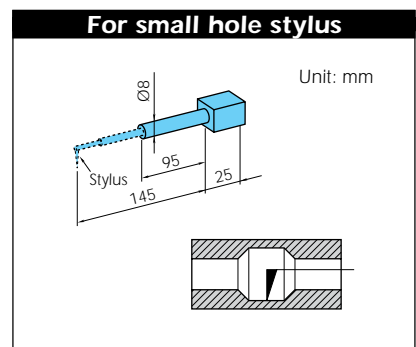
For CV-1000/2000



- 935111 for 6mm (.24") high stylus
  - 935112 for 12mm (.47") high stylus
  - 935113\* for 20mm (.79") high stylus
  - 935114 for 30mm (1.18") high stylus
  - 935115 for 42mm (1.65") high stylus
- \*Standard accessory

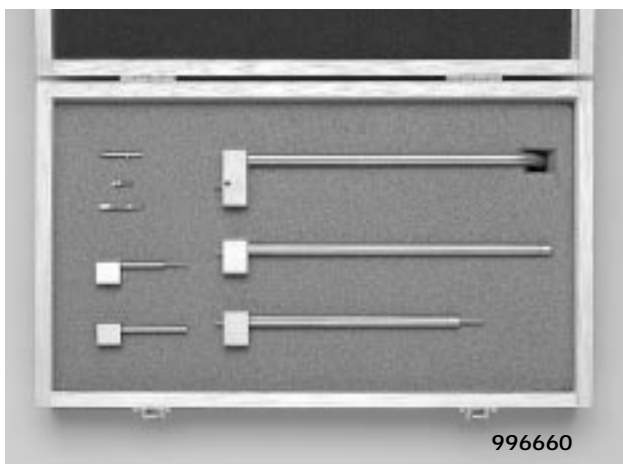


- 935116 for 6mm (.24") high stylus
- 935117 for 12mm (.47") high stylus
- 935118 for 20mm (.79") high stylus
- 935119 for 30mm (1.18") high stylus
- 935120 for 42mm (1.65") high stylus



- 935110

— ARM AND STYLUS SET —



- Consists of three special arms and five special styli.

For CV-3000/4000

| Order No.         | 996660   |
|-------------------|--|
| Components in set | <ul style="list-style-type: none"> <li>996504 Straight arm for 6mm high stylus</li> <li>996511 Eccentric arm for 20mm high stylus</li> <li>996514 Arm for small hole stylus</li> <li>354882 6mm high one-sided cut stylus</li> <li>354889 20mm high intersecting cut stylus</li> <li>354894 20mm high cone stylus</li> <li>996540 Small hole stylus</li> <li>996542 Small hole stylus</li> </ul> |

— STYLI —

For CV-3000/4000, CV-1000/2000 ( CV-H628)

**One-sided cut**

Tip angle: 12°  
Tungsten carbide

| H            | Order No. |
|--------------|-----------|
| 6mm (.24")   | 354882    |
| 12mm (.47")  | 354883    |
| 20mm (.79")  | 354884**  |
| 30mm (1.18") | 354885    |
| 42mm (1.65") | 354886    |

\*\*CV-1000/2000/3000/4000  
Standard accessory

**Intersecting cut**

Tip angle: 20°  
Tungsten carbide

| H            | Order No. |
|--------------|-----------|
| 6mm (.24")   | 354887    |
| 12mm (.47")  | 354888    |
| 20mm (.79")  | 354889    |
| 30mm (1.18") | 354890    |
| 42mm (1.65") | 354891    |

**Cone**

Tip angle: 30°  
Sapphire or Tungsten carbide

| H            | Order No. | Order No. |
|--------------|-----------|-----------|
| 6mm (.24")   | 354892    | 12AAA566  |
| 12mm (.47")  | 354893    | 12AAA567  |
| 20mm (.79")  | 354894    | 12AAA568  |
| 30mm (1.18") | 354895    | 12AAA569  |
| 42mm (1.65") | 354896    | 12AAA570  |

Sapphire tip Tungsten tip

**Knife edge**

Tip angle: 20°  
Edge width: 3mm  
Tungsten carbide

| H            | Order No. |
|--------------|-----------|
| 6mm (.24")   | 354897    |
| 12mm (.47")  | 354898    |
| 20mm (.79")  | 354899    |
| 30mm (1.18") | 354900    |
| 42mm (1.65") | 354901    |

**Ball**

Ball dia.: 1mm  
Tungsten carbide

| H            | Order No. |
|--------------|-----------|
| 6mm (.24")   | 354902    |
| 12mm (.47")  | 354903*   |
| 20mm (.79")  | 354904    |
| 30mm (1.18") | 354905    |
| 42mm (1.65") | 354906    |

\*CV-H628 Standard accessory

**Diamond**

Cone Tip angle: 50°  
High accuracy type

| H            | Order No. |
|--------------|-----------|
| 6mm (.24")   | —         |
| 12mm (.47")  | —         |
| 20mm (.79")  | 355129    |
| 30mm (1.18") | —         |
| 42mm (1.65") | —         |

For CV-3000/4000

**Small hole**

Unit: mm

**996540**  
Tip angle: 20°  
Tungsten carbide

**996541**  
Tip angle: 20°  
Tungsten carbide

**996542**  
Tip angle: 20°  
Tungsten carbide

For CV-1000/2000

**Small hole**

Unit: mm

**932693**  
Tip angle: 20° (one-sided cut)  
Tungsten carbide (ø2.5mm or larger)

**932694**  
Tip angle: 20° (one-sided cut)  
Tungsten carbide (ø4.5mm or larger)

**932695**  
Tip angle: 20° (one-sided cut)  
Tungsten carbide (ø7mm or larger)



# Contracer CV-1000/2000

## SERIES 218

### Contour Measuring Instruments



### SPECIFICATIONS

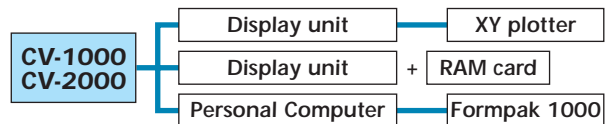
#### Contracer CV-1000/2000

##### Metric

| Model No.                       | CV-1000N2  | CV-2000M4  |
|---------------------------------|--|--|
| Order No.                       | 100V AC <b>218-611</b><br>110V AC <b>218-611C</b><br>120V AC <b>218-611A</b><br>220V AC <b>218-611D</b><br>240V AC <b>218-611E</b> | <b>218-631</b><br><b>218-631C</b><br><b>218-631A</b><br><b>218-631D</b><br><b>218-631E</b> |
| Measuring range                 | X-axis: 50mm<br>Z-axis: 25mm   | X-axis: 100mm<br>Z-axis: 40mm  |
| Resolution                      | X-axis: 0.2µm<br>Z-axis: 0.4µm   | X-axis: 0.2µm<br>Z-axis: 0.5µm   |
| Accuracy (20°C)                 | X-axis: (3.5+0.02L)µm*<br>Z-axis: ±(3.5+ 4H /25)µm**   |  |
| Straightness                    | 3.5µm/50mm   | 3.5µm/100mm  |
| Vertical travel                 | —  | 320mm  |
| Stylus tip orientation          | Downward   |  |
| traversing direction            | Forward  |  |
| Measuring force                 | 10 to 30mN (1 to 3gf)  |  |
| Stylus traceable angle          | Ascent: 77°<br>(depends on the workpiece surface condition)<br>Descent: 87°<br>(depends on the workpiece surface condition)        |  |
| Traverse speed                  | 0.2mm/s (.008"/s) or 0.5mm/s (.02"/s) for tracing<br>0.2mm/s (.008"/s) or 1mm/s (.04"/s)<br>or manual feeding for retracing)       |  |
| Digital data output             | Via RS-232C interface  |  |
| Operating temperature           | 0°C to 40°C  |  |
| Power supply                    | 100V AC - 240V AC  |  |
| Power consumption               | 150VA (at maximum)   |  |
| Dimensions (WxDxH) <sup>1</sup> | 490x178x138mm  | 600x450x740mm  |
| Mass <sup>1</sup>               | 5kg  | 115.8kg  |

\*L= Measuring length (mm)  
\*\*H= Measuring height from the horizontal (within ±12.5mm)  
<sup>1</sup>Main unit only

### FEATURES



- Icons and graphics on the LCD and touch panel make it easy for anyone—even a novice—to perform key analysis operations. The contour profile can be confirmed with the display unit prior to output to an XY plotter.
- Contour measurement data can be stored on optional RAM cards and read into the personal computer.
- Connected to a personal computer, the FORMPAK-1000 contour analysis program provides various modes of measurement and analysis. When connected to an XY plotter, the contour profile can be checked with the display unit prior to output.
- The CV-1000 is portable and can be carried to the machine-shop for measurement of large workpieces. Even at a site where a power source may not be nearby, the CV-1000 can work with the optional display unit (built-in rechargeable battery).

##### Inch

| Model No.                     | CV-1000   | CV-2000   |
|-------------------------------|---|---|
| Order No.                     | 120V AC <b>218-621A</b><br>220V AC <b>218-621D</b><br>240V AC <b>218-621E</b> | <b>218-641A</b><br><b>218-641D</b><br><b>218-641E</b> |
| Measuring range               | X-axis: 2"<br>Z-axis: 1"  | X-axis: 4"<br>Z-axis: 1.5"                            |
| Measuring accuracy (at 20°C)* | X-axis: ±(138+20L)µinch<br>Z-axis: ±(138+ 157H )µinch                         |   |
| Straightness                  | .14µinch/2"   | .14µinch/4"   |
| Vertical travel               | —   | 12.6"   |

\*L= Measuring length (inch)  
\*\*H= Measuring height from the horizontal (within ±.5inch)

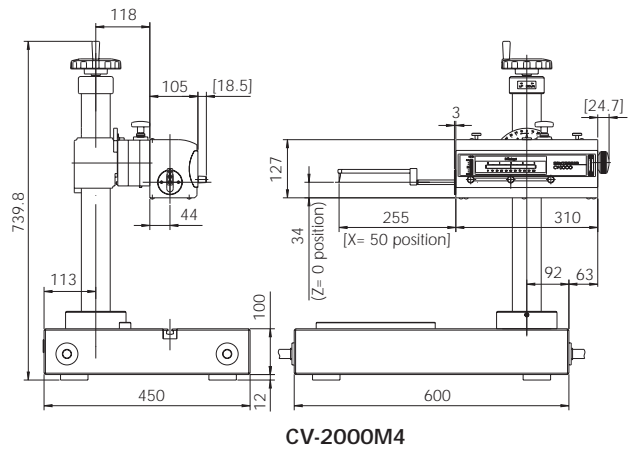
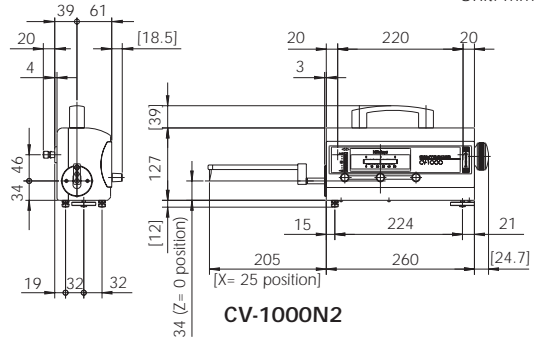
## OPTIONAL ACCESSORIES

| Order No.       | Description                                    |
|-----------------|--|
| 12AAA841        | RAM card                                       |
| 218-341■        | Display unit                                   |
| 218-024         | Column stand for CV-1000                       |
| 218-001         | Cross-travel table (XY range: 100x50mm)        |
| 218-011         | Cross-travel table (XY range: 4"x2")           |
| 218-041         | Cross-travel table (XY range: 50x25mm)         |
| 218-051         | Cross-travel table (XY range: 2"x1")           |
| 218-002         | Rugged table                                   |
| 172-196         | Rotary table                                   |
| 176-107         | Holder with clamp                              |
| 218-003         | Rotary vise (heavy-duty type)                  |
| 172-144         | Rotary vise                                    |
| 172-234         | V-block with clamp (Max. workpiece dia.: 50mm) |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm) |
| 172-197         | Swivel center support                          |
| 172-142         | Center support                                 |
| 172-143         | Center support riser                           |
| 178-023         | Vibration isolator                             |
| 178-024         | Vibration isolator stand                       |
| 998862          | Pin gage unit (mm)                             |
| 998861          | Pin gage unit (inch)                           |
| (See page 384.) | <b>Arms and styli</b>                          |

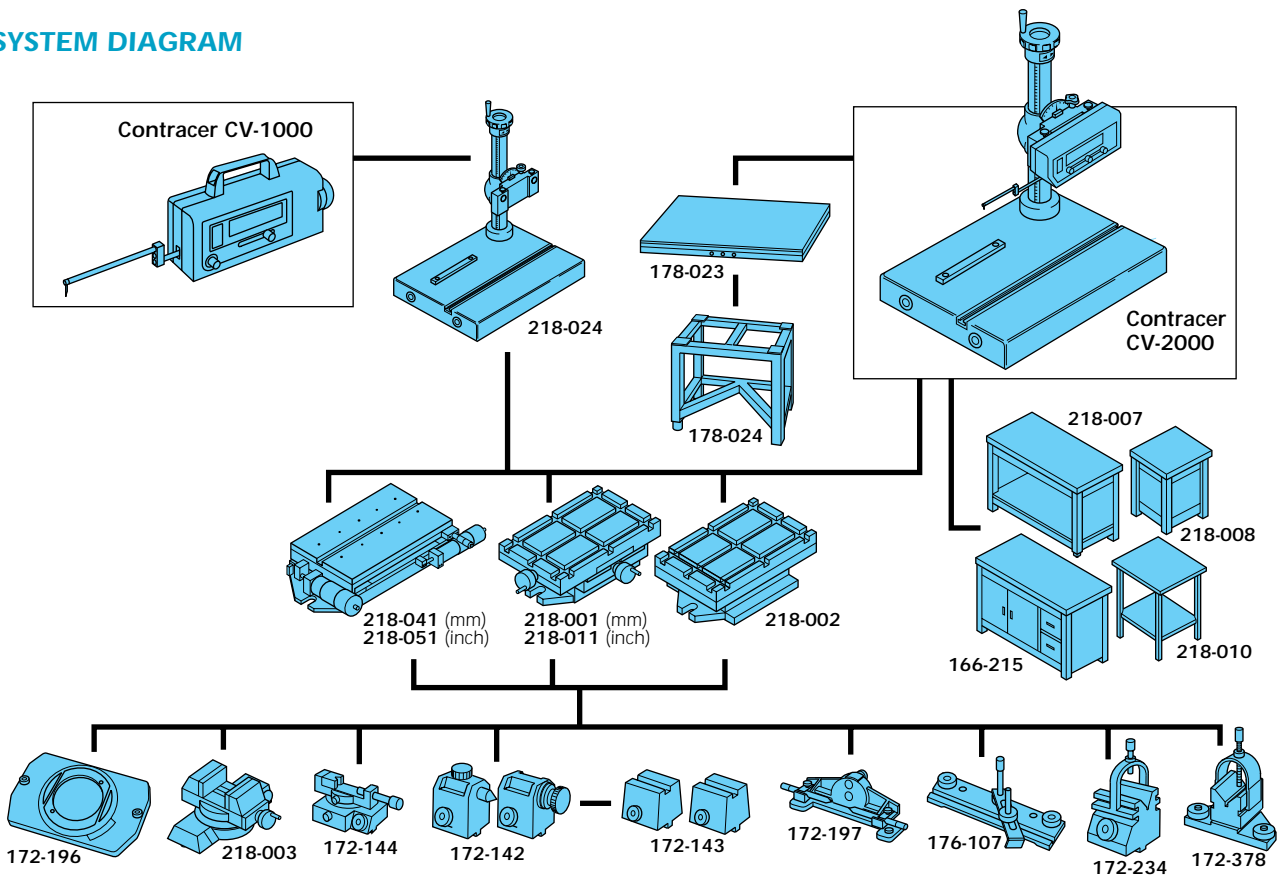
■ Suffix: **A** for 120V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

## Dimensions

Unit: mm



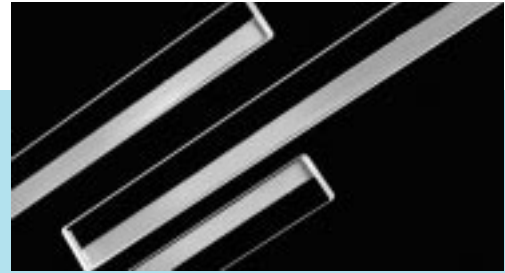
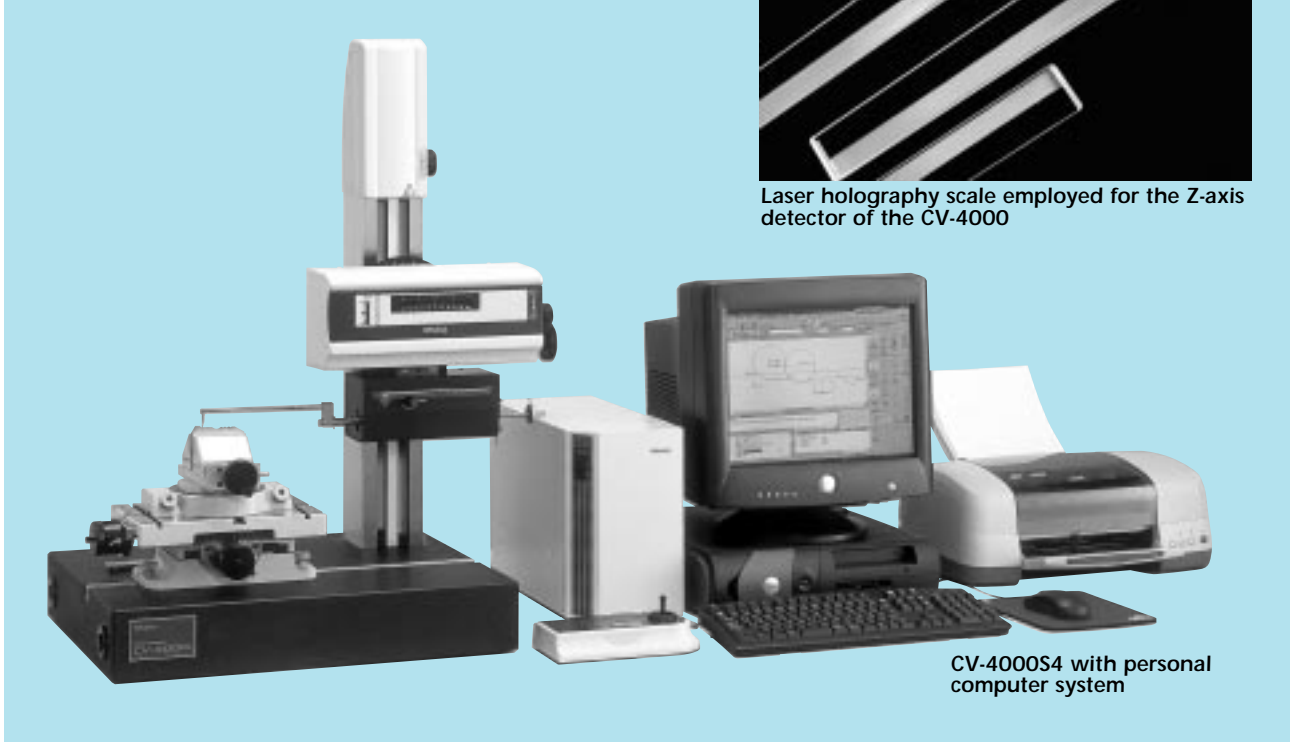
## SYSTEM DIAGRAM



# Contracer CV-3000/4000

## SERIES 218

### Contour Measuring Instruments



Laser holography scale employed for the Z-axis detector of the CV-4000

CV-4000S4 with personal computer system

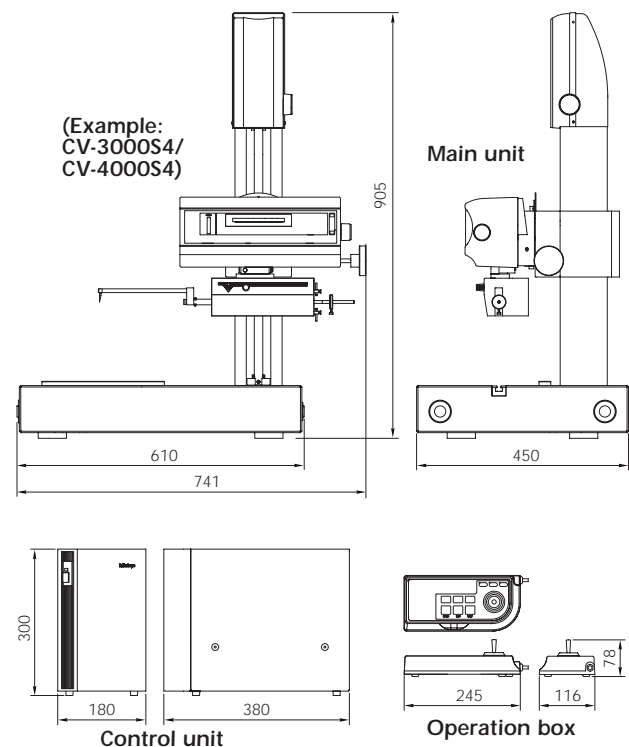
The Contracer CV-3000/4000 is a high-accuracy contour measuring instrument with a digital scale on the Z-axis (especially the CV-4000 Series employs a high-accuracy laser holography scale on it), which is an industry first for a general purpose type. High-resolution and outstanding accuracy can be attained over the entire measuring range.

### FEATURES

- **CV-3000 Series Contracer**— The digital scale in the Z-axis detecting unit provides a high resolution of 0.0002mm at a full stroke of  $\pm 25$ mm.
- **CV-4000 Series Contracer**—The laser holography scale equipped in the Z-axis detecting unit is a new top-of-the-line high-accuracy scale. It is based on the interference phenomenon of diffracted light, allowing a high resolution of 0.00005mm over the entire measuring range.
- There is no resolution change of the Z axis according to the recording magnification. Without the need to switch ranges, operability has drastically improved.
- FORMPAK®.1000 contour analysis program compatible with Windows®95/98/NT4.0/2000 for excellent measurement support.
- The control box independent of the main unit allows positioning, measurement start/stop, returning, and other operations to be performed remotely.
- The ceramic guides have been employed for abrasion resistance.
- A straight arm for 20mm high stylus (**996506**) and a one-sided cut stylus (**354884**) are provided as standard.

### Dimensions

Unit: mm



## SPECIFICATIONS

### Contracer CV-3000/4000

#### Metric

| Model No.                       | CV-3000S4   | CV-3000H4      | CV-3000W4       | CV-3000S8                    | CV-3000H8      | CV-3000W8       |
|---------------------------------|---|----------------|-----------------|------------------------------|----------------|-----------------|
| Order No.                       | 100V AC   | 218-652        | 218-653         | 218-654                      | 218-657        | 218-659         |
|                                 | 110V AC   | 218-652C       | 218-653C        | 218-654C                     | 218-657C       | 218-659C        |
|                                 | 120V AC   | 218-652A       | 218-653A        | 218-654A                     | 218-657A       | 218-659A        |
|                                 | 230V AC   | 218-652D       | 218-653D        | 218-654D                     | 218-657D       | 218-659D        |
|                                 | 240V AC   | 218-652E       | 218-653E        | 218-654E                     | 218-657E       | 218-659E        |
| Model No.                       | CV-4000S4   | CV-4000H4      | CV-4000W4       | CV-4000S8                    | CV-4000H8      | CV-4000W8       |
| Order No.                       | 100V AC   | 218-672        | 218-673         | 218-674                      | 218-677        | 218-679         |
|                                 | 110V AC   | 218-672C       | 218-673C        | 218-674C                     | 218-677C       | 218-679C        |
|                                 | 120V AC   | 218-672A       | 218-673A        | 218-674A                     | 218-677A       | 218-679A        |
|                                 | 230V AC   | 218-672D       | 218-673D        | 218-674D                     | 218-677D       | 218-679D        |
|                                 | 240V AC   | 218-672E       | 218-673E        | 218-674E                     | 218-677E       | 218-679E        |
| Measuring range                 | CV-3000S4/H4/W4 CV-4000S4/H4/W4 X-axis: 100mm, Z-axis: 50mm<br>CV-3000S8/H8/W8 CV-4000S8/H8/W8 X-axis: 200mm, Z-axis: 50mm  |                |                 |                              |                |                 |
| Resolution                      | X-axis: 0.0005mm<br>Z-axis: CV-3000 models: 0.0002mm CV-4000 models: 0.0005mm   |                |                 |                              |                |                 |
| Measuring accuracy (20°C)       | X-axis: CV-3000S4/H4/W4: $\pm(1+2L/100)\mu\text{m}^*$ CV-3000S8/H8/W8: $\pm(1+4L/200)\mu\text{m}^*$<br>CV-4000S4/H4/W4: $\pm(0.8+2L/100)\mu\text{m}^*$ CV-4000S8/H8/W8: $\pm(0.8+4L/200)\mu\text{m}^*$<br>Z-axis: CV-3000 models: $\pm(3+ 2H /25)\mu\text{m}^{**}$ CV-4000 models: $\pm(0.8+ 0.5H /25)\mu\text{m}^{**}$ |                |                 |                              |                |                 |
| Linearity of drive unit         | 0.8 $\mu\text{m}/100\text{mm}$  |                |                 | 2 $\mu\text{m}/200\text{mm}$ |                |                 |
| Vertical travel                 | 250mm   | 450mm          |                 | 250mm                        | 450mm          |                 |
| Drive unit inclination          | $\pm 45^\circ$  |                |                 |                              |                |                 |
| Measuring direction             | Forward/backward  |                |                 |                              |                |                 |
| Stylus orientation              | Downward/upward   |                |                 |                              |                |                 |
| Stylus traceable angle          | 77° (ascent), 87° (descent) depending on the workpiece surface condition  |                |                 |                              |                |                 |
| Traverse speed                  | Measuring: 0.02mm/s - 2mm/s (7-step)<br>Retracting: 5mm/s<br>Positioning: 0.1mm/s - 5mm/s (adjustable with control box)   |                |                 |                              |                |                 |
| Digital data output             | Via RS-232C interface   |                |                 |                              |                |                 |
| Measuring force                 | 30mN  |                |                 |                              |                |                 |
| Operating temperature           | 15°C to 25°C  |                |                 |                              |                |                 |
| Power supply                    | 150VA (at maximum)  |                |                 |                              |                |                 |
| Dimensions (WxDxH) <sup>1</sup> | 741x450x905mm   | 741x450x1105mm | 1118x450x1105mm | 767x450x905mm                | 767x450x1105mm | 1144x450x1105mm |
| Mass <sup>1</sup>               | 140kg   | 150kg          | 150kg           | 145kg                        | 155kg          | 155kg           |

\*L= Measuring length (mm), \*\*H= Measuring height (within  $\pm 25\text{mm}$ )  
<sup>1</sup>Main unit only

#### Inch/Metric

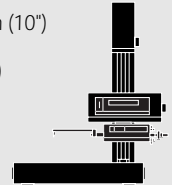
| Model No.               | CV-3000S4  | CV-3000H4 | CV-3000W4 | CV-3000S8              | CV-3000H8 | CV-3000W8 |
|-------------------------|--|-----------|-----------|------------------------|-----------|-----------|
| Order No.               | 100V AC  | 218-662   | 218-663   | 218-664                | 218-667   | 218-669   |
|                         | 120V AC  | 218-662A  | 218-663A  | 218-664A               | 218-667A  | 218-669A  |
|                         | 230V AC  | 218-662D  | 218-663D  | 218-664D               | 218-667D  | 218-669D  |
|                         | 240V AC  | 218-662E  | 218-663E  | 218-664E               | 218-667E  | 218-669E  |
| Model No.               | CV-4000S4  | CV-4000H4 | CV-4000W4 | CV-4000S8              | CV-4000H8 | CV-4000W8 |
| Order No.               | 100V AC  | 218-682   | 218-683   | 218-684                | 218-687   | 218-689   |
|                         | 120V AC  | 218-682A  | 218-683A  | 218-684A               | 218-687A  | 218-689A  |
|                         | 230V AC  | 218-682D  | 218-683D  | 218-684D               | 218-687D  | 218-689D  |
|                         | 240V AC  | 218-682E  | 218-683E  | 218-684E               | 218-687E  | 218-689E  |
| Measuring range         | CV-3000S4/H4/W4 CV-4000S4/H4/W4 X-axis: 4" (100mm), Z-axis: 2" (50mm)<br>CV-3000S8/H8/W8 CV-4000S8/H8/W8 X-axis: 8" (200mm), Z-axis: 2" (50mm)   |           |           |                        |           |           |
| Resolution              | X-axis: .00002"<br>Z-axis: CV-3000 models: .000008" CV-4000 models: .000002"   |           |           |                        |           |           |
| Measuring accuracy      | X-axis: CV-3000S4/H4/W4: $\pm(40+20L)\mu\text{inch}^*$ CV-3000S8/H8/W8: $\pm(40+20L)\mu\text{inch}^*$<br>CV-4000S4/H4/W4: $\pm(31+20L)\mu\text{inch}^*$ CV-4000S8/H8/W8: $\pm(31+20L)\mu\text{inch}^*$<br>Z-axis: CV-3000 models: $\pm(120+ 40H )\mu\text{inch}^{**}$ CV-4000 models: $\pm(31+ 10H )\mu\text{inch}^{**}$ |           |           |                        |           |           |
| Linearity of drive unit | 32 $\mu\text{inch}/4"$   |           |           | 80 $\mu\text{inch}/8"$ |           |           |
| Vertical travel         | 9.8"   | 17.7"     |           | 9.8"                   | 17.7"     |           |

\*L= Measuring length (inch), \*\*H= Measuring height (within  $\pm 1"$ )

## A variety of models available for measuring requirements

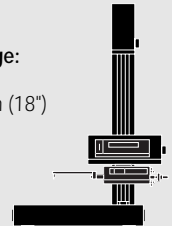
### CV-3000S4/4000S4

X-axis measuring range: 100mm (4")  
Vertical travel: 250mm (10")  
Base size (WxD): 610x450mm (24"x17.7")  
Base material: Granite



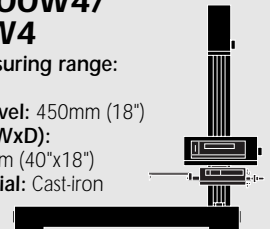
### CV-3000H4/4000H4

X-axis measuring range: 100mm (4")  
Vertical travel: 450mm (18")  
Base size (WxD): 610x450mm (24"x18")  
Base material: Granite



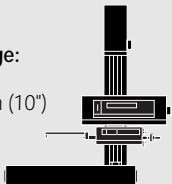
### CV-3000W4/4000W4

X-axis measuring range: 100mm (4")  
Vertical travel: 450mm (18")  
Base size (WxD): 1000x450mm (40"x18")  
Base material: Cast-iron



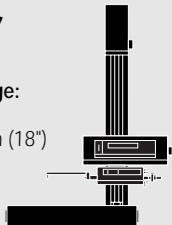
### CV-3000S8/4000S8

X-axis measuring range: 200mm (8")  
Vertical travel: 250mm (10")  
Base size (WxD): 610x450mm (24"x18")  
Base material: Granite



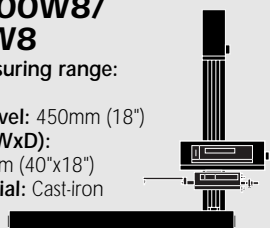
### CV-3000H8/4000H8

X-axis measuring range: 200mm (8")  
Vertical travel: 450mm (18")  
Base size (WxD): 610x450mm (24"x18")  
Base material: Granite



### CV-3000W8/4000W8

X-axis measuring range: 200mm (8")  
Vertical travel: 450mm (18")  
Base size (WxD): 1000x450mm (40"x18")  
Base material: Cast-iron

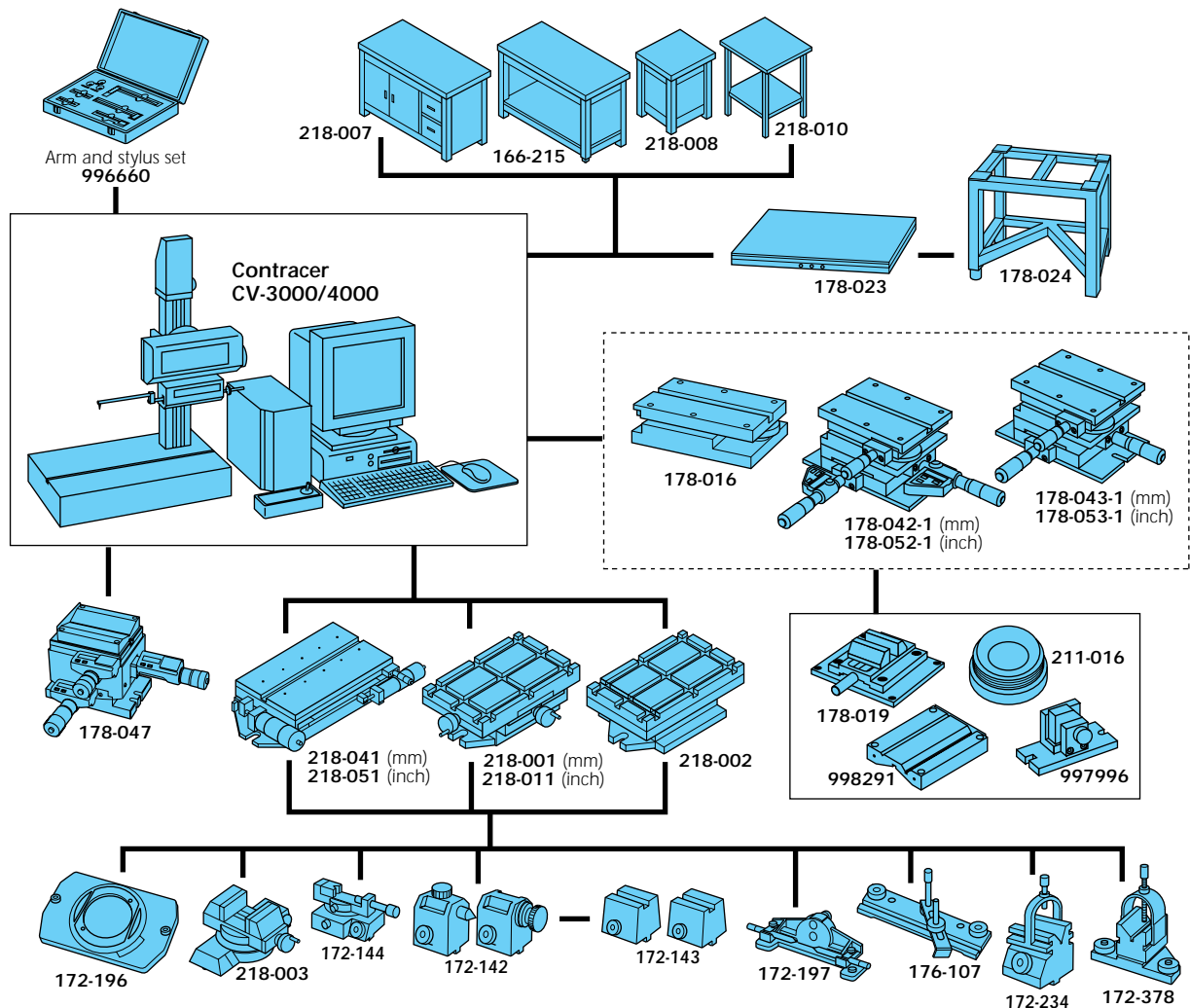


OPTIONAL ACCESSORIES

| Order No. | Description                                    |
|-----------|--|
| 996660    | Convenient set of arms and styli               |
| 218-001   | Cross-travel table (XY range: 100x50mm)        |
| 218-011   | Cross-travel table (XY range: 4"x2")           |
| 218-041   | Cross-travel table (XY range: 50x25mm)         |
| 218-051   | Cross-travel table (XY range: 2"x1")           |
| 218-002   | Rugged table                                   |
| 172-196   | Rotary table                                   |
| 176-107   | Holder with clamp                              |
| 218-003   | Rotary vise (heavy-duty type)                  |
| 172-144   | Rotary vise                                    |
| 172-234   | V-block with clamp (Max. workpiece dia.: 50mm) |
| 172-378   | V-block with clamp (Max. workpiece dia.: 25mm) |
| 172-197   | Swivel center support                          |
| 172-142   | Center support                                 |
| 172-143   | Center support riser                           |

| Order No.       | Description                                     |
|-----------------|---|
| 178-043-1       | XY leveling table (XY range: 25x25mm)           |
| 178-053-1       | XY leveling table (XY range: 1"x1")             |
| 178-042-1       | Digimatic XY leveling table (XY range: 25x25mm) |
| 178-052-1       | Digimatic XY leveling table (XY range: 1"x1")   |
| 178-047         | Three-axis adjustment table                     |
| 178-019         | Precision vise                                  |
| 998291          | Precision V-block                               |
| 997996          | Symmetry calibration gage (angle type)          |
| 211-016         | Symmetry calibration gage (sphere type)         |
| 178-023         | Vibration isolator                              |
| 178-024         | Stand for vibration isolator                    |
| 218-007         | Workbench                                       |
| 166-215         | Workbench (with drawers)                        |
| 218-010         | Auxiliary desk                                  |
| 218-008         | Auxiliary desk                                  |
| (See page 384.) | <b>Arms and styli</b>                           |

SYSTEM DIAGRAM



## Workpiece Fixtures for Contracer

### FEATURES

- These workpiece fixtures are designed to be used with the cross-travel table—100x50mm type (**218-001**) or 4"x2" type (**218-011**) or rugged table (**218-002**).

#### Cross-travel Tables



218-001

| Order No.        | 218-001             | 218-011 |
|------------------|---------------------|---------|
| XY range         | 100x50mm            | 4"x2"   |
| Graduation       | 0.01mm              | .001"   |
| Table size (WxD) | 280x180mm (11"x7")  |         |
| Workpiece weight | max. 30kg (66 lbs.) |         |
| Height           | 100mm (4")          |         |
| Mass             | 19kg                |         |

#### Rugged Table



218-002

| Order No.        | 218-002              |
|------------------|----------------------|
| Table size (WxD) | 280x180mm (11"x7")   |
| Workpiece weight | max. 50kg (110 lbs.) |
| Height           | 100mm (4")           |
| Mass             | 7kg                  |

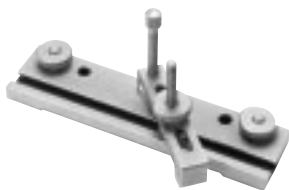
#### Rotary Table



172-196

| Order No.      | 172-196  |
|----------------|--|
| Stage diameter | 146mm (5.7")   |
| Angle reading  | 2'   |
| Mass           | 2.5kg  |
| Remarks        | Holder with clamp ( <b>176-107</b> ) can be mounted. |

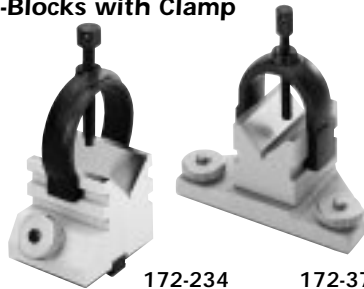
#### Holder with Clamp



176-107

| Order No.                | 176-107     |
|--------------------------|-------------|
| Maximum workpiece height | 35mm (1.3") |
| Mass                     | 0.42kg      |

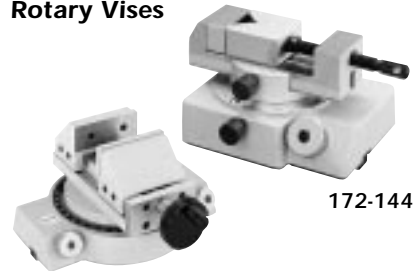
#### V-Blocks with Clamp



172-234 172-378

| Order No.              | 172-234      | 172-378     |
|------------------------|--------------|-------------|
| Maximum workpiece dia. | 50mm (1.96") | 25mm (1")   |
| Width of block         | 60mm (2.4")  | 41mm (1.6") |
| Mass                   | 1.24kg       | 0.8kg       |

#### Rotary Vises



172-144

218-003

| Order No.              | 218-003       | 172-144       |
|------------------------|---------------|---------------|
| Type                   | Two-slide jaw | One-slide jaw |
| Maximum workpiece dia. | 60mm (2.4")   | 60mm (2.4")   |
| Width of jaw           | 80mm (3.1")   | 40mm (1.6")   |
| Angle reading          | 1°            | 5°            |
| Height                 | 110mm (4.3")  | 76mm (3")     |
| Mass                   | 10kg          | 2.5kg         |

#### Swivel Center Support



172-197

| Order No.                | 172-197   |
|--------------------------|---|
| Maximum workpiece dia.   | 80mm (3.1") when not swiveled<br>65mm (2.5") at 10° |
| Maximum workpiece length | 140mm (5.5")  |
| Swivel range             | ±10° (in 1° increment)                              |
| Mass                     | 2.5kg   |

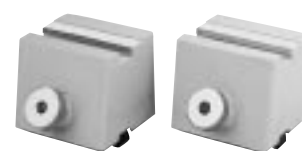
#### Center Support



172-142

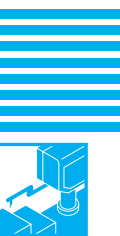
| Order No.              | 172-142   |
|------------------------|---|
| Maximum workpiece dia. | 120mm (4.7")<br>(240mm (9.4") when using center support riser ( <b>172-143</b> )) |
| Mass                   | 3.3kg   |

#### Center Support Riser



172-143

| Order No. | 172-143     |
|-----------|-------------|
| Height    | 60mm (2.3") |
| Mass      | 2.2kg       |





## Contracer CV-H628

SERIES 218

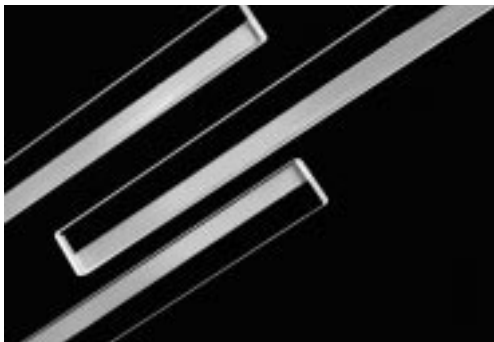
Contour Measuring Instruments



### FEATURES

#### Equipped the X- and Z-axis with Laser Hologscale

Mitutoyo's holographic scale, which is based on the interference phenomenon of diffracted light, is incorporated into the detector as a measuring unit for the X- and Z-axes. The Laser Hologscale offers the world's highest level of resolution along the X-axis  $0.00625\mu\text{m}$  (.25 $\mu\text{inch}$ ), Z-axis  $0.0125\mu\text{m}$  (.5 $\mu\text{inch}$ ) over the entire measurement range of the X-axis at 200 mm (8"), and the Z-axis 25 mm (1").

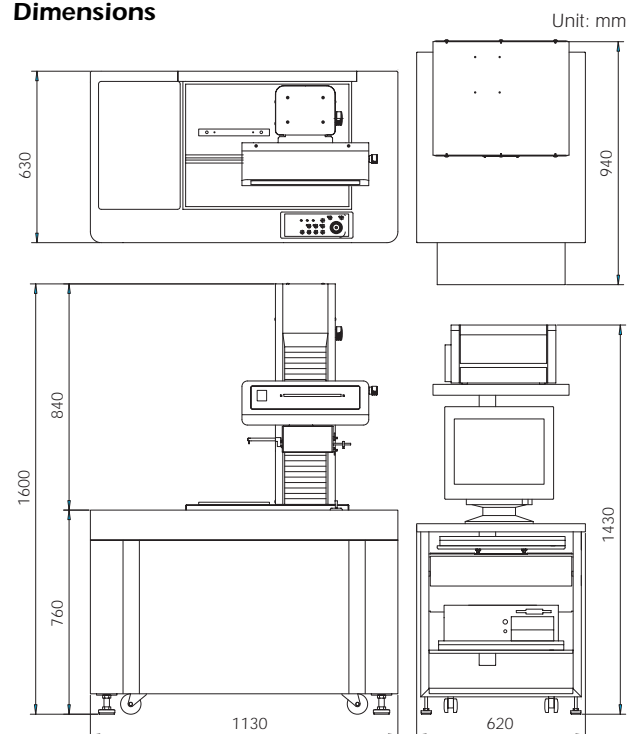


Laser hologscale

#### Small-footprint design . . . smart, simple operation

The electronic unit is housed within the measuring unit's vibration isolator, and the vertical side table is a standard configuration that houses the data analysis unit.

### Dimensions



## Metric

|                           |  |
|---------------------------|--|
| <b>Model No.</b>          | <b>CV-H628</b>   |
| <b>Order No.</b>          | 110V AC <b>218-787C</b>  |
|                           | 120V AC <b>218-787A</b>  |
|                           | 230V AC <b>218-787D</b>  |
|                           | 240V AC <b>218-787E</b>  |
| Measuring range           | X-axis: 200mm<br>Z-axis: 50mm  |
| Resolution                | X-axis: 0.00625μm<br>Z-axis: 0.0125μm  |
| Measuring accuracy (20°C) | X-axis: (0.5+0.003L)μm*<br>Z-axis: ±(0.5+ 0.02H )μm**  |
| Straightness              | (0.3+0.002L)μm   |
| Vertical travel           | 250mm  |
| Stylus tip orientaion     | Downward   |
| Traversing direction      | Forward/backward   |
| Measuring force           | 30mN   |
| Stylus traceable angle    | 60 degrees for upward/downward slope depending on the workpiece surface condition  |
| Measuring speed           | 0.02mm/s to 2mm/s<br>Can be specified by 7 steps.  |
| Moving speed              | X-axis: 0.1mm/s to 5mm/s<br>Can be adjusted manually with a joystick box.<br>Column: 0.1mm/s to 5mm/s<br>Can be adjusted manually with a joystick box. |
| Digital output            | Via GPIB interface   |
| Operating temperature     | 10°C to 30°C   |
| Power supply              | 150VA (at maximum)   |
| Dimensions (WxDxH)†       | 765x450x890mm  |
| Mass‡                     | 140kg  |

\*L= Measuring length (mm)  
\*\*H= Measuring height (within ±25mm)  
†Main unit only

## Inch

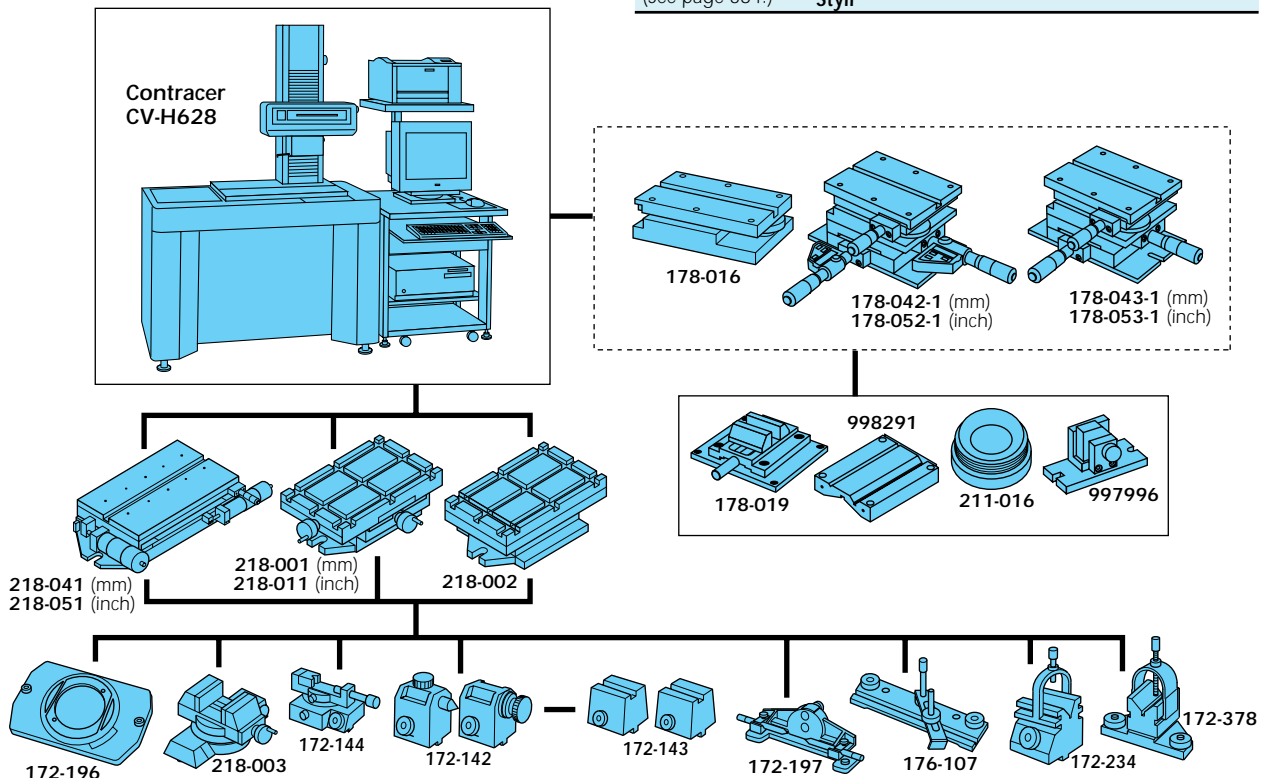
|                          |   |
|--------------------------|---|
| <b>Model No.</b>         | <b>CV-H628</b>                                      |
| <b>Order No.</b>         | 100V AC <b>218-797</b>                              |
|                          | 120V AC <b>218-797A</b>                             |
|                          | 230V AC <b>218-797D</b>                             |
|                          | 240V AC <b>218-797E</b>                             |
| Measuring range          | X-axis: 8"<br>Z-axis: 1"                            |
| Resolution               | X-axis: .25μinch<br>Z-axis: .5μinch                 |
| Mesuring accuracy (20°C) | X-axis: (20+3L)μinch<br>Z-axis: (20 +  20H )μinch** |
| Straightness             | (11.8+2L)μinch*                                     |
| Vertical travel          | 10"   |

\*L= Measuring length (inch)  
\*\*H= Measuring height (within ±1inch)

## OPTIONAL ACCESSORIES

| Order No.       | Description                                    |
|-----------------|--|
| 218-041         | Cross-travel table (XY range: 50x25mm)         |
| 218-051         | Cross-travel table (XY range: 2"x1")           |
| 218-002         | Rugged table                                   |
| 172-196         | Rotary table                                   |
| 176-107         | Holder with clamp                              |
| 218-003         | Rotary vise (heavy-duty type)                  |
| 172-144         | Rotary vise                                    |
| 172-234         | V-block with clamp (Max. workpiece dia.: 50mm) |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm) |
| 172-197         | Swivel center support                          |
| 172-142         | Center support                                 |
| 172-143         | Center support riser                           |
| 178-043-1       | XY leveling table (XY range: 25x25mm)          |
| 178-053-1       | XY leveling table (XY range: 1"x1")            |
| 178-019         | Precision vise                                 |
| 998291          | Precision V-block                              |
| 12AAC168        | Windshield cover                               |
| (See page 384.) | <b>Styli</b>                                   |

## SYSTEM DIAGRAM



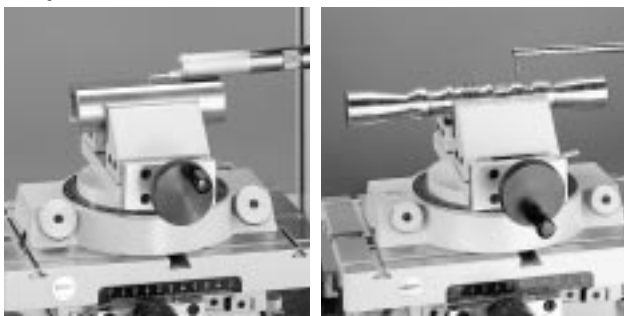
# Formtracer SV-C3000/4000

SERIES 525

Combination Surftest/Contracer Units

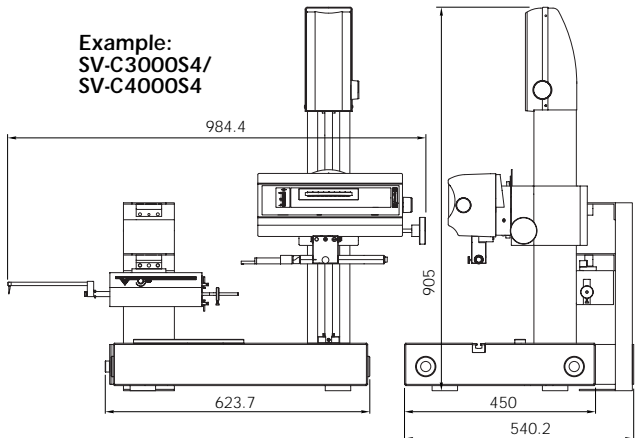


Mitutoyo SV-C3000/4000 Series Formtracer integrates a surface roughness tester (Surftest) and a contour measuring instrument (Contracer) in a single unit, achieving economy, space savings, and efficient inspection. Exchanging the detector unit each other allows the Formtracer to perform 2-way measurements of surface roughness analysis and contour measurement. The Windows®-based software DUALTRACEPAK included in the system provides advanced data processing capabilities and operability for surface texture analysis and contour measurement.



## Dimensions

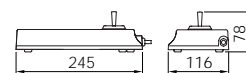
Unit: mm



Main Unit



Control Unit



Operation box

## FEATURES

- There is no resolution change of the Z axis according to the recording magnification when performing contour measurement. Without the need to switch ranges, operability has dramatically improved.
- The surface roughness-analyzing program SURFPAK®-SV is equipped with a variety of evaluation parameters conforming to most of the world standards and various analyzing functions.
- A straight arm for 20mm high stylus (**996506**) and a one-sided cut stylus (**354884**) are provided as standard for contour measurement.

## SPECIFICATIONS

### Formtracer SV-C3000/4000

#### Metric

| Model No.                                | SV-C3000S4                    | SV-C3000H4           | SV-C3000W4           | SV-C3000S8           | SV-C3000H8           | SV-C3000W8           |
|--|-------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Order No.                                | 100V AC<br>525-800<br>525-840 | 525-801<br>525-841   | 525-802<br>525-842   | 525-805<br>525-845   | 525-806<br>525-846   | 525-807<br>525-847   |
| Measuring force of detectotr: 0.75mN 4mN | 110V AC                       | 525-800C<br>525-840C | 525-801C<br>525-841C | 525-802C<br>525-842C | 525-805C<br>525-845C | 525-806C<br>525-846C |
|  | 120V AC                       | 525-800A<br>525-840A | 525-801A<br>825-841A | 525-802A<br>525-842A | 525-805A<br>525-845A | 525-806A<br>525-846A |
|  | 230V AC                       | 525-800D<br>525-840D | 525-801D<br>525-841D | 525-802D<br>525-842D | 525-805D<br>525-845D | 525-806D<br>525-846D |
|  | 240V AC                       | 525-800E<br>525-840E | 525-801E<br>525-841E | 525-802E<br>525-842E | 525-805E<br>525-845E | 525-806E<br>525-846E |
| Order No.                                | 100V AC<br>525-820<br>525-860 | 525-821<br>525-861   | 525-822<br>525-862   | 525-825<br>525-865   | 525-826<br>525-866   | 525-827<br>525-867   |
| Measuring force of detectotr: 0.75mN 4mN | 110V AC                       | 525-820C<br>525-860C | 525-821C<br>525-861C | 525-822C<br>525-862C | 525-825C<br>525-865C | 525-826C<br>525-866C |
|  | 120V AC                       | 525-820A<br>525-860A | 525-821A<br>525-861A | 525-822A<br>525-862A | 525-825A<br>525-865A | 525-826A<br>525-866A |
|  | 230V AC                       | 525-820D<br>525-860D | 525-821D<br>525-861D | 525-822D<br>525-862D | 525-825D<br>525-865D | 525-826D<br>525-866D |
|  | 240V AC                       | 525-820E<br>525-860E | 525-821E<br>525-861E | 525-822E<br>525-862E | 525-825E<br>525-865E | 525-826E<br>525-866E |
| Operating temperature                    | 15°C to 25°C                  |                      |                      |                      |                      |                      |
| Power supply                             | 100V - 240V AC, 50/60Hz       |                      |                      |                      |                      |                      |
| Dimensions (WxDxH)*                      | 984.4x450x905mm               | 984.4x450x1105mm     | 1361.4x450x1105mm    | 1010.4x450x905mm     | 1010.4x450x1105mm    | 1387.4x450x1105mm    |
| Mass*                                    | 140kg                         | 150kg                | 155kg                | 145kg                | 155kg                | 160kg                |

\*Main unit only

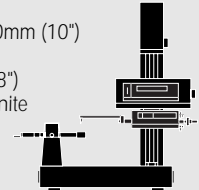
#### Inch

| Model No.                                | SV-C3000S4                    | SV-C3000H4                    | SV-C3000W4           | SV-C3000S8           | SV-C3000H8           | SV-C3000W8           |
|--|-------------------------------|-------------------------------|----------------------|----------------------|----------------------|----------------------|
| Order No.                                | 100V AC<br>525-810<br>525-850 | 525-811<br>525-851            | 525-812<br>525-852   | 525-815<br>525-855   | 525-816<br>525-856   | 525-817<br>525-857   |
| Measuring force of detectotr: 0.75mN 4mN | 120V AC                       | 525-810A<br>525-850A          | 525-811A<br>825-851A | 525-812A<br>525-852A | 525-815A<br>525-855A | 525-816A<br>525-856A |
|  | 230V AC                       | 525-810D<br>525-850D          | 525-811D<br>525-851D | 525-812D<br>525-852D | 525-815D<br>525-855D | 525-816D<br>525-856D |
|  | 240V AC                       | 525-810E<br>525-850E          | 525-811E<br>525-851E | 525-812E<br>525-852E | 525-815E<br>525-855E | 525-816E<br>525-856E |
|  | Order No.                     | 100V AC<br>525-830<br>525-870 | 525-831<br>525-871   | 525-832<br>525-872   | 525-835<br>525-875   | 525-836<br>525-876   |
| Measuring force of detectotr: 0.75mN 4mN | 120V AC                       | 525-830A<br>525-870A          | 525-831A<br>525-871A | 525-832A<br>525-872A | 525-835A<br>525-875A | 525-836A<br>525-876A |
|  | 230V AC                       | 525-830D<br>525-870D          | 525-831D<br>525-871D | 525-832D<br>525-872D | 525-835D<br>525-875D | 525-836D<br>525-876D |
|  | 240V AC                       | 525-830E<br>525-870E          | 525-831E<br>525-871E | 525-832E<br>525-872E | 525-835E<br>525-875E | 525-836E<br>525-876E |

A variety of models available for measuring requirements

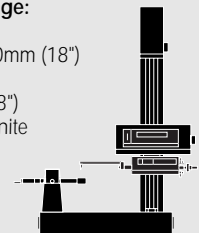
### SV-C3000S4/4000S4

X-axis traverse range: 100mm (4")  
Vertical travel: 250mm (10")  
Base size (WxD): 610x450mm (24"x18")  
Base material: Granite



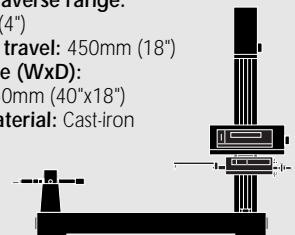
### SV-C3000H4/4000H4

X-axis traverse range: 100mm (4")  
Vertical travel: 450mm (18")  
Base size (WxD): 610x450mm (24"x18")  
Base material: Granite



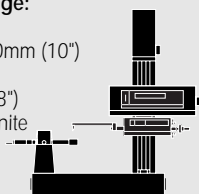
### SV-C3000W4/4000W4

X-axis traverse range: 100mm (4")  
Vertical travel: 450mm (18")  
Base size (WxD): 1000x450mm (40"x18")  
Base material: Cast-iron



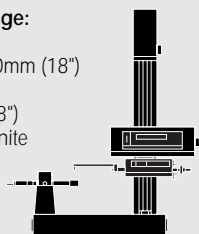
### SV-C3000S8/4000S8

X-axis traverse range: 200mm (8")  
Vertical travel: 250mm (10")  
Base size (WxD): 610x450mm (24"x18")  
Base material: Granite



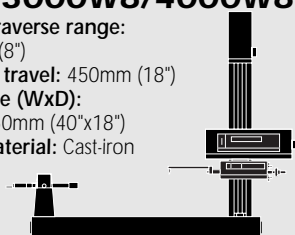
### SV-C3000H8/4000H8

X-axis traverse range: 200mm (8")  
Vertical travel: 450mm (18")  
Base size (WxD): 610x450mm (24"x18")  
Base material: Granite

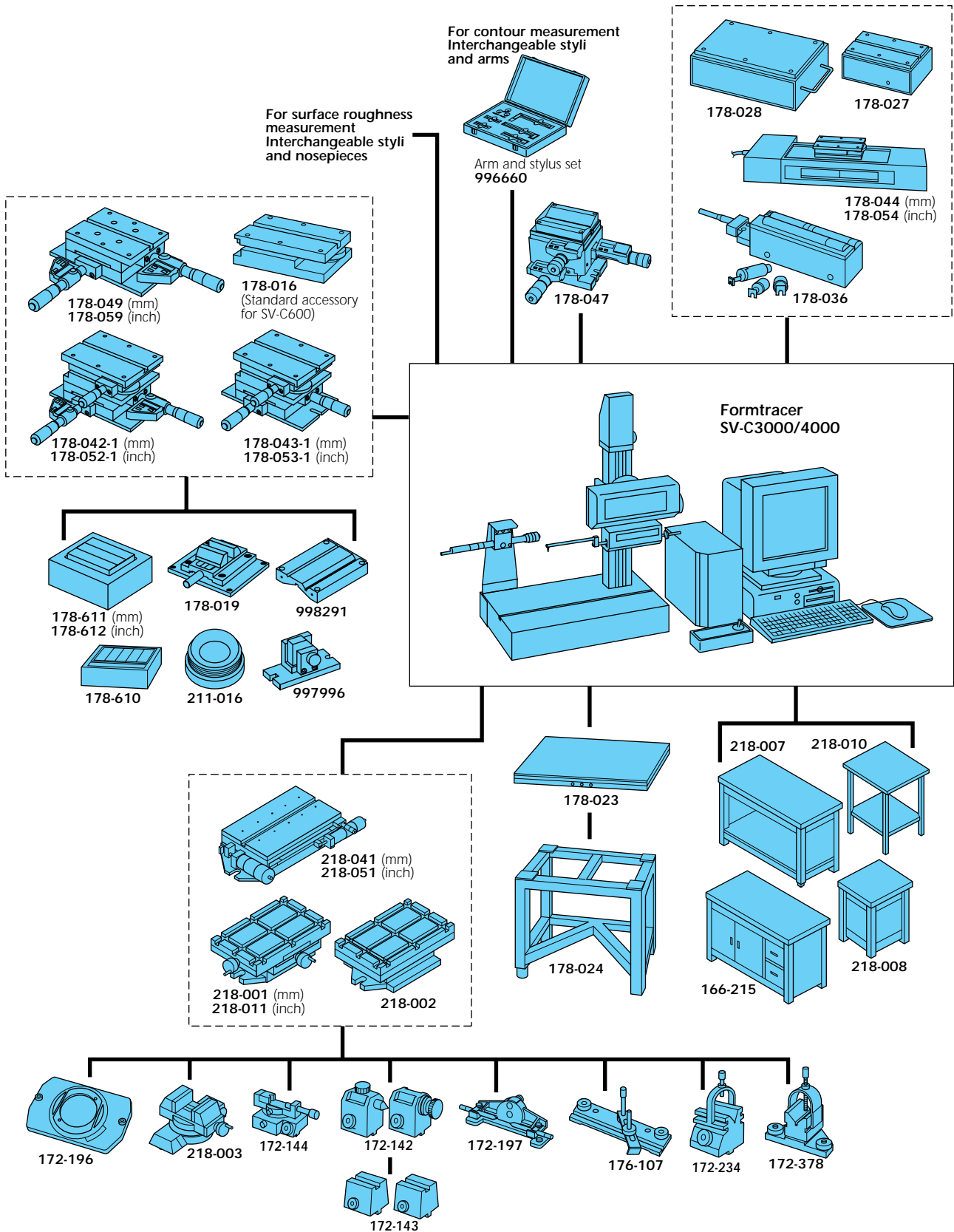


### SV-C3000W8/4000W8

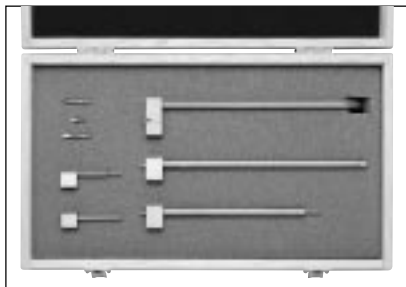
X-axis traverse range: 200mm (8")  
Vertical travel: 450mm (18")  
Base size (WxD): 1000x450mm (40"x18")  
Base material: Cast-iron



SYSTEM DIAGRAM



## Arm and Stylus Set



- Consists of three special arms and five special styli.

| Order No. | Components in set                           |
|-----------|---|
| 996660    | 996504 Straight arm for 6mm high stylus     |
|           | 996511 Eccentric arm for 20mm high stylus   |
|           | 996514 Arm for small hole stylus            |
|           | 354882 One-sided cut stylus (H= 6mm)        |
|           | 354889 Intersecting cut stylus (H= 20mm)    |
|           | 354894 Cone stylus (H= 20mm)                |
|           | 996540 Small hole stylus (Ø2.5mm or larger) |
|           | 996542 Small hole stylus (Ø7mm or larger)   |

## OPTIONAL ACCESSORIES

| Order No. | Description                                     |
|-----------|---|
| 178-043-1 | XY leveling table (XY range: 25x25mm)           |
| 178-053-1 | XY leveling table (XY range: 1"x1")             |
| 178-042-1 | Digimatic XY leveling table (XY range: 25x25mm) |
| 178-052-1 | Digimatic XY leveling table (XY range: 1"x1")   |
| 178-016   | Leveling table                                  |
| 178-019   | Precision vise                                  |
| 998291    | Precision V-block                               |
| 178-023   | Vibration isolator                              |
| 178-024   | Stand for vibration isolator                    |
| 218-007   | Workbench                                       |
| 166-215   | Workbench (with drawers)                        |
| 218-010   | Auxiliary desk                                  |
| 218-008   | Auxiliary desk                                  |

## Contour measurement

| Order No.       | Description                                    |
|-----------------|--|
| 996660          | Convenient set of arms and styli               |
| 218-001         | Cross-travel table (XY range: 100x50mm)        |
| 218-011         | Cross-travel table (XY range: 4"x2")           |
| 218-002         | Rugged table                                   |
| 218-041         | Cross-travel table (XY range: 50x25mm)         |
| 218-051         | Cross-travel table (XY range: 2"x1")           |
| 172-196         | Rotary table                                   |
| 176-107         | Holder with clamp                              |
| 218-003         | Rotary vise (heavy-duty type)                  |
| 172-144         | Rotary vise                                    |
| 172-234         | V-block with clamp (Max. workpiece dia.: 50mm) |
| 172-378         | V-block with clamp (Max. workpiece dia.: 25mm) |
| 172-197         | Swivel center support                          |
| 172-142         | Center support                                 |
| 172-143         | Center support riser                           |
| 997996          | Symmetry calibration gage (angle type)         |
| 211-016         | Symmetry calibration gage (sphere type)        |
| (See page 384.) | <b>Arms and styli</b>                          |

## Surface roughness measurement

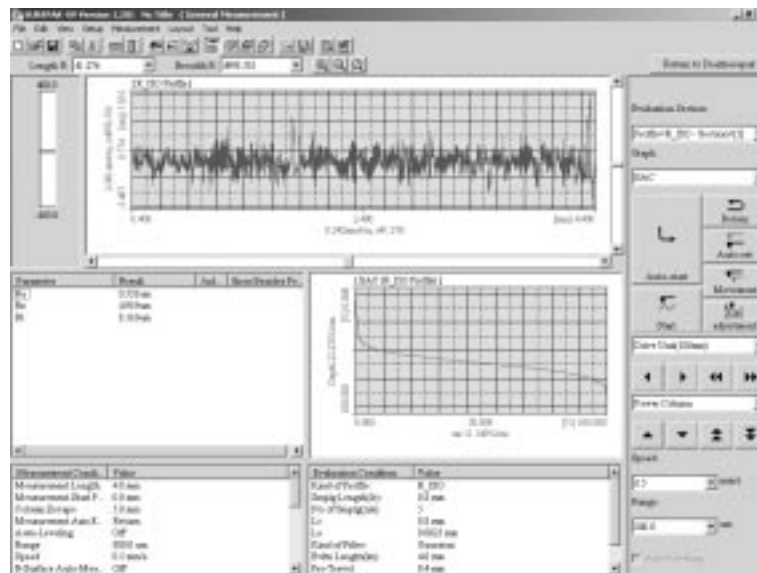
| Order No.       | Description                                       |
|-----------------|---|
| 178-611         | Step gage (2µm, 10µm)                             |
| 178-612         | Step gage (2µm, 10µm, 79µinch, 394µinch)          |
| 178-047         | Three-axis adjustment table (998291 is included.) |
| 178-610         | Metric 4-step gage (1µm, 2µm, 5µm, 10µm)          |
| 178-027         | Auto-leveling Table (Table size: 130x100mm)       |
| 178-028         | Auto-leveling Table (Table size: 280x250mm)       |
| 178-044         | Surftest Traverse Table (Range: 160mm)            |
| 178-054         | Surftest Traverse Table (Range: 6.3")             |
| 178-036         | Rolling Unit                                      |
| (See page 420.) | <b>Detectors, styli, and nosepieces</b>           |



# DUALTRACEPAK

Data Analysis Software for Formtracer SV-C3000/4000

For Surface Roughness Measurement : SURFPAK-SV



Measurement result window

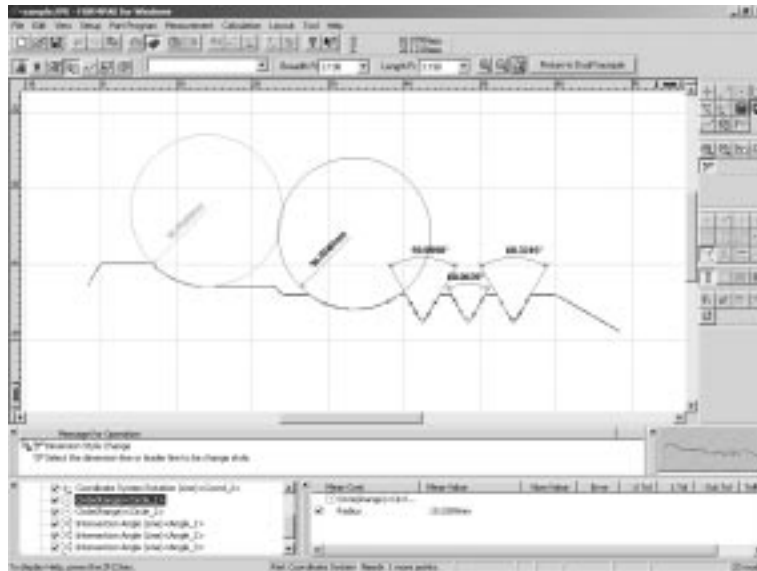
- SURFPAK®-SV dedicated analysis software allows 57 types of parameters that conform to international standards, including ISO, DIN, ANSI, and JIS to be analyzed.
- This system supports 10 types of measured profiles, including the roughness profile, primary profile, and waviness profile, and 2 types of motifs.
- The system supports 7 types of digital filters, including a Gaussian filter.
- Various analysis graphs such as the bearing area curve (BAC) and amplitude distribution graph are easily displayed.
- The system can delete unnecessary data such as scratches and assess an inclination and a rounded surface after digital compensation.
- The system has a wide measuring range of a maximum of 800 $\mu$ m.
- An auto-leveling table (option), which automatically levels a workpiece measuring surface, can be mounted.
- The system supports optional software including the fine contour measuring program (FORMPAK®-SV).
- Report generation function (printer is optional).

## Surftest (Surface Roughness Measurement) Functions

|                         |   |   |
|-------------------------|---|---|
| X-axis traverse range   | SV-C3000S4/H4/W4, SV-C4000S4/H4/W4: 100mm (4")<br>SV-C3000S8/H8/W8, SV-C4000S8/H8/W8: 200mm (8")  |   |
| Straightness            | SV-C3000S4/H4/W4, SV-C4000S4/H4/W4: (0.05+1.5L/1000) $\mu$ m [(2+1.5L) $\mu$ inch]<br>SV-C3000S8/H8/W8, SV-C4000S8/H8/W8: 0.5 $\mu$ m/200mm (20 $\mu$ inch/8")    |   |
| Measuring range         | 800 $\mu$ m, 80 $\mu$ m, 8 $\mu$ m (32000 $\mu$ inch, 3200 $\mu$ inch, 320 $\mu$ inch)  |   |
| Standard detector       | Stylus  | Measuring force 0.75mN: Material: Diamond, 60° cone, Tip radius: 2 $\mu$ m (79 $\mu$ inch)  |
|                         | Measuring force   | Measuring force 4mN: Diamond, 90° cone, Tip radius: 5 $\mu$ m (200 $\mu$ inch)  |
|                         | Skid  | Carbide, Radius of curvature: 40mm (1.6")   |
| Assessed profiles       | P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, E (envelope residual profile), R-motif (roughness motif), W-motif (waviness motif) |   |
| Evaluation parameters   | P, R, WC, WCA, WE, WEA, E, DIN4776  | Ra, Rq, Rz, Rz(JIS), Ry, Ry(DIN), Rc, Rp, Rpmax, Rpi, Rv, Rvmax, Rvi, Rt, Rti, R3z, R3zi, R3y, S, Pc, Sm, HSC, mr, dc, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Da, Dq, Ia, Iq, Sk, Ku, Lo, Lr, A1, A2 |
|                         | R-motif   | Rx, R, AR, SR, SAR, NR, NCRX, CPM   |
|                         | W-motif   | Wte, Wx, W, AW, SW, SAW, NW   |
| Analysis graphs         | ADC, BAC1, BAC2, power spectrum chart, auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart              |   |
| Digital filter          | 2CR-50%, 2CR-75%, 2CR-50% (phase corrected), 2CR-75% (phase corrected), Gaussian-50% (phase corrected)  |   |
| Cutoff length           | $\lambda_c$   | 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm or arbitrary value* (.001", .003", .01", .03", .1", .3", 1" or arbitrary value*)   |
|                         | fl  | 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm or arbitrary value* (.003", .01", .03", .1", .3", 1" or arbitrary value*)   |
|                         | fh  | 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm or arbitrary value* (.001", .003", .01", .03", .1", .3" or arbitrary value*)   |
| Sampling length (L)     | 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm or arbitrary value* (.001", .003", .01", .03", .1", .3", 1" or arbitrary value*)                                 |   |
| Recording magnification | Vertical: 100X - 500,000X   | Horizontal: 1X - 10,000X  |

\*Can be specified in the range from 0.025mm to 200mm (.001" to 8").

## For Contour Measurement : FORMPAK-1000



Analysis result window

- The dedicated analysis software, FORMPAK®-1000, allows easy calculation, tolerancing, and analysis of two-dimensional coordinate (contour) data obtained by measuring geometric elements such as points, lines, circles, angles, and pitches.
- In the Formtracer, a high-accuracy linear scale is installed on the X axis and also in the Z-axis detecting unit. Since high-resolution measurement can always be performed at full stroke, the measuring magnification does not need to be changed. The unit can be efficiently measure various workpiece sizes.
- There are two models: the SV-C3000 series (standard type) which has a Z-axis resolution of 0.2μm, and the SV-C4000 series (high-accuracy type) which has a resolution of 0.05μm.
- The X-axis drive unit has excellent straightness which guarantees high-accuracy.
- The system can compare measured data with nominal data or two pieces of measured data, and then display the deviation. Not only can the coordinate value and specific dimension be measured, but the form can also be assessed and the wear condition can be observed for the entire workpiece.
- Report generation function (printer is optional)

### Contracer (Contour Measuring) Functions

|                            |             |  |
|----------------------------|-------------|--|
| Measuring range            | X-axis      | SV-C3000S4/H4/W4, SV-C4000S4/H4/W4: 100mm (4")<br>SV-C3000S8/H8/W8, SV-C4000S8/H8/W8: 200mm (8")   |
|                            | Z-axis      | 50mm (2")  |
| Straightness               |             | SV-C3000S4/H4/W4, SV-C4000S4/H4/W4: 0.8μm/100mm (32μinch/4")<br>SV-C3000S8/H8/W8, SV-C4000S8/H8/W8: 2μm/200mm (80μinch/8")   |
| Accuracy                   | X-axis      | SV-C-3000S4/H4/W4: $\pm(1+2L/100)\mu\text{m}$ [ $\pm(40+20L)\mu\text{inch}$ ]*<br>SV-C-3000S8/H8/W8: $\pm(1+4L/200)\mu\text{m}$ [ $\pm(40+20L)\mu\text{inch}$ ]*<br>SV-C-4000S4/H4/W4: $\pm(0.8+2L/100)\mu\text{m}$ [ $\pm(31+20L)\mu\text{inch}$ ]*<br>SV-C-4000S8/H8/W8: $\pm(0.8+4L/200)\mu\text{m}$ [ $\pm(31+20L)\mu\text{inch}$ ]* |
|                            | Z-axis      | SV-C-3000 models: $\pm(3+ 2H /25)\mu\text{m}$ [ $\pm(120+ 40H )\mu\text{inch}$ ]**<br>SV-C-4000 models: $\pm(0.8+ 0.5H /25)\mu\text{m}$ [ $\pm(31+ 10H )\mu\text{inch}$ ]**  |
| Resolution                 | X-axis      | 0.00005mm (.000002")   |
|                            | Z-axis      | SV-C3000 Series: 0.0002mm (.000008")<br>SV-C4000 Series: 0.00005mm (.000002")  |
| Stylus tip orientation     |             | Upward/downward  |
| Traversing direction       |             | Forward/backward   |
| Measuring force            |             | 30mN (3gf)   |
| Maximum traceable angle    |             | 77 degrees for upward slope***<br>87 degrees for downward slope***   |
| Drive unit inclining range |             | ±45 degrees  |
| Stylus speed               | Tracing     | 0.02mm/s to 2mm/s (.0008"/s to .08"/s), Can be specified by 7 steps.   |
|                            | Retracing   | 5mm/s (.2"/s)  |
|                            | Positioning | 0.1mm/s to 5mm/s (.004"/s to .2"/s), Can be adjusted manually with a operation box.  |

\* L = Traverse length (mm [inch])

\*\* H = Measuring height (within ±25mm [±1inch])

\*\*\* Depends on the workpiece surface condition.





# Formtracer CS-5000

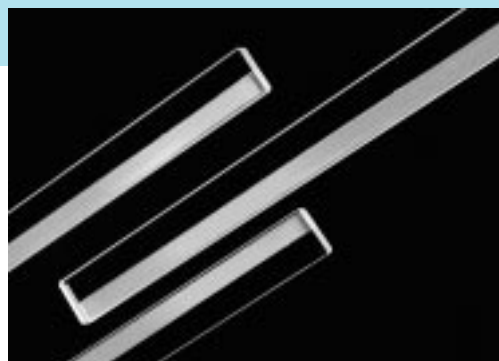
SERIES 525

Comination SurfTest/Contracer Units

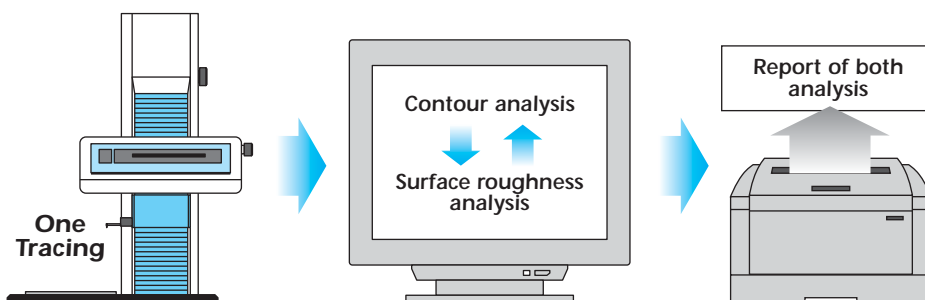


## FEATURES

- A hybrid surface contour measuring machine that combines "contour and surface roughness" measurements and analyses.
- Employing Active Control Method, which reduces the variation of the dynamic measuring force to improve traceability and to thereby allow measurements with high-accuracy.
- The X- and Z-axes are equipped with the Laser Hologscale, which boasts excellent narrow-range accuracy.



Laser hologscale



## Metric

|                                 |  |
|---------------------------------|--|
| <b>Model No.</b>                | <b>CS-5000</b>   |
| <b>Order No.</b>                | 110V AC <b>525-885C</b>  |
|                                 | 120V AC <b>525-885A</b>  |
|                                 | 230V AC <b>525-885D</b>  |
|                                 | 240V AC <b>525-885E</b>  |
| Measuring range                 | X-axis:200mm<br>Z-axis: 6mm/12mm*  |
| Resolution                      | X-axis: 0.00625μm<br>Z-axis: 0.002μm/0.004μm*  |
| Measuring accuracy (20°C)       | X-axis: ±(0.2+0.001L)μm<br>Z-axis: ±(0.2+  0.001H  )μm/±(0.2+  0.005H  )μm*  |
| Straightness                    | (0.05+0.0005L)μm/(0.1+0.0005L)*  |
| Vertical travel                 | 250mm  |
| Stylus tip orientation          | Downward   |
| Traversing direction            | Forward/backward   |
| Measuring force                 | 4mN  |
| Stylus traceable angle          | 60 degrees for upward/downward slope depending on the workpiece surface condition  |
| Measuring speed                 | Surface roughness: 0.02mm/s to 0.2mm/s, can be specified by 4 steps<br>Contour: 0.02mm/s to 2mm/s, can be specified by 7 steps   |
| Moving speed                    | X-axis: 0.1mm/s to 1.5mm/s, can be adjusted manually with a joystick box 0.1mm/s to 3mm/s*, can be adjusted manually with a joystick box<br>Column: 0.1mm/s to 2mm/s. can be adjusted manually with a joystick box 0.1mm/s to 4mm/s*, can be adjusted manually with a joystick box |
| Digital data output             | Via GPIB interface   |
| Operating temperature           | 15°C to 25°C   |
| Power supply                    | AC100-240  |
| Dimensions (WxDxH) <sup>†</sup> | 765x450x890mm  |
| Mass <sup>†</sup>               | 140kg  |

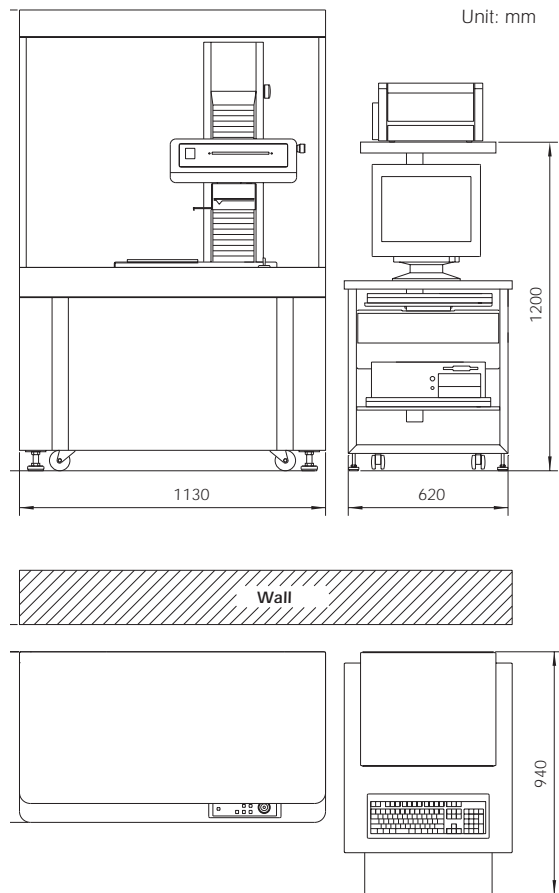
\*When using a long stylus  
L= Measuring length (mm),  
H= Measuring height (within ±25mm)  
<sup>†</sup>Measuring unit only

## Inch

|                               |   |
|-------------------------------|---|
| <b>Model No.</b>              | <b>CS-5000</b>  |
| <b>Order No.</b>              | 110V AC <b>525-885</b>  |
|                               | 120V AC <b>525-895A</b>   |
|                               | 230V AC <b>525-895D</b>   |
|                               | 240V AC <b>525-895E</b>   |
| Measuring range               | X-axis: 8"<br>Z-axis: .24"/.47"*  |
| Resolution                    | X-axis: .25μinch<br>Z-axis: .08μinch/.16μinch*                          |
| Measuring accuracy (at 20°C)* | X-axis: ±(7.8+L)μinch<br>Z-axis: ±(7.8+  H  )μinch/±(7.8+  5H   )μinch* |
| Straightness                  | (2+0.5L)μinch/(4+0.5L)μinch*  |
| Vertical travel               | 10"   |

\*When using a long stylus  
L= Measuring length (inch)  
H= Measuring height (within ±1inch)

## Dimensions

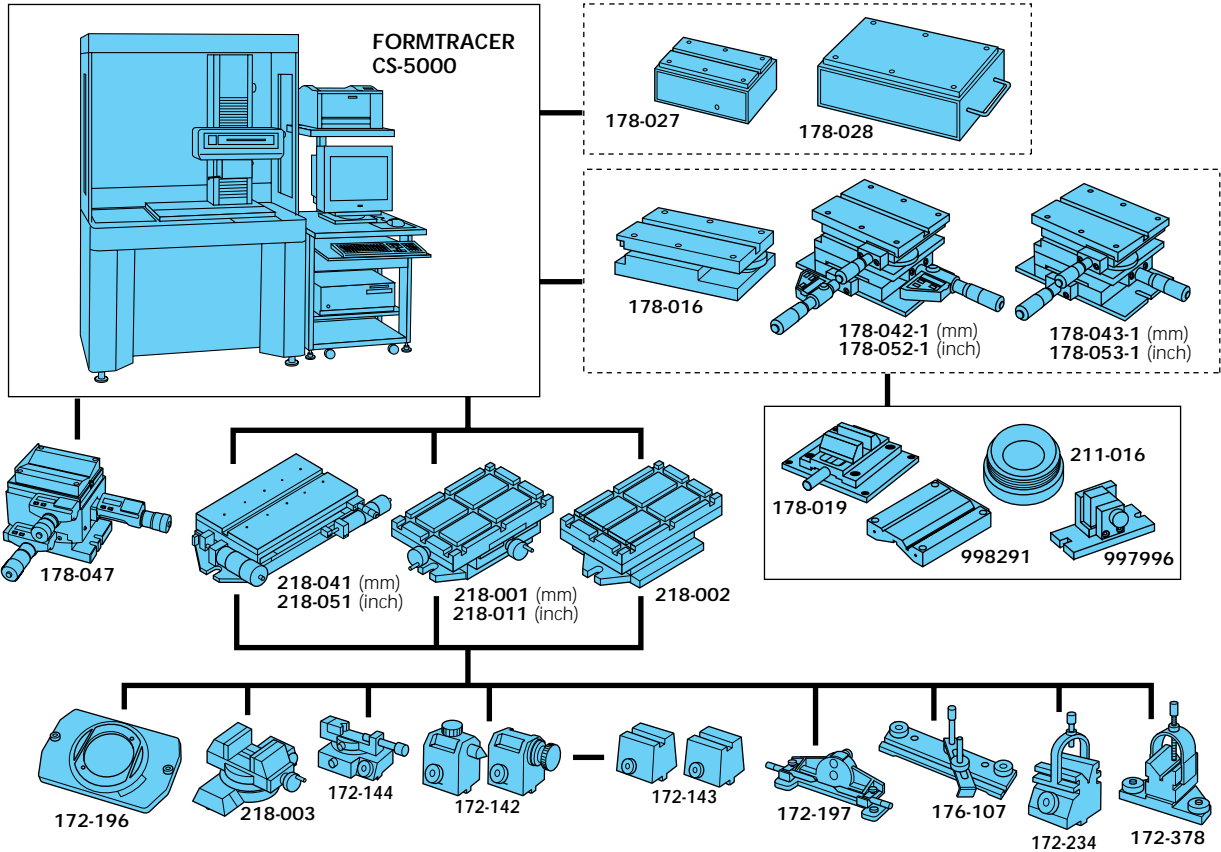


## OPTIONAL ACCESSORIES

| Order No. | Description                                    |
|-----------|--|
| 178-027   | Auto-leveling table                            |
| 178-028   | Large-sized auto-leveling table                |
| 178-047   | Three-axis adjustment table                    |
| 178-611   | Step reference specimen (metric)               |
| 178-612   | Step reference specimen (inch)                 |
| 178-601   | Roughness reference specimen (metric)          |
| 178-602   | Roughness reference specimen (inch)            |
| 218-041   | Cross-travel table (XY range: 50x25mm)         |
| 218-051   | Cross-travel table (XY range: 2"x1")           |
| 218-002   | Rugged table                                   |
| 172-196   | Rotary table                                   |
| 176-107   | Holder with clamp                              |
| 218-003   | Rotary vise (heavy-duty type)                  |
| 172-144   | Rotary vise                                    |
| 172-234   | V-block with clamp (Max. workpiece dia.: 50mm) |
| 172-378   | V-block with clamp (Max. workpiece dia.: 25mm) |
| 172-197   | Swivel center support                          |
| 172-142   | Center support                                 |
| 172-143   | Center support riser                           |
| 178-043-1 | XY leveling table (XY range: 25x25mm)          |
| 178-053-1 | XY leveling table (XY range: 1"x1")            |
| 178-019   | Precision vise                                 |
| 998291    | Precision V-block                              |



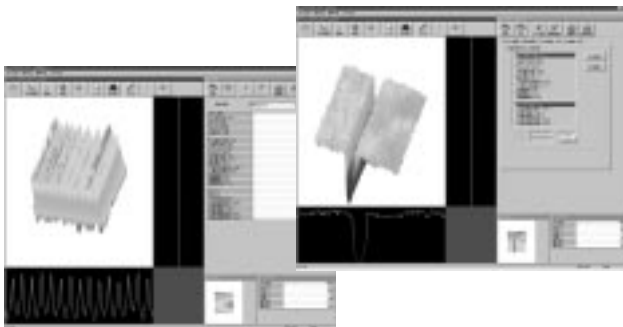
SYSTEM DIAGRAM



**CS-5000-3D**  
High-accuracy three-dimensional topography

**Supports three-dimensional surface texture measurement and analysis**

- CS-5000-3D provides a variety of graphics methods and evaluation parameters for various surface texture evaluations from the three-dimensional topography data.
- A desired topographic profile can be analyzed two-dimensionally, thus allowing the evaluation of fine contour and fine texture at the same time.



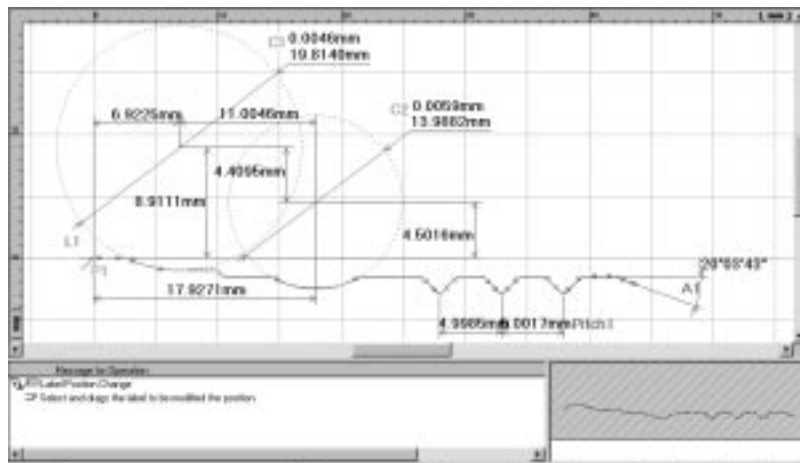
Y-axis table + three-dimensional auto-leveling table



# FORMTRACEPAK

Data Analysis Software for FORMTRACER

**FORMTRACEPAK is a program that analyzes both "contour and surface roughness" by one measurement. Mitutoyo's popular "FORMPAK®-1000", a form/contour analysis program known for its high-functionality and excellent operability, and "SURFPAK®-SV", a surface roughness analysis program have been improved and combined as "FORMTRACEPAK".**



Contour analysis screen

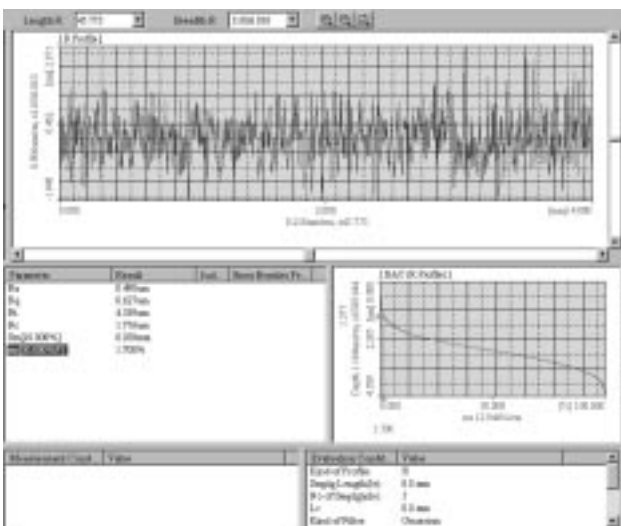
## Contour analysis

### Multiple analyses and high-functionality

For various dimensional measurements such as "radius", "distance", "angle", etc. The "design value generation function" and the "contour tolerancing function" are standard features.

### Measurement assistance function

Supports "Auto-leveling table" and "3-axes adjustment table" to facilitate "leveling" and "finding the axis of a cylindrical workpiece"!



Surface roughness analysis screen

## Surface roughness analysis

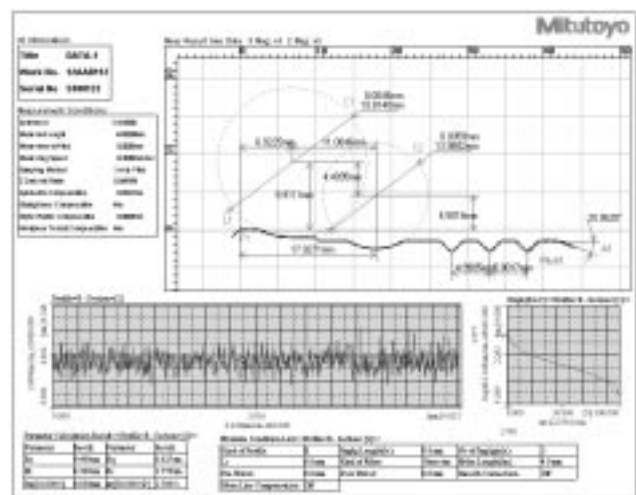
### Conforming to various surface roughness standards

**Conforming to the following standards:**

JIS1982 / JIS1994 / JIS2001 / DIN / ISO / CNOMO / MOTIF

### Supports a wide range of parameters

FORMTRACEPAK supports as many as 80 different parameters including: parameters related to Ra, Ry, Rz, S, Sm, mr, Pc, Rq, Rv, Rk, and motif-related parameters, etc.



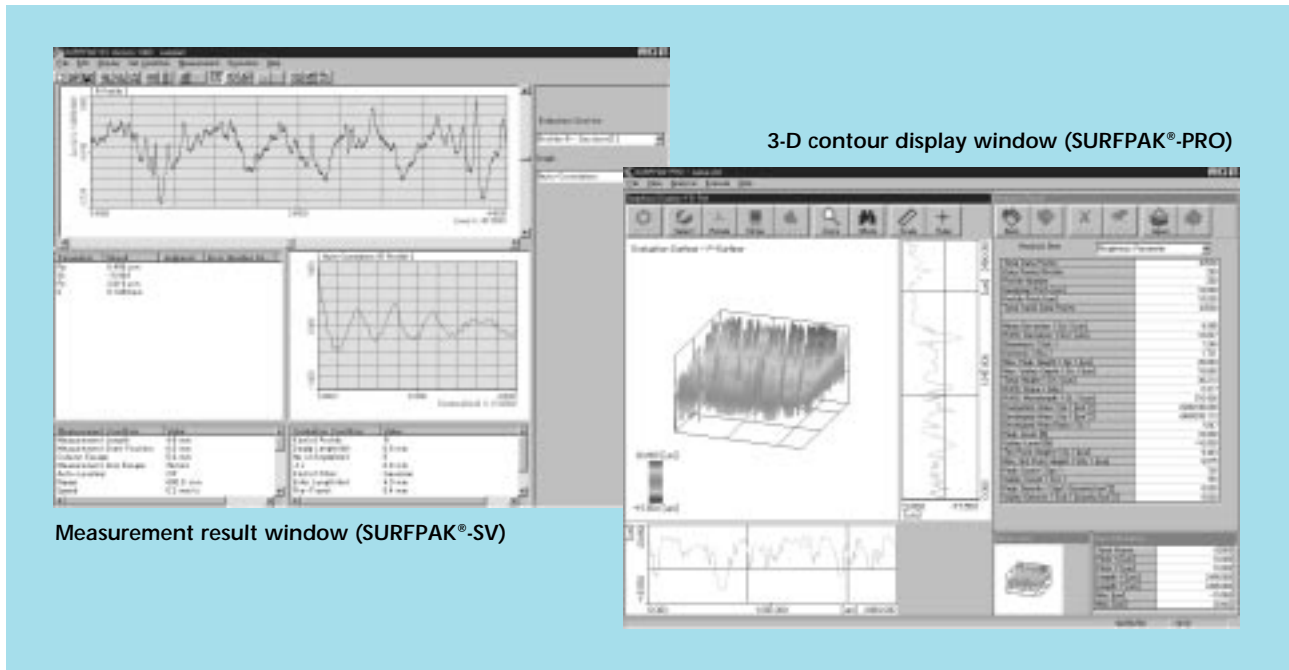
## Report making

### One report for both analyses •Patent pending (Japan)

The layout editing function allows both form/contour analysis and surface roughness analysis to be printed out in one report.

# SURFPAK®-SJ, SURFPAK®-SV, SURFPAK®-PRO

Data Analysis Software for Surfptest



All the SURFPAK® Series surface roughness-analyzing programs have high operability, and they can exchange data with each other. SURFPAK®-SJ is the software for the portable type model, SURFPAK®-SV for use in the inspection room, and SURFPAK®-PRO for models with three-dimensional surface measuring (Surfptest SV-3000•3D Series).

## FEATURES

- SURFPAK® Series software makes it easier to manage data, from the manufacturing site to the laboratory, as the same format can be used in the surface roughness measurement and the storage and analysis of the measured data.
- Equipped with a variety of evaluation parameters conforming to most of the world standards and various analyzing functions.
- Allows the operator to perform a complicated measurement easily and speedily with mouse.
- Control method for the machine differs, depending on the model.



## SPECIFICATIONS

### SURFPAK-SV

|                             |  |
|-----------------------------|--|
| Assessed profiles           | P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, envelope residual profile, roughness motif, waviness motif  |
| Evaluation parameters       | Ra, Rq, Rz, Ry, Rz(JIS), Ry(DIN), Rc, Rp, Rpmax, Rpi, Rv, Rvmax, Rvi, Rt, Rti, Rz, Rz3i, Rz3y, S, Pc (Ppi), Sm, HSC, mr, $\delta c$ , plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, $\Delta a$ , $\Delta q$ , $\lambda a$ , $\lambda q$ , Sk, Ku, Lo, Lr, A1, A2<br>Roughness motif parameters: Rx, R, AR, SR, SAR, NR, NCRX, CPM<br>Waviness motif parameters: Wte, Wx, W, AW SW, SAW, NW |
| Analysis graphs             | ADC, BAC1, BAC2, power spectrum chart, auto-correlation chart, Walsh power spectrum chart, Walsh auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart   |
| Digital filter              | 2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian-50%   |
| Cutoff length*              | $\lambda c$ : 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm<br>(.001", .003", .01", .03", .1", .3", 1")<br>fl: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm<br>(.003", .01", .03", .1", .3", 1")<br>fh: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm<br>(.003", .01", .03", .1", .3")   |
| Sampling length (L)*        | 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm<br>(.001", .003", .01", .03", .1", .3", 1")   |
| Data compensation functions | Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, quadric curve automatic compensation, polynomial compensation, polynomial automatic compensation  |
| Data deletion function      | <ul style="list-style-type: none"> <li>• Data deletion to avoid over speed error</li> <li>• Data deletion in a specific range to perform recalculation</li> <li>• Automatic data deletion according to conditions set</li> </ul>   |
| Recording magnifications    | Vertical: 100X - 500,000X<br>Horizontal: 1X - 10,000X  |
| Report generation functions | <ul style="list-style-type: none"> <li>• Bit-map image paste-up function</li> <li>• Multiple data layout function</li> </ul>   |
| OS requirement              | Windows®95/Windows®98/Windows®2000/Windows®NT 4.0  |

\*Arbitrary length can be specified in the range from 0.025mm (.001") to the maximum traverse length.

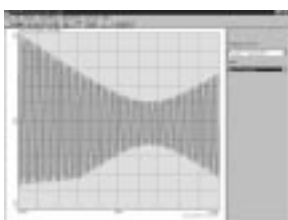
## SURFPAK®-SV Data Analysis Functions

### Conforming to the World's Standards

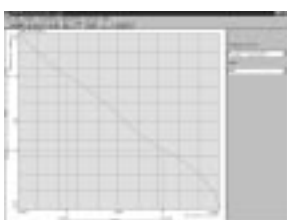
Evaluation parameters conform to the world surface roughness standards including DIN, ISO, JIS, CNOMO, Motif, etc. Combinations of a variety of evaluation profiles and parameters satisfy various needs for surface roughness evaluations.

### Various Types of Analysis Graphs

SURFPAK®-SV provides various types of analysis graphs, such as BAC (bearing area curve), ADC (amplitude distribution chart), power spectrum chart, etc. for diverse evaluations of surface textures. The graph profiles help visual assessment of the surface texture of workpiece.



Auto-correlation chart



BAC chart

### Recalculation Function

Allows the operator to delete unnecessary data points, then recalculates the data or resets the cutoff length and the evaluation range. Automatic deletion of unnecessary data points is also possible when conditions are set at the time of measurement.

### Part Program Creation and Execution

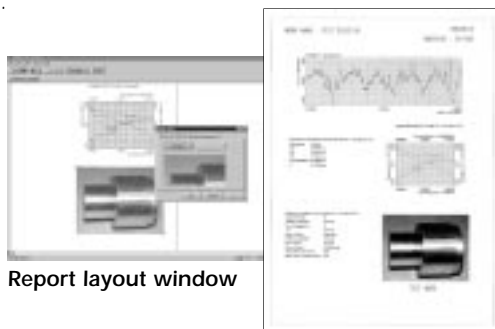
SURFPAK®-SV greatly reduces the amount of manual operations by easy mouse-operation, the on-screen instruction on the operation procedures, and the repeat measurement by automatic execution of a part program.

### Data Compensation Functions

- Tilt compensation: Compensates tilt in the measured data. In addition to the compensation of the entire data, the compensation of a desired area is also possible.
- Arc compensation: Compensates the measured data to eliminate curvature in the measurement of the surface texture of arc (curved surface such as cylinder or sphere), processing the data as those of a flat surface.

### Report Generation Function

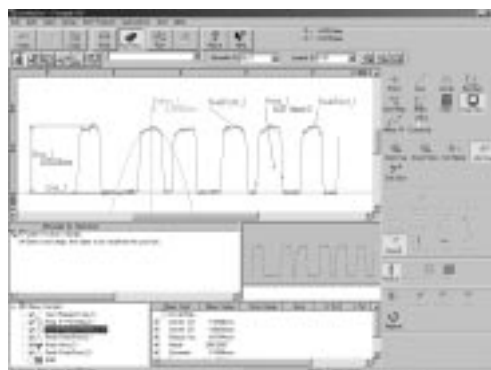
The assessed profiles, calculation results, measuring conditions, and comments can be freely laid out and printed out as reports. The operator can cut and paste-up not only the measurement data but also image files (bit map) to create unique reports with photos and company logos. Reports can be printed on large size paper or in color using the optional color printer.



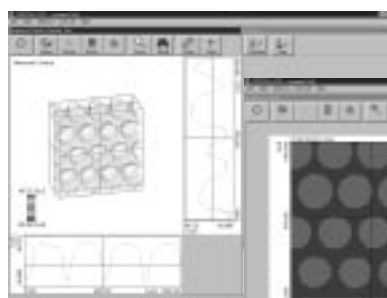
Report layout window

### Optional Program FORMPAK®-SV

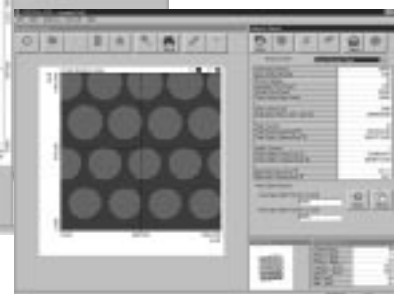
Fine contour analyzing software FORMPAK®-SV is available as an option. This program evaluates the fine texture of the workpiece surface that cannot be evaluated in the surface roughness parameters. By combining contour elements such as point, line, circle, and coordinates, various evaluations can be performed, including the length measurement of step and pitch, the area calculation, etc.



## 3-D Surface Texture Analysis Program SURFPAK®-PRO



3-D contour analysis window



Cross-section analysis window

The dedicated software to the SurfTest SV-600•3D Series, SURFPAK®-PRO provides a variety of graphics methods and evaluation parameters for various surface texture evaluations from the three-dimensional data. A desired cross-section can be analyzed two-dimensionally, thus allowing the evaluation of fine contour and fine texture at the same time.

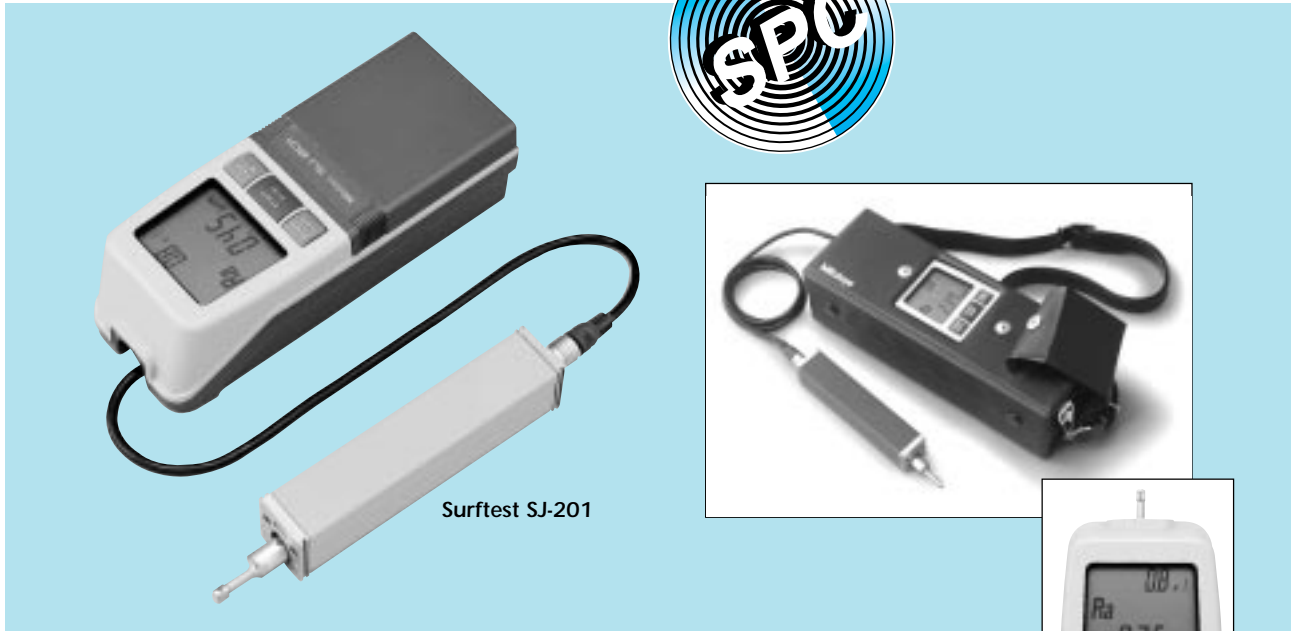
### SURFPAK®-PRO 3-D Analysis Functions

|   |   |
|---|---|
| Three-dimensional evaluation parameters | Sa, Sq, Ssk, Sku, SΔq, Sλ, Sz, So, Sr, Sp, Sv, St, Sz3y, etc.   |
| Filter functions                        | Moving average filter, Gaussian filter  |
| Three-dimensional trend compensation    | Plane compensation, sphere compensation, cylinder compensation, polyhedron compensation   |
| Three-dimensional analysis functions    | 3-D contour line display, Cross-section analysis, BAC, ADC analysis, spectrum analysis, probability distribution analysis, local peak distribution analysis, parameter distribution analysis, slope enhancement |
| Two-dimensional data analysis functions | Include the same evaluation parameters, analysis graphs, and functions as SURFPAK-SV  |

# Surftest SJ-201P/M

SERIES 178

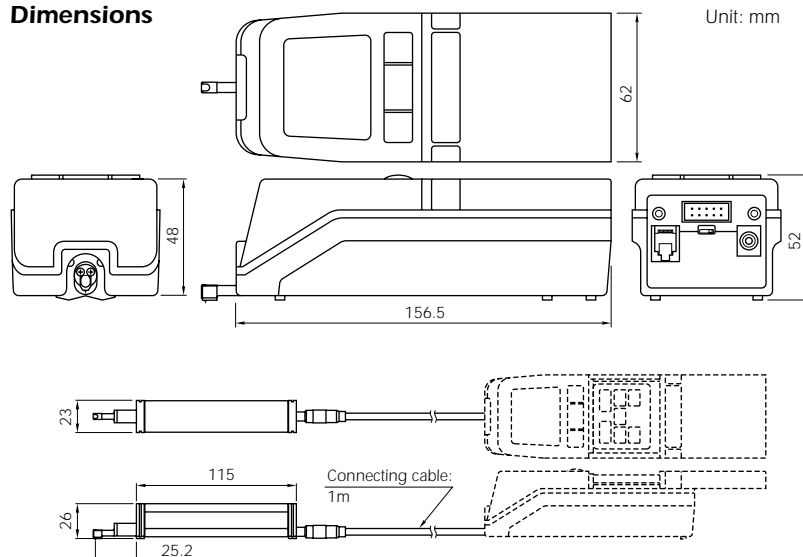
Portable Surface Roughness Tester



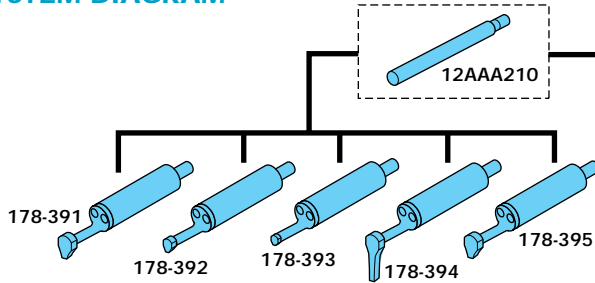
## FEATURES

- Large characters are displayed on the large easy-to-view LCD.
- Portable for easy measurement anywhere necessary.
- The detector/drive unit can be detached from the display unit for effortless measurement of awkwardly oriented workpieces.
- Wide  $350\mu\text{m}$  ( $-200\mu\text{m}$  to  $+150\mu\text{m}$ ) measurement range.
- Roughness parameters compatible with ISO, DIN, ANSI, and JIS.
- 19 analysis parameters are provided, including the basic  $R_a$ ,  $R_q$ ,  $R_z$ , and  $R_y$  parameters.
- Customize function allows hiding of unnecessary parameters.
- GO/NG judgment on a desired parameter.
- Auto-calibration for simple gain-adjustment.
- Auto-sleep function saves energy.
- 10 Measurement data is retained in memory even after the power is turned off.
- Data output is available for SPC operation.
- RS-232C interface enables data transfer to computer or other devices using an external device.
- 2-way power system (AC adapter/rechargeable built-in battery).
- A dedicated carrying case is included for safe transport.
- A precision roughness specimen is supplied.
- Possible to printout the measurement data by the optional printer (178-420).

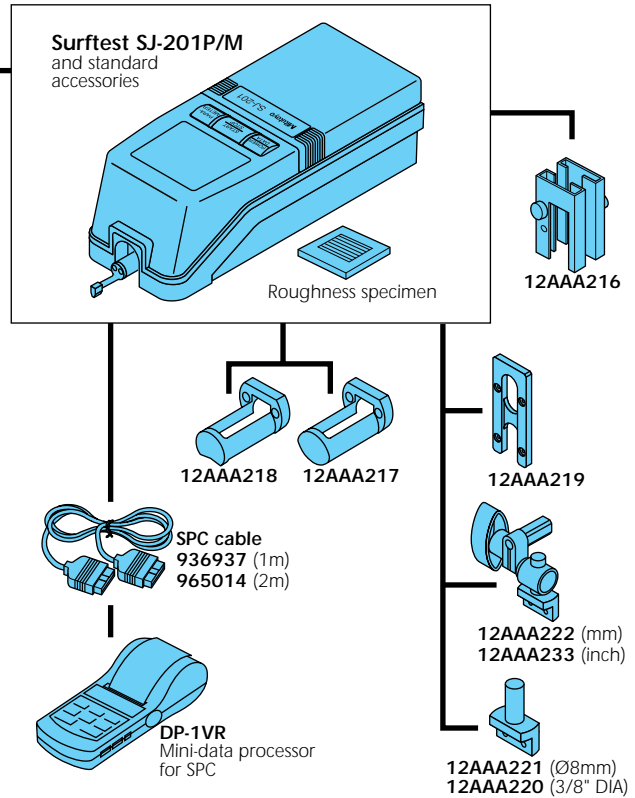
## Dimensions



## SYSTEM DIAGRAM



Various optional accessories widen the application range of measurements.



## SPECIFICATIONS

### Surftest SJ-201P/M

#### Metric

| Model No.                    | SJ-201P   | SJ-201M         |  |
|------------------------------|---|-----------------|--|
| Order No.                    | 100V AC <b>178-930K</b>   | <b>178-920K</b> | —  |
|                              | 120V AC <b>178-930A</b>   | <b>178-920A</b> | —  |
|                              | 230V AC <b>178-930D</b>   | <b>178-920D</b> | <b>178-920F</b>  |
|                              | 240V AC <b>178-930E</b>   | <b>178-920E</b> | —  |
| Measuring force of detector  | 0.75mN  | 4mN             | 0.75mN 4mN   |
| Evaluation length            | 12.5mm  |                 |  |
| Measuring range              | 350µm (-200µm to +150µm)  |                 |  |
| Drive/detector unit          | Detector: <b>178-395/178-390*</b><br>Stylus: Diamond (tip radius: 2µm/5µm*)<br>Detecting method: Differential inductance  |                 |  |
| Assessed profiles            | P, R, DIN4776 profile   |                 | P, R, Motif  |
| Evaluation parameters        | Ra, Ry, Rz, Rt, Rp, Rq, Rv, Sm, S, Pc, Rsz, mr, δc, Rpk, Rvk, Rk, Mr1, Mr2, Lo, R, AR, Rx, A1, A2, Vo (can be customized) |                 | Ra, Ry, Rz, Rt, Rp, Rq, Sm, S, Pc, Rsz, mr, R, AR, Rx, (can be customized) |
| Roughness standard           | JIS, DIN, ISO, ANSI   |                 |  |
| Digital filter               | 2CR-75%, 2CR-75% PC, Gaussian-50%   |                 |  |
| Cutoff length λ <sub>c</sub> | 0.25, 0.8, 2.5mm  |                 |  |
| λ <sub>s</sub>               | 2.5, 8µm  |                 |  |
| Sampling length (L)          | 0.25, 0.8, 2.5mm  |                 |  |
| Number of sampling spans**   | x1, x3, x5, xL**  |                 |  |
| Display                      | LCD   |                 |  |
| Data output                  | Via RS-232C interface/SPC output  |                 |  |
| Power supply                 | Via AC adapter/battery (rechargeable)   |                 |  |
| Dimensions (WxDxH)           | 156.5x62x52mm   |                 |  |
| Mass                         | 290g  |                 |  |

\* 4mN measuring force models

\*\* Evaluation length can be specified arbitrarily in the range from 0.3mm to 12.5mm.

#### Inch/Metric

| Model No.                    | SJ-201P                               |                 |
|------------------------------|---------------------------------------|-----------------|
| Order No.                    | 100V AC <b>178-930K</b>               | <b>178-923</b>  |
|                              | 120V AC <b>178-930A</b>               | <b>178-923A</b> |
|                              | 230V AC <b>178-930D</b>               | <b>178-923D</b> |
|                              | 240V AC <b>178-930E</b>               | <b>178-923E</b> |
| Measuring force of detector  | 0.75mN 4mN                            |                 |
| Evaluation range             | .49" (12.5mm)                         |                 |
| Measuring range              | 13780µinch (-7880µinch to +5900µinch) |                 |
| Cutoff length λ <sub>c</sub> | 0.1", .03", .1"                       |                 |
| λ <sub>s</sub>               | 100µinch, 320µinch                    |                 |
| Sampling length (L)          | .01", .03", .1"                       |                 |

## OPTIONAL ACCESSORIES

| Order No.         | Description                              |
|-------------------|--|
| <b>178-395</b>    | Standard detector                        |
| <b>178-390</b>    | Detector for low pressure type           |
| <b>178-391</b>    | Detector for soft material measurement   |
| <b>178-392</b>    | Small hole detector (Ø4.5mm or larger)   |
| <b>178-393</b>    | Small hole detector (Ø2.8mm or larger)   |
| <b>178-394</b>    | Deep groove detector                     |
| <b>12AAA208</b>   | RS-232C connecting cable                 |
| <b>12AAA216</b>   | Support foot set (pair)                  |
| <b>12AAA217</b>   | Nosepiece for flat surface               |
| <b>12AAA218</b>   | Nosepiece for cylindrical surface        |
| <b>12AAA219</b>   | Vertical positioning adapter             |
| <b>12AAA220</b>   | Magnetic stand adapter (3/8" dia. stem)  |
| <b>12AAA221</b>   | Magnetic stand adapter (ø8mm stem)       |
| <b>12AAA222</b>   | Height gage adapter                      |
| <b>12AAA210</b>   | Extension rod (50mm)                     |
| <b>178-033</b>    | Setting attachment: V type               |
| <b>178-034</b>    | Setting attachment: Slider type          |
| <b>178-035</b>    | Setting attachment: Inside diameter type |
| <b>178-420*</b>   | Printer (with connecting cable)          |
| <b>12AAC243</b>   | Printer paper (20-roll)                  |
| <b>178-241-2*</b> | Display unit for SJ-301                  |
| <b>936937</b>     | SPC cable (1m)                           |
| <b>965014</b>     | SPC cable (2m)                           |

\*Suffix: **A** for 120V, **C** for 110V, **D** for 230V, **E** for 240V or non for 100V





# Surftest SJ-301

SERIES 178

Portable Surface Roughness Tester



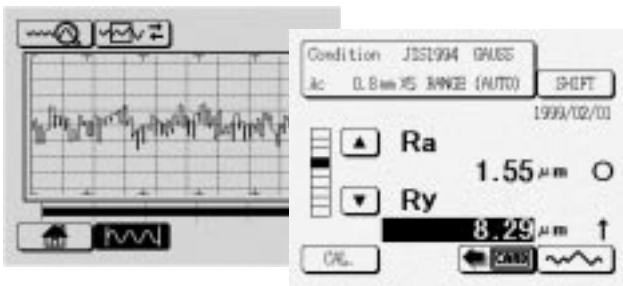
Surftest SJ-301

## FEATURES

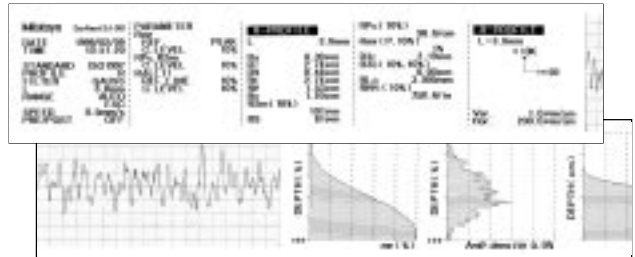
- Easy-to-operate touch-panel
- Printer built in and rechargeable battery operation
- JIS/DIN/ISO/ANSI compatible 36 evaluation parameters and 3 analysis graphs
- 350µm wide measuring range detector
- Statistical processing function included
- Compatible with PC base Surfpak-SJ software
- Auto-sleep function for power conservation



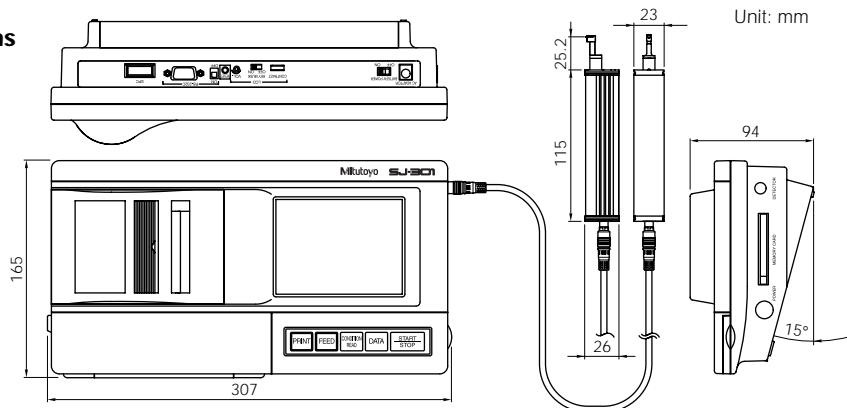
- Measurement results and profiles can be read in the large LCD screen.



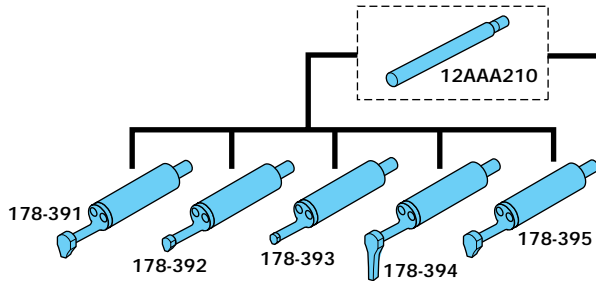
- High-speed printout including recorded profiles and analysis graphs.



## Dimensions



## SYSTEM DIAGRAM



## SPECIFICATIONS

### Surftest SJ-301

#### Metric

|                             |  |            |
|-----------------------------|--|------------|
| Model No.                   | SJ-301   |            |
| Order No.                   | 100V AC  | 178-952-2  |
|                             | 110V AC  | 178-952-2C |
|                             | 120V AC  | 178-952-2A |
|                             | 230V AC  | 178-952-2D |
|                             | 240V AC  | 178-952-2E |
| Measuring force of detector | 0.75mN   | 4mN        |
| Evaluation length           | 12.5mm   |            |
| Measuring range             | 350 $\mu$ m (-200 $\mu$ m to + 150 $\mu$ m)  |            |
| Drive/detector unit         | Detector: 178-395/178-390*<br>Stylus: Diamond (tip radius: 2 $\mu$ m/5 $\mu$ m*)<br>Detecting method: Differential inductance  |            |
| Assessed profiles           | P, R, DIN4776, MOTIF.R, MOTIF.W  |            |
| Evaluation parameters       | Ra, Ry, Rz, Rt, Rp, Rq, Rv, Sm, S, Pc, R3z, mr, Rpk, Rvk, $\sigma$ c, Rk, Mr1, Mr2, Lo, Ppi, R, AR, Rx, A1, A2, Vo, HSC, mrd, sk, Ku, $\Delta$ a, $\Delta$ q, Wte, Wt, W, AW (can be customized) |            |
| Roughness standard          | JIS, DIN, ISO, ANSI  |            |
| Digital filter              | 2CR-75%, 2CR-75% PC, Gaussian-50%  |            |
| Cutoff length $\lambda$ c   | 0.08, 0.25, 0.8, 2.5, 8mm  |            |
| $\lambda$ s                 | 2.5, 8, 25 $\mu$ m   |            |
| Sampling length (L)         | 0.08, 0.25, 0.8, 2.5, 8mm  |            |
| Number of sampling spans**  | x1, x3, x5, xL**   |            |
| Display                     | LCD  |            |
| Data output                 | Via RS-232C interface/SPC output   |            |
| Power supply                | Via AC adapter/battery (rechargeable)  |            |
| Dimensions (WxDxH)          | 307x165x94mm   |            |
| Mass                        | 1200g  |            |

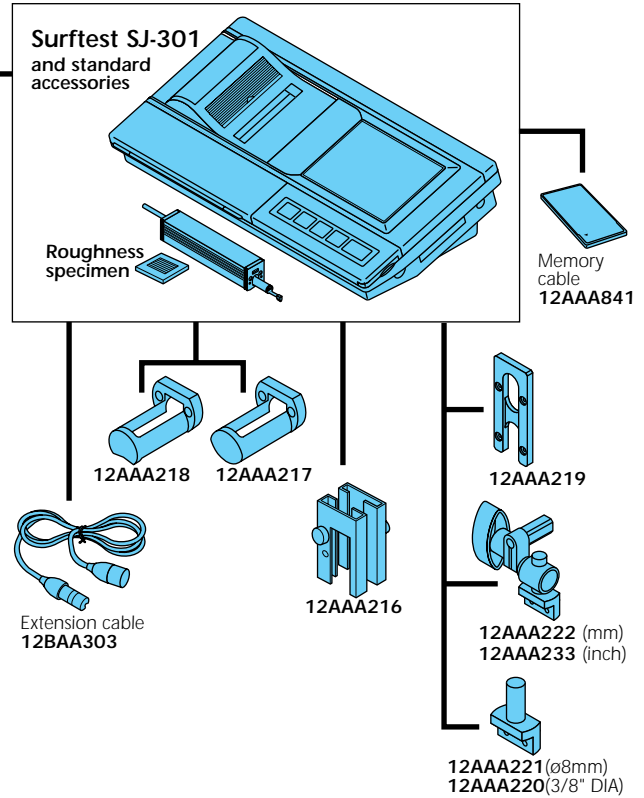
\* 4mN measuring force models

\*\* Evaluation length can be specified arbitrarily in the range from 0.3mm to 12.5mm.

#### Inch/Metric

|                             |   |            |
|-----------------------------|---|------------|
| Model No.                   | SJ-301  |            |
| Order No.                   | 100V AC   | 178-955-2  |
|                             | 120V AC   | 178-955-2A |
|                             | 230V AC   | 178-955-2D |
|                             | 240V AC   | 178-955-2E |
| Measuring force of detector | 0.75mN  | 4mN        |
| Evaluation range            | .49" (12.5mm)   |            |
| Measuring range             | 13780 $\mu$ inch (-7880 $\mu$ inch to +5900 $\mu$ inch) |            |
| Cutoff length $\lambda$ c   | .003", .01", .03", .1", .3"                             |            |
| $\lambda$ s                 | 100 $\mu$ inch, 320 $\mu$ inch, 1000 $\mu$ inch         |            |
| Sampling length (L)         | .003", .01", .03", .1", .3"                             |            |

Various optional accessories widen the application range of measurements.



## CONSUMABLE PARTS

| Order No. | Description                  | Remarks       |
|-----------|------------------------------|---------------|
| 12AAA896  | LCD protective sheet         | 10 sheets/set |
| 270732    | Standard printer paper (25m) | 5 rolls/set   |
| 12AAA876  | Durable printer paper (25m)  | 5 rolls/set   |

## OPTIONAL ACCESSORIES

| Order No. | Description                             |
|-----------|---|
| 178-395   | Standard detector                       |
| 178-390   | Detector for low pressure type          |
| 178-391   | Detector for soft material measurement  |
| 178-392   | Small hole detector (Ø4.5mm or larger)  |
| 178-393   | Small hole detector (Ø2.8mm or larger)  |
| 178-394   | Deep groove detector                    |
| 12AAA219  | Vertical positioning adapter            |
| 12AAA220  | Magnetic stand adapter (3/8" dia. stem) |
| 12AAA221  | Magnetic stand adapter (ø8mm stem)      |
| 12AAA222  | Height gage adapter (mm)                |
| 12AAA223  | Height gage adapter (inch)              |
| 12AAA210  | Extension rod (50mm)                    |
| 12BAA303  | Extension cable                         |
| 12AAA882  | RS-232C connecting cable                |
| 12AAA841  | Memory card                             |
| 12AAA896  | LCD protective sheet (10-sheet)         |
| 12AAA879  | Printer paper (durable type, 5-roll)    |
| 936937    | SPC cable (1m)                          |
| 965014    | SPC cable (2m)                          |

# Surftest SJ-400

## SERIES 178

Portable Surface Roughness Tester



Surftest SJ-401

### FEATURES

- Equipped with 35 kinds of roughness parameters that conform to the latest ISO, DIN, ANSI, and JIS standards.
- A wide-range, high-resolution detector and an straight drive unit provide superior high-accuracy measurement in its class.

- <Detector>
  - Measuring range: 800 $\mu$ m
  - Resolution: 0.000125 $\mu$ m (at 8 $\mu$ m range)
- <Drive unit>
  - Straightness/traverse length
  - SJ-401: 0.3 $\mu$ m/25mm
  - SJ-402: 0.5 $\mu$ m/50mm



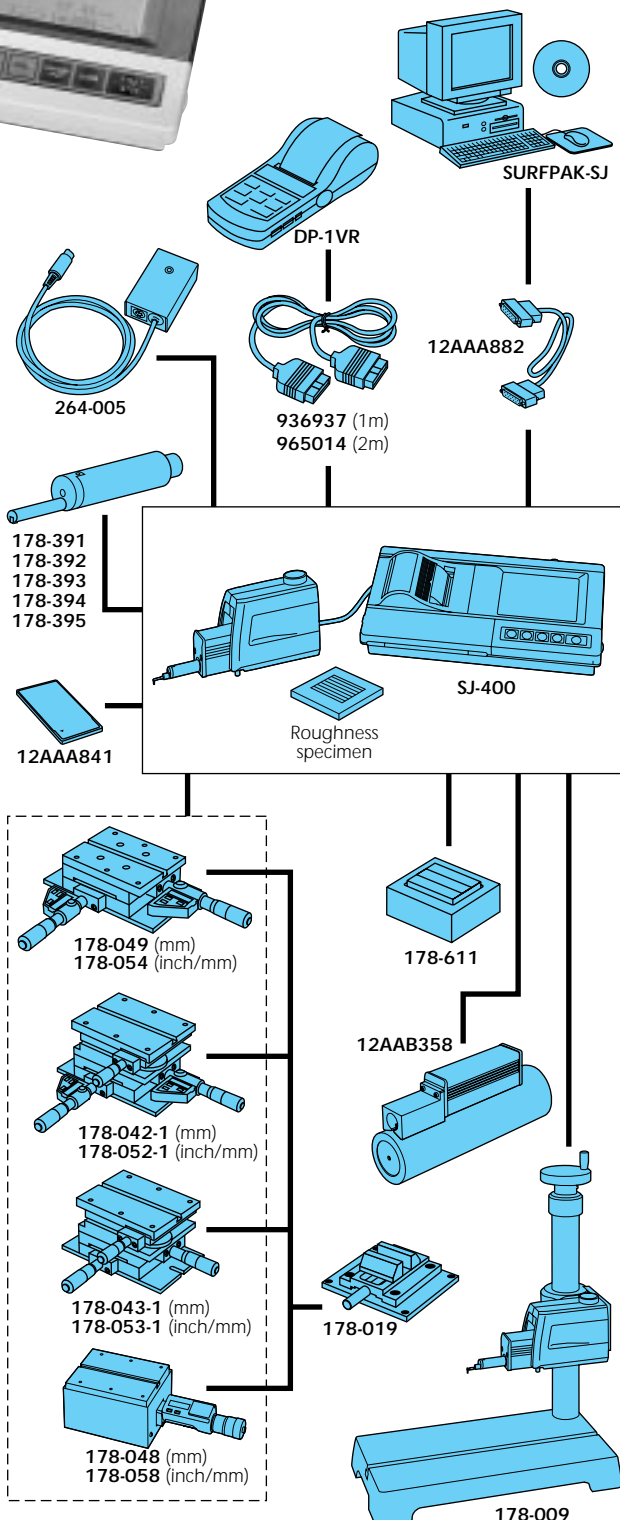
SJ-401

SJ-402

- The skidless detector and the curved surface compensation function make it so efficient to evaluate cylinder surface roughness.
- Ultra-fine steps, straightness and waviness can be measured by using the skidless measurement function.
- Measured data can be output to an external PC by using an RS-232C cable (optional).
- With a roughness specimen.
- Digital filter function for non-distorted roughness profiles.
- GO/NG judgment function.
- Auto-calibration function.

### CONSUMABLE PARTS

| Order No. | Description                  | Remarks       |
|-----------|------------------------------|---------------|
| 12AAA896  | LCD protective sheet         | 10 sheets/set |
| 270732    | Standard printer paper (25m) | 5 rolls/set   |
| 12AAA876  | Durable printer paper (25m)  | 5 rolls/set   |



## SPECIFICATIONS

### Surftest SJ-400

#### Metric

| Model No.               | SJ-401   |            | SJ-402     |            |            |
|-------------------------|--|------------|------------|------------|------------|
| Order No.               | 100V AC  | 178-956-2  | 178-958-2  | 178-946-2  | 178-940-2  |
|                         | 110V AC  | 178-956-2C | 178-958-2C | 178-946-2C | 178-940-2C |
|                         | 120V AC  | 178-956-2A | 178-958-2A | 178-946-2A | 178-940-2A |
|                         | 230V AC  | 178-956-2D | 178-958-2D | 178-946-2D | 178-940-2D |
|                         | 240V AC  | 178-956-2E | 178-958-2E | 178-946-2E | 178-940-2E |
| Measuring force         | 0.75mN   | 4mN        | 0.75mN     | 4mN        |            |
| Evaluation range        | 25mm   |            | 50mm       |            |            |
| Measuring range         | 800μm, 80μm, 8μm<br>(up to 2400μm with an optional stylus)   |            |            |            |            |
| Detector                | Detector: <b>178-397/178-396*</b><br>Detecting method: Skidless/skid measurement<br>Stylus: Diamond, 60°/90°* (tip radius 2μm/5μm*)                  |            |            |            |            |
| Assessed profiles       | Nosepiece: skidded/skidless changeable<br>P, R, W (filtered waviness profile), DIN4776, MOTIF (R, W)   |            |            |            |            |
| Evaluation parameters   | Ra, Ry, Rz, Rq, Pc, R3z, mr, Rt, Rp, Rv, Sm, S, δc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Lo, Ppi, R, AR, Rx, Δa, Δq, Ku, HSC, mrd, Sk, W, AW, Wte, Wx, Vo |            |            |            |            |
| Analysis graphs         | BAC, ADC   |            |            |            |            |
| Statistical data        | Maximum value, minimum value, mean value, standard deviation (s), Pass ratio, Histogram  |            |            |            |            |
| Digital filter          | 2CR, PC75 (phase corrected), Gauss   |            |            |            |            |
| Cutoff length           | λc: 0.08, 0.25, 0.8, 2.5, 8mm<br>λs: 0.25, 0.8, 2.5, 8, 25μm   |            |            |            |            |
| Sampling length (L)**   | 0.08, 0.25, 0.8, 2.5, 8mm  |            |            |            |            |
| Display                 | LCD  |            |            |            |            |
| Printer (built-in)      | Thermal line printer   |            |            |            |            |
| Recording magnification | Vertical: 10 to 100K magnification, Auto<br>Horizontal: 1 to 1K magnification, Auto  |            |            |            |            |
| Data output             | Via RS-232C interface/SPC output   |            |            |            |            |
| Power supply            | Via AC adapter/battery (rechargeable)  |            |            |            |            |
| Dimensions (WxDxH)      | Control unit: 307x165x94mm<br>Height-tilt adjustment unit: 131x63x99mm   |            |            |            |            |
| Mass                    | Control unit: Approx. 1.2kg<br>Height-tilt adjustment unit: Approx. 0.4kg  |            |            |            |            |

\* 4mN measuring force models

\*\* Evaluation length can be specified arbitrarily in the range from 0.1mm to 25.4mm.

#### Inch/Metric

| Model No.             | SJ-401   |            | SJ-402     |            |            |
|-----------------------|--|------------|------------|------------|------------|
| Order No.             | 100V AC  | 178-957-2  | 178-959-2  | 178-947-2  | 178-945-2  |
|                       | 120V AC  | 178-957-2A | 178-959-2A | 178-947-2A | 178-945-2A |
|                       | 230V AC  | 178-957-2D | 178-959-2D | 178-947-2D | 178-945-2D |
|                       | 240V AC  | 178-957-2E | 178-959-2E | 178-947-2E | 178-945-2E |
| Measuring force       | 0.75mN   | 4mN        | 0.75mN     | 4mN        |            |
| Evaluation range      | 1" (25mm)  |            | 2" (50mm)  |            |            |
| Measuring range       | 3200μinch, 320μinch, 320μinch<br>(up to 15000μinch with an optional stylus)  |            |            |            |            |
| Cutoff length         | λc: .003", .01", .03", .1", .3"<br>λs: 10μin, 32μin, 100μin, 320μin, 1000μin |            |            |            |            |
| Sampling length (L)** | .003", .01", .03", .1", .3"  |            |            |            |            |

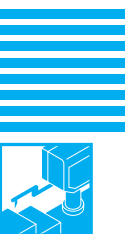
\*\* Evaluation length can be specified arbitrarily in the range from .01" to 1".

## OPTIONAL ACCESSORIES

| Order No.       | Description  |
|-----------------|--|
| 178-009         | Manual column stand                                      |
| 12AAB358        | Cylinder attachment                                      |
| 178-048         | Leveling table<br>for digital table adjustment (mm)      |
| 178-058         | Leveling table<br>for digital table adjustment (inch/mm) |
| 178-043-1       | XY leveling table (XY range: 25x25mm)                    |
| 178-053-1       | XY leveling table (XY range: 1"x1")                      |
| 178-042-1       | Digimatic XY leveling table<br>(XY range: 25x25mm)       |
| 178-052-1       | Digimatic XY leveling table<br>(XY range: 1"x1")         |
| 178-049*        | Digimatic XY leveling table<br>(XY range: 25x25mm)       |
| 178-059*        | Digimatic XY leveling table<br>(XY range: 1"x1")         |
| 178-019         | Precision vise   |
| 178-016         | Leveling table   |
| 181-902         | V-block with clamp                                       |
| 178-610         | Step gage  |
| 178-611         | Reference step specimen (mm)                             |
| 178-612         | Reference step specimen (inch)                           |
| 12BAA781        | Carrying case  |
| 12AAA841        | Memory card (8MB)  |
| 12AAA882        | PC connecting cable<br>(RS-232C specification)           |
| 936937          | SPC cable (1m)   |
| 965014          | SPC cable (2m)   |
| 264-005         | Input tool   |
| 264-504**       | DP-1VR   |
| (See page 420.) | <b>Detectors, Styli, and nosepieces</b>                  |

\* w/o table swiveling

\*\* Suffix: A for 120V, C for 110V, D for 220V, E for 240V or non for 100V



## Surftest SV-2000/3000

### SERIES 178

#### Surface Roughness Testers



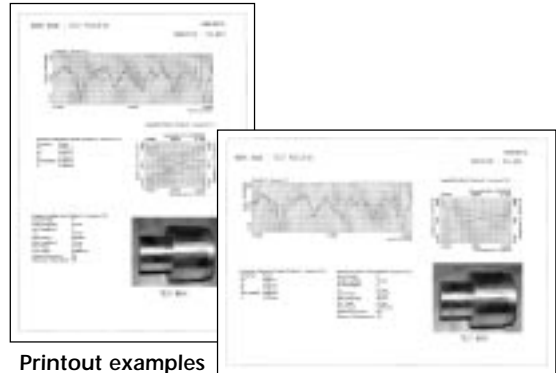
The Surftest SV-2000/3000 Series provide high-accuracy, high-level analysis, and multi-functionality in measurement of surface roughness.

#### FEATURES

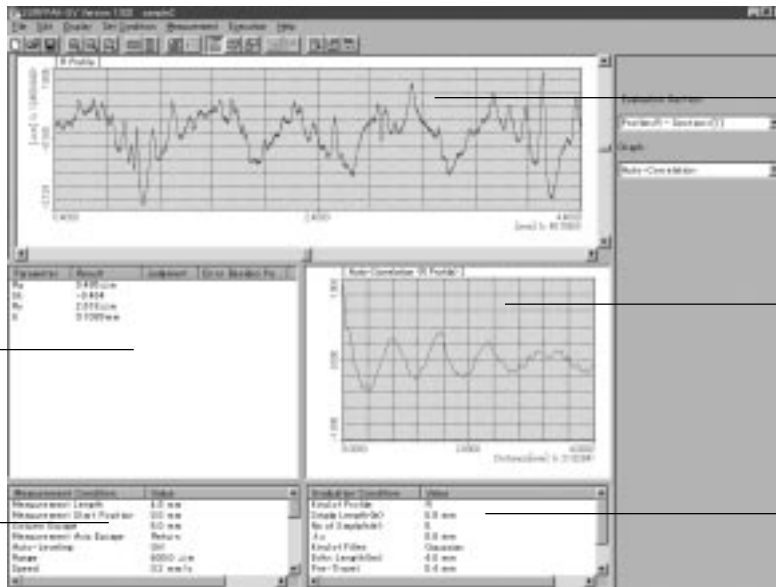
- Mitutoyo's Surftest SV-2000/3000 Series provide high-accuracy, high-level analysis, and multi-functionality in three dimensional analysis and measurement of fine contour, as well as the conventional type surface roughness measurement.
- Peripheral devices such as the auto-leveling table and three-axis adjustment table are available to enhance operability and to enable automatic measurement.
- SURFPAK®, a dedicated data-analyzing software is installed. This software allows data management in a consistent format, from the work site to the laboratory.
- TCON, Touch-Panel Controller is given priority to ease of use, it makes high-level analysis affordable.
- Ceramic, which is known for its superb anti-abrasive property, is used as the X-axis drive unit guide. No lubrication of the guide is required.
- High-accuracy glass scales (X-axis resolution:  $0.05\mu\text{m}$ , Y-axis resolution:  $1\mu\text{m}$ ) are built-in on X- and Y-axes to insure high-accuracy positioning. The SV-3000 series manifest high-reliability especially in the horizontal roughness parameters ( $S$ ,  $S_m$ ), that require high-accuracy of the X-axis travel.
- Equipped with high-accuracy detector stylus.
- Equipped with various functions such as: the "straightness compensation" function, which improves the linear accuracy of the X-axis; the "circular compensation" function for the vertical movement of the stylus; and the "stylus-tip diameter compensation" function.
- The stylus and the skid can be replaced easily. Optional styli and skids are available for a wide variety of roughness measurement applications, such as measurement of small holes, deep holes, etc.
- An easy-to-operate Control Box is provided for SV-2000S2, SV-3000S4/H4/W4/S8/H8/W8. The Control Box independent of the main unit allows positioning, measurement start/stop, retracting, and other operations to be performed remotely. The Drive Unit up/down position and the X-axis traverse can be fine controlled manually.

## Surface roughness-analyzing program SURFPAK®-SV

- Enhanced with various control functions to support automatic measurement.
- Equipped with a variety of evaluation parameters conforming to most of the world standards and various analyzing functions.
- Allows the operator to perform a complicated measurement easily and speedily with mouse.



Printout examples



**Measurement result window:**  
Provides a great variety of parameters conforming to most of the world's standards.

**Measuring condition setting window:**

**Assessed profile window:**  
The size of the assessed profile display can be freely changed.

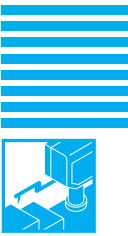
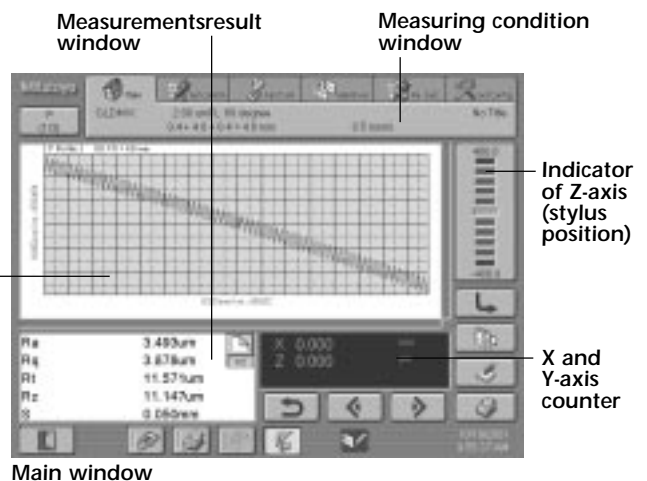
**Analysis graph window:**  
Various analysis graphs can be created.

**Evaluation conditions window:**  
For various recalculations of the measured data.

## Touch-Panel Controller TCON



- Easy & speedy operation with a touch panel
- Employing a 12-inch color LCD
- Large sized and easy-to-understand icons allow high-level analysis as well as SURFPAK-SV with facility.



## SPECIFICATIONS

## Surftest SV-2000

## Metric

| Model No.                   | SV-2000N2  |   | SV-2000S2                                |  | SV-2000M4   |   |  |
|-----------------------------|--|---|--|--|---|---|--|
| Order No.                   | 100V AC  | 178-660                                       | 178-640                                  | 178-661  | 178-641   | 178-662   | 178-642                                  |
|                             | 110V AC  | 178-660C                                      | 178-640C                                 | 178-661C   | 178-641C  | 178-662C  | 178-642C                                 |
|                             | 120V AC  | 178-660A                                      | 178-640A                                 | 178-661A   | 178-641A  | 178-662A  | 178-642A                                 |
|                             | 220V AC  | 178-660D                                      | 178-640D                                 | 178-661D   | 178-641D  | 178-662D  | 178-642D                                 |
|                             | 240V AC  | 178-660E                                      | 178-640E                                 | 178-661E   | 178-641E  | 178-662E  | 178-642E                                 |
| Measuring force of detector | 0.75mN   | 4mN   | 0.75mN                                   | 4mN  | 0.75mN  | 4mN   |  |
| Vertical travel             | —  |   | 300mm<br>Power column                    |  | 300mm<br>Manual column  |   |  |
| Granite base size (WxD)     | —  |   | 610x450mm                                |  | 610x450mm   |   |  |
| Traverse range              | 50mm   |   | —  |  | 100mm   |   |  |
| Traverse linearity          | 0.3μm/50mm   |   | —  |  | 0.3μm/100mm   |   |  |
| Stylus speed                | Measuring  | 0.1mm/s, 0.2mm/s,<br>0.5mm/s, 1mm/s,<br>2mm/s |  | 0.02mm/s, 0.05mm/s,<br>0.1mm/s, 0.2mm/s,<br>0.5mm/s, 1mm/s,<br>2mm/s |   | 0.05mm/s, 0.1mm/s,<br>0.2mm/s, 0.5mm/s,<br>1mm/s, 2mm/s |  |
|                             |  | Positioning                                   | 0.5mm/s, 2mm/s,<br>Manual feed available |  | Can be adjusted with<br>joystick 0.1mm/s to<br>5mm/s, Manual feed<br>adjustment |   | 0.5mm/s, 2mm/s,<br>Manual feed available |
| Measuring range             | 8μm, 80μm, 800μm   |   | —  |  | —   |   |  |
| Detector                    | Type: Standard (178-396-2/178-397-2*)<br>Stylus: Diamond, 60°/90°* conical (tip radius: 2μm/5μm*)<br>Detecting method: Differential inductance |   |  |  |   |   |  |
| Data output                 | Via RS-232C interface  |   |  |  |   |   |  |
| Power supply                | Via AC adapter (100 - 240V AC, 150VA)  |   |  |  |   |   |  |
| Dimensions (WxDxH)**        | 263x82x144mm   |   | 710x50x905mm                             |  | 710x50x711mm  |   |  |
| Mass**                      | 2.8kg  |   | 130kg                                    |  | 140kg   |   |  |

\*4mN measuring force models  
\*\*Main unit only.

## Inch/Metric

| Model No.                   | SV-2000N2                       |   | SV-2000S2                                |   | SV-2000M4   |  |  |
|-----------------------------|---------------------------------|---|--|---|---|--|--|
| Order No.                   | 120V AC                         | 178-670A                                    | 178-650A                                 | 178-671A  | 178-651A  | 178-672A   | 178-652A                                 |
|                             | 220V AC                         | 178-670D                                    | 178-650D                                 | 178-671D  | 178-651D  | 178-672D   | 178-652D                                 |
|                             | 240V AC                         | 178-670E                                    | 178-650E                                 | 178-671E  | 178-651E  | 178-672E   | 178-652E                                 |
| Measuring force of detector | 0.75mN                          | 4mN   | 0.75mN                                   | 4mN   | 0.75mN  | 4mN  |  |
| Vertical travel             | —                               |   | 11.8" (300mm)<br>Power column            |   | 11.8" (300mm)<br>Manual column  |  |  |
| Granite base size (WxD)     | —                               |   | 24"x17.7"                                |   | 24"x17.7"mm   |  |  |
| Traverse range              | 2" (50mm)                       |   | —  |   | 4" (100mm)  |  |  |
| Traverse linearity          | 20μinch/2"                      |   | —  |   | 0.3μm/100mm   |  |  |
| Stylus speed                | Measuring                       | .004"/s, .008"/s,<br>.02"/s, .04"/s, .08"/s |  | .0008"/s, .002"/s,<br>.004"/s, .008"/s, .02"/s,<br>.04"/s, .08"/s |   | .002"/s, .004"/s, .008"/s,<br>.02"/s, .04"/s, .08"/s |  |
|                             |                                 | Positioning                                 | .02"/s, .08"/s,<br>Manual feed available |   | Can be adjusted with<br>joystick .004"/s to .2"/s,<br>Manual<br>feed adjustment |  | 0.5mm/s, 2mm/s,<br>Manual feed available |
| Measuring range             | 32000μinch, 3200μinch, 320μinch |   | —  |   | —   |  |  |

## Portable SV-2000N2



The SV-2000N2 model is provided with a carrying handle so it can be quickly and easily moved around on the shop-floor. The SV-2000N2 can easily perform measurements on cylinders with the optional cylinder attachment (997843).

## Add-on Unit for SV-2000N2/2000S2/3000M4 (optional)



The Add-on Unit is used to connect two or more kinds of motor-driven options, such as the Auto-leveling Table, Traverse Table, and Rolling Unit.

## SPECIFICATIONS

### Surftest SV-3000

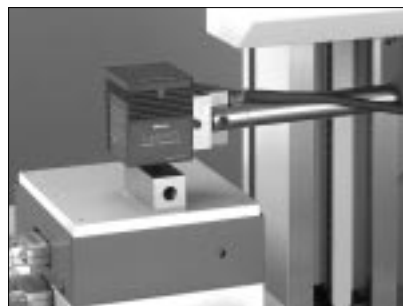
#### Metric

| Model No.                   | SV-3000S4  |  | SV-3000H4             |          | SV-3000W4      |          |          |
|-----------------------------|--|--|-----------------------|----------|----------------|----------|----------|
| Order No.                   | 100V AC  | 178-663  | 178-643               | 178-664  | 178-644        | 178-665  | 178-645  |
|                             | 110V AC  | 178-663C   | 178-643C              | 178-664C | 178-644C       | 178-665C | 178-645C |
|                             | 120V AC  | 178-663A   | 178-643A              | 178-664A | 178-644A       | 178-665A | 178-645A |
|                             | 220V AC  | 178-663D   | 178-643D              | 178-664D | 178-644D       | 178-665D | 178-645D |
|                             | 240V AC  | 178-663E   | 178-643E              | 178-664E | 178-644E       | 178-665E | 178-645E |
| Measuring force of detector | 0.75mN   | 4mN  | 0.75mN                | 4mN      | 0.75mN         | 4mN      |          |
| Vertical travel             | 300mm<br>Power column  |  | 500mm<br>Power column |          |                |          |          |
| Granite base size (WxD)     | 610x450mm  |  |                       |          | 1000x450mm     |          |          |
| Traverse range              | 100mm  |  |                       |          |                |          |          |
| Traverse linearity          | 0.05+1.5L/1000μm L=Measuring range   |  |                       |          |                |          |          |
| Stylus speed                | Measuring  | 0.02mm/s, 0.05mm/s, 0.1mm/s, 0.2mm/s, 0.5mm/s, 1mm/s, 2mm/s            |                       |          |                |          |          |
|                             | Positioning  | Can be adjusted with joystick 0.1mm/s to 5mm/s, Manual feed adjustment |                       |          |                |          |          |
| Measuring range             | 8μm, 80μm, 800μm   |  |                       |          |                |          |          |
| Detector                    | Type: Standard (178-396-2/178-397-2*)<br>Stylus: Diamond, 60°/90°* conical (tip radius: 2μm/5μm*)<br>Detecting method: Differential inductance |  |                       |          |                |          |          |
| Operating temperature       | 15°C to 25°C   |  |                       |          |                |          |          |
| Power supply                | Via AC adapter (100 - 240V AC, 50/60Hz)  |  |                       |          |                |          |          |
| Dimensions (WxDxH)**        | 710x450x905mm  |  | 710x450x1105mm        |          | 710x450x1111mm |          |          |
| Mass**                      | 140kg  |  | 150kg                 |          | 150kg          |          |          |

\*4mN measuring force models  
\*\*Main unit only

#### Inch / Metric

| Model No.                   | SV-3000S4                       |  | SV-3000H4                     |          | SV-3000W4 |          |          |
|-----------------------------|---------------------------------|--|-------------------------------|----------|-----------|----------|----------|
| Order No.                   | 100V AC                         | 178-673  | 178-653                       | 178-674  | 178-654   | 178-675  | 178-655  |
|                             | 120V AC                         | 178-673A   | 178-653A                      | 178-674A | 178-654A  | 178-675A | 178-655A |
|                             | 220V AC                         | 178-673D   | 178-653D                      | 178-674D | 178-654D  | 178-675D | 178-655D |
|                             | 240V AC                         | 178-673E   | 178-653E                      | 178-674E | 178-654E  | 178-675E | 178-655A |
| Measuring force of detector | 0.75mN                          | 4mN  | 0.75mN                        | 4mN      | 0.75mN    | 4mN      |          |
| Vertical travel             | 11.8" (300mm)<br>Power column   |  | 19.7" (500mm)<br>Power column |          |           |          |          |
| Granite base size (WxD)     | 24"x17.7"                       |  |                               |          | 40"x17.7" |          |          |
| Traverse range              | 4"                              |  |                               |          |           |          |          |
| Traverse linearity          | (2+1.5L)μinch L=Measuring range |  |                               |          |           |          |          |
| Stylus speed                | Measuring                       | .0008"/s, .002"/s, .004"/s, .008"/s, .02"/s, .04"/s, .08"/s            |                               |          |           |          |          |
|                             | Positioning                     | Can be adjusted with joystick .004"/s to .2"/s, Manual feed adjustment |                               |          |           |          |          |
| Measuring range             | 32000μinch, 3200μinch, 320μinch |  |                               |          |           |          |          |



Non-contact sensor unit can be attached to SV-3000 series (except SV-3000M4)

Order No. **178-067**  
**178-067C**  
**178-067A**  
**178-067D**





## SPECIFICATIONS

## Surftest SV-3000

## Metric

| Model No.                   | SV-3000S8  |  | SV-3000H8             |          | SV-3000W8       |          |          |
|-----------------------------|--|--|-----------------------|----------|-----------------|----------|----------|
| Order No.                   | 100V AC  | 178-666  | 178-646               | 178-667  | 178-647         | 178-668  | 178-648  |
|                             | 110V AC  | 178-666C   | 178-646C              | 178-667C | 178-647C        | 178-668C | 178-648C |
|                             | 120V AC  | 178-666A   | 178-646A              | 178-667A | 178-647A        | 178-668A | 178-648A |
|                             | 220V AC  | 178-666D   | 178-646D              | 178-667D | 178-647D        | 178-668D | 178-648D |
|                             | 240V AC  | 178-666E   | 178-646E              | 178-667E | 178-647E        | 178-668E | 178-648E |
| Measuring force of detector | 0.75mN   | 4mN  | 0.75mN                | 4mN      | 0.75mN          | 4mN      |          |
| Vertical travel             | 300mm<br>Power column  |  | 500mm<br>Power column |          |                 |          |          |
| Granite base size (WxD)     | 610x450mm  |  |                       |          | 1000x450mm      |          |          |
| Traverse range              | 200mm  |  |                       |          |                 |          |          |
| Traverse linearity          | 0.5µm/200mm  |  |                       |          |                 |          |          |
| Stylus speed                | Measuring  | 0.02mm/s, 0.05mm/s, 0.1mm/s, 0.2mm/s, 0.5mm/s, 1mm/s, 2mm/s            |                       |          |                 |          |          |
|                             | Positioning  | Can be adjusted with joystick 0.1mm/s to 5mm/s, Manual feed adjustment |                       |          |                 |          |          |
| Measuring range             | 8µm, 80µm, 800µm   |  |                       |          |                 |          |          |
| Detector                    | Type: Standard (178-396-2/178-397-2*)<br>Stylus: Diamond, 60°/90°* conical (tip radius: 2µm/5µm*)<br>Detecting method: Differential inductance |  |                       |          |                 |          |          |
| Operating temperature       | 15°C to 25°C   |  |                       |          |                 |          |          |
| Power supply                | Via AC adapter (100 - 240V AC, 50/60Hz)  |  |                       |          |                 |          |          |
| Dimensions (WxDxH)**        | 760x450x905mm  |  | 760x450x1105mm        |          | 1150x450x1111mm |          |          |
| Mass**                      | 145kg  |  | 155kg                 |          | 160kg           |          |          |

\*4mN measuring force models

\*\*Main unit only.

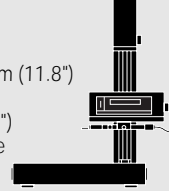
## Inch / Metric

| Model No.                   | SV-3000S8                       |  | SV-3000H8                     |          | SV-3000W8 |          |          |
|-----------------------------|---------------------------------|--|-------------------------------|----------|-----------|----------|----------|
| Order No.                   | 100V AC                         | 178-676  | 178-656                       | 178-677  | 178-657   | 178-678  | 178-658  |
|                             | 120V AC                         | 178-676A   | 178-656A                      | 178-677A | 178-657A  | 178-678A | 178-658A |
|                             | 220V AC                         | 178-676D   | 178-656D                      | 178-677D | 178-657D  | 178-678D | 178-658D |
|                             | 240V AC                         | 178-676E   | 178-656E                      | 178-677E | 178-657E  | 178-678E | 178-658E |
| Measuring force of detector | 0.75mN                          | 4mN  | 0.75mN                        | 4mN      | 0.75mN    | 4mN      |          |
| Vertical travel             | 11.8" (300mm)<br>Power column   |  | 19.7" (500mm)<br>Power column |          |           |          |          |
| Granite base size (WxD)     | 24"x17.7"                       |  |                               |          | 40"x17.7" |          |          |
| Traverse range              | 8"                              |  |                               |          |           |          |          |
| Traverse linearity          | 20µinch/8"                      |  |                               |          |           |          |          |
| STylus speed                | Measuring                       | .0008"/s, .002"/s, .004"/s, .008"/s, .02"/s, .04"/s, .08"/s            |                               |          |           |          |          |
|                             | Positioning                     | Can be adjusted with joystick .004"/s to .2"/s, Manual feed adjustment |                               |          |           |          |          |
| Measuring range             | 32000µinch, 3200µinch, 320µinch |  |                               |          |           |          |          |

## A variety of models available for measuring requirements

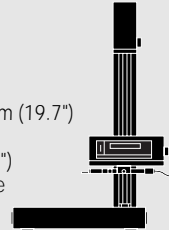
## SV-3000S4

Traverse range:  
100mm (4")  
Vertical travel: 300mm (11.8")  
Base size (WxD):  
610x450mm (24"x17.7")  
Base material: Granite



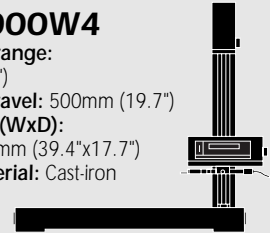
## SV-3000H4

Traverse range:  
100mm (4")  
Vertical travel: 500mm (19.7")  
Base size (WxD):  
610x450mm (24"x17.7")  
Base material: Granite



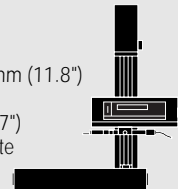
## SV-3000W4

Traverse range:  
100mm (4")  
Vertical travel: 500mm (19.7")  
Base size (WxD):  
1000x450mm (39.4"x17.7")  
Base material: Cast-iron



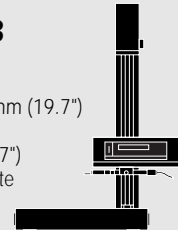
## SV-3000S8

Traverse range:  
200mm (8")  
Vertical travel: 300mm (11.8")  
Base size (WxD):  
610x450mm (24"x17.7")  
Base material: Granite



## SV-3000H8

Traverse range:  
200mm (8")  
Vertical travel: 500mm (19.7")  
Base size (WxD):  
610x450mm (24"x17.7")  
Base material: Granite



## SV-3000W8

Traverse range:  
200mm (8")  
Vertical travel: 500mm (19.7")  
Base size (WxD):  
1000x450mm (39.4"x17.7")  
Base material: Cast-iron



## OPTIONAL ACCESSORIES

| Order No. | Description  |
|-----------|--|
| 178-611   | Step gage (2μm, 10μm)                              |
| 178-612   | Step gage (2μm, 10μm, 79μinch, 394μinch)           |
| 178-610   | Metric 4-step gage (1μm, 2μm, 5μm, 10μm)           |
| 178-047   | Three-axis adjustment table (998291 is included.)  |
| 178-016   | Leveling table                                     |
| 178-042-1 | Digimatic XY leveling table (XY range: 25x25mm)    |
| 178-052-1 | Digimatic XY leveling table (XY range: 1"x1")      |
| 178-043-1 | XY leveling table (XY range: 25x25mm)              |
| 178-053-1 | XY leveling table (XY range: 1"x1")                |
| 178-019   | Precision vise*                                    |
| 998291    | Precision V-block*                                 |
| 181-902   | V-block set with clamp (Max. workpiece dia.: 25mm) |
| 181-901   | V-block set with clamp (Max. workpiece dia.: 1")   |
| 178-023   | Vibration isolator                                 |
| 178-024   | Stand for vibration isolator                       |
| 218-007   | Workbench  |
| 166-215   | Workbench (with drawers)                           |
| 218-010   | Auxiliary desk                                     |
| 218-008   | Auxiliary desk                                     |

\*Use with an XY leveling table

| Order No. | Description                                     |
|-----------|---|
| 178-027   | Auto-leveling Table (Table size: 130x100mm)     |
| 178-028   | Auto-leveling Table (Table size: 280x250mm)     |
| 178-044   | Surftest Traverse Table (Traverse range: 160mm) |
| 178-054   | Surftest Traverse Table (Traverse range: 6.3")  |
| 178-036   | Rolling Unit                                    |
| 998054    | Extension unit*                                 |
| 998055    | Add-on Unit**                                   |

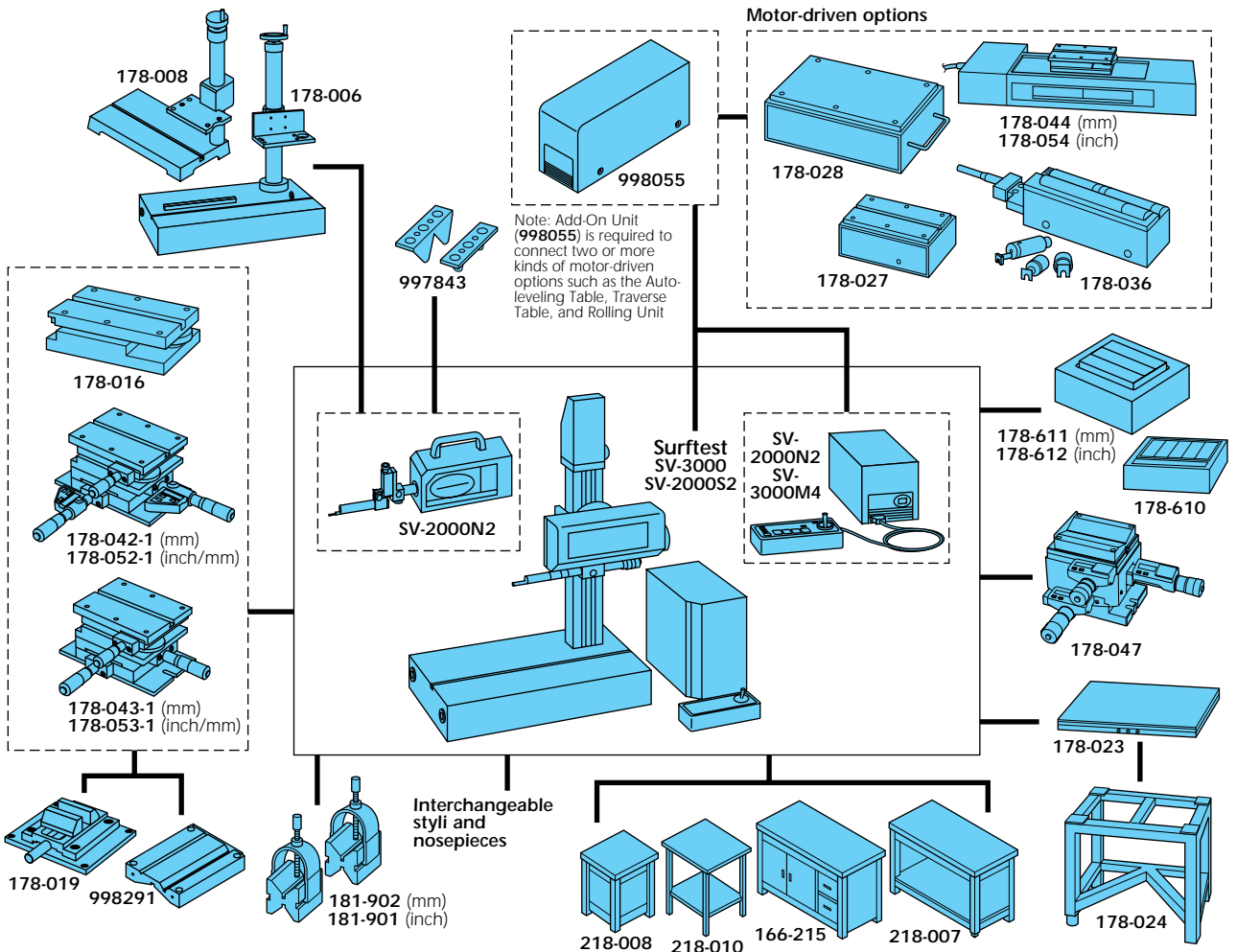
(See page 420.) **Detectors, styli, and nosepieces**

\*The Extension unit is required to connect up to two kinds of motor-driven options, such as the Auto-leveling table Traverse Table, and Rolling Unit, with the SV-2000N2/3000M4  
 \*\*The Add-on Unit is required to connect two more kinds of motor-driven options with SV-2000N2/2000S2/3000M4.

## OPTIONAL ACCESSORIES FOR SV-2000N2

| Order No. | Description                      |
|-----------|----------------------------------|
| 997843    | Cylinder attachment              |
| 178-006   | Column stand (Granite base type) |
| 178-008   | Column stand (Economy type)      |

## SYSTEM DIAGRAM



# Surftest SV-3000•3D

## SERIES 178

Surface Roughness Tester

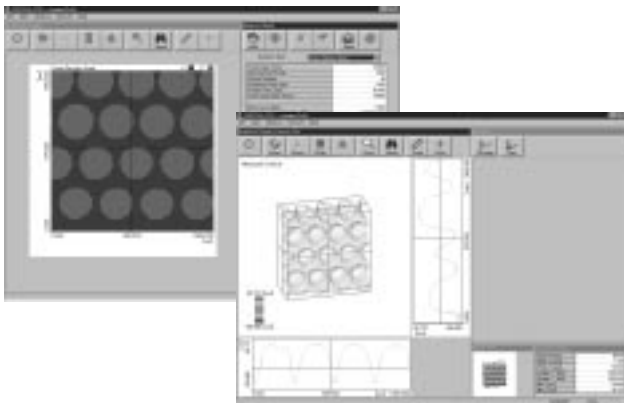


Non-contact sensor unit can be attached to SV-3000•3D

Order No. **178-067**  
**178-067C**  
**178-067A**  
**178-067D**

Surftest SV-3000•3D  
with optional accessories

The Surftest SV-3000•3D is a multi-functional system provided with SURFPAK-PRO, the software that measures, analyzes, and evaluates the texture of workpiece surfaces three-dimensionally. From various graphics and three-dimensional surface roughness parameter analyses to the volume and area measurements, a variety of surface contour evaluations can be performed freely. With this series, a selected cross-section can also be evaluated two-dimensionally.



## FEATURES

- High-accuracy glass scales are built-in on X- and Y-axes to insure high-accuracy positioning.
- The three-dimensional auto-leveling table greatly reduces the workpiece set-up time.
- Equipped with data compensation functions including R-plane (curved surface) compensation, tilt compensation, and polynomial automatic compensation for the elimination of irregular surface texture elements.
- The assessed profiles, calculation results, measuring conditions, and comments can be freely laid out and printed out as an "Evaluation Report".
- Fine contour analyzing software, FORMPAK-SV is available as an optional accessory. This program evaluates the fine texture of the workpiece surface that cannot be evaluated in the surface roughness parameters.

## SPECIFICATIONS

### Surftest SV-3000•3D

#### Metric

| Model No.                   | SV-3000S4•3D                                   |          | SV-3000H4•3D |          |          |
|-----------------------------|--|----------|--------------|----------|----------|
| Order No.                   | 100V AC  | 178-721  | 178-722      | 178-723  | 178-724  |
|                             | 120V AC  | 178-721A | 178-722A     | 178-723A | 178-724A |
|                             | 110V AC  | 178-721C | 178-722C     | 178-723C | 178-724C |
|                             | 220V AC  | 178-721D | 178-722D     | 178-723D | 178-724D |
|                             | 240V AC  | 178-721E | 178-722E     | 178-723E | 178-724E |
| Measuring force of detector | 0.75mN   | 4mN      | 0.75mN       | 4mN      |          |
| Vertical travel             | 125mm  |          |              |          |          |
| Traverse range              | 100mm  |          |              |          |          |
| Traverse linearity          | 0.05+1.5L/1000µm                               |          |              |          |          |
| Measuring speed             | 0.02mm/s - 2mm/s (7-step)                      |          |              |          |          |
| Measuring range             | 8µm, 80µm, 800µm                               |          |              |          |          |
| Detector                    | Standard detector: <b>178-396-2/178-397-2*</b> |          |              |          |          |
| Analysis software           | <b>SURFPAK-PRO</b>                             |          |              |          |          |
| Operating temperature       | 15°C to 25°C                                   |          |              |          |          |
| Power supply                | 100 - 240V AC, 50/60Hz                         |          |              |          |          |
| Dimensions (WxDxH)          | 710x450x905mm                                  |          |              |          |          |
| Mass                        | 170kg  |          |              |          |          |

\*4mN measuring force models

#### Inch/Metric

| Model No.                   | SV-3000S4•3D   |          | SV-3000H4•3D |          |          |
|-----------------------------|--|----------|--------------|----------|----------|
| Order No.                   | 100V AC  | 178-731  | 178-732      | 178-733  | 178-734  |
|                             | 120V AC  | 178-731A | 178-732A     | 178-733A | 178-734A |
|                             | 220V AC  | 178-731D | 178-732D     | 178-733D | 178-734D |
|                             | 240V AC  | 178-731E | 178-732E     | 178-733E | 178-734E |
| Measuring force of detector | 0.75mN   | 4mN      | 0.75mN       | 4mN      |          |
| Vertical travel             | 4.9" (125mm)   |          |              |          |          |
| Traverse range              | 4" (100mm)   |          |              |          |          |
| Traverse linearity          | 8µinch/4"  |          |              |          |          |
| Measuring speed             | .0008"/s - .08"/s (7-step)                           |          |              |          |          |
| Measuring range             | 320µinch (8µm), 3200µinch (80µm), 32000µinch (600µm) |          |              |          |          |

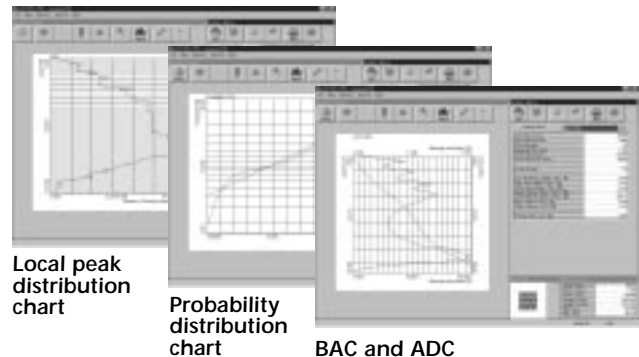
SURFPAK-PRO provides a variety of graphics methods and evaluation parameters for various surface texture evaluations from the three-dimensional data.

### SURFPAK-PRO 2-D Analysis Functions

|                             |   |
|-----------------------------|---|
| Assessed profiles           | P, R, WC, WCA, WE, WEA, DIN4776 profile, envelope residual profile, roughness motif, waviness motif   |
| Evaluation parameters       | Ra, Rq, Rz, Ry, Rz(JIS), Ry(DIN), Rc, Rp, Rpmax, Rpi, Rv, Rvmax, Rvi, Rt, Rti, Rz, Rzzi, Rz, S, Pc (Ppi), Sm, HSC, mr, δc, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Δa, Δq, λa, λq, Sk, Ku, Lo, Lr, A1, A2<br>Roughness motif parameters: Wte, Rx, R, AR, SR, SAR, NR, NCRX, CPM<br>Waviness motif parameters: WTF, Wx, W, AW, SW, SAW, NW |
| Analysis graphs             | ADC, BAC1, BAC2, power spectrum chart, auto-correlation chart, Walsh power spectrum chart, Walsh auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart  |
| Digital filter              | 2CR-50%/75%, 2CR-50%/75% (phase corrected), Gaussian-50%  |
| Cutoff length               | λc: 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm<br>(.001", .003", .01", .03", .1", .3", 1")<br>fl: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm<br>(.003", .01", .03", .1", .3", 1")<br>fh: 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm<br>(.001", .003", .01", .03", .1", .3")  |
| Sampling length (L)         | 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm<br>(.001", .003", .01", .03", .1", .3", 1")  |
| Data compensation functions | Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, quadric curve automatic compensation, polynomial compensation, polynomial automatic compensation   |
| Recording magnifications    | Vertical: 100X - 500,000X<br>Horizontal: 1X - 10,000X   |

### SURFPAK-PRO 3-D Analysis Functions

|   |   |
|---|---|
| Three-dimensional evaluation parameters | Sa, Sq, Ssk, Sku, SΔq, Sλ, Sz, So, Sr, Sp, Sv, St, Ssy, etc.  |
| Filter functions                        | Moving average filter, Gaussian filter  |
| Three-dimensional trend compensation    | Plane compensation, sphere compensation, cylinder compensation, polyhedron compensation   |
| Three-dimensional analysis functions    | 3-D contour line display, cross-section analysis, BAC, ADC analysis, spectrum analysis, probability distribution analysis, local peak distribution analysis, parameter distribution analysis, slope enhancement |
| Cross-section sampling function         | A desired cross-section can be analyzed two-dimensionally.  |

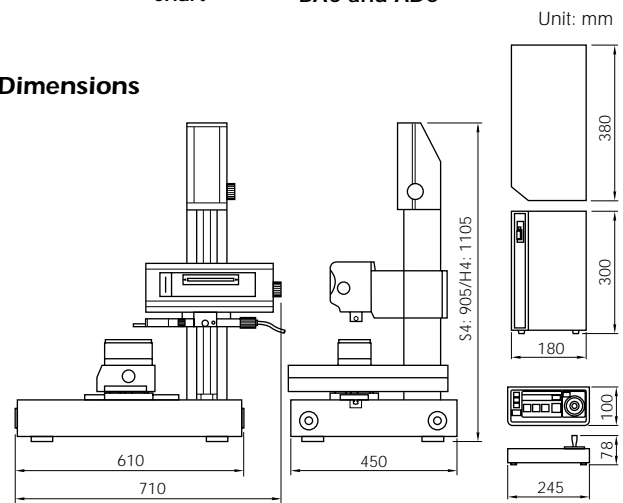


Local peak distribution chart

Probability distribution chart

BAC and ADC

### Dimensions



### 3-D Auto-leveling Table (Equipped as standard)



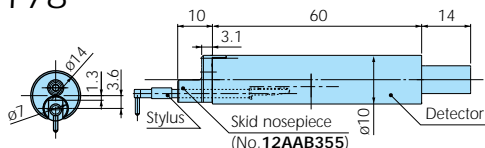
The 3-D auto-leveling table, which adjusts the level of the measuring surface of the workpiece automatically, is a standard accessory. This relieves the operator from the time-consuming manual adjustment that a conventional type machine would require, thus greatly improving work efficiency.

### 3-D Auto-leveling Table Specifications

|                           |  |
|---------------------------|--|
| Y-axis range              | 100mm (4")                               |
| Y-axis traverse linearity | 0.2μm/100mm (8μinch/4")                  |
| Traverse speed            | 5mm/s (.2"/s) max.                       |
| Resolution                | 0.001mm (.00004")                        |
| Feeding accuracy          | ±(2+2L/100)μm, L= Traversing length (mm) |
| Leveling range            | ±2° (for each direction)                 |
| Max. workpiece weight     | 10kg (22 lbs.)                           |

# Detectors, Styli and Nosepieces for Surfptest SV-2000/3000 and SJ-400

## SERIES 178



### Detector

| Order No. | Measuring force | Stylus                   |
|-----------|-----------------|--------------------------|
| 178-396-2 | 0.75mN          | 12AAC731(standard type)  |
| 178-397-2 | 4mN             | 12AAB403 (standard type) |



Using a small hole stylus



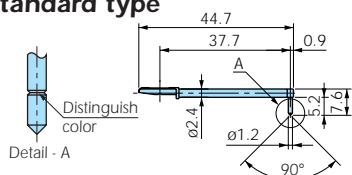
Using a deep groove stylus

Unit: mm

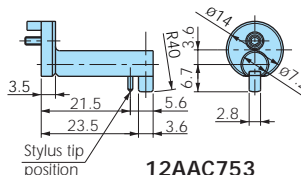
### Stylus

### Applicable skid nosepiece

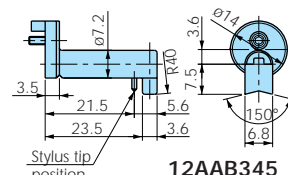
#### Standard type



- 12AAC731 (2μm)\*1
- 12AAB403 (5μm)
- 12AAB415 (10μm)
- ( ) : Tip radius

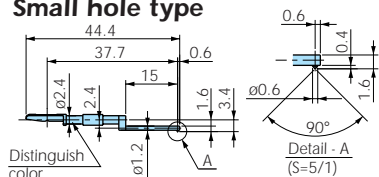


12AAC753

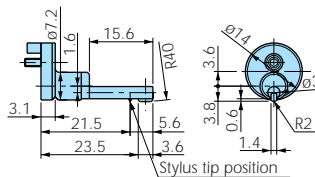


12AAB345

#### Small hole type

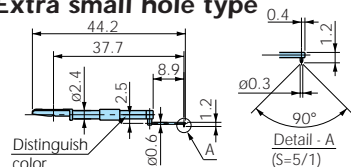


- 12AAC732 (2μm)\*1
- 12AAB404 (5μm)
- 12AAB416 (10μm)
- ( ) : Tip radius

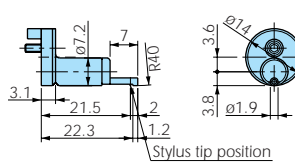


12AAC754

#### Extra small hole type

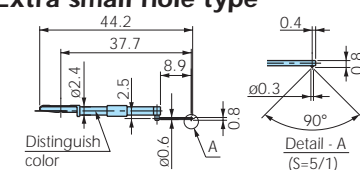


- 12AAC733 (2μm)\*1
- 12AAB405 (5μm)
- 12AAB417 (10μm)
- ( ) : Tip radius



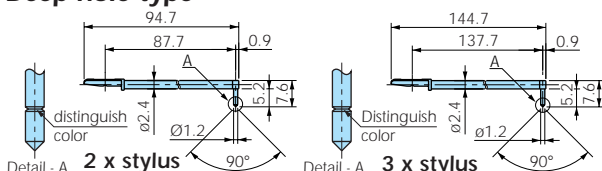
12AAB347

#### Extra small hole type



- 12AAC734 (2μm)\*1
- 12AAB406 (5μm)
- 12AAB418 (10μm)
- ( ) : Tip radius

#### Deep hole type



- 2 x stylus
- 12AAC740 (2μm)
  - 12AAB413 (5μm)
  - 12AAB425 (10μm)
  - ( ) : Tip radius

- 3 x stylus
- 12AAC741 (2μm)\*1
  - 12AAB414 (5μm)
  - 12AAB426 (10μm)
  - ( ) : Tip radius

\*1 Tip angle is 60°

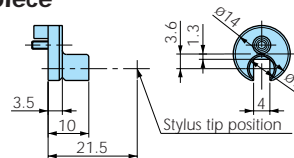
### Skidless nosepiece with stylus stopper

• Used for measuring a workpiece having grooves the depth of which exceeds the measuring range of the detector. The stylus stopper prevents the stylus from falling in the concavity.



12AAC867

### Skidless nosepiece



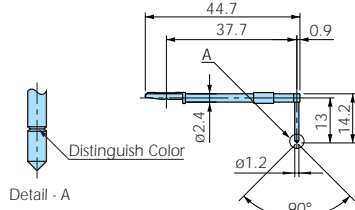
12AAB355

Unit: mm

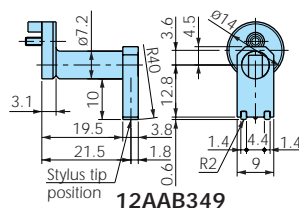
## Stylus

## Applicable skid nosepiece

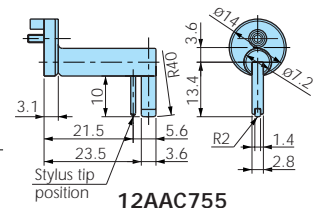
### Deep groove type\*2



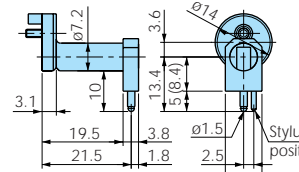
**12AAC735** (2μm)\*1  
**12AAB409** (5μm)  
**12AAB421** (10μm)  
 ( ) : Tip radius



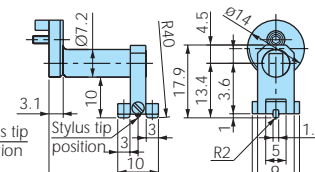
**12AAB349**



**12AAC755**

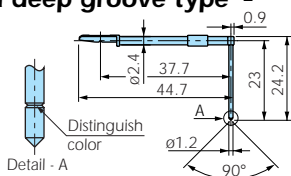


**12AAB351**

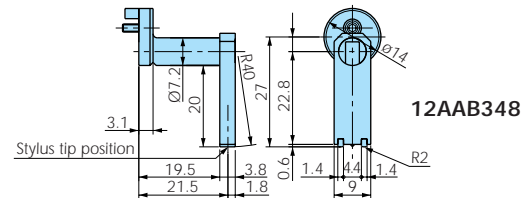


**12AAB352**

### Extra deep groove type\*2

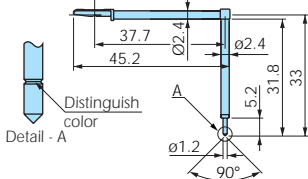


**12AAC736** (2μm)\*1  
**12AAB408** (5μm)  
**12AAB420** (10μm)  
 ( ) : Tip radius



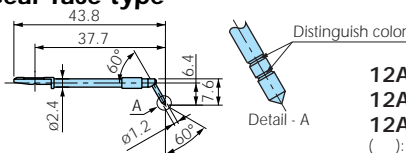
**12AAB348**

### Extra deep groove type\*2

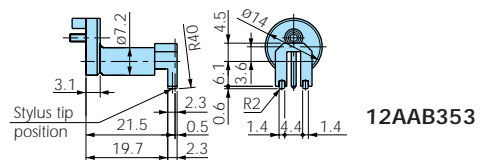


**12AAC737** (2μm)\*1  
**12AAB407** (5μm)  
**12AAB419** (10μm)  
 ( ) : Tip radius

### Gear face type

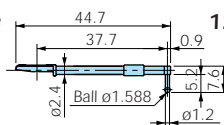


**12AAB339** (2μm)\*1  
**12AAB410** (5μm)  
**12AAB422** (10μm)  
 ( ) : Tip radius



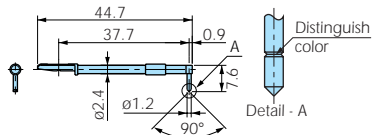
**12AAB353**

### WE-curve type

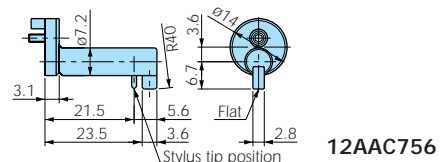


**12AAB338** (0.8mm)

### Knife edge type

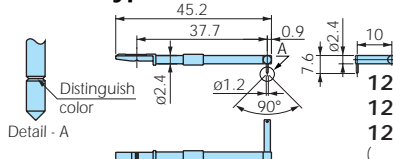


**12AAC738** (2μm)\*1  
**12AAB411** (5μm)  
**12AAB423** (10μm)  
 ( ) : Tip radius



**12AAC756**

### Eccentric type\*2



**12AAC739** (2μm)\*1  
**12AAB412** (5μm)  
**12AAB424** (10μm)  
 ( ) : Tip radius



12AAC763

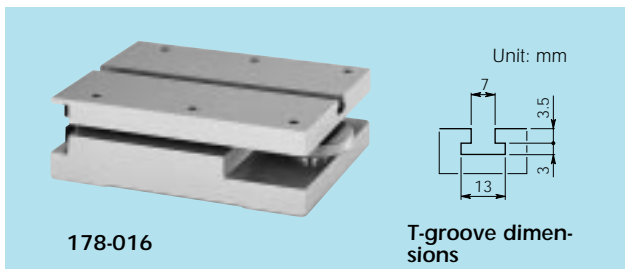
Detector right angle adapter  
 (SV-3000 series only)  
 • Applicable stylus: Standard stylus,  
 gear face stylus, WE-curve stylus

\*1 Tip angle is 60°

\*2 At using this stylus, measuring force of the detector does not guarantee.

# Leveling Table

## SERIES 178

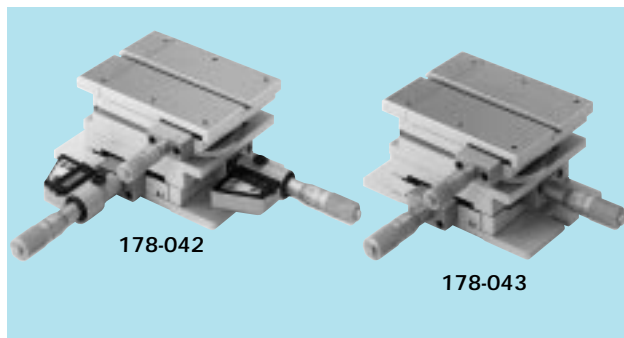


### SPECIFICATIONS

|                       |              |
|-----------------------|--------------|
| Order No.             | 178-016      |
| Table top size        | 130x100mm    |
| Max. workpiece weight | 15kg         |
| Leveling range        | ±1.5°        |
| Dimensions (WxDxH)    | 130x100x40mm |
| Mass                  | 3kg          |

# XY Leveling Tables

## SERIES 178



- Used to adjust the level of the measuring surface of the workpiece.
- The table swivels ±3°.
- Workpiece fixtures such as precision vice (178-019) and precision V-block (998291) can be mounted on the top.

### SPECIFICATIONS

#### Metric

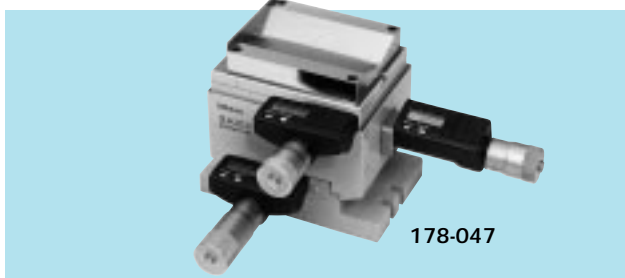
| Order No.             | 178-042      | 178-043-1    |
|-----------------------|--------------|--------------|
| Table top size        | 130x100mm    |              |
| Max. workpiece weight | 15kg         |              |
| Leveling range        | ±1.5°        |              |
| Swivel range          | ±3°          |              |
| XY range              | 25x25mm      |              |
| Micrometer head       | Digital      | Analog       |
| Resolution            | 0.001mm      | 0.01mm       |
| Dimensions (WxDxH)    | 262x233x83mm | 220x189x83mm |
| Mass                  | 6.3kg        | 6kg          |

#### Inch

| Order No.             | 178-052            | 178-053           |
|-----------------------|--------------------|-------------------|
| Table top size        | 5"x4"              |                   |
| Max. workpiece weight | 1533 lbs.          |                   |
| Leveling range        | ±1.5°              |                   |
| Swivel range          | ±3°                |                   |
| XY range              | 1"x1"              |                   |
| Micrometer head       | Digital            | Analog            |
| Resolution            | .00005"/0.001mm    | .001"             |
| Dimensions(WxDxH)     | 10.31"x9.17"x3.27" | 8.66"x7.44"x3.27" |
| Mass                  | 13.86 lbs.         | 13.2 lbs.         |

# 3-axis Adjustment Table

## SERIES 178

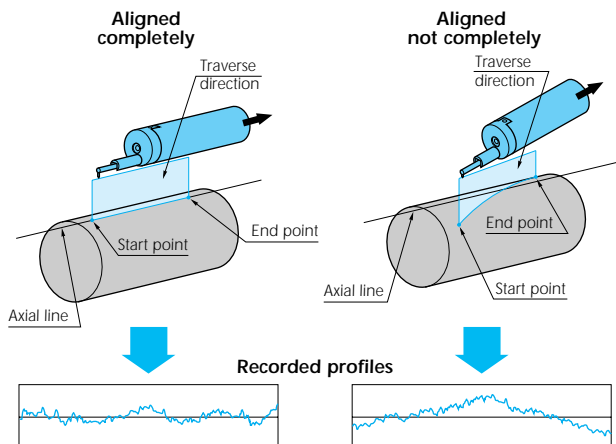


This table facilitates the straightness adjustment required for the measurement of cylindrical workpiece. When the amount for the workpiece angle and the swiveling angle is determined in a preliminary measurement, simply rotate the Digimatic micrometer attached for fine positioning of the workpiece. A flat-surface workpiece can also be leveled with this table.



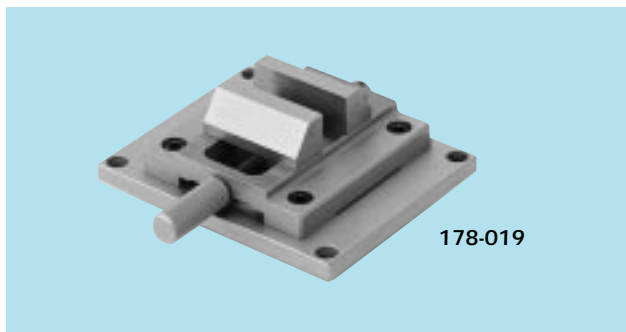
### SPECIFICATIONS

|                    |                                |
|--------------------|--------------------------------|
| Order No.          | 178-047                        |
| Table top          | 130x100mm                      |
| Workpiece weight   | 15kg at max.                   |
| Workpiece diameter | 1mm to 160mm                   |
| Leveling range     | ±1.5°                          |
| Swivel range       | ±2°                            |
| Y-axis adjustment  | ±12.5mm                        |
| Height             | 152.5mm                        |
| Mass               | 9kg                            |
| Remarks            | V-block (998291) is provided.s |



## Precision Vise

SERIES 178

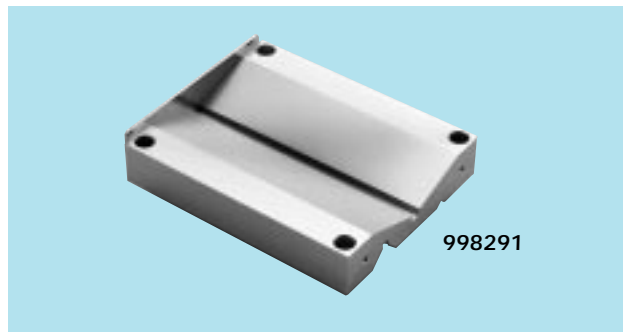


Can be mounted on a leveling table, XY leveling tables and Auto-leveling Tables.

### SPECIFICATIONS

| Order No. | Maximum workpiece dia. | Width of jaw | Mass  |
|-----------|------------------------|--------------|-------|
| 178-019   | 36mm                   | 44mm         | 1.2kg |

## Precision V-Block



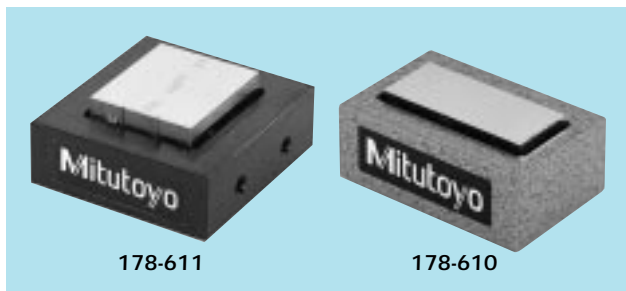
Can be mounted on a leveling table, XY leveling tables and Auto-leveling Tables.

### SPECIFICATIONS

| Order No. | Workpiece diameter for three V-grooves | Mass  |
|-----------|--|-------|
| 998291    | Ø1 - 6mm, Ø6 - 20mm, Ø20 - 160mm       | 1.2kg |

## Surftest Step Gages

SERIES 178



These gages are used to calibrate the vertical magnification of the Surftest.

### SPECIFICATIONS

| Order No.          | 178-611*   | 178-610             |
|--------------------|------------|---------------------|
| Steps              | 2µm, 10µm  | 1µm, 2µm, 5µm, 10µm |
| Dimensions (WxDxH) | 46x49x23mm | 46x30x20mm          |
| Mass               | 230g       | 100g                |

\*Inch/metric gage (178-612) is also available with steps of 79µinch, 394µinch in addition to the steps of 2µm and 10µm.

## Vibration Isolator

SERIES 178



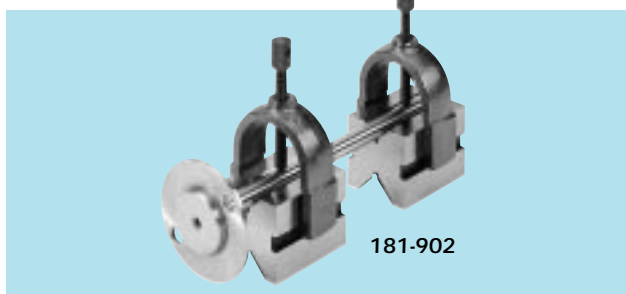
The air-supported isolator minimizes the effect of ambient vibration during roughness measurement. An optional stand (178-024) is also available.

### SPECIFICATIONS

| Order No.             | 178-023       |
|-----------------------|---------------|
| Max. workpiece weight | 200kg         |
| Natural frequency     | Approx. 3.0Hz |
| Dimensions (WxDxH)    | 750x550x57mm  |
| Mass                  | 30kg          |

## V-block Set

SERIES 181



- Two V-blocks per set.
- With a workpiece clamp for each block.

### SPECIFICATIONS

#### Metric

| Order No. | Maximum workpiece dia. | Width of block | Mass  |
|-----------|------------------------|----------------|-------|
| 181-902   | 25mm                   | 41mm           | 0.3kg |

#### Inch

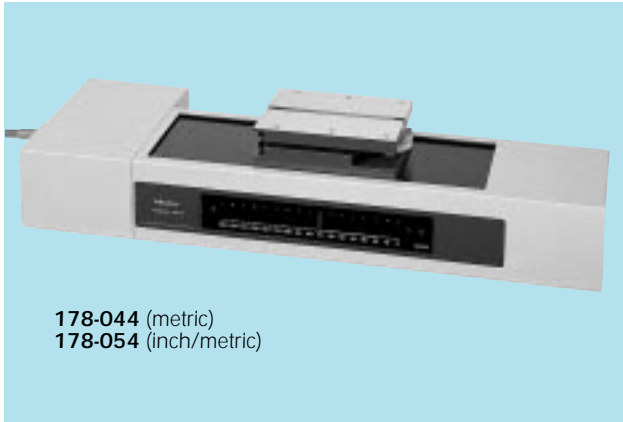
| Order No. | Maximum workpiece dia. | Width of block | Mass     |
|-----------|------------------------|----------------|----------|
| 181-901   | 1"                     | 1.61"          | .66 lbs. |





## Surftest Traverse Table

SERIES 178



178-044 (metric)  
178-054 (inch/metric)

The Traverse Table is used for measuring workpieces whose dimensions exceed the traverse range of the Surftest. It moves the workpiece, and extends the tracing range up to 160mm (6.3").

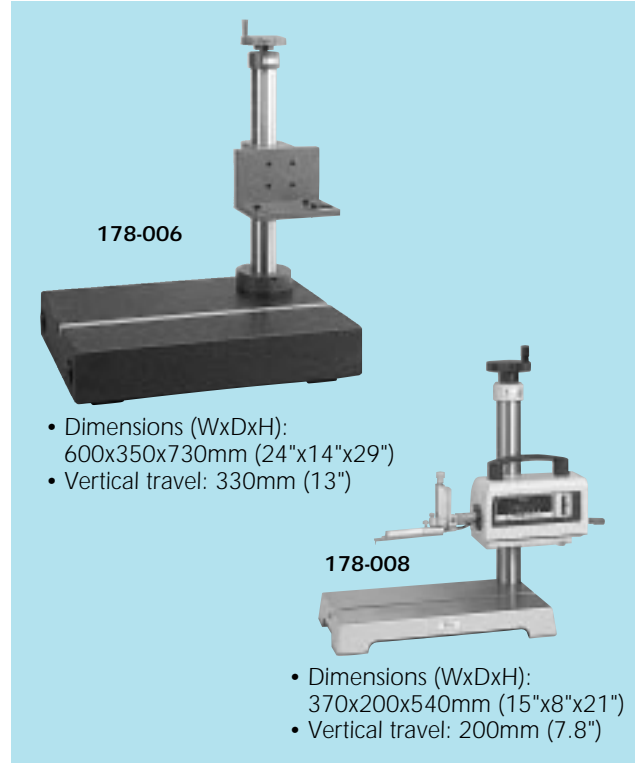
### SPECIFICATIONS

#### Surftest Traverse Table

| Order No.           | 178-044  | 178-054 |
|---------------------|--|---------|
| Traverse range      | 160mm  | 6.3"    |
| Table top           | 130x100mm  | 5"x4"   |
| Leveling range      | ±1.5°  |         |
| Max. workpiece load | 10kg (22 lbs.)   |         |
| Linearity           | 0.5µm (19.6µin)  |         |
| Traverse speed      | 0.05mm/s, 0.5mm/s, 2mm/s (.002"/s, .02"/s, .08"/s) for measuring 0.5mm/s, 4mm/s (.02"/s, .16"/s) for positioning |         |
| Dimensions (WxDxH)  | 535x185x117mm (21.16"x7.28"x4.61")   |         |

## Column stand for SV-2000N2

SERIES 178



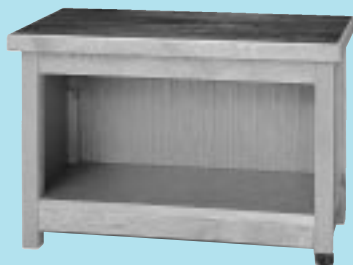
178-006

- Dimensions (WxDxH): 600x350x730mm (24"x14"x29")
- Vertical travel: 330mm (13")

178-008

- Dimensions (WxDxH): 370x200x540mm (15"x8"x21")
- Vertical travel: 200mm (7.8")

## Workbenches



### Adjustable workbench

- Dimensions (WxDxH): 1000x500x660mm (40"x20"x26")

218-007



### Auxiliary desk

- Dimensions (WxDxH): 400x500x660mm (16"x20"x26")

218-008

### Adjustable workbench

- Dimensions (WxDxH): 1200x750x670mm (48"x30"x27")



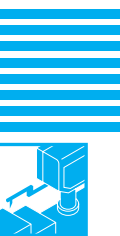
166-215

### Auxiliary desk

- Dimensions (WxDxH): 550x500x700mm (22"x20"x28")

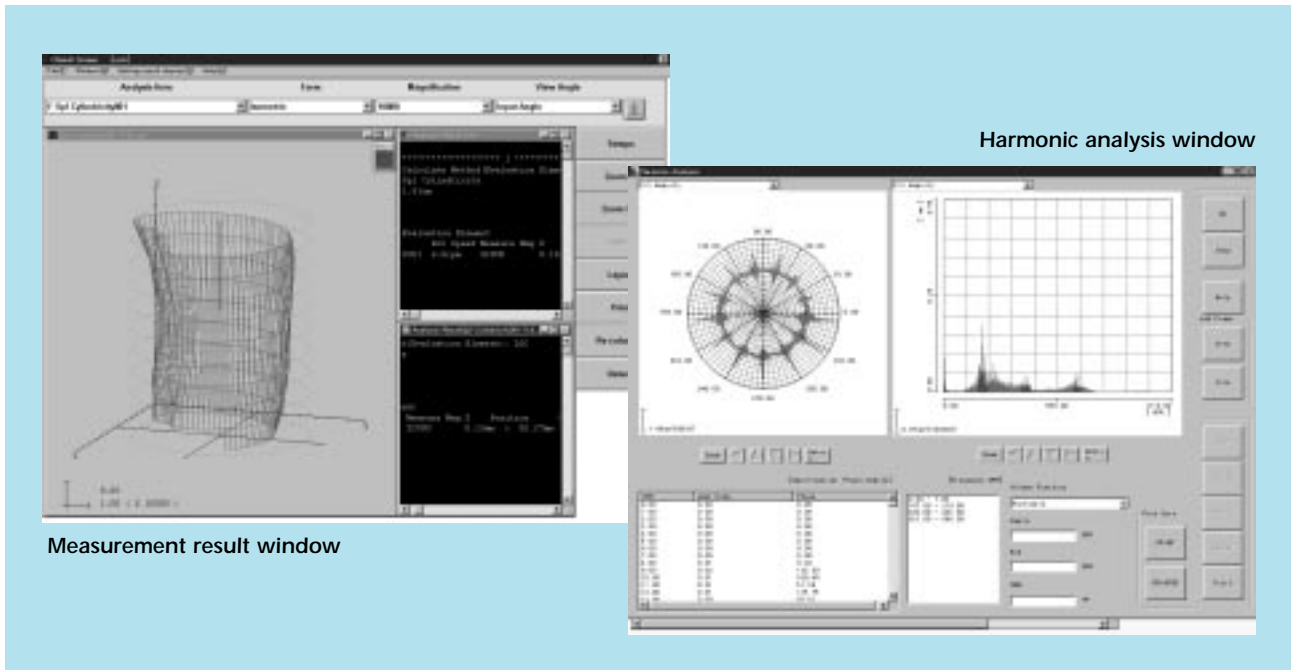


218-010



# ROUNDPAK

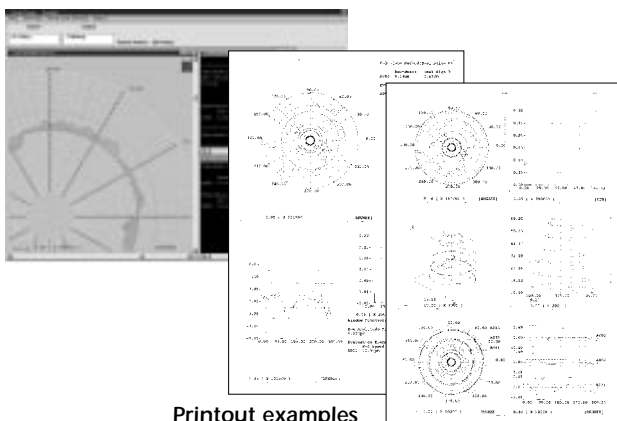
## Data Analysis Software for Roundtest



ROUNDPAK is a dedicated PC software for Mitutoyo Roundtest. It is Windows® based, and provides advanced data processing capabilities for roundness analysis, including simplified measurement function, intuitive three-dimensional screen display of measurement results, a variety of analysis features, graphs, and digital filters. In addition, the optional printer allows the creation of sophisticated, data-rich reports and certificates.

### FEATURES

- Frequently used measurement conditions can be organized as an icon on the screen. Clicking the icon makes a part program, etc. active.
- Graphs of multiple cross-sections can be displayed on the monitor. The zoom function allows image expansion for easy viewing.
- A variety of 3-D displays are available from multiple view points.
- The data layout function eliminates tedious cutting and pasting operations when creating a report or an inspection certificate.
- Once the measured data is logged into memory, the operator is able to perform recalculation on the measured data by changing parameters.



Printout examples

### SPECIFICATIONS

#### ROUNDPAK

|  |  |
|--|--|
| Data analysis items                              | <p><b>Items obtained through table rotation:</b><br/>Roundness, concentricity, co-axiality (between two sections), co-axiality (between two axes), radius deviation, cylindricity, simplified cylindricity, mean cylindricity, thickness deviation (in radial direction), thickness deviation (in axial direction), parallelism (between two elements), parallelism (in multiple elements), diameter, squareness (to section), squareness (to axis), flatness, flatness (in multiple elements), circular runout (in radial direction), circular runout (in axial direction), total runout (in radial direction), total runout (in axial direction)</p> <p><b>Items obtained through arm's horizontal travel and column's vertical travel:</b><br/>Straightness (vertical), straightness (horizontal), inclination (vertical), inclination (horizontal), co-axiality, taper, cylindricity, squareness, parallelism (vertical), parallelism (horizontal)</p> <p><b>Items obtained through spiral scanning:</b><br/>Cylindricity, flatness, co-axiality, squareness, total runout</p> |
| Reference circles                                | LSC, MZC, MIC, MCC   |
| Variation of displaying views                    | Top view, opened view, side view, inclined view, overlooked view   |
| Recording magnification                          | 100X to 100000X, Auto  |
| Digital filter                                   | 2CR-50%/75%, 2CR-50%/75% (phase corrected), Gaussian-50%   |
| Filter types                                     | Low-pass filter, high-pass filter, band-pass filter  |
| Cutoff value (Arbitrary value can be specified.) | <ul style="list-style-type: none"> <li>• Rotation/spiral measurement: 15upr, 50upr, 150upr, 500upr</li> <li>• Vertical/horizontal measurement: 0.25mm, 0.8mm, 2.5mm, 8mm, .01", .03", .1", .3"</li> </ul>  |

Note: Functions listed above vary on some models of Roundtest.

## A VARIETY OF MEASUREMENT/ANALYSIS FEATURES

| Mode                   | Analysis item                     | Procedure | Result |
|------------------------|-----------------------------------|-----------|--------|
| ROTATIONAL MEASUREMENT | ROUNDNESS (LSC/MZC/MIC/ MCC)      |           |        |
|                        | FLATNESS (SINGLE-CIRCUMFERENCE)   |           |        |
|                        | FLATNESS (MULTIPLE-CIRCUMFERENCE) |           |        |
|                        | SQUARENESS (AGAINST AXIS)         |           |        |
|                        | SQUARENESS (AGAINST PLANE)        |           |        |
|                        | CONCENTRICITY                     |           |        |
|                        | COAXIALITY (OF SECTION)           |           |        |
|                        | COAXIALITY (OF AXIS)              |           |        |
|                        | PARALLELISM (SINGLE-RADIUS)       |           |        |
|                        | PARALLELISM (MULTIPLE-RADIUS)     |           |        |
|                        | THICKNESS DEVIATION (RADIAL)      |           |        |
|                        | THICKNESS DEVIATION (AXIAL)       |           |        |
|                        | CYLINDRICITY                      |           |        |
|                        | SIMPLIFIED CYLINDRICITY           |           |        |
|                        | MEAN CYLINDRICITY                 |           |        |
|                        | RADIUS VARIATION                  |           |        |
|                        | CIRCULAR RUN-OUT (RADIAL)         |           |        |
|                        | CIRCULAR RUN-OUT (AXIAL)          |           |        |
|                        | TOTAL RUN-OUT (RADIAL)            |           |        |
|                        | TOTAL RUN-OUT (AXIAL)             |           |        |
| DIAMETER MEASUREMENT   |                                   |           |        |

| Mode                       | Analysis item             | Procedure                 | Result |
|----------------------------|---------------------------|---------------------------|--------|
| RECTILINEAR MEASUREMENT    | STRAIGHTNESS (VERTICAL)   |                           |        |
|                            | STRAIGHTNESS (HORIZONTAL) |                           |        |
|                            | TAPER RATIO (VERTICAL)    |                           |        |
|                            | TAPER RATIO (HORIZONTAL)  |                           |        |
|                            | SLOPE (VERTICAL)          |                           |        |
|                            | SLOPE (HORIZONTAL)        |                           |        |
|                            | CYLINDRICITY              |                           |        |
|                            | SQUARENESS                |                           |        |
|                            | COAXIALITY                |                           |        |
|                            | PARALLELISM (VERTICAL)    |                           |        |
|                            | PARALLELISM (HORIZONTAL)  |                           |        |
|                            | CYLINDRICITY              |                           |        |
|                            | FLATNESS                  |                           |        |
|                            | COAXIALITY                |                           |        |
|                            | SPIRAL MEASUREMENT        | SQUARENESS (AGAINST AXIS) |        |
| SQUARENESS (AGAINST PLANE) |                           |                           |        |
| TOTAL RUN-OUT (RADIAL)     |                           |                           |        |
| TOTAL RUN-OUT (AXIAL)      |                           |                           |        |

## LOCATION OF THE WORKPIECE CENTER ON TURNTABLE

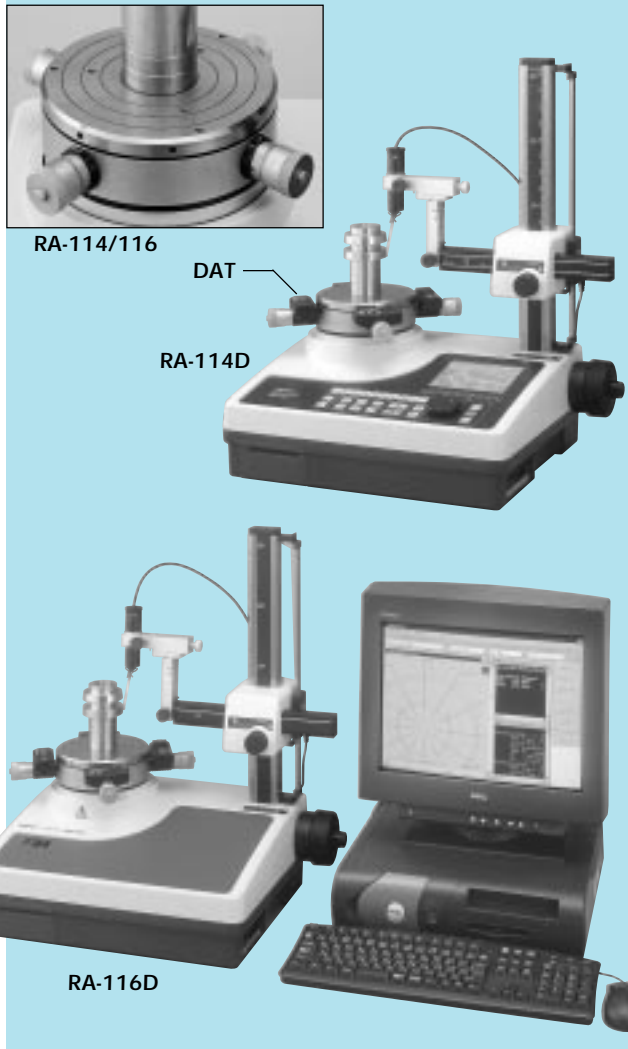
|                         |  |
|-------------------------|--|
| ECCENTRICITY COORDINATE |  |
| ECCENTRICITY ANGLE      |  |



# Roundtest RA-100

## SERIES 211

### Roundness Measuring Instruments



The RA-100 Series Roundtest is a compact, affordable, and simple-to-use device for measuring part geometry on the shop floor. It also provides such superb data analysis capabilities as required with laboratory roundness measuring instruments and has an excellent table rotation accuracy. The RA-114/114D is a dedicated processor based model which controls all operations via the control panel incorporated in the main unit; the RA-116/116D is a PC based model which controls all operations via ROUNDPAK software.

### FEATURES

- $\pm 1000\mu\text{m}$  wide range detector.
- Recalculation function.
- HELP function for centering and leveling reduces the time required for setting up a workpiece.
- The RA-114D/116D is provided with a DAT (Digital Adjustment Table) mechanism. The turntable digitally displays the centering and leveling adjustments, turning what used to be a difficult and finicky task into one that is simple enough for even untrained operator to perform.
- Easy-to-operate control panel, large clear backlit LCD, and high-speed graphic thermal printer (RA-114/114D).
- Measured data can be saved on a floppy disk and on the hard disk (RA-116/116D).

### SPECIFICATIONS

#### Roundtest RA-100

##### Metric

| Model No.               | RA-114  | RA-114D  | RA-116                   | RA-116D  |
|-------------------------|---|----------|--------------------------|----------|
| Order No.               | 100V AC   | 211-703K | 211-704K                 | 211-707K |
|                         | 110V AC   | 211-703C | 211-704C                 | 211-707C |
|                         | 120V AC   | 211-703A | 211-704A                 | 211-707A |
|                         | 220V AC   | 211-703D | 211-704D                 | 211-707D |
|                         | 240V AC   | 211-703E | 211-704E                 | 211-707E |
| Turntable               | Table top diameter: 150mm<br>Centering range: $\pm 3\text{mm}$<br>Leveling range: $\pm 1^\circ$<br>Rotating speed: 6rpm<br>Rotating accuracy: $(0.07+6H/10000)\mu\text{m}^*$<br>Maximum workpiece diameter: 440mm<br>Maximum workpiece weight: 20kg |          |                          |          |
| Max. probing diameter   | 280mm   |          |                          |          |
| Horizontal arm travel   | 165mm (including 25mm over the table center)  |          |                          |          |
| Vertical travel         | 280mm   |          |                          |          |
| Max. probing height     | 280mm   |          |                          |          |
| Max. probing depth      | 100mm   |          |                          |          |
| Detector                | Measuring range: $\pm 1000\mu\text{m}$<br>Measuring force: 70 - 100mN<br>Stylus: $\varnothing 1.6\text{mm}$ carbide sphere (12AAAB681)  |          |                          |          |
| Digital filter          | 2CR-75%/50%, 2CR-75%/50% (phase corrected), Gaussian-50%  |          |                          |          |
| Cutoff value            | Low-pass: 15upr, 50upr, 150upr, 500upr<br>Band-pass: 15-150upr, 15-500upr, 50-500upr<br>(Arbitrary values can be set on RA-116/116D.)   |          |                          |          |
| Reference circle        | LSC, MZC, MIC, MCC  |          |                          |          |
| Data analysis items     | Roundness, concentricity, co-axiality, circular runout, squareness, thickness deviation, flatness, parallelism, power spectrum chart*, gear tooth analysis*, harmonic analysis* (*RA-116/116D)  |          |                          |          |
| Recording magnification | 5X - 50,000X (13-step),<br>Auto   |          | 100X - 200,000X,<br>Auto |          |
| Display                 | LCD with back light   |          |                          |          |
| Printer                 | Thermal line printer  |          |                          |          |
| Air pressure            | 390kPa (4kgf/cm <sup>2</sup> )  |          |                          |          |
| Air consumption         | 45 liters per minute (normal state)   |          |                          |          |
| Power supply            | 100 - 240V AC   |          |                          |          |
| Dimensions (WxDxH)      | 450x360x620mm (main unit only)  |          |                          |          |
| Mass                    | 36kg (main unit only)   |          |                          |          |

\*H= Probing height (mm)

##### Inch/Metric

| Model No.             | RA-114   | RA-114D  | RA-116   | RA-116D  |
|-----------------------|--|----------|----------|----------|
| Order No.             | 100V AC  | 211-713  | 211-714  | 211-717  |
|                       | 120V AC  | 211-713A | 211-714A | 211-717A |
|                       | 220V AC  | 211-713D | 211-714D | 211-717D |
|                       | 240V AC  | 211-713E | 211-714E | 211-717E |
| Turntable             | Maximum workpiece diameter: 17.3"<br>Maximum workpiece weight: 44 lbs.<br>Rotating accuracy: $(2.8+0.6H)\mu\text{inch}^{**}$ |          |          |          |
| Max. probing diameter | 11.0"  |          |          |          |
| Horizontal arm travel | 6.5" (including 1" over the table center)  |          |          |          |
| Vertical travel       | 11.0"  |          |          |          |
| Max. probing height   | OD: 11.0"  |          |          |          |
| Max. probing depth    | ID: 3.9"   |          |          |          |
| Detector              | Measuring range: $\pm .04"$ ( $\pm 1000\mu\text{m}$ )  |          |          |          |

\*\*H= Probing height (inch)



### DAT (Digital Adjustment Table) function for RA-114D/116D

The turntable digitally displays the centering and leveling adjustments, turning what used to be a difficult and finicky task into one that is simple enough for even untrained operators to perform.

### OPTIONAL ACCESSORIES

| Order No.       | Description                                |
|-----------------|--|
| 356038*         | Auxiliary stage for a low-height workpiece |
| 211-016*        | Reference hemisphere                       |
| 211-045         | Magnification checking gage                |
| 997090          | Gauge block set for calibration            |
| 211-014         | Chuck (OD: 1 - 85mm, ID: 33 - 85mm)        |
| 211-032         | Quick chuck (OD: 1 - 75mm, ID: 14 - 70mm)  |
| 211-031         | Micro-chuck (OD: 1.5mm max.)               |
| (See page 433.) | <b>Interchangeable styli**</b>             |

\*Standard accessory for RA-114D/116D

\*\*2X-long and 3X-long styli are not available for the RA-100 Series.

### CONSUMABLE PARTS

| Order No. | Description               | Remarks      |
|-----------|---------------------------|--------------|
| 998698    | Printer paper (25m)       | 10 rolls/set |
| 358592    | Element for air filter    | 1 pc./set    |
| 358593    | Element for air regulator | 10 pcs./set  |

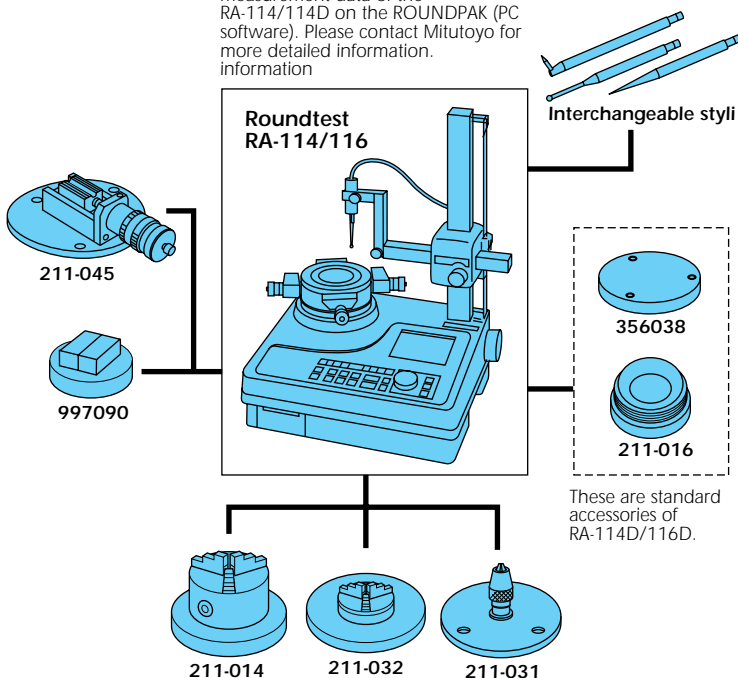
### Roundtest RA-114/114D is Perfect for Use at the Shop-floor.

Integration of the measuring unit, display unit, and printer allows easier system installation and transport. The RA-114/114D model is suitable for use at the production line. The RA-114D Type is equipped with Digimatic micrometer heads, a Digimatic scale unit, and a floppy disk drive unit for superior measurement efficiency.

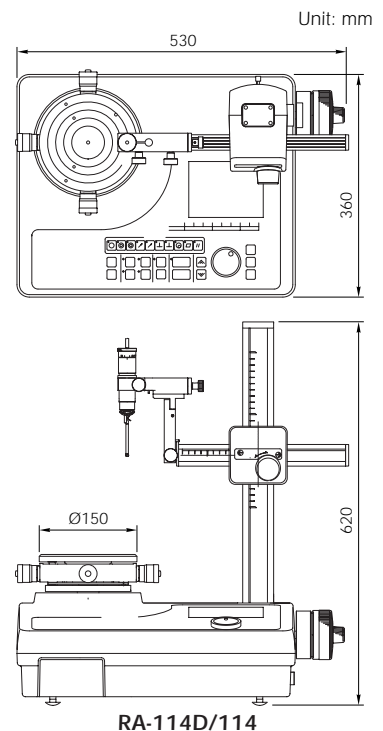


### SYSTEM DIAGRAM

Note: It is also possible to analyze the measurement data of the RA-114/114D on the ROUNDPAK (PC software). Please contact Mitutoyo for more detailed information.



### Dimensions



# Roundtest RA-1400/1500

## SERIES 211

### Roundness Measuring Instruments



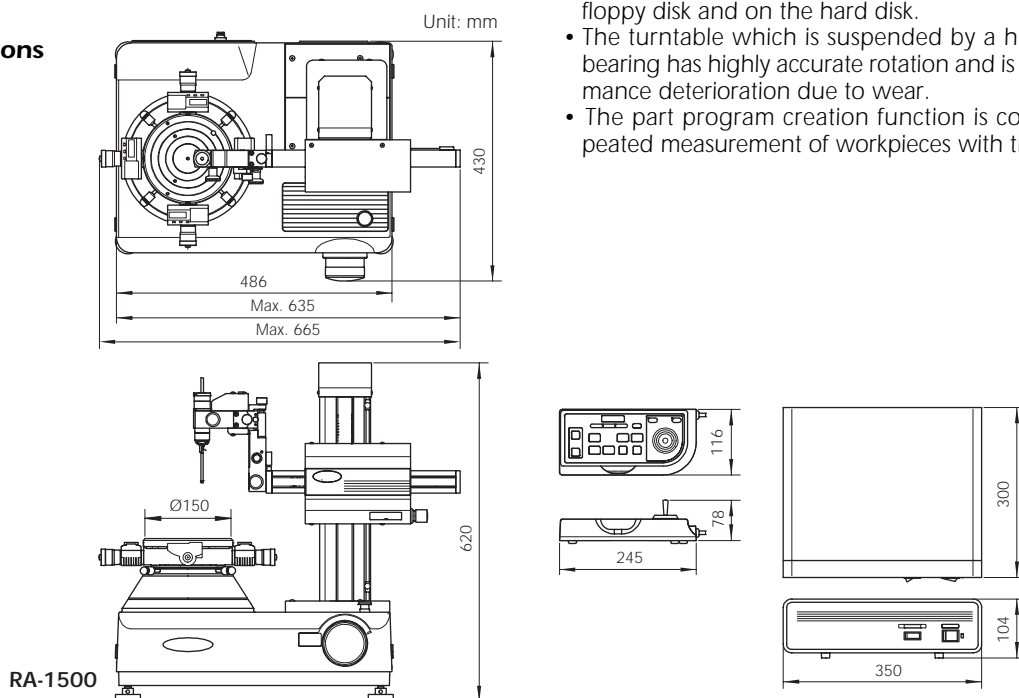
The RA-1400/1500 Series Roundtest is a roundness measuring system equipped with state-of-the-art technologies including a DAT (Digital Adjustment Table) mechanism which makes workpiece centering and leveling simple and speedy, an automatic measurement function, and an arc measuring function. Especially the RA-1500 Series Roundtest is provided with a high-precision power column unit for cylindricity/straightness measurement. The column unit, which has a

guaranteed accuracy (straightness) of 0.3 $\mu$ m/150mm, enables the analysis of cylindrical forms. Cylinders can be measured in the spiral scanning method for speedy measurement as well as the section measurement method.

### FEATURES

- They are a PC based system which control all operations via ROUNDPAK software. The analysis results can be clearly displayed on the color CRT. Measured data can be saved on a floppy disk and on the hard disk.
- The turntable which is suspended by a high-precision air bearing has highly accurate rotation and is free from performance deterioration due to wear.
- The part program creation function is convenient for repeated measurement of workpieces with the same shape.

### Dimensions



## SPECIFICATIONS

### Roundtest RA-1400/1500

#### Metric

| Model No.                   | RA-1400  | RA-1500  |
|-----------------------------|--|--|
| Order No.                   |  |  |
| 100V AC                     | 211-721  | 211-722  |
| 110V AC                     | 211-721C   | 211-722C   |
| 120V AC                     | 211-721A   | 211-722A   |
| 220V AC                     | 211-721D   | 211-722D   |
| 240V AC                     | 211-721E   | 211-722E   |
| Turntable                   | Table top diameter: 150mm<br>Centering range: ±3mm<br>Leveling range: ±1°<br>Rotating speed: 4rpm, 6rpm, 10rpm<br>Rotating accuracy: (0.02+6H/10000)μm*<br>Maximum workpiece diameter: 440mm<br>Maximum workpiece weight: 10kg |  |
| Max. probing diameter       | 100mm  |  |
| Horizontal arm travel       | 75mm   |  |
| Vertical travel             | 150mm  |  |
| Max. probing height         | OD 150mm<br>ID 150mm   |  |
| Straightness of column      | —  | 0.15μm/50mm (in narrow range)<br>0.3μm/150mm (in entire range) |
| Parallelism of column       | —  | 0.3μm/150mm  |
| Max. probing depth Detector | 90mm (When using a standard stylus)<br>Measuring range: ±400μm<br>Measuring force: 7 - 10mN<br>Stylus: Ø1.6mm carbide sphere (12AAB681)  |  |
| Cutoff filter               | Low-pass: 15upr, 50upr, 150upr, 500upr<br>Band-pass: 15-150upr, 15-500upr, 50-500upr   |  |
| Reference circle            | LSC, MZC, MIC, MCC   |  |
| Data analysis items         | Roundness, co-axiality, concentricity, circular runout, thickness deviation, squareness, flatness, parallelism, cylindricity*, straightness* (*RA-1500)  |  |
| Recording magnification     | 5X - 50,000X (13-step), Auto   |  |
| Magnification               | 100X - 50,000X (9-step)  |  |
| Air pressure                | 390kPa (4kgf/cm <sup>2</sup> )   |  |
| Air consumption             | 30 liters per minute (normal state)  |  |
| Power supply                | 100 - 240V AC  |  |
| Dimensions (WxDxH)**        | 635X430X620mm  | 635X430X620mm  |
| Mass**                      | 95kg   | 95kg   |

\* H= Probing height (mm)  
\*\* Main unit only

#### Inch/Metric

| Model No.              | RA-1400  | RA-1500   |
|------------------------|--|---|
| Order No.              |  |   |
| 100V AC                | 211-731  | 211-732   |
| 120V AC                | 211-731A   | 211-732A  |
| 220V AC                | 211-731D   | 211-732D  |
| 240V AC                | 211-731E   | 211-732E  |
| Turntable              | Table top diameter: 6μm<br>Centering range: ±.12"<br>Leveling range: ±1°<br>Rotating speed: 4rpm, 6rpm, 10rpm<br>Rotating accuracy: (.78+0.6H)μm*<br>Maximum workpiece diameter: 17.32"<br>Maximum workpiece weight: 22 lbs. |   |
| Max. probing diameter  | 4"   |   |
| Horizontal arm travel  | 3"   |   |
| Vertical travel        | 6"   |   |
| Max. probing height    | OD 6"<br>ID 6"   |   |
| Straightness of column | —  | 6μinch/1" (in narrow range)<br>12μinch/6" (in entire range) |
| Parallelism of column  | —  | 12μinch/6"  |

\*H= Probing height (inch)

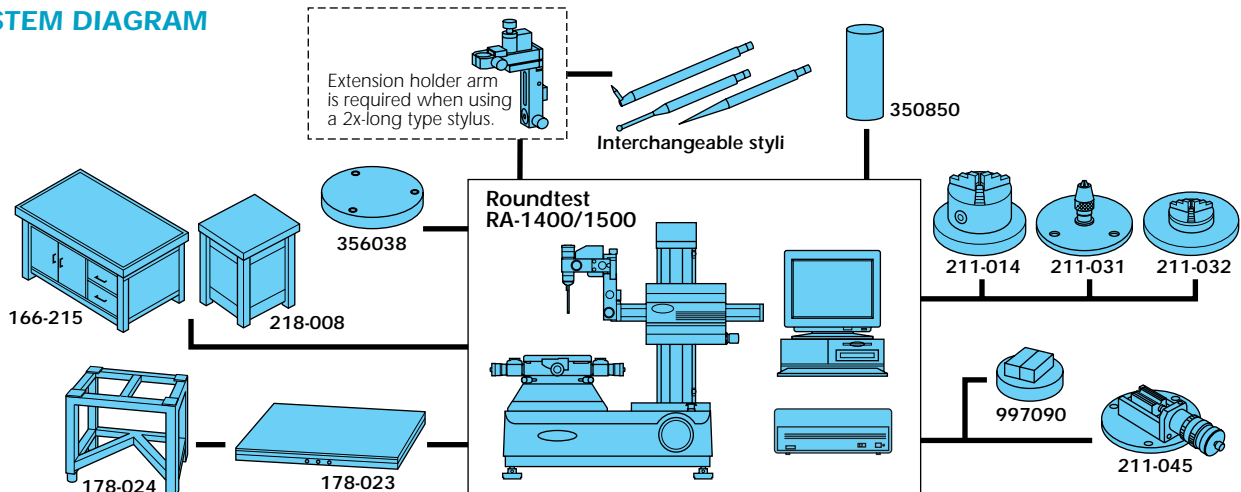
## OPTIONAL ACCESSORIES

| Order No.       | Description   |
|-----------------|---|
| 350850          | Cylindrical square                                    |
| 356038          | Auxiliary workpiece stand                             |
| 12AAB569        | Extension probe holder(2X higher)                     |
| 12AAB597        | Auxiliary probe holder for a large diameter workpiece |
| 211-045         | Magnification checking gage                           |
| 211-014         | Chuck (OD: 1 - 85mm, ID: 33 - 85mm)                   |
| 211-032         | Quick chuck (OD: 1 - 75mm, ID: 14 - 70mm)             |
| 211-031         | Micro-chuck (OD: 1.5mm max.)                          |
| 178-023         | Vibration isolator                                    |
| 178-024         | Stand for vibration isolator                          |
| 166-215         | Workbench (with drawers)                              |
| 218-008         | Auxiliary desk  |
| (See page 433.) | <b>Interchangeable styli</b>                          |

## CONSUMABLE PARTS

| Order No. | Description                                  | Remarks      |
|-----------|--|--------------|
| 356889    | Battery pack for memory backup <sup>††</sup> | 10 rolls/set |
| 358592    | Element for air filter                       | 1 pc.        |
| 358593    | Element for air regulator                    | 10 pcs./set  |

## SYSTEM DIAGRAM

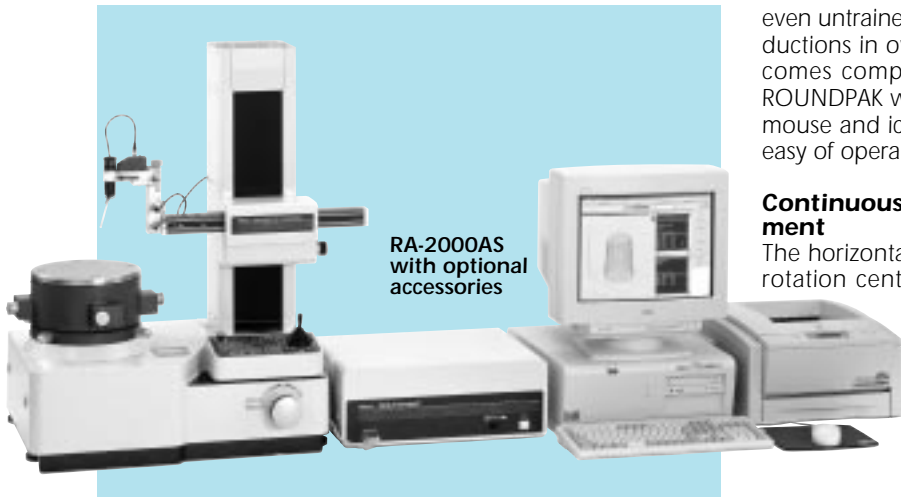




# Roundtest RA-2000

## SERIES 211

### Roundness Measuring System

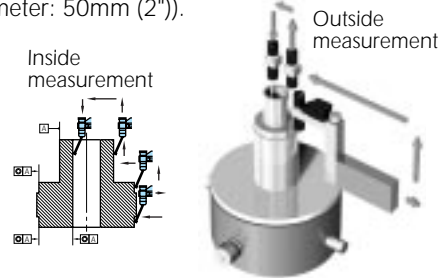


RA-2000AS with optional accessories

The RA-2000 provides a high accuracy, high speed and high performance in roundness measurement. The fully-automatic or a DAT (Digital Adjustment Table) function aided manual workpiece centering and leveling turns what used to be a difficult and finicky task into one that is simple enough for even untrained users to perform. This facilitates substantial reductions in overall measurement time. The RA-2000 system comes complete with a powerful data analysis software ROUNDPAK which requires only simple manipulation using a mouse and icon, achieving the enhanced functionality and ease of operation.

#### Continuous internal/external diameter measurement

The horizontal R-axis arm can traverse 25mm past the table rotation center, permitting continuous measurements on both internal and external features without manually changing the measuring direction of the probe (maximum measurable hole diameter: 50mm (2")).



### SPECIFICATIONS

#### Roundtest RA-2000AS/DS/AH/DH

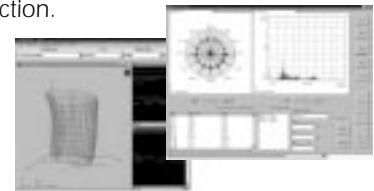
##### Metric

| Model No.              | RA-2000AS   | RA-2000DS                                    | RA-2000AH                                    | RA-2000DH                                    |
|------------------------|---|--|--|--|
| Order No.              | 110V AC<br>120V AC<br>220V AC<br>240V AC  | 211-841C<br>211-841A<br>211-841D<br>211-841E | 211-861C<br>211-861A<br>211-861D<br>211-861E | 211-842C<br>211-842A<br>211-842D<br>211-842E |
| Turntable              | Top diameter: 235mm (200mm: RA2000DS/DH)<br>Centering range: ±3mm (±5mm: RA-2000DS/DH)<br>Leveling range: ±1°<br>Rotating speed: 2rpm, 4rpm, 6rpm, 10rpm<br>Rotating accuracy: (0.02+6H/10000)µm*<br>Maximum workpiece diameter: 580mm<br>Maximum workpiece weight: 30kg  |  |  |  |
| Max. probing diameter  | 300mm   |  |  |  |
| Horizontal arm travel  | 175mm (including 25mm over the table center)  |  |  |  |
| Straightness of arm    | 1.0µm/150mm   |  |  |  |
| Vertical travel        | 280mm   |  | 480mm  |  |
| Straightness of column | 0.8µm/280mm   |  | 1.2µm/480mm                                  |  |
| Parallelism of column  | 1.0µm/280mm   |  | 1.7µm/480mm                                  |  |
| Max. probing height    | OD  | 280mm  |  | 480mm  |
|                        | ID  | 280mm  |  | 480mm  |
| Max. probing depth     | 100mm (when using a standard stylus)  |  |  |  |
| Detector               | Measuring range: ±300µm<br>Measuring force: 7 - 10mN<br>Stylus: Ø1.6mm carbide sphere (12AAB681)  |  |  |  |
| Digital filter         | 2CR-75%/50%, 2CR-75%/50% (phase corrected), Gaussian-50%  |  |  |  |
| Filter type            | Low-pass, high-pass, band-pass, non-filter  |  |  |  |
| Cutoff value           | 15upr, 50upr, 150upr, 500upr  |  |  |  |
| Reference circle       | LSC, MZC, MIC, MCC  |  |  |  |
| Data analysis items    | Roundness, diameter, diameter, concentricity, co-axiality, circular runout, total runout, cylindricity, radius deviation, thickness deviation, flatness, parallelism, squareness, taper, straightness, inclination, taper, tolerancing, graph analysis, power spectrum chart, gear tooth analysis, harmonic analysis, text data output (CSV format) |  |  |  |
| Magnification          | 100X - 100000X, Auto  |  |  |  |
| Air pressure           | 390kPa (4kgf/cm <sup>2</sup> )  |  |  |  |
| Air consumption        | 30 liters per minute (normal state)   |  |  |  |
| Power supply           | 100 - 240V AC, 50/60Hz  |  |  |  |
| Dimensions (WxDxH)**   | 667x475x900mm   |  | 667x475x1100mm                               |  |
| Mass**                 | 180kg   |  | 200kg  |  |

\*H=Probing height (mm) \*\*Main unit only

#### ROUNDPAK

Supports advanced roundness analysis with excellent operability. This software also includes the report creation function, automatic measurement function, recalculation function and graphic analysis function.



##### Inch/Metric

| Model No.              | RA-2000AS   | RA-2000DS                                   | RA-2000AH                                   | RA-2000DH                                   |
|------------------------|---|---|---|---|
| Order No.              | 100V AC<br>120V AC<br>220V AC<br>240V AC  | 211-851<br>211-851A<br>211-851D<br>211-851E | 211-871<br>211-871A<br>211-871D<br>211-871E | 211-852<br>211-852A<br>211-852D<br>211-852E |
| Turntable              | Top diameter: 9.2" (7.8": RA-2000DS/DH)<br>Centering range: ±.1" (±.19": RA-2000DS/DH)<br>Leveling range: ±1°<br>Rotating speed: 2rpm, 4rpm, 6rpm, 10rpm<br>Rotating accuracy: (0.8+0.6H)µinch***<br>Maximum workpiece diameter: 22.8"<br>Maximum workpiece weight: 66 lbs. |   |   |   |
| Max. probing diameter  | 11.8"   |   |   |   |
| Horizontal arm travel  | 6.9" (including 1" over the table center)   |   |   |   |
| Straightness of arm    | 39µinch/5.9"  |   |   |   |
| Vertical travel        | 11.0"   |   | 18.9"                                       |   |
| Straightness of column | 32µinch/11.02"  |   | 47µinch/18.9"                               |   |
| Parallelism of column  | 39µinch/11.02"  |   | 67µinch/18.9"                               |   |
| Max. probing height    | OD  | 11.0"                                       |   | 18.9"                                       |
|                        | ID  | 11.0"                                       |   | 18.9"                                       |
| Max. probing depth     | 4" (when using a standard stylus)   |   |   |   |
| Detector               | Measuring range: ±.012" (±300µm)  |   |   |   |

\*\*\*H= Probing height (inch)

#### CONSUMABLE PARTS

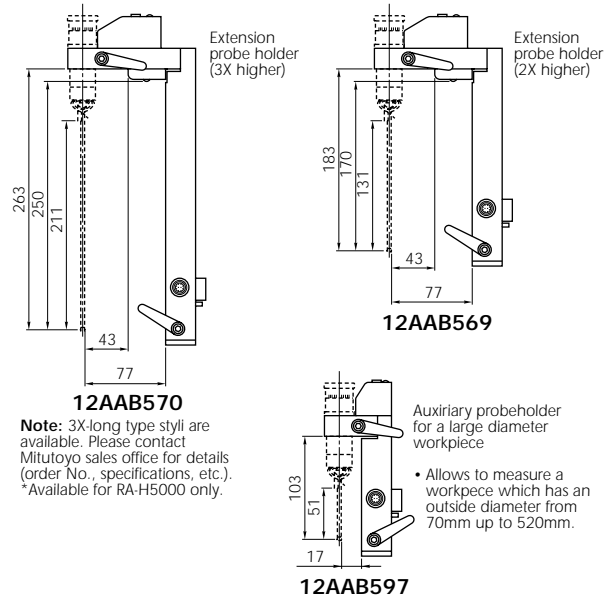
| Order No. | Description               | Remarks |
|-----------|---------------------------|---------|
| 358592    | Element for air filter    | 1 pc.   |
| 358593    | Element for air regulator | 1 pc.   |

## Interchangeable Styli for Roundtest



### Extension Holder Arms for RA-1400/1500/2000/H5000

Unit: mm



### SPECIFICATIONS

| Application                     | General purpose             | Notch                     | Groove                     | Corner                     | Cutter mark              | Small diameter hole       |
|---------------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|--------------------------|---------------------------|
| <b>Dimensions</b><br>(Unit: mm) | Ø1.6mm tungsten carbide tip | Ø3mm tungsten carbide tip | 0.25mm radius sapphire tip | 0.25mm radius sapphire tip | 15mm radius carbide tip  | Ø1mm tungsten carbide tip |
|                                 |                             |                           |                            |                            |                          |                           |
| <b>Order No.</b>                |                             |                           |                            |                            |                          |                           |
| Standard type                   | <b>12AAB681</b> (L= 66)     | <b>12AAB682</b> (L= 66)   | <b>12AAB683</b> (L= 66)    | <b>12AAB684</b> (L= 66)    | <b>12AAB686</b> (L= 66)  | <b>12AAB686</b> (L= 66)   |
| 2X-long type*                   | <b>12AAB688</b> (L= 146)    | <b>12AAB689</b> (L= 146)  | <b>12AAB690</b> (L= 146)   | <b>12AAB691</b> (L= 146)   | <b>12AAB692</b> (L= 146) | <b>12AAB693</b> (L= 146)  |

\*12AAB569 extension Holder Arm is required when using these long type styli. Vertical use only.  
\*Not available for RA-100

| Application                     | Extra-small diameter hole   | Ball                           | For Renishaw stylus  | Disk                        | Crank  | Crank  |
|---------------------------------|-----------------------------|--------------------------------|----------------------|-----------------------------|--|--|
| <b>Dimensions</b><br>(Unit: mm) | Ø0.5mm tungsten carbide tip | Ø1.6mm tungsten carbide sphere | With M2-thread mount | Ø12mm tungsten carbide disk | Ø1mm tungsten carbide tip Horizontal use only. | Ø0.5mm tungsten carbide tip Horizontal use only. |
|                                 |                             |                                |                      |                             |  |  |
| <b>Order No.</b>                |                             |                                |                      |                             |  |  |
| Standard type                   | <b>12AAB687</b>             | <b>12AAB674</b>                | <b>12AAB676</b>      | <b>12AAB694</b>             | <b>12AAB695</b>                                | <b>12AAB696</b>                                  |
| 2X-long type*                   | —                           | —                              | —                    | —                           | —  | —  |

\*12AAB569 extension Holder Arm is required when using these long type styli. Vertical use only.



# Roundtest RA-H5000

## SERIES 211

### Roundness Measuring System



The roundtest RA-H5000AS/AH has been developed by Mitutoyo to provide the world's greatest degree of accuracy in roundness measurement. High precision has been achieved without sacrificing speed through a process involving constant redesign, prototyping and experimentation. This development is based on Mitutoyo's years of experience in the industry, along with cutting-edge technology in the field of shape measurement.

#### Accuracy compensation function (Option)

Measured data generally includes various error factors, one of which is mechanical error (rotational accuracy and straightness) in the instrument itself. But the RA-H5000 Series has achieved the highest level of mechanical accuracy, and we at Mitutoyo believe it presents no problem in the evaluation of standard workpieces. However, when measuring a precision workpiece that requires an accuracy level equivalent to or greater than the measuring accuracy of the instrument, the mechanical error inherent in the instrument itself



PTB calibrated glass hemisphere (optional)

can be digitally compensated from the measurement data, thereby achieving to a workpiece shape that's much closer to a true value.



Reference data

Data without error compensation

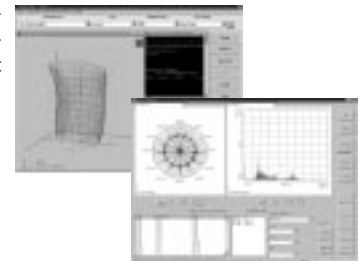
Data with error compensation

#### CONSUMABLE PARTS

| Order No. | Description                      | Remarks |
|-----------|----------------------------------|---------|
| 354320    | Element for air filter           | 1 pc.   |
| 354321    | Element for mist separator       | 1 pc.   |
| 354322    | Element for micro-mist separator | 1 pc.   |

#### ROUNDPAK

Supports advanced roundness analysis with excellent operability. This software also includes the report creation function, automatic measurement function, recalculation function and graphic analysis function.



#### SPECIFICATIONS

##### Roundtest RA-H5000AS/AH

###### Metric

| Model No.              | RA-H5000AS  |              | RA-H5000AH    |            |           |
|------------------------|---|--------------|---------------|------------|-----------|
| Order No.              | 110V AC   | 211-821C-2   | 211-821C*     | 211-822C-2 | 211-822C* |
|                        | 120V AC   | 211-821A-2   | 211-821A*     | 211-822A-2 | 211-822A* |
|                        | 220V AC   | 211-821D-2   | 211-821D*     | 211-822D-2 | 211-822D* |
|                        | 240V AC   | 211-821E-2   | 211-821E*     | 211-822E-2 | 211-822E* |
| Turntable              | Top diameter: 300mm<br>Centering range: ±5mm<br>Leveling range: ±1°<br>Rotating speed: 2rpm, 4rpm, 6rpm, 10rpm, 20rpm<br>Rotating accuracy: (0.02+4H/10000)µm**<br>Maximum workpiece diameter: 680mm<br>Maximum workpiece weight: 80kg (65kg when performing auto-centering function)   |              |               |            |           |
| Max. probing diameter  | 400mm   |              |               |            |           |
| Horizontal arm travel  | 225mm (including 25mm over the table center)  |              |               |            |           |
| Straightness of arm    | 0.5µm/200mm   |              |               |            |           |
| Vertical travel        | 350mm   | 550mm        |               |            |           |
| Straightness of column | 0.3µm/350mm   | 0.47µm/550mm |               |            |           |
| Parallelism of column  | 0.2µm/350mm   | 0.32µm/550mm |               |            |           |
| Max. probing height    | OD 350mm  | 550mm        |               |            |           |
|                        | ID 350mm  | 550mm        |               |            |           |
| Max. probing depth     | 100mm (when using a standard stylus)  |              |               |            |           |
| Detector               | Measuring range: ±300µm<br>Measuring force: 7 - 10mN<br>Stylus: Ø1.6mm carbide sphere (12AAB681)  |              |               |            |           |
| Digital filter         | 2CR-75%/50%, 2CR-75%/50% (phase corrected), Gaussian-50%  |              |               |            |           |
| Filter type            | Low-pass, high-pass, band-pass, non-filter  |              |               |            |           |
| Cutoff value           | 15upr, 50upr, 150upr, 500upr  |              |               |            |           |
| Reference circle       | LSC, MZC, MIC, MCC  |              |               |            |           |
| Data analysis items    | Roundness, diameter, concentricity, co-axiality, circular runout, total runout, cylindricity, radius deviation, thickness deviation, flatness, parallelism, squareness, taper, straightness, inclination, taper, tolerancing, graph analysis, power spectrum chart, gear tooth analysis, harmonic analysis, text data output (CSV format) |              |               |            |           |
| Magnification          | 100X - 100000X, Auto  |              |               |            |           |
| Air pressure           | 390kPa (4kgf/cm <sup>2</sup> )  |              |               |            |           |
| Air consumption        | 45 liters per minute (normal state)   |              |               |            |           |
| Power supply           | 100 - 240V AC, 50/60Hz  |              |               |            |           |
| Dimensions (WxDxH)**   | 944x672x1700mm  |              | 944x672x900mm |            |           |
| Mass**                 | 750kg   |              | 770kg         |            |           |

\*Set w/ standard stand

\*\*H=Probing height (mm)

\*\*\*Main unit with standard stand

## Inch / Metric

| Model No.              | RA-H5000AS   |            | RA-H5000AH     |            |           |
|------------------------|--|------------|----------------|------------|-----------|
| Order No.              | 100V AC  | 211-831-2  | 211-831*       | 211-832-2  | 211-832*  |
|                        | 120V AC  | 211-831A-2 | 211-831A*      | 211-832A-2 | 211-832A* |
|                        | 220V AC  | 211-831D-2 | 211-831D*      | 211-832D-2 | 211-832D* |
|                        | 240V AC  | 211-831E-2 | 211-831E*      | 211-832E-2 | 211-832E* |
| Turntable              | Top diameter: 11.8"<br>Centering range: ± 2"<br>Leveling range: ± 1"<br>Rotating speed: 2rpm, 4rpm, 6rpm, 10rpm, 20rpm<br>Rotating accuracy: (0.8+0.4H)μinch****<br>Maximum workpiece diameter: 26.7"<br>Maximum workpiece weight: 176 lbs. (143 lbs. when performing auto-centering function) |            |                |            |           |
| Max. probing diameter  | 15.7"  |            |                |            |           |
| Horizontal arm travel  | 8.8" (including 1" over the table center)  |            |                |            |           |
| Vertical travel        | 13.7"  |            | 21.6"          |            |           |
| Straightness of column | 12μinch/13.77"   |            | 19μinch/21.65" |            |           |
| Parallelism of column  | 8μinch/13.77"  |            | 13μinch/21.65" |            |           |
| Max. probing height    | OD   | 13.7"      |                | 21.6"      |           |
|                        | ID   | 13.7"      |                | 21.6"      |           |
| Max. probing depth     | 4" (when using a standard stylus)  |            |                |            |           |
| Detector               | Measuring range: ±.012" (±300μm)   |            |                |            |           |

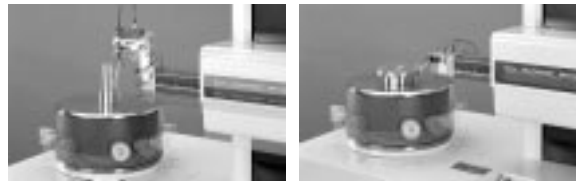
\*\*\*\*H= Probing height (inch)

## OPTIONAL ACCESSORIES

| Order No.       | Description                                       |
|-----------------|---|
| 350850          | Cylindrical square                                |
| 12AAB595        | Reference hemisphere with error compensation data |
| 211-045         | Magnification checking gage                       |
| 12AAB596        | Dynamic calibration gage                          |
| 211-014         | Chuck (OD: 1 - 85mm, ID: 33 - 85mm)               |
| 211-032         | Quick chuck (OD: 1 - 75mm, ID: 14 - 70mm)         |
| 211-031         | Micro-chuck (OD: 1.5mm max.)                      |
| 178-023         | Vibration isolator                                |
| 178-024         | Stand for vibration isolator                      |
| 166-215         | Workbench (with drawers)                          |
| 218-008         | Auxiliary desk                                    |
| (See page 433.) | <b>Extension probe holder</b>                     |
| (See page 433.) | <b>Interchangeable styli</b>                      |

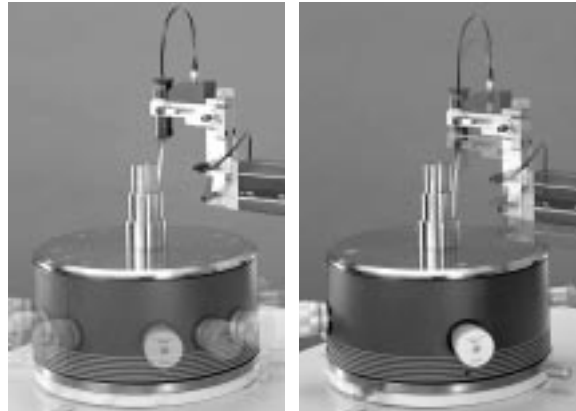
## Spiral measurement

Cylindricity and flatness can be measured in a spiral motion, combining table rotation and the rectilinear motions of the vertical column and horizontal arm. One single measurement accomplishes intermittent measurements over multiple cross-sections, and the measurement data is saved continuously. Compared to the conventional measurement by sectioning, the measurement time is greatly reduced while permitting detection of flaws on the circumference.

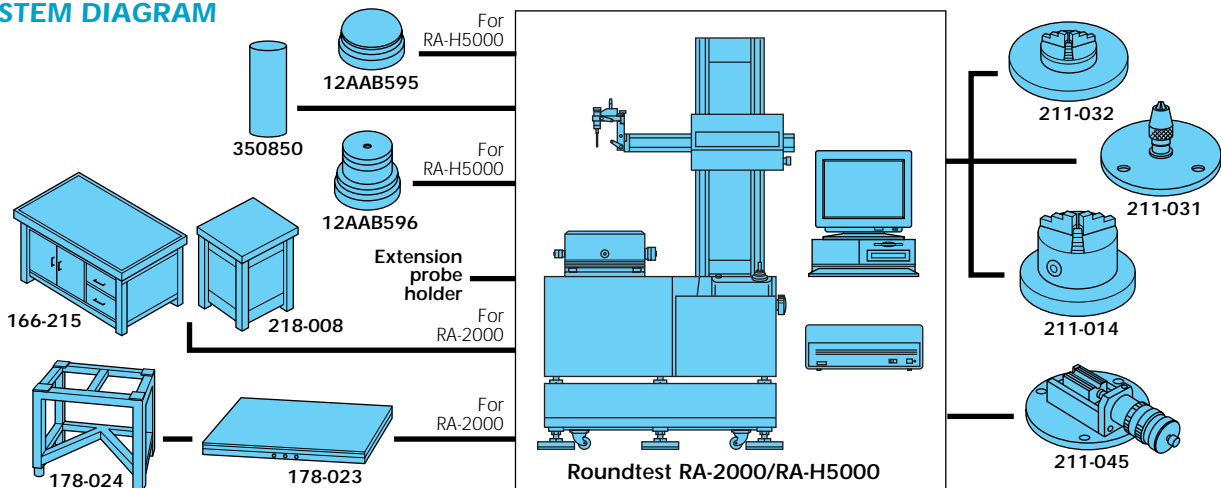


## Automatic positioning function for the turntable

This function allows the turntable to be rotated over a desired range, thereby permitting automatic rectilinear measurement of a cylindrical workpiece at a predetermined position.

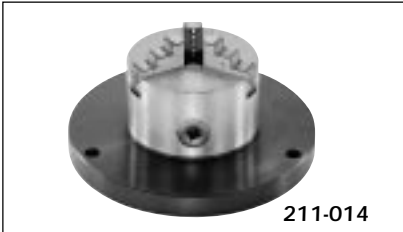


## SYSTEM DIAGRAM



# Accessories for Roundtest

## Chuck (Heavy-duty Type)



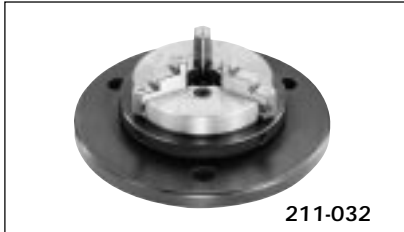
211-014

- Used for centering and clamping a small diameter workpiece.
- Clamping wrench is provided.

### SPECIFICATIONS

|                |                               |
|----------------|-------------------------------|
| Order No.      | 211-014                       |
| Clamping range | OD: 1 - 85mm<br>ID: 33 - 85mm |
| Mass           | 3.8kg                         |

## Quick Chuck



211-032

- Used for centering and clamping a small diameter workpiece.
- Knurled clamping ring is provided.

### SPECIFICATIONS

|                |                               |
|----------------|-------------------------------|
| Order No.      | 211-032                       |
| Clamping range | OD: 1 - 75mm<br>ID: 14 - 70mm |
| Mass           | 1.2kg                         |

## Micro-Chuck



211-031

- Used for clamping extra-small diameter workpieces such as pins or wires.

### SPECIFICATIONS

|                |                   |
|----------------|-------------------|
| Order No.      | 211-031           |
| Clamping range | OD: 1.5mm or less |
| Mass           | 620g              |

## Dynamic calibration gage



12AAB596

- Allows to perform quick calibration of the probe sensitivity.
- Roundness: 20-30µm
- Mass: 0.5kg

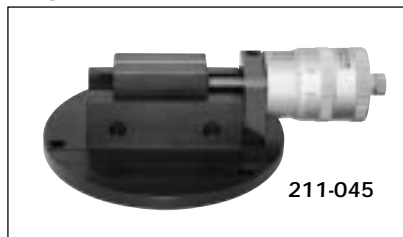
## Reference Hemisphere



211-016  
12AAB595

- Used for checking accuracy.
- Roundness: 0.08µm
- **12AAB595**: with error compensation data for RA-H5000

## Magnification Checking Gage



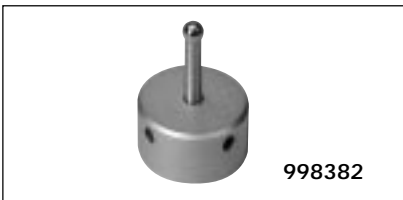
211-045

- Used for checking the probe sensitivity.

### SPECIFICATIONS

|            |         |
|------------|---------|
| Order No.  | 211-045 |
| Range      | 400µm   |
| Graduation | 0.2µm   |
| Mass       | 4kg     |

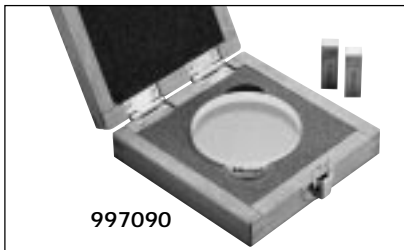
## Origin Point Gage



998382

- Used for setting an origin point when performing absolute measurements in the radial and the Z-axis directions.

## Gauge Block Set



997090

- Consists of 10.00mm and 10.02mm gauge blocks and an optical flat. This accessory is used for checking the probe sensitivity.

## Cylindrical Square



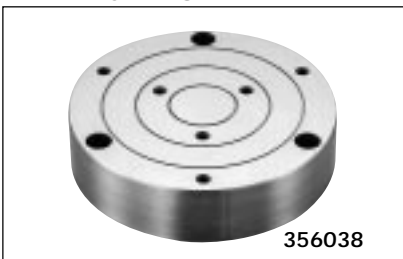
350850

- Used for checking the column squareness of RA-400/700 Series.

### SPECIFICATIONS

|              |        |
|--------------|--------|
| Order No.    | 350850 |
| Squareness   | 3µm    |
| Straightness | 1µm    |
| Cylindricity | 2µm    |
| Mass         | 7.5kg  |

## Auxiliary Stage

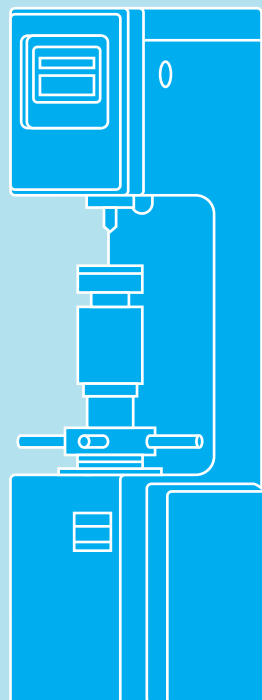
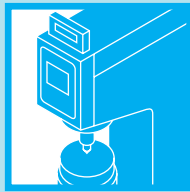


356038

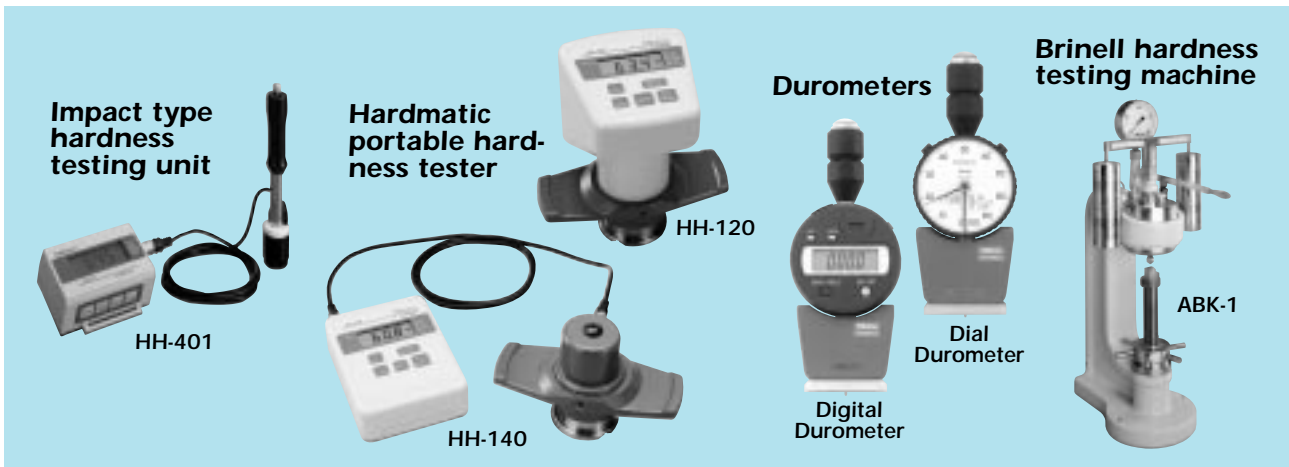
- Used for measuring a workpiece whose diameter is 40mm or shorter and whose height is 20mm or lower.

# Hardness Testing Machines

Pages 438 — 452



## Hardness Testing Machine Selection Guide

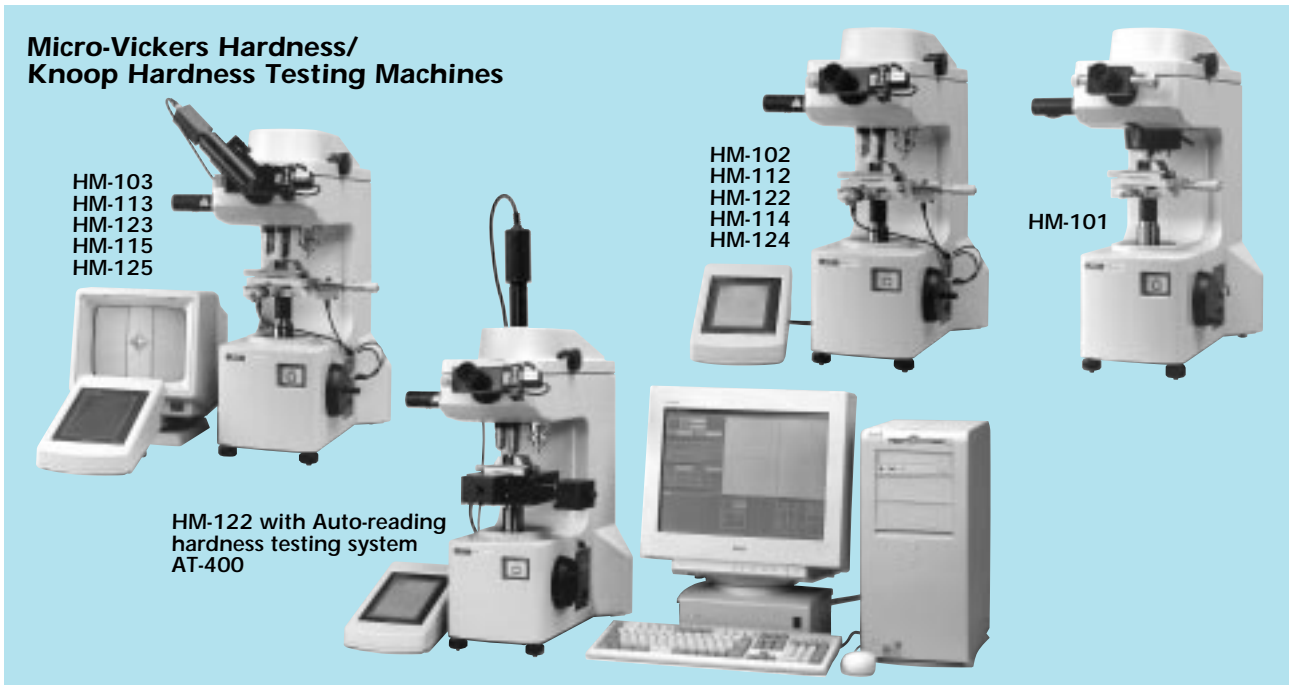


### Hardness and Hardness Measurement

Hardness is a measure of resistance of a material to deformation when an external force or load is applied to the material. There are several hardness scales, which use different methods of applying force and quantifying the resistance to deformation. Hardness is closely correlated to other mechanical characteristics. It is, like many other mechanical characteristics, a relative value that has no fundamental quantity or absolute standard and is different from physical quantities such as length, time, and force. Because of this, hardness values

are determined using a standard testing machine under standard conditions.

Today the most popular hardness scales are Brinell hardness (HB), Vickers hardness (HV), Rockwell hardness (HR), Rockwell superficial hardness (HR), and Knoop hardness (HK). All hardness tests determine hardness from the area of the indentation made in a specimen by the indenter under a known load.



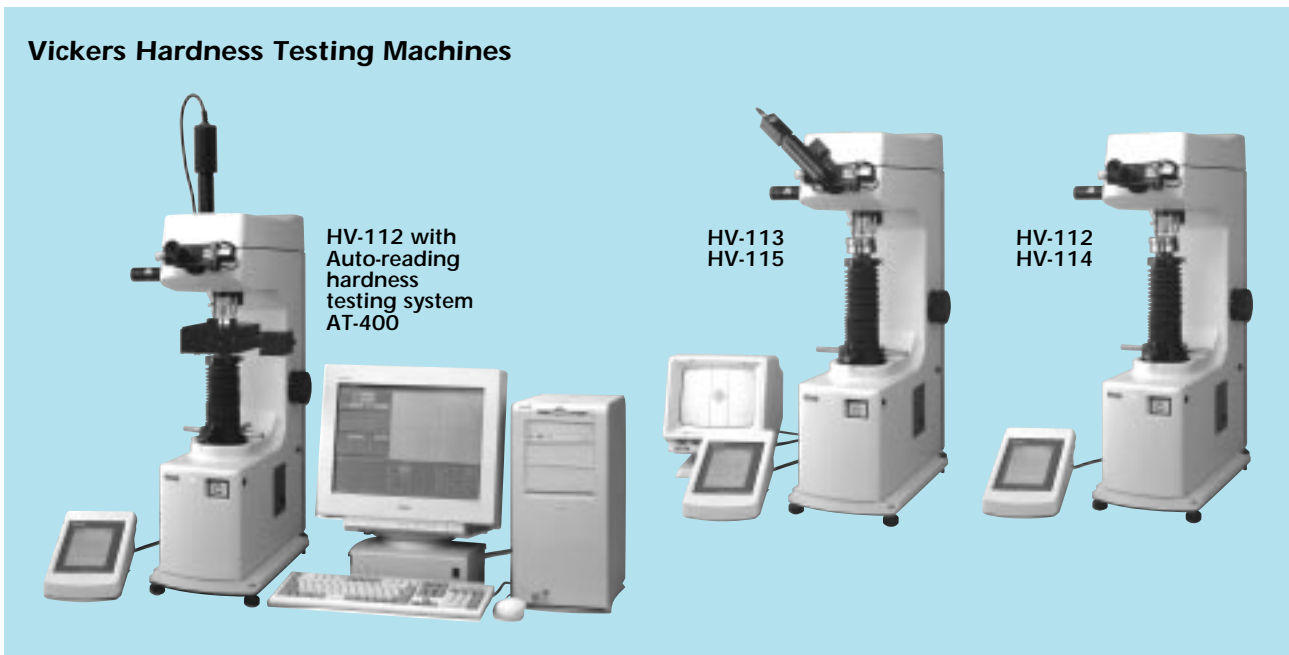
### FEATURES

- The Micro-Vickers hardness is suitable for testing the nature of the following materials.
  - i) IC wafer, steels, nonferrous metals.
  - ii) Thin plastic, metallic foils, plating, coating, surface layers, laminated metals.
  - iii) Effect of heat treatment and depths of carburized layer and flame hardened layer.

### HM-100 Series

| Model  | Range of test force                                 |
|--|---|
| HM-101, HM-102, HM-103, HM-131, HM-112, HM-113, HM-133, HM-122, HM-123, HM-135 | 98.07x10 <sup>-3</sup> - 9.807N<br>(HV0.01 - HV1)   |
| HM-114, HM-115, HM-134   | 9.807x10 <sup>-3</sup> - 19.61N<br>(HV0.001 - HV1)  |
| HM-124, HM-125   | 4.903x10 <sup>-3</sup> - 19.61N<br>(HV0.0005 - HV2) |

## Vickers Hardness Testing Machines



### FEATURES

- The Vickers hardness is suitable for testing the nature of the following materials.
  - Cemented carbide, ceramics, steels, nonferrous metals.
  - Thin plates, metallic foils, plating, miniature objects.
  - Material strength, effect of heat treatment, depths of carburized or decarburized layer and flame hardened layer, effect of hardening, and the hardness resulting from welding or deposition.

### HV-100 Series

| Model          | Range of test force              |
|----------------|----------------------------------|
| HV-112, HV-113 | 1.961 - 196.1N<br>(HV0.2 - HV20) |
| HV-114, HV-115 | 9.807 - 490.3N<br>(HV1 - HV50)   |

## Rockwell Hardness/Rockwell Superficial Hardness/Brinell Hardness Testing Machines



### FEATURES

- The Rockwell and Rockwell Superficial hardness are suitable for testing the nature of the following materials.
  - Cemented carbide, ceramics, steels, nonferrous metals, plastics, grinding stone.
  - Material hardness, effect of heat treatment, depths of decarburized layer or flame hardened layer, effect of hardening, and the hardness resulting from deposition.

### HR-500, ARK, ASK, ATK, AR

| Model                          | Type of hardness testing                            |
|--------------------------------|---|
| HR-523, HR-521, HR-522, HR-511 | Rockwell, Rockwell superficial and Brinell hardness |
| ARK-601, AR-20, AR-10          | Rockwell hardness                                   |
| ATK-601                        | Rockwell and Rockwell superficial hardness          |





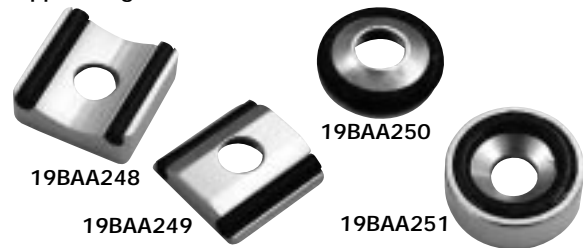
# Hardmatic HH-401

## SERIES 810

Impact Type Hardness Testing Instrument



Support rings for curved surface measurement



### FEATURES

- The HH-401 is an impact type hardness testing instrument that can be easily operated by one hand.
- The portability due to the slim and lightweight construction and the 2-way power source design makes the HH-401 suitable for testing in the shop-floor.
- Can be operated in any orientation including the inverted direction.
- Complete hardness value conversion on the LCD is available in Rockwell B, Rockwell C, Vickers, Shore, and Brinell hardness scales.
- 100 hours continue in battery operation for on-site use.
- GO/NG judgment function for easy sorting of specimens.
- 450 points of testing data can be stored in memory.
- RS-232C output and SPC output interfaces are standard.

### OPTIONAL ACCESSORIES

| Order No. | Description                                    |
|-----------|--|
| 810-622   | Thermal printer DPU-414 (100V AC)              |
| 19BAA262  | Printer connecting cable                       |
| 19BAA157  | Printer paper                                  |
| 19BAA248  | Support ring for cylinder (R10 - 20mm convex)  |
| 19BAA249  | Support ring for cylinder (R14 - 20mm concave) |
| 19BAA250  | Support ring for sphere (R10 - 27.5mm convex)  |
| 19BAA251  | Support ring for sphere (R13.5 - 20mm concave) |
| 937386    | SPC cable (1m)                                 |
| 965012    | SPC cable (2m)                                 |
| 19BAA243  | Hardness test block (HLD880)                   |
| 19BAA244  | Hardness test block (HLD830)                   |
| 19BAA245  | Hardness test block (HLD730)                   |
| 19BAA246  | Hardness test block (HLD620)                   |
| 19BAA247  | Hardness test block (HLD520)                   |

### SPECIFICATIONS

#### Hardmatic HH-401

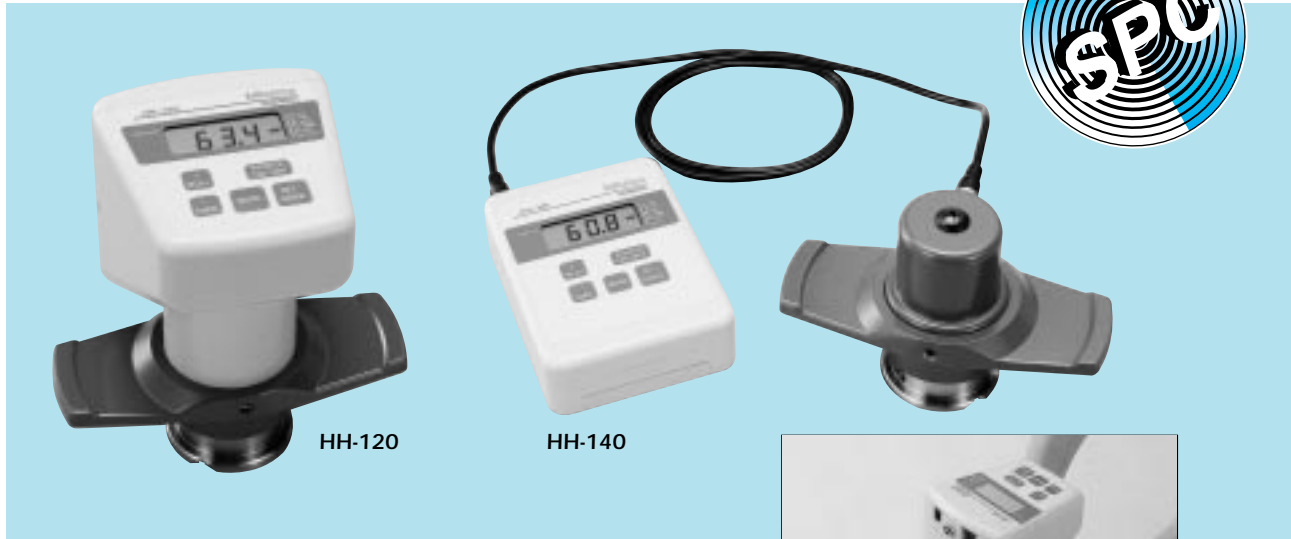
| Model No.   | HH-401   |  |
|---|--|--|
| Order No.   | 810-278  | 810-281K (100V AC)<br>810-281A (120V AC)<br>810-281D (220V AC)<br>810-281E (240V AC)   |
| Components of set (Each set comes with carrying cases.) | <ul style="list-style-type: none"> <li>• HH-401 main unit</li> <li>• Hardness test block (HLD860*)</li> </ul>  | <ul style="list-style-type: none"> <li>• HH-401 main unit</li> <li>• Hardness test block (HLD860*)</li> <li>• RS-232C cable</li> <li>• AC adapter</li> </ul> |
| Hardness value  | L hardness (conforming to ASTM A 956)  |  |
| Impact hammer   | Type D with carbide tip  |  |
| Display   | LCD  |  |
| Functions   | <ul style="list-style-type: none"> <li>• Hardness value conversion:                             <ul style="list-style-type: none"> <li>Rockwell C (20.0HRC - 68.0HRC)</li> <li>Rockwell B (13.5HRB - 99.5HRB)</li> <li>Vickers (80HV - 940HV)</li> <li>Shore (30.1HS - 647HS)</li> </ul> </li> <li>• Impact direction compensation: 45° step</li> <li>• Test time setting for data average: 1 - 10 times</li> <li>• GO/NG judgment</li> <li>• Data offset</li> <li>• Data memory: 450 data points</li> </ul> |  |
| Data output   | RS-232C, SPC   |  |
| Power supply  | LR6 battery (x 2pcs.)/via AC adapter (2-way)   |  |
| Dimensions  | Testing unit: Ø20x16mm<br>Display unit: 65x42x32mm   |  |
| Mass  | Testing unit: Approx. 55g<br>Display unit: Approx. 100g  |  |

\*Equal to 700HV or 60HRC

# Hardmatic HH-120/140

## SERIES 810

Portable Hardness Testing Instruments



HH-120

HH-140

### FEATURES

- Any of five hardness values (Vickers, Brinell, Rockwell B, Rockwell C, Shore) and the tensile strength is available with simple operation.
- Measurement results and conditions are displayed on the LCD.
- Capable of retaining a maximum of 450 measurements.
- RS-232C output and SPC output interfaces are standard. This allows the data to be output to an external printer or a PC.
- The HH-140 can be operated in the same way as a desktop-type testing machine, if the measuring unit is mounted on a drilling machine (mounting shank diameter: 8mm) or dedicated stand (optional).



### OPTIONAL ACCESSORIES

| Order No. | Description                              |
|-----------|--|
| 19BAA189  | Support for cylinder                     |
| 19BAA194  | Support for step                         |
| 19BAA195  | V-block                                  |
| 810-081   | Testing stand for HH-140                 |
| 810-082   | Specimen clamping device for HH-140      |
| 810-080K  | Hardmatic printer (with 100V AC adapter) |
| 810-080A  | Hardmatic printer (with 120V AC adapter) |
| 810-080D  | Hardmatic printer (with 220V AC adapter) |
| 810-080E  | Hardmatic printer (with 240V AC adapter) |
| 19BAA179  | RS-232C connecting cable (for printer)   |
| 19BAA191  | RS-232C connecting cable (for PC)        |
| 937386    | SPC cable (1m)                           |
| 965012    | SPC cable (2m)                           |
| 19BAA011  | Hardness test block (200HV)              |
| 19BAA014  | Hardness test block (500HV)              |
| 19BAA016  | Hardness test block (700HV)              |
| 19BAA127  | Hardness test block (30 - 35HRB)         |
| 19BAA030  | Hardness test block (52HRB)              |
| 19BAA126  | Hardness test block (90 - 95HRB)         |
| 19BAA124  | Hardness test block (45 - 50HRC)         |

### SPECIFICATIONS

#### Hardmatic HH-120/140

| Model No.          | HH-120  | HH-140        |          |
|--------------------|---|---------------|----------|
| Order No.          | 100V AC                                       | 810-263K      | 810-264K |
|                    | 120V AC                                       | 810-263A      | 810-264A |
|                    | 220V AC                                       | 810-263D      | 810-264D |
|                    | 240V AC                                       | 810-263E      | 810-264E |
| Measuring range    |   |               |          |
| Vickers            | 32HV - 999HV                                  |               |          |
| Brinell            | 81HB - 767HB for hard specimen (steel)        |               |          |
|                    | 42HB - 169HB for soft specimen (brass)        |               |          |
| Rockwell B         | 41.0HRB - 110.0HRB for hard specimen (steel)  |               |          |
|                    | 10.0HRB - 93.5HRB for soft specimen (brass)   |               |          |
| Rockwell C         | 0 - 68.0HRC for hard specimen (steel)         |               |          |
| Shore              | 14.0HS - 101.3HS for hard specimen (steel)    |               |          |
|                    | 5.5HS - 30.2HS for soft specimen (brass)      |               |          |
| Tensile strength   | 390 - 1999N/mm <sup>2</sup> for hard specimen |               |          |
| Resolution         | HV/HB/tensile strength: 1<br>HRB/HRC/HS: 0.1  |               |          |
| Display            | LCD   |               |          |
| Operating pressure | Approx. 15kgf                                 |               |          |
| Indenter           | Diamond, conical (Tip angle: 100°)            |               |          |
| Data output        | Via RS-232C interface, SPC                    |               |          |
| Power supply       | Via AC adapter or batteries (9V DC)           |               |          |
| Dimensions (WxDxH) | 136x100x143mm                                 | 136x83x60mm*  |          |
|                    |   | 82x112x33mm** |          |
| Mass               | 950g  | 800g*         |          |
|                    |   | 200g**        |          |

\*Measuring unit  
\*\*Display unit



HM-102/103/112/113/114/115/122/123/124/125

SERIES 810

Micro-Vickers Hardness Testing Machines



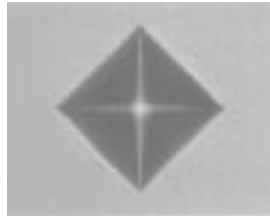
HM-122



HM-123

**FEATURES: HM-102/112/114/122/124**

• A wide range of test force from  $4.903 \times 10^{-3} \text{N}$  to  $19.61 \text{N}^*$  is available for measuring a various type of specimens. The load duration can be set in 1sec increments between 5 and 99sec<sup>\*\*</sup>. The minimum reading of indentation is  $0.01 \mu\text{m}^{***}$ . It allows small indentations to be measured with high precision.



\*HM-124/125  
\*\*60sec: HM-102/103  
\*\*\*0.1 $\mu\text{m}$ : HM-102/103

• Up to three\* objectives can be installed on the turret mount (except for HM-101). The calibration function allows all of objectives installed to be used for the measurement. This expands the measurement application. The magnification can be switched according to the indentation result.

\*two: HM-102/103

• In addition to the standard Vickers indenter, an optional Knoop indenter can be installed at the next mount on the turret\*. A simple turn of the turret makes the HM-100 of a Knoop hardness testing machine.

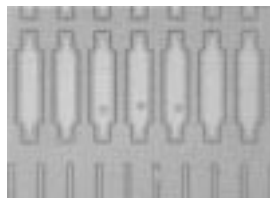


\*except for HM-101, HM-102/103

• The power turret\* can switch indenter/objective position by a single touch of LCD screen.

\*HM-122/123/135, HM-124/125

• The indenter/objective turret provides a high positioning accuracy and repeatability. This allows the HM-100 to indent a target place set through the objective exactly. A hardness in minute area like crystal grain boundary and deposit of metal material can be measured simply and accurately.



**Control unit**

**Touch screen type**

- Back-lit LCD graphic display for Indentation size (D1/D2) Hardness value and scale
- Number of measurement point
- XY table position
- Test conditions (HV/HK indenter type, test force, load duration)
- OK/ $\pm$ NG tolerance judgment
- Cylindrical and spherical surface compensation and offset
- Remote selection of the test force\*
- Remote control of power turret\*\*
- Complete conversion to other hardness scales (Soft metal: HV, HK, HBS, TENS, HRA/B/F/G/15T/30T/45T) (Hard metal: HV, HK, HS, HBS, TENS, HRA/C/D/15N/30N/45N)
- Powerful statistical processing (No. of data, max./min./mean values, range, upper/lower limit values, standard deviation (n, n-1), No. of passing/defective) with flexible data point editing and 256 data memory

\*HM-114/115, HM-124/125  
\*\*HM-122/123, HM-124/125

**Durable sheet switch type**

- LED display for Indentation size (D1/D2) Hardness value
- OK/NG tolerance judgment



Touch screen type

Durable sheet switch type

## CCD video monitor system\*

- Indentation measurement on the 9-inch monitor reduces operator's eye fatigue and therefore operator error.
- Flicker-free images on the video monitor due to the use of the vibration-resistance and shock-resistance CCD camera.
- With the optional video printer connected, video images can be printed out easily.

\*HM-103/131, HM-113/133, HM-123/135, HM-115/134, HM-125



## CONSUMABLE PARTS

| Order No. | Description       | Qty.  |
|-----------|-------------------|-------|
| 19BAA219  | Illumination lamp | 1 pc. |

## OPTIONAL ACCESSORIES

| Order No. | Description   |
|-----------|---|
| 810-017   | Vise (larger type)                                      |
| 810-013   | Specimen (thin plate) holder                            |
| 810-085   | Adjustable specimen (thin plate) holder                 |
| 810-014   | Specimen (wire) holder                                  |
| 810-015   | Specimen (wire or ball) holder                          |
| 810-019   | Specimen tilting holder                                 |
| 810-020   | Universal specimen holder                               |
| 810-084   | Rotatable universal specimen holder                     |
| 810-018   | Rotary table  |
| 810-092   | Video printer (VP-1200, 100V AC)                        |
| 19BAA221  | Video printer paper                                     |
| 810-078   | Printer (iDP-3110-40PF)                                 |
| 19BAA173  | Printer paper (20-roll set)                             |
| 19BAA174  | Ink ribbon cartridge (5 pcs. set)                       |
| 936937    | SPC cable (1m)  |
| 965014    | SPC cable (2m)  |
| 19BAA001  | Hardness test block (100HV0.3)                          |
| 19BAA002  | Hardness test block (200HV0.3)                          |
| 19BAA003  | Hardness test block (300HV0.3)                          |
| 19BAA004  | Hardness test block (400HV0.3)                          |
| 19BAA005  | Hardness test block (500HV0.3)                          |
| 19BAA006  | Hardness test block (600HV0.3)                          |
| 19BAA007  | Hardness test block (700HV0.3)                          |
| 19BAA008  | Hardness test block (800HV0.3)                          |
| 19BAA009  | Hardness test block (900HV0.3)                          |
| 19BAA010  | Hardness test block (40HV0.01)                          |
| -----     | VLPAK auto-reading measuring program<br>(See page 447.) |

## SPECIFICATIONS

### HM-102/103/112/113/114/115/122/123/124/125

| Model No.                 | HM-103                                       | HM-102                                       | HM-113                                       | HM-112                                       | HM-123                                       | HM-122                                       | HM-115                                       | HM-114                                       | HM-125                                       | HM-124                                       |  |
|---------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Order No.                 | 100V AC<br>120V AC<br>220V AC<br>240V AC     | 810-959K<br>810-959A<br>810-959D<br>810-959E | 810-125K<br>810-125A<br>810-125D<br>810-125E | 810-969K<br>810-969A<br>810-969D<br>810-969E | 810-126K<br>810-126A<br>810-126D<br>810-126E | 810-990K<br>810-990A<br>810-990D<br>810-990E | 810-127K<br>810-127A<br>810-127D<br>810-127E | 810-998K<br>810-998A<br>810-998D<br>810-998E | 810-128K<br>810-128A<br>810-128D<br>810-128E | 810-975K<br>810-975A<br>810-975D<br>810-975E | 810-129K<br>810-129A<br>810-129D<br>810-129E |
| Test force range          | 98.07mN - 9.807N (HV0.01 - HV1)              |  |  |  |  |  | 9.807mN - 19.61N (HV0.001 - HV2)             |  | 4.903mN - 19.61N (HV0.0005 - HV2)            |  |  |
| Test force setting        | By dial                                      |  |  |  |  |  | By dial/control unit                         |  |  |  |  |
| Loading accuracy          | ±1% (forces less than 1gf are ignored)       |  |  |  |  |  |  |  |  |  |  |
| Load control              | Automatic (loading, duration, unloading)     |  |  |  |  |  |  |  |  |  |  |
| Load duration             | 5s - 60s (1s increments)                     |  |  | 5s - 90s (1s increments)                     |  |  |  |  |  |  |  |
| XY stage size             | 100x100mm                                    |  |  |  |  |  |  |  |  |  |  |
| XY stage travel           | 25x25mm                                      |  |  |  |  |  |  |  |  |  |  |
| Max. specimen height      | 95mm   |  |  |  |  |  |  |  |  |  |  |
| Max. specimen depth       | 150mm (from the center of indenter shaft)    |  |  |  |  |  |  |  |  |  |  |
| Indenter/objective turret | Manual type                                  |  |  | Manual type                                  |  | Power drive                                  |  | Manual type                                  |  | Power drive                                  |  |
| No. of indenter mount     | 1-mount                                      |  |  | 2-mount                                      |  |  |  |  |  |  |  |
| No. of objective mount    | 2-mount                                      |  |  | 3-mount                                      |  |  |  |  |  |  |  |
| Optical path              | 2-way (video monitor/photograph) switchable  |  |  |  |  |  |  |  |  |  |  |
| Video monitor             | 9" B/W                                       | -----  | 9" B/W                                       | -----  | 9" B/W                                       | -----  | 9" B/W                                       | -----  | 9" B/W                                       | -----  |  |
| Minimum reading           | 0.1µm  |  |  | 0.01µm                                       |  |  |  |  |  |  |  |
| Control unit              | Sheet switch type                            |  |  | Touch screen type                            |  |  |  |  |  |  |  |
| Data output               | RS-232C, Digimatic code (SPC) and Centronics |  |  |  |  |  |  |  |  |  |  |
| Power supply              | 100/120/220/240V AC, 50/60Hz                 |  |  |  |  |  |  |  |  |  |  |
| Dimensions                | Machine                                      | 410(W)x600(D)x590(H)mm                       |  |  |  |  |  |  |  |  |  |
|                           | Control unit                                 | 165(W)x260(D)x105(H)mm                       |  |  |  |  |  |  |  |  |  |
| Mass                      | Approx. 42kg                                 |  |  |  |  |  |  |  |  |  |  |



Printers

**iDP-3110-40PF**

Standard printer that can be connected to a hardness testing machine with a Centronics output interface.

Order No.

- 810-078K: 100V AC, with connecting cable
- 810-078A: 120V AC, with connecting cable
- 810-078D: 220V AC, with connecting cable
- 810-078E: 240V AC, with connecting cable
- 19BAA173: Printer paper (20-roll set)
- 19BAA174: Ink ribbon cartridge (5 pcs. set)



**DP-1VR —SPC printer—**

A cost-effective portable printer capable of statistically calculating up to 100000 pieces of data. The DP-1VR can be connected to a hardness testing machine with an SPC output.

Order No.

- 264-504: 100V AC
- 264-504A: 120V AC
- 264-504D: 220V AC
- 264-504E: 240V AC
- 936937: Connecting cable (1m/40")
- 965014: Connecting cable (2m/80")
- 937179T: Foot switch
- 09EAA082: Printer paper (10-roll set)

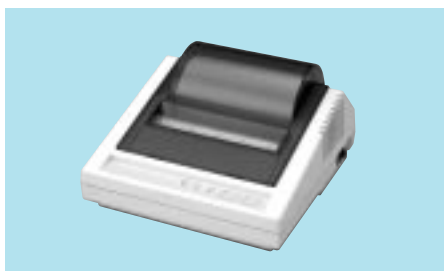


**NP-104**

Dedicate thermal printer for HV-112, HV-114, HV-113, and HV-115.

Order No.

- 810-097K: 100V AC, with connecting cable
- 810-097A: 120V AC, with connecting cable
- 810-097D: 220V AC, with connecting cable
- 19BAA157: Printer paper (10-roll set)



**HM-101**

**SERIES 810**

Micro-Vickers Hardness Testing Machine



HM-101

**FEATURES**

- The least expensive Micro-Vickers hardness tester.
- The measuring microscope uses the glass-edges that fit with the indentation from both sides. This ensures quick and precise indentation measurement.
- The optical path can be switched at a single touch, increasing photographing efficiency.

**SPECIFICATIONS**

**HM-101**

| Model No.                 | HM-101                                      |          |
|---------------------------|---|----------|
| Order No.                 | 100V AC                                     | 810-124K |
|                           | 120V AC                                     | 810-124A |
|                           | 220V AC                                     | 810-124D |
|                           | 240V AC                                     | 810-124E |
| Test force range          | 98.07mN - 9.807N (HV0.01 - HV1)             |          |
| Test force setting        | By dial                                     |          |
| Loading accuracy          | ±1%   |          |
| Load control              | Automatic (loading, duration, unloading)    |          |
| Load duration             | 5s - 30s (5s increments)                    |          |
| XY stage size             | 100x100mm                                   |          |
| XY stage travel           | 25x25mm                                     |          |
| Max. specimen height      | 95mm  |          |
| Max. specimen depth       | 150mm (from the center of indenter shaft)   |          |
| Indenter/objective turret | Manual type                                 |          |
| No. of indenter mount     | 1-mount                                     |          |
| No. of objective mount    | 2-mount                                     |          |
| Optical path              | 2-way (video monitor/photograph) switchable |          |
| Minimum reading           | 0.2µm (with 50x objective)                  |          |
| Data output               | -----                                       |          |
| Power supply              | 100/120/220/240V AC, 50/60Hz                |          |
| Dimensions                | 410(W)x600(D)x590(H)mm                      |          |
| Mass                      | Approx. 42kg                                |          |

## AT-400 System

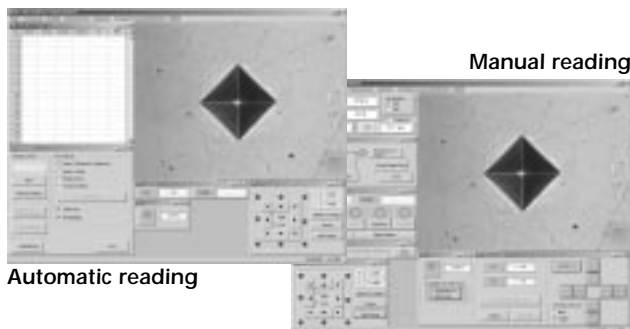
### SERIES 810

Auto-Reading Hardness Testing System with automatic XY stage



### FEATURES

- The high-speed auto-reader captures the indentation and displays hardness result in just 0.3 second, so the otherwise lengthy measuring work can be performed quickly.
- Complex multi-point measurement can be performed with ease.
- The movement pattern of the XY stage can be set line, zig-zag, matrix, circle, random, or combination.
- The learn function allows part programs to be easily created.
- Measurement conditions and positional data can be displayed on the monitor.
- The evaluation curves of case depth and hardness curves can be displayed on the monitor.



### CONFIGURATION

#### AT-400 System

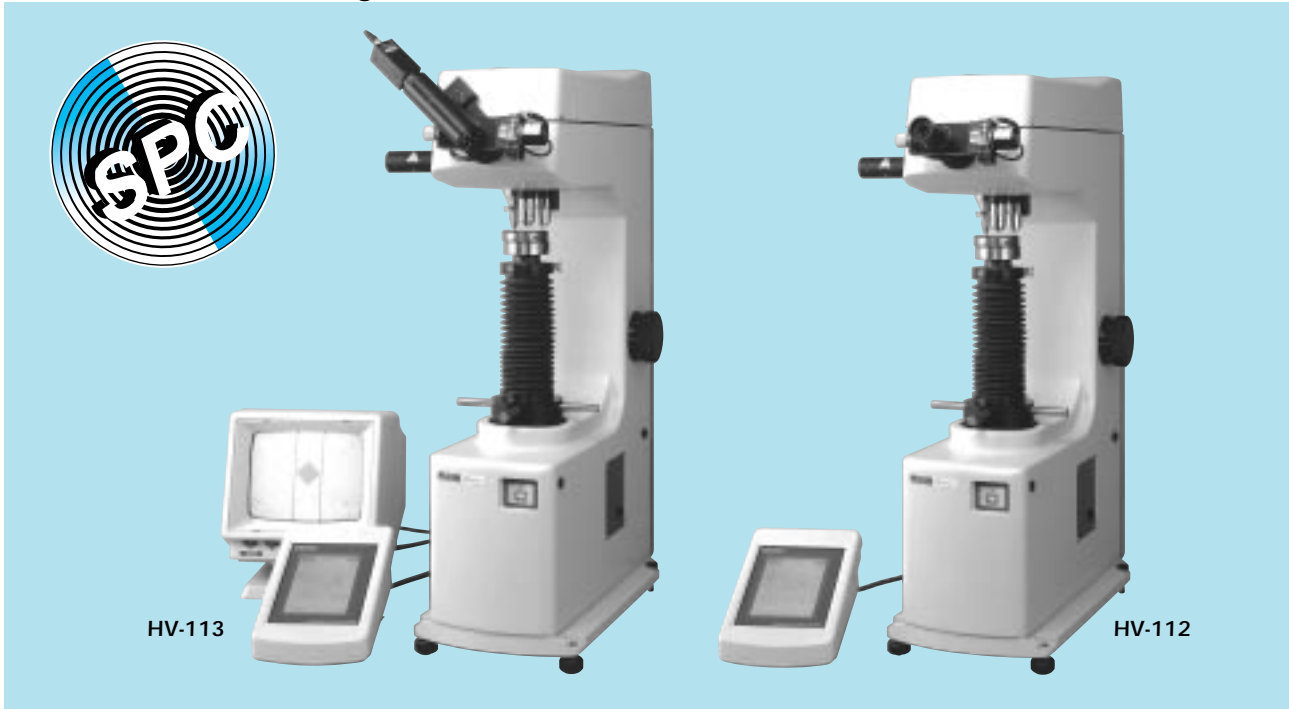
| Model No.        | Order No.             | Hardness testing machine integrated |
|------------------|-----------------------|-------------------------------------|
| AT-400 System 5  | 810-314-5K (100V AC)  | HM-112 (810-126K)                   |
|                  | 810-314-5A (120V AC)  | HM-112 (810-126A)                   |
|                  | 810-314-5D (220V AC)  | HM-112 (810-126D)                   |
|                  | 810-314-5E (240V AC)  | HM-112 (810-126E)                   |
| AT-400 System 6  | 810-314-6K (100V AC)  | HM-122 (810-127K)                   |
|                  | 810-314-6A (120V AC)  | HM-122 (810-127A)                   |
|                  | 810-314-6D (220V AC)  | HM-122 (810-127D)                   |
|                  | 810-314-6E (240V AC)  | HM-122 (810-127E)                   |
| AT-400 System 7  | 810-314-7K (100V AC)  | HM-114 (810-128K)                   |
|                  | 810-314-7A (120V AC)  | HM-114 (810-128A)                   |
|                  | 810-314-7D (220V AC)  | HM-114 (810-128D)                   |
| AT-400 System 8  | 810-314-7E (240V AC)  | HM-114 (810-128E)                   |
|                  | 810-314-8K (100V AC)  | HM-124 (810-129K)                   |
|                  | 810-314-8A (120V AC)  | HM-124 (810-129A)                   |
|                  | 810-314-8D (220V AC)  | HM-124 (810-129D)                   |
| AT-400 System 15 | 810-314-8E (240V AC)  | HM-124 (810-129E)                   |
|                  | 810-314-15K (100V AC) | HV-112 (810-163K)                   |
|                  | 810-314-15A (120V AC) | HV-112 (810-163A)                   |
|                  | 810-314-15D (220V AC) | HV-112 (810-163D)                   |
| AT-400 System 16 | 810-314-15E (240V AC) | HV-112 (810-163E)                   |
|                  | 810-314-16K (100V AC) | HV-114 (810-165K)                   |
|                  | 810-314-16A (120V AC) | HV-114 (810-165A)                   |
|                  | 810-314-16D (220V AC) | HV-114 (810-165D)                   |
|                  | 810-314-16E (240V AC) | HV-114 (810-165E)                   |



# HV-112/113/114/115

## SERIES 810

Vickers Hardness Testing Machines



HV-113

HV-112

### FEATURES

- A wide range of test force from 1.961N to 490.3N\* is available for measuring a various type of specimens. The load duration can be set in 1sec increments between 5 and 99sec. The minimum reading of indentation is 0.1 $\mu$ m. It allows small indentations to be measured with high precision.  
\*Refer to the page 3 for details.
- Two objectives can be installed on the turret mount. The calibration function allows all of objectives installed to be used for the measurement. This expands the measurement application. The magnification can be switched according to the indentation result.
- The power turret can switch indenter/objective position by a single touch of LCD screen.
- The indenter/objective turret provides a high positioning accuracy and repeatability. This allows the HV-100 to indent a target place set through the objective exactly. A hardness in minute area like crystal grain boundary and deposit of metal material can be measured simply and accurately.



### Touch screen control unit

- Back-lit LCD graphic display for Indentation size (D1 and D2)  
Hardness value and scale  
Number of measurement point  
Test conditions (HV/HK indenter type, test force, load duration)  
OK/ $\pm$ NG tolerance judgment  
Cylindrical and spherical surface compensation and offset
- Remote control of power turret
- Complete conversion to other hardness scales (Soft metal: HV, HK, TENS, HRA/B/F/G/15T/30T/45T) (Hard metal: HV, HK, HS, HBS, TENS, HRA/C/D/15N/30N/45N)
- Powerful statistical processing (No. of data, max./min./mean values, range, upper/lower limit values, standard deviation (n, n-1), No. of passing/defective) with flexible data point editing and 256 data memory



## CCD video monitor system\*

- Indentation measurement on the 9-inch monitor reduces operator's eye fatigue and therefore operator error.
- Flicker-free images on the video monitor due to the use of the vibration-resistance and shock-resistance CCD camera.
- With the optional video printer connected, video images can be printed out easily.

\*HV-113/115



## CONSUMABLE PARTS

| Order No. | Description       | Qty.  |
|-----------|-------------------|-------|
| 19BAA219  | Illumination lamp | 1 pc. |

## SPECIFICATIONS

### HV-112/113/114/115

| Model No.                       | HV-113   | HV-112                                       | HV-115                                       | HV-114                                       |
|---------------------------------|--|--|--|--|
| Order No.                       | 100V AC<br>120V AC<br>220V AC<br>240V AC           | 810-981K<br>810-981A<br>810-981D<br>810-981E | 810-163K<br>810-163A<br>810-163D<br>810-163E | 810-985K<br>810-985A<br>810-985D<br>810-985E |
| Test force range                | 1.961N - 196.1N<br>(HV0.2 - HV20)                  |  | 9.807N - 490.3N<br>(HV1 - HV50)              |  |
| Test force setting              | By dial  |  |  |  |
| Loading accuracy                | ±1%  |  |  |  |
| Load control                    | Automatic (loading, duration, unloading)           |  |  |  |
| Load duration                   | 5s - 99s (1s increments)                           |  |  |  |
| Max. specimen height            | 210mm (for standard flat anvil)                    |  |  |  |
| Max. specimen depth             | 170mm (from the center of indenter shaft)          |  |  |  |
| Indenter/objective turret       | Power drive  |  |  |  |
| No. of indenter mount           | 1-mount  |  |  |  |
| No. of objective mount          | 2-mount  |  |  |  |
| Optical path                    | Split in two ways fro video monitor and photograph |  |  |  |
| Video monitor <sup>9"</sup> B/W | -----  | 9" B/W                                       | -----  | -----  |
| Minimum reading                 | 0.1μm  |  |  |  |
| Control unit                    | Touch screen type                                  |  |  |  |
| Data output                     | RS-232C, Digimatic code (SPC) and Centronics       |  |  |  |
| Power supply                    | 100/120/220/240V AC, 50/60Hz                       |  |  |  |
| Dimensions                      | Machine  | 245(W)x515(D)x840(H)mm                       |  |  |
|                                 | Control unit                                       | 165(W)x260(D)x105(H)mm                       |  |  |
| Mass                            | Approx. 57.5kg                                     |  |  |  |

## OPTIONAL ACCESSORIES

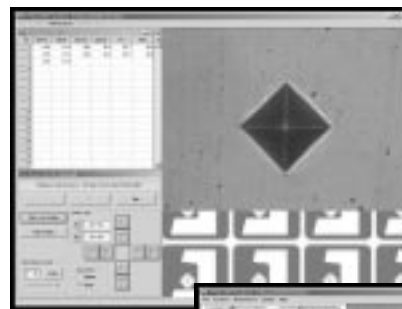
| Order No. | Description                             |
|-----------|---|
| 810-037   | Round table (Ø180mm)                    |
| 810-038   | Round table (Ø250mm)                    |
| 810-012   | 50x50mm-travel XY stage                 |
| 810-016   | Vise (max. opening: 45mm)               |
| 810-017   | Vise (larger type, max. opening: 100mm) |
| 810-092   | Video printer (VP-1200, 100V AC)        |
| 19BAA221  | Video printer paper                     |
| 810-078   | Printer (iDP-3110-40PF)                 |
| 19BAA173  | Printer paper (20-roll set)             |
| 19BAA174  | Ink ribbon cartridge (5 pcs. set)       |
| 936937    | SPC cable (1m)                          |
| 965014    | SPC cable (2m)                          |
| 19BAA011  | Hardness test block (200HV)             |
| 19BAA012  | Hardness test block (300HV)             |
| 19BAA013  | Hardness test block (400HV)             |
| 19BAA014  | Hardness test block (500HV)             |
| 19BAA015  | Hardness test block (600HV)             |
| 19BAA016  | Hardness test block (700HV)             |
| 19BAA017  | Hardness test block (800HV)             |
| 19BAA018  | Hardness test block (900HV)             |

## VLPK2000 -optional-

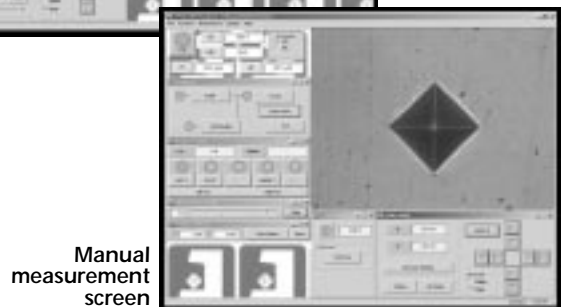
### Auto-reading measuring program

In hardness measurement the diagonal lines of the indentation must be measured on the TV monitor, which often results in varying measurements taken by different individuals. It also makes it difficult to save labor and increase efficiency. The VLPK2000 auto-reading measuring program automatically reads the lengths of the indentation's diagonal lines and converts the result to a hardness value, thereby reducing operator-dependent measurement error. Moreover, the program's automatic high-speed reading function requires only 0.3 second to read hardness, which significantly improves work efficiency in hardness measurement.

Order No.: 810-312-1 (including PC system)



Automatic measurement screen



Manual measurement screen





## HR-511/521/522/523

## SERIES 810

Rockwell Type Hardness Testing Machines



HR-523

HR-521

HR-511

## FEATURES

- Multiple test force generation for Rockwell, Rockwell Superficial and Brinell hardness.
- Dolphin-nose indenter arm for easy reach of interior (min.  $\phi 40\text{mm}/\phi 22\text{mm}^*$ ) and exterior surfaces.  
\*When using an optional diamond indenter (19BAA292).
- Real time electronic test force control for accurate loading. This perfectly eliminates load force overshooting.
- Indenter escape function for continuous testing at fixed table position. This eliminates instability caused by the table retraction.
- Auto-stop elevation table and automatic preliminary test force loading to provide stable test force generation.
- Compact body with large working space.
- Various data output, RS-232C, Centronics and Digimatic Code.

## Control unit

## Durable sheet switch type

- Durable sheet switch operation with LED display.
- Remote selection of the test force linked to the hardness scale selection.
- Powerful statistical processing and 1024 data memory.
- Data offset
- OK/NG tolerance judgment.
- SPC calculation (No. of data, max./min./mean values, range, upper/lower limit values, standard deviation (n, n-1), No. of passing/defective)



## Touch screen type

- Touch screen operation with a back-lit LCD graphic display.
- Remote selection of the test force linked to the hardness scale selection.
- Choice of message language in English, German, French, Spanish, Italian and Japanese for user friendly operation.
- Cylindrical and spherical surface compensation.
- Data offset
- Complete conversion to other hardness scales (HV, HK, HRA/B/C/D/F/G/15T/30T/45T/15N/30N/45N, HS, HB (HBS)) or tensile strength.
- Powerful statistical processing with flexible data point editing and 1024 data memory.
- Measured data editing
- OK/±NG tolerance judgment.
- SPC calculation (No. of data, max./min./mean values, range, upper/lower limit values, standard deviation (n, n-1), No. of passing/defective)
- Histogram and  $\bar{X}$ -R chart



The control unit can be attached on the top of the machine.

## SPECIFICATIONS

### HR-511/521/522/523

| Model No.                | HR-511                                       | HR-521                                       | HR-522                                       | HR-523                                       |  |
|--------------------------|--|--|--|--|--|
| Order No.                | 100V AC<br>120V AC<br>220V AC<br>240V AC     | 810-208K<br>810-208A<br>810-208D<br>810-208E | 810-202K<br>810-202A<br>810-202D<br>810-202E | 810-203K<br>810-203A<br>810-203D<br>810-203E | 810-204K<br>810-204A<br>810-204D<br>810-204E |
| Preliminary test force   | 29.42N, 98.07N                               |  |  |  |  |
| Available hardness scale | See right.                                   |  |  |  |  |
| Test force setting       | By control unit                              |  |  |  |  |
| Load control             | Automatic (loading, duration, unloading)     |  |  |  |  |
| Load duration            | 0s - 120s (1s increments)                    |  |  |  |  |
| Max. specimen height     | 205mm (for standard flat anvil)              |  |  |  |  |
| Max. specimen depth      | 150mm (from the center of indenter shaft)    |  |  |  |  |
| Stage elevation          | Manual                                       |  | Power drive                                  |  |  |
| Control unit             | Sheet switch type                            |  | Touch screen type                            |  |  |
| Data output              | RS-232C, Digimatic code (SPC) and Centronics |  |  |  |  |
| Power supply             | 100/120/220/240V AC, 50/60Hz                 |  |  |  |  |
| Dimensions               | Machine                                      | 250(W)x670(D)x605(H)mm                       |  |  |  |
|                          | Control unit                                 | 165(W)x260(D)x105(H)mm                       |  |  |  |
| Mass                     | Approx. 65kg                                 |  |  |  |  |

## OPTIONAL ACCESSORIES

| Order No. | Description  |
|-----------|--|
| 19BAA292  | Diamond indenter (Min. to ø22mm)                           |
| 19BAA074  | 1/16" DIA steel ball indenter                              |
| 19BAA082  | Spare 1/16" steel ball (10 pcs. set)                       |
| 19BAA076  | 1/4" DIA steel ball indenter                               |
| 19BAA084  | Spare 1/4" steel ball (10 pcs. set)                        |
| 19BAA075  | 1/8" DIA steel ball indenter                               |
| 19BAA083  | Spare 1/8" steel ball (10 pcs. set)                        |
| 19BAA077  | 1/2" DIA steel ball indenter                               |
| 19BAA085  | Spare 1/2" steel ball (10 pcs. set)                        |
| 810-037   | Round tables (ø180mm)                                      |
| 810-038   | Round tables (ø250mm)                                      |
| 810-043   | Spot anvils (ø12mm)  |
| 810-030   | Spot anvils (diamond tipped type for Rockwell Superficial) |
| 810-044   | Spot anvils (ø5.5mm)                                       |
| 810-040   | V-anvils (ø40mm, 30mm groove width)                        |
| 810-041   | V-anvils (ø40mm, 6mm groove width)                         |
| 810-042   | V-anvils (ø10mm, 8mm groove width)                         |
| 810-029   | V-anvils (400mm length, 30mm groove width)                 |
| 19BAA123  | Hardness test blocks (30HRC - 35HRC)                       |
| 19BAA124  | Hardness test blocks (45HRC - 50HRC)                       |
| 19BAA125  | Hardness test blocks (60HRC - 65HRC)                       |
| 19BAA126  | Hardness test blocks (90HRB - 95HRB)                       |
| 19BAA127  | Hardness test blocks (30HRB - 35HRB)                       |
| 19BAA128  | Hardness test blocks (64HR30N - 69HR30N)                   |
| 19BAA129  | Hardness test blocks (74HR30T - 79HR30T)                   |
| 810-622   | Printer (DPU-414, 100V)                                    |
| 19BAA262  | Connecting cable   |
| 19BAA157  | Printer paper  |
| 19BAA161  | Measuring microscope (20x model)                           |
| 19BAA318  | Measuring microscope (40x model)                           |
| 19BAA319  | Measuring microscope (100x model)                          |

## Available hardness scale

### Rockwell Superficial

|                  | 147.1N | 294.2N | 441.3N |
|------------------|--------|--------|--------|
| Diamond          | HR15N  | HR30N  | HR45N  |
| 1/16" steel ball | HR15T  | HR30T  | HR45T  |
| 1/8" steel ball  | HR15W  | HR30W  | HR45W  |
| 1/4" steel ball  | HR15X  | HR30X  | HR45X  |
| 1/2" steel ball  | HR15Y  | HR30Y  | HR45Y  |

### Rockwell

|                  | 588.4N | 980.7N | 1471N |
|------------------|--------|--------|-------|
| Diamond          | HRA    | HRD    | HRC   |
| 1/16" steel ball | HRF    | HRB    | HRG   |
| 1/8" steel ball  | HRH    | HRE    | HRK   |
| 1/4" steel ball  | HRL    | HRM    | HRP   |
| 1/2" steel ball  | HRR    | HRS    | HRV   |

### Brinell

|                    | 61.29N       | 98.07N     | 153.2N         |
|--------------------|--------------|------------|----------------|
| 1mm carbide ball   | —            | HBW1/10*   | —              |
| 2.5mm carbide ball | HBW2.5/6.25* | —          | HBW2.5/15.625* |
|                    | 245.2N       | 294.2N     | 306.4N         |
| 1mm carbide ball   | —            | HBW1/30*   | —              |
| 2.5mm carbide ball | —            | —          | HBW2.5/31.25*  |
| 5mm carbide ball   | HBW5/25*     | —          | —              |
|                    | 612.9N       | 980.7N     | 1226N          |
| 2.5mm carbide ball | HBW2.5/62.5* | —          | —              |
| 5mm carbide ball   | HBW5/62.5*   | —          | HBW5/125*      |
| 10mm carbide ball  | —            | HBW10/100* | —              |
|                    | 1839N        |            |                |
| 2.5mm carbide ball | HBW25/187.5  |            |                |

\*Not available for HR-521, HR-511



## OPTIONAL ACCESSORIES (for Brinell hardness testing)

| Order No. | Description                           |
|-----------|---------------------------------------|
| 19BAA277  | ø1mm carbide ball indenter            |
| 19BAA279  | ø2.5mm carbide ball indenter          |
| 19BAA280  | ø5mm carbide ball indenter            |
| 19BAA284  | ø10mm carbide ball indenter           |
| 19BAA281  | Spare ø1mm carbide ball (5pcs. set)   |
| 19BAA283  | Spare ø2.5mm carbide ball (5pcs. set) |
| 19BAA162  | Spare ø5mm carbide ball (1pc.)        |
| 19BAA163  | Spare ø10mm carbide ball (1pc.)       |
| 19BAA027  | Hardness test block (200HBW)          |
| 19BAA161  | Measuring microscope                  |



## ARK-600, ATK-600

### SERIES 810

Rockwell/Rockwell Superficial  
Hardness Testing Machine



ATK-600

ARK-600

#### FEATURES

- Diamond indenter and 1/16" diameter steel ball indenter are provided as standard.
- The ARK-600 is designed for testing Rockwell hardness. The ATK-600 can measure Rockwell and Rockwell Superficial hardness scales by one unit.
- The measured hardness is displayed on the large LED.
- Test load selection can be easily made with the selection wheel.

#### SPECIFICATIONS

##### ARK-600/ATK-600

| Model No.              | ARK-600   | ATK-600   |
|------------------------|---|---|
| Order No.              | 100V AC   | 810-218K  |
|                        | 120V AC   | 810-218A  |
|                        | 220V AC   | 810-218D  |
|                        | 240V AC   | 810-218E  |
| Preliminary test force | 98.07N (10kgf)                                  | 98.07N (10kgf), 29.42N (3kgf)                                   |
| Test force             | 588.4N (60kgf), 980.7N (100kgf), 1471N (150kgf) | 588.4N (60kgf), 980.7N (100kgf), 1471N (150kgf), 147.1N (15kgf) |
| Hardness increment     | 0.1   |   |
| Test force setting     | By dial   |   |
| Load control           | Automatic (loading, duration, unloading)        |   |
| Anvil                  | Flat (Ø64mm)                                    |   |
| Max. specimen height   | 140mm   |   |
| Max. specimen depth    | 122mm (from the center of indenter shaft)       |   |
| Data output            | RS-232C, SPC                                    |   |
| Power supply           | 100/120/220/240V AC, 50/60Hz                    |   |
| Dimensions             | 210x486x720mm                                   | 210x486x860mm   |
| Mass                   | Approx. 40kg                                    | Approx. 47kg  |

## AR-20/10

### SERIES 810

Rockwell Hardness Testing Machine



AR-20

AR-10

#### FEATURES

- Economy type Rockwell hardness testing machines.
- Diamond indenter (HRA, HRD, HRC) and 1/16" diameter steel ball indenter (HRF, HRB, HRC) are provided.
- The dial indicator can be zero-set automatically, allowing the preliminary test load to be applied with the table elevation wheel only.
- Test load selection can be made with wheel. (AR-20)

#### SPECIFICATIONS

##### AR-20/10

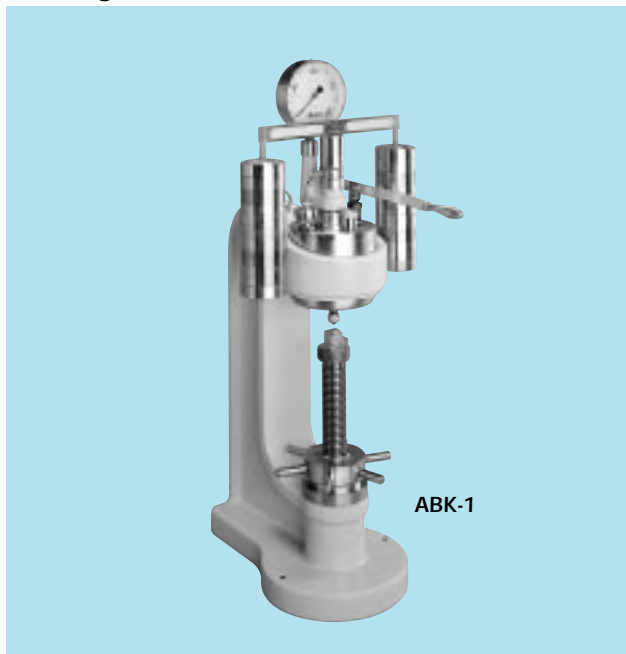
| Model No.              | AR-20   | AR-10              |
|------------------------|---|--------------------|
| Order No.              | 100V AC   | 810-201K           |
|                        | 120V AC   | 810-201A           |
|                        | 220V AC   | 810-201D           |
|                        | 240V AC   | 810-201E           |
| Preliminary test force | 98.07N (10kgf)                                  |                    |
| Test force             | 588.4N (60kgf), 980.7N (100kgf), 1471N (150kgf) |                    |
| Minimum reading        | 0.5   |                    |
| Test force setting     | By dial   | By weight exchange |
| Load control           | Automatic (loading, duration, unloading)        |                    |
| Anvil                  | Flat (Ø64mm)                                    |                    |
| Max. specimen height   | 140mm   |                    |
| Max. specimen depth    | 122mm*  | 115mm*             |
| Power supply           | 100/120/220/240V AC, 50/60Hz                    |                    |
| Dimensions             | 210x486x680mm                                   | 220x445x655mm      |
| Mass                   | 40kg  | 36kg               |

\*From the center of indenter shaft

## ABK-1

### SERIES 810

Hydraulic Brinell Hardness Testing Machine



#### FEATURES

- Easy operation permits high-accuracy Brinell hardness testing.
- Suitable for testing molded or forged materials.
- For testing materials with rough metallurgical compositions, use a large-diameter indenter to produce a large indentation so that the hardness values are evened by a large surface area.

#### SPECIFICATIONS

##### ABK-1

|                      |   |
|----------------------|---|
| Model No.            | ABK-1   |
| Order No.            | 810-265   |
| Test force range     | 4903 - 24920N (500 - 3000kgf)                       |
| Test force setting   | By weight exchange                                  |
| Steel ball indenter  | Ø5mm and Ø10mm                                      |
| Load control         | Manual  |
| Anvil                | Flat anvil (Ø68mm),<br>V-anvil (groove width: 50mm) |
| Max. specimen height | 200mm   |
| Max. specimen depth  | 155mm (from the center of indenter shaft)           |
| Dimensions           | 430(W)x510(D)x1100(H)mm                             |
| Mass                 | 180kg   |

#### OPTIONAL ACCESSORIES

| Order No. | Description                         |
|-----------|-------------------------------------|
| 19BAA162  | Carbide ball (Ø5mm)                 |
| 19BAA163  | Carbide ball (Ø10mm)                |
| 19BAA071  | Ø5mm steel ball (spare, 10pcs./set) |
| 19BAA165  | Ø10mm steel ball (spare, 5pcs./set) |
| 19BAA166  | Hardness test block (200HB)         |
| 19BAA098  | Split level                         |

## AAV-602

### SERIES 810

Automatic Vickers Hardness Testing System



Employing a unique vision measurement technology, the Autovick AAV-602 automatically recognizes the contour of a specimen which has a complex shape, combines the vision data with the preset hardness test condition and thereby calculates the measuring position to automatically perform Vickers hardness test.

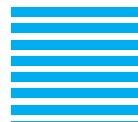
## MZT-500

### SERIES 810

Micro Zone Test System



When it comes to evaluating mechanical properties of ultra-small regions of ultra-fine specimens, the MZT-500 Series are most powerful in the fields of research and development and quality control. The MZT-500 can evaluate mechanical properties, which the conventional hardness testing machines for fine specimens cannot measure, such as: various CVD and PVD-deposited or generated films, including ion-plated films; hardness of ultra-fine cross-sections; bonding mechanical properties; and wear mechanical properties of carbon fiber, glass fiber, whisker, etc.



# Digital Durometers, Dial Durometers

## SERIES 811

Hardness Testing Instruments for Rubber and Plastics



### FEATURES

- Digital/Dial Durometers are suitable for testing the nature of the following materials—natural rubber, neoprene, polyesters, P.V.C., leather, Thiokol, nitrile rubber, wax, vinyl, cellulose acetates, glass polystyrene, etc.
- The Mitutoyo Digital/Dial Durometers are designed in accordance with the ASTM D 2240, ISO868, ISO 7619, DIN 53 505, JIS K 6253, and JIS K 7215 specifications.
- Units are available in both Shore A and Shore D scales, and will test a wide variety of applications.
- The Digital Durometer is provided with data hold function, permitting the operator to make an error-free reading on the LCD screen.
- The Dial Durometer is provided with a peak retaining hand for error-free reading.

### OPTIONAL ACCESSORIES

| Order No. | Description                 |
|-----------|-----------------------------|
| 19BAA180  | Holding bar*                |
| 811-019   | Testing stand (Shore A)     |
| 811-012   | Testing stand (Shore D)     |
| 811-013   | Testing stand (Shore A)**   |
| 811-014   | Testing stand (Shore D)**   |
| 811-017   | Auxiliary weights (Shore A) |
| 811-018   | Auxiliary weights (Shore D) |

\*Only available on Compact Type Durometer.  
\*\*Long-leg Type Durometer attachment is included.

### SPECIFICATIONS

#### Digital Durometers and Dial Durometers

| Order No.            | Digital   | 811-336 | 811-336-01   | 811-332     | 811-338  | 811-338-01 | 811-334  |
|----------------------|---|---------|--|-------------|--|------------|--|
|                      | Dial  | 811-335 | 811-335-01   | 811-331     | 811-337  | 811-337-01 | 811-333  |
| Scale                | Shore A   |         |  |             | Shore D  |            |  |
| Applications         | Natural rubber, soft elastomers, etc.   |         |  |             | Hard elastomers, plastics, hard rubber, ebonite, etc.  |            |  |
| Minimum reading      | Digital durometer: 0.5 or Dial durometer: 1   |         |  |             | Digital durometer: 0.5 or Dial durometer: 1            |            |  |
| Measuring range      | 10 - 90   |         |  |             | 20 - 90  |            |  |
| Accordable standards | ASTM D 2240, ISO 868, ISO 7619, JIS K 6253, JIS K 7215  |         | ASTM D 2240, ISO 868, ISO 7619, DIN 53 505, JIS K 6253, JIS K 7215 |             | ASTM D 2240, ISO 868, ISO 7619, JIS K 6253, JIS K 7215 |            | ASTM D 2240, ISO 868, ISO 7619, DIN 53 505, JIS K 6253, JIS K 7215 |
| Location area        | 44x18mm   |         | Ø18mm  |             | 44x18mm  |            | Ø18mm  |
| Spring strength      | 550mN (Reading: 0) - 8050mN (Reading: 100)  |         |  |             | 0N (Reading: 0) - 44.45N (Reading: 100)                |            |  |
| Functions            | <b>Digital durometer:</b> Data hold, zero-set, SPC data output, power ON/OFF (Power supply: SR44 battery)<br><b>Dial durometer:</b> Peak retaining hand |         |  |             |  |            |  |
| Type                 | Compact   |         |  | Long-leg    | Compact  |            | Long-leg   |
| Dimensions (WxDxH)   | 65x35x100mm   |         |  | 65x50x180mm | 65x35x100mm  |            | 65x50x180mm  |
| Mass (Digital/dial)  | 290g/300g   |         |  | 310g/320g   | 290g/300g  |            | 310g/320g  |

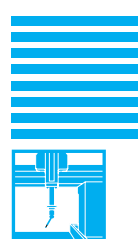
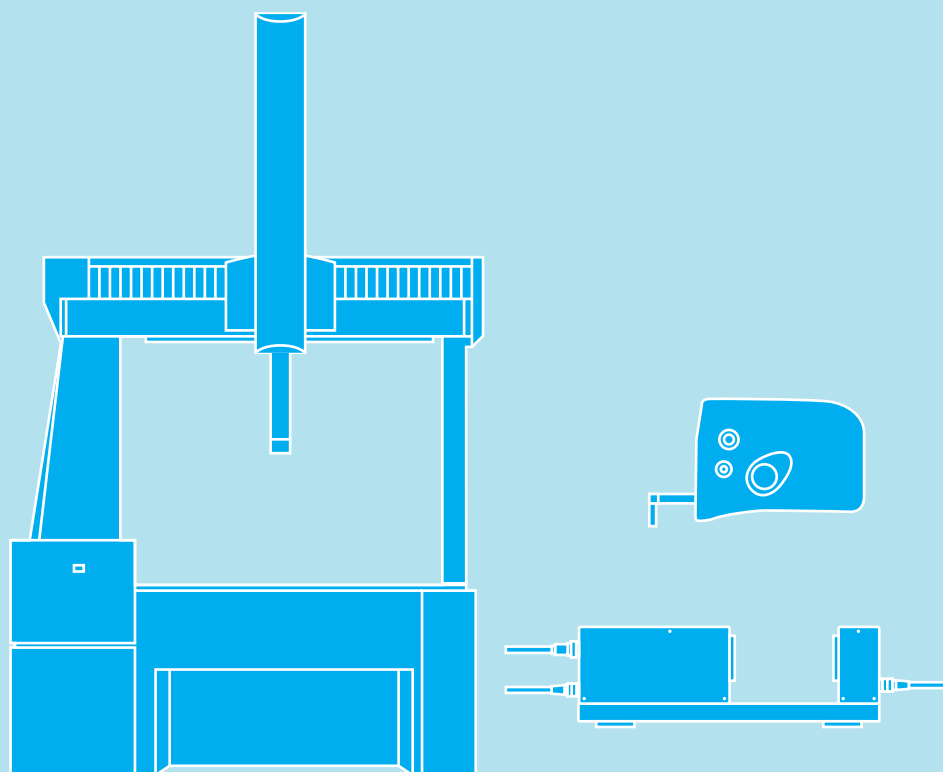
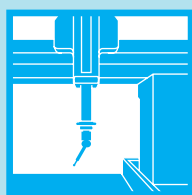
Coordinate Measuring Machines Pages 454 — 459

Flexible Measuring Gage Page 460 — 461

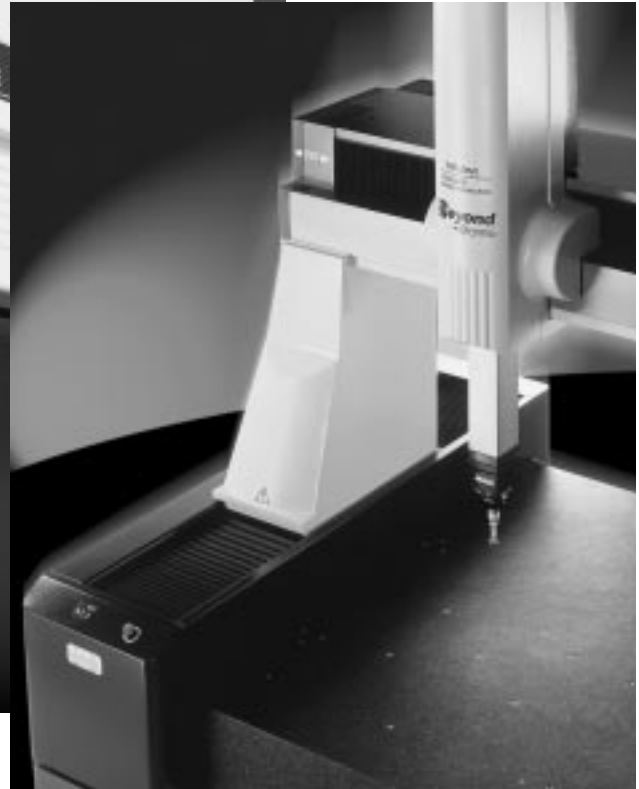
Vision Measuring System Page 462 — 464

Laser Scan Micrometers Pages 465 — 469

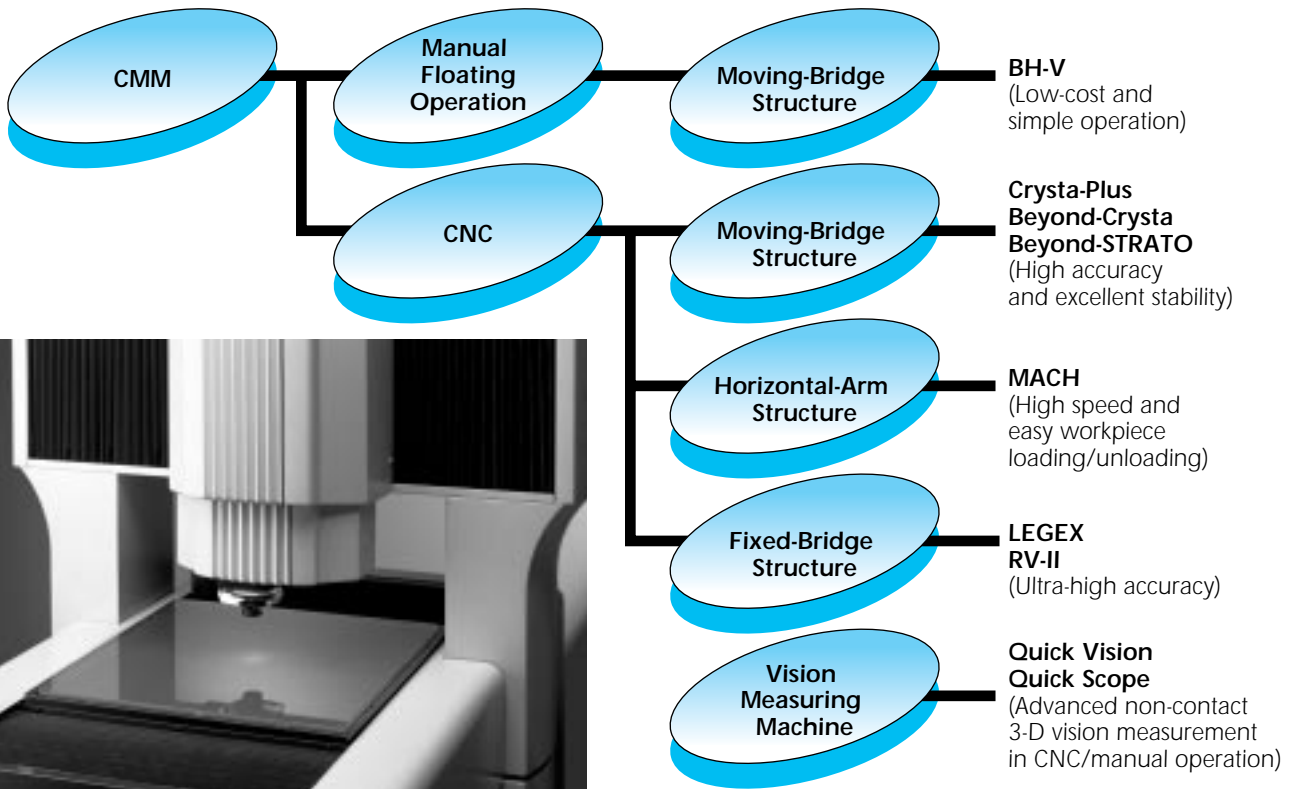
Do-It-Yourself Tools Page 469 — 471



# Coordinate Measuring Machines



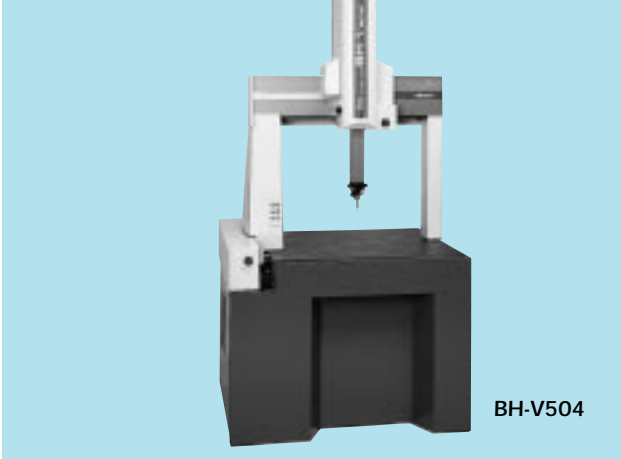
## MITUTOYO CMM



## BH-V504/506

SERIES 196

Manual-Floating Type CMM



BH-V504

### FEATURES

- Smooth operation because of the high-precision air bearings and lightweight moving members.
- Continuous fine feed over the entire measuring range.
- One-touch air clamp for each axis.

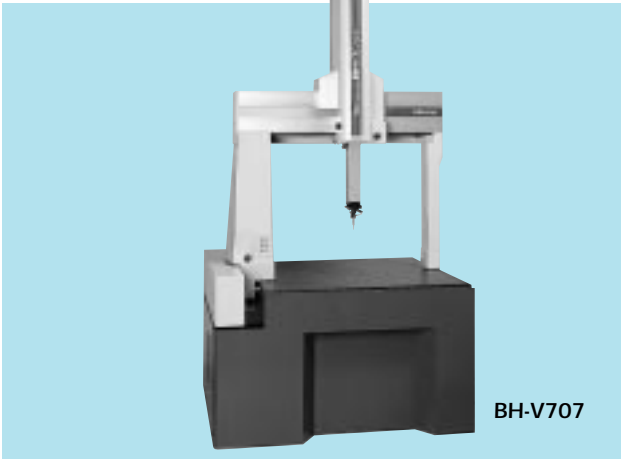
| Model No.        |                     | BH-V504  | BH-V507     |
|------------------|---------------------|--|-------------|
| Range            | X-axis              | 500mm (20")  | 500mm (20") |
|                  | Y-axis              | 400mm (16")  | 700mm (28") |
|                  | Z-axis              | 400mm (16")  | 400mm (16") |
| Resolution       |                     | 0.0005mm (.00002")                                   |             |
| Accuracy at 20°C | ISO10360-2          | E= (4.0+5L/1000)µm*                                  |             |
|                  |                     | R= 5.0µm (when using TP2 probe)                      |             |
|                  | ANSI/ASME B89.1.12M | Repeatability= 4µm<br>Ball bar performance= 13.8µm** |             |

\*L: Measuring length (mm)  
\*\*Ball bar length: 250mm

## BH-V707/710

SERIES 196

Manual-Floating Type CMM



BH-V707

### FEATURES

- Moving-bridge structure provides excellent stability.
- No obstruction on the large-size measuring table permits easy workpiece handling.
- Continuous fine feed over the entire measuring range.

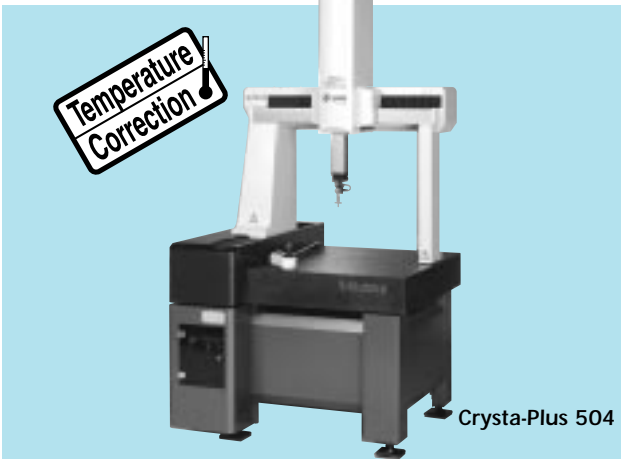
| Model No.        |                     | BH-V707  | BH-V710      |
|------------------|---------------------|--|--------------|
| Range            | X-axis              | 700mm (28")  | 700mm (28")  |
|                  | Y-axis              | 700mm (28")  | 1000mm (40") |
|                  | Z-axis              | 600mm (24")  | 600mm (24")  |
| Resolution       |                     | 0.0005mm (.00002")                                   |              |
| Accuracy at 20°C | ISO10360-2          | E= (5.0+5L/1000)µm*                                  |              |
|                  |                     | R= 5.0µm (when using TP2 probe)                      |              |
|                  | ANSI/ASME B89.1.12M | Repeatability= 6µm<br>Ball bar performance= 13.8µm** |              |

\*L: Measuring length (mm)  
\*\*Ball bar length: 500mm

## Crysta-Plus 504

SERIES 191

CNC CMM



Crysta-Plus 504

### FEATURES

- Light weight and compact dimensions.
- Easy-to-operate joystick for measuring efficiency.
- Excellent cost/performance ratio.

| Model No.         |                     | Crysta-Plus 504  |
|-------------------|---------------------|--|
| Range             | X-axis              | 505mm (20")  |
|                   | Y-axis              | 405mm (16")  |
|                   | Z-axis              | 405mm (16")  |
| Resolution        |                     | 0.0001mm (.000004")                                    |
| Accuracy at 20°C* | ISO10360-2          | E= (2.9+4L/1000)µm**                                   |
|                   |                     | R= 2.9µm (when using TP200 probe)                      |
|                   | ANSI/ASME B89.1.12M | Repeatability= 3.0µm<br>Ball bar performance= 9.0µm*** |

\*Real-time temperature correction 16°C to 26°C is optional.  
Temperature variation: 2.0K (per hour), 5.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

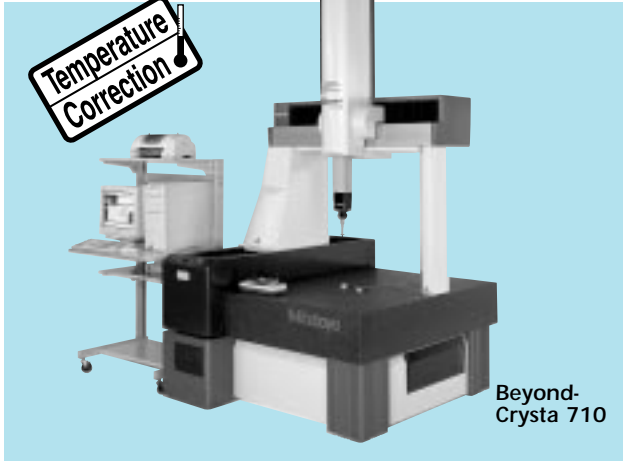
\*\*L: Measuring length (mm)  
\*\*\*Ball bar length: 250mm





## Beyond-Crysta 707/710

SERIES 191  
CNC CMM



### FEATURES

- Extremely high measuring accuracy even at its maximum drive speed of 520mm/s.
- The special light alloy for drastic weight reduction.
- Easy-to-operate joystick box for measuring efficiency.

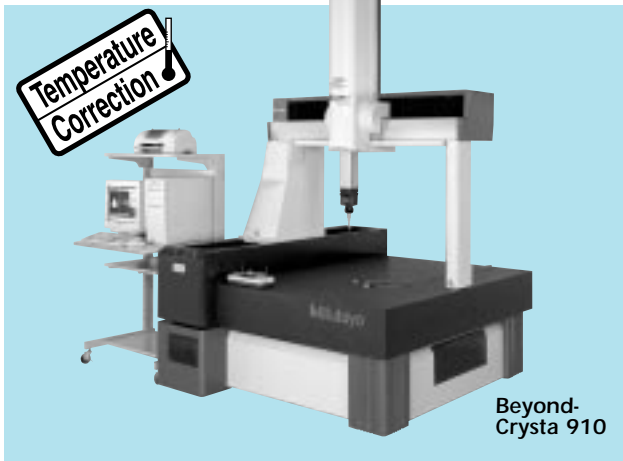
| Model No.         |                     | Beyond-Crysta 707                                    | Beyond-Crysta 710 |
|-------------------|---------------------|--|-------------------|
| Range             | X-axis              | 705mm (28")  | 705mm (28")       |
|                   | Y-axis              | 705mm (28")  | 1005mm (40")      |
|                   | Z-axis              | 605mm (24")  | 605mm (24")       |
| Resolution        |                     | 0.0001mm (.000004")                                  |                   |
| Accuracy at 20°C* | ISO10360-2          | E= (2.5+4L/1000)µm**                                 |                   |
|                   |                     | R= 2.7µm (when using TP200 probe)                    |                   |
|                   | ANSI/ASME B89.1.12M | Repeatability= 2.5µm<br>Ball bar performance= 8µm*** |                   |

\*Real-time temperature correction 16°C to 26°C is optional.  
Temperature variation: 2.0K (per hour), 5.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

\*\*L: Measuring length (mm)  
\*\*\*Ball bar length: 500mm

## Beyond-Crysta 910/916

SERIES 191  
CNC CMM



### FEATURES

- The optimum machine structure have been determined through the FEM & Modal Analysis in its quest for high-accuracy, high-speed yet affordable CNC CMM.
- Excellent cost/performance ratio.

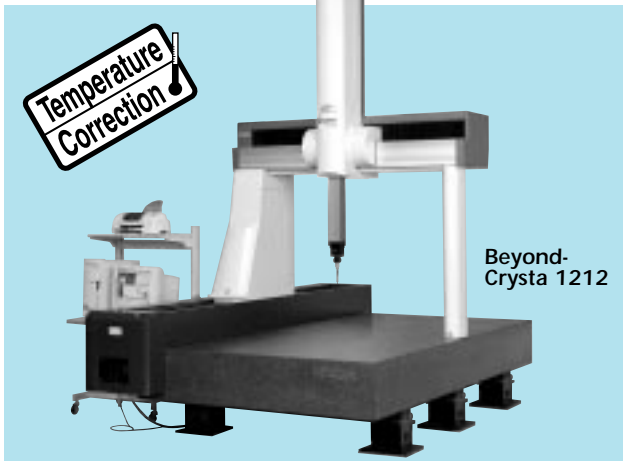
| Model No.         |                     | Beyond-Crysta 910  | Beyond-Crysta 916       |
|-------------------|---------------------|--|-------------------------|
| Range             | X-axis              | 905mm (36")  | 905mm (36")             |
|                   | Y-axis              | 1005mm (40")   | 1605mm (64")            |
|                   | Z-axis              | 605mm (24")/805mm (32")  | 605mm (24")/805mm (32") |
| Resolution        |                     | 0.0001mm (.000004")  |                         |
| Accuracy at 20°C* | ISO10360-2          | E= (2.9+4L/1000)µm/(3.2+4L/1000)µm**                               |                         |
|                   |                     | R= 3.2µm/3.4µm (when using TP200 probe)                            |                         |
|                   | ANSI/ASME B89.1.12M | Repeatability= 2.9µm/3.2µm<br>Ball bar performance= 9.0µm/9.5µm*** |                         |

\*Real-time temperature correction 16°C to 26°C is optional.  
Temperature variation: 2.0K (per hour), 5.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

\*\*L: Measuring length (mm)  
\*\*\*Ball bar length: 500mm

## Beyond-Crysta 1212/1220/1230

SERIES 191  
CNC CMM



### FEATURES

- Moving-bridge structure provides excellent stability.
- No obstruction on the measuring table permits easy workpiece handling.
- Wide measuring range for large workpieces.

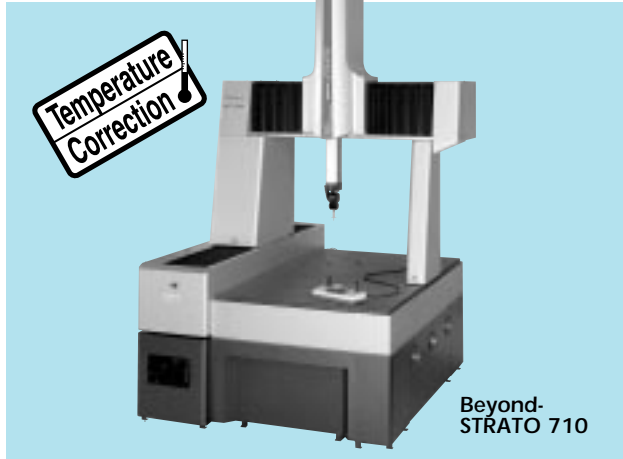
| Model No.         |                     | Beyond-Crysta 1212                                      | Beyond-Crysta 1220 | Beyond-Crysta 1230 |
|-------------------|---------------------|---|--------------------|--------------------|
| Range             | X-axis              | 1205mm (48")  | 1205mm (48")       | 1205mm (48")       |
|                   | Y-axis              | 1205mm (48")  | 2005mm (80")       | 3005mm (120")      |
|                   | Z-axis              | 1005mm (40")  | 1005mm (40")       | 1005mm (40")       |
| Resolution        |                     | 0.0001mm (.000004")                                     |                    |                    |
| Accuracy at 20°C* | ISO10360-2          | E= (3.5+5L/1000)µm**                                    |                    |                    |
|                   |                     | R= 3.7µm (when using TP200 probe)                       |                    |                    |
|                   | ANSI/ASME B89.1.12M | Repeatability= 3.5µm<br>Ball bar performance= 11.0µm*** |                    |                    |

\*Real-time temperature correction 16°C to 26°C is optional.  
Temperature variation: 2.0K (per hour), 5.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

\*\*L: Measuring length (mm)  
\*\*\*Ball bar length: 500mm

## Beyond-STRATO 707/710

SERIES 355  
Upgraded CNC CMM



### FEATURES

- High measuring accuracy and high-speed motion.
- Full-digital motion control.
- Improved rigid air bearings on all axial guideways.

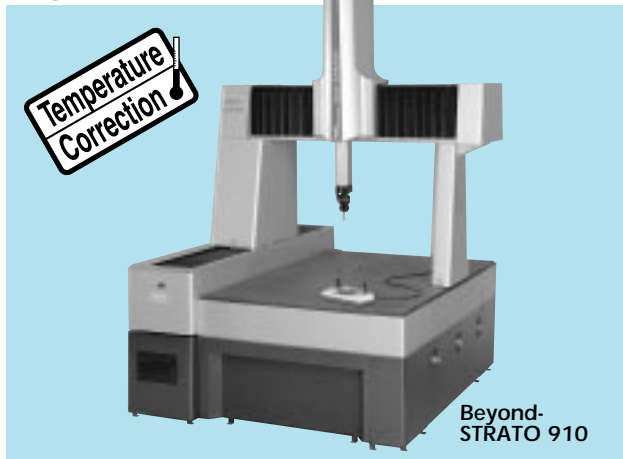
| Model No.  |            | Beyond-STRATO 707   | Beyond-STRATO 710 |
|------------|------------|---|-------------------|
| Range      | X-axis     | 705mm (28")   | 705mm (28")       |
|            | Y-axis     | 705mm (28")   | 1005mm (40")      |
|            | Z-axis     | 605mm (24")   | 605mm (24")       |
| Resolution |            | 0.0002mm (.000008")                                       |                   |
| Accuracy*  | ISO10360-2 | E= (1.4+3L/1000)μm**<br>R= 1.8μm (when using TP200 probe) |                   |
|            | ANSI/ASME  | Repeatability= 4μm  |                   |
|            | B89.1.12M  | Ball bar performance= 7.5μm***                            |                   |

\*Real-time temperature correction 18°C to 22°C is available.  
Temperature variation: 1.0K (per hour), 5.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

\*\*L: Measuring length (mm)  
\*\*\*Ball bar length: 500mm

## Beyond-STRATO 910/916

SERIES 355  
Upgraded CNC CMM



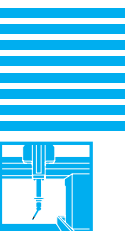
### FEATURES

- Provided with the highest measuring accuracy in its class.
- Advanced structure with low mass/high stiffness ratio.
- Vibration-free operation with high measuring speed.

| Model No.  |            | Beyond-STRATO 910   | Beyond-STRATO 916 |
|------------|------------|---|-------------------|
| Range      | X-axis     | 905mm (36")   | 905mm (36")       |
|            | Y-axis     | 1005mm (40")  | 1605mm (63")      |
|            | Z-axis     | 605mm (24")   | 605mm (24")       |
| Resolution |            | 0.0002mm (.000008")                                       |                   |
| Accuracy*  | ISO10360-2 | E= (1.7+3L/1000)μm**<br>R= 1.9μm (when using TP200 probe) |                   |
|            | ANSI/ASME  | Repeatability= 4μm  |                   |
|            | B89.1.12M  | Ball bar performance= 8.5μm***                            |                   |

\*Real-time temperature correction 18°C to 22°C is available.  
Temperature variation: 1.0K (per hour), 5.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

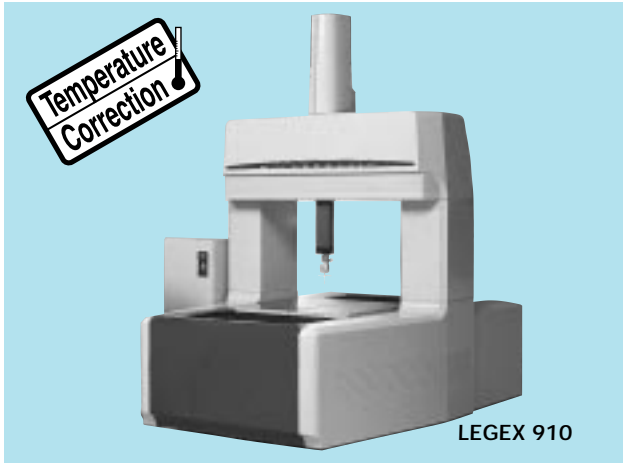
\*\*L: Measuring length (mm)  
\*\*\*Ball bar length: 500mm



# LEGEX

## SERIES 356

Ultra-high Accuracy CNC CMM



### FEATURES

- The fixed bridge structure and precision air bearings resting on the rigid guideways ensure superior stability of motion and ultra-high measuring accuracy.

| Model No.  |                        | LEGEX 707  | LEGEX 910    |
|------------|------------------------|--|--------------|
| Range      | X-axis                 | 705mm (28")  | 905mm (36")  |
|            | Y-axis                 | 705mm (28")  | 1005mm (40") |
|            | Z-axis                 | 455mm (18") or<br>605mm (24")                                  | 605mm (24")  |
| Resolution |                        | 0.00001mm (.0000001")  |              |
| Accuracy*  | ISO10360-2             | E= (0.48+L/1000)µm**<br>R= 0.6µm (when using PH10M/TP7M probe) |              |
|            | ANSI/ASME<br>B89.1.12M | Repeatability= 0.48µm<br>Ball bar performance= 3µm***          |              |

\*Real-time temperature correction 18°C to 22°C is available.  
Temperature variation: 0.5K (per hour), 1.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

\*\*L: Measuring length (mm)

\*\*\*Ball bar length: 500mm

# RV-II

## SERIES 356

Ultra-high Accuracy CNC CMM



### FEATURES

- Excellent cost-efficient performance with quality equaling that of the LEGEX series.

| Model No.  |                        | RV-II 707  | RV-II 707     | RV-II 910      |
|------------|------------------------|--|---------------|----------------|
| Range      | X-axis                 | 705mm (27.7")  | 705mm (27.7") | 905mm (35.6")  |
|            | Y-axis                 | 705mm (27.7")  | 705mm (27.7") | 1005mm (39.5") |
|            | Z-axis                 | 455mm (17.9")  | 605mm (23.8") | 605mm (23.8")  |
| Resolution |                        | 0.00001mm (.0000001")  |               |                |
| Accuracy*  | ISO10360-2             | E= (0.8+1.5L/1000)µm**<br>R= 0.8µm (when using PH10M/TP7M probe) |               |                |
|            | ANSI/ASME<br>B89.1.12M | Repeatability= 0.8µm<br>Ball bar performance= 5µm***             |               |                |

\*Real-time temperature correction 18°C to 22°C is available.  
Temperature variation: 0.5K (per hour), 1.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

\*\*L: Measuring length (mm)

\*\*\*Ball bar length: 500mm

# MACH 403/806

## SERIES 360

In-line Type CNC CMM



### FEATURES

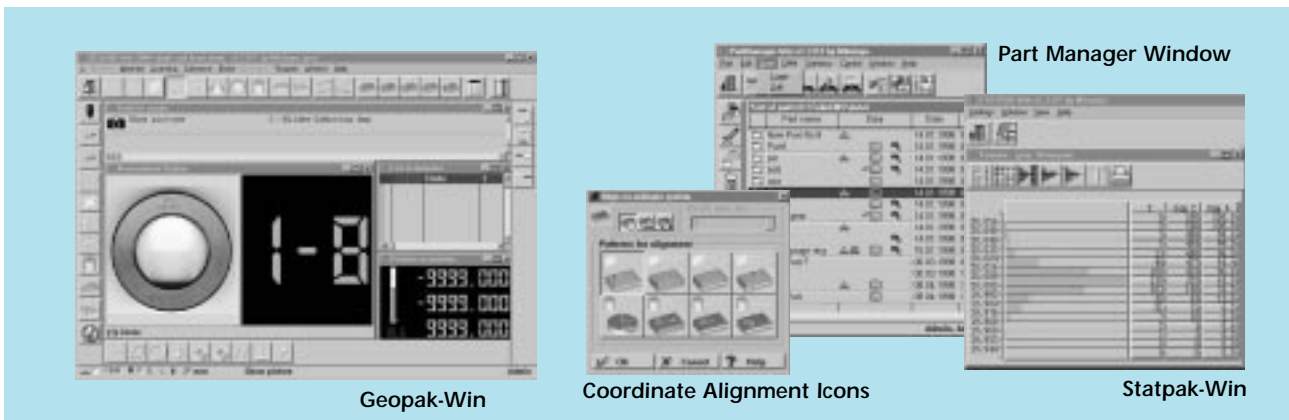
- Easy and high-speed (1800mm/s max.) measurement for in-line use.
- Horizontal-arm structure allows measurement of bulky workpieces.

| Model No.  |            | MACH 403-04  | MACH 806-10  |
|------------|------------|--|--------------|
| Range      | X-axis     | 460mm (18")  | 1021mm (40") |
|            | Y-axis     | 460mm (18")  | 818mm (32")  |
|            | Z-axis     | 300mm (12")  | 615mm (24")  |
| Resolution |            | 0.0001mm (.000004")  |              |
| Accuracy*  | ISO10360-2 | Temperature condition 15°C to 25°C:<br>E= (3.5+4L/1000)µm**<br>R= 4.0µm (when using MTP1000 probe) |              |
|            |            | Temperature condition 10°C to 35°C:<br>E= (5.0+5L/1000)µm**<br>R= 4.0µm (when using MTP1000 probe) |              |

\*Real-time temperature correction is available.  
Temperature variation: 2.0K (per hour), 5.0K (per day)  
Temperature gradient (vertical and horizontal): 1.0K/m

\*\*L: Measuring length (mm)

## Data Processing Software for Mitutoyo CMM



### GEOPAK-WIN

#### General Purpose Program

Geopak-Win is a Windows®NT-based 3-D data analysis and CMM programming software that operates under the M-COSMOS (Mitutoyo's Controlled Open System for Modular Operation). This module includes all features of the geometric measuring program for CMMs. Its enhanced graphic displays and the built-in interactivity on screen allow an inexperienced operator to measure complex parts, while maintaining the flexibility demanded by power users.

### 3D-TOL-WIN

3D-Tol-Win allows the user to make an immediate compensation of actual part 3-D surface data obtained from Geopak-Win to the nominal 2-D data generated by a CAD system (VDAFS or IGES format).

### DMISPAK-WIN

DMISPAK-Win is a module that converts workpiece CAD data to be readily imported into the Geopak-Win, permitting dramatic reduction of the time needed for part program creation. The CAD data thus imported enhances the Geopak-Win part program operability.

### SCANPAK-WIN

#### Profile Data Analysis Program

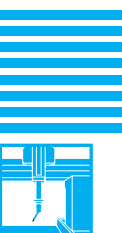
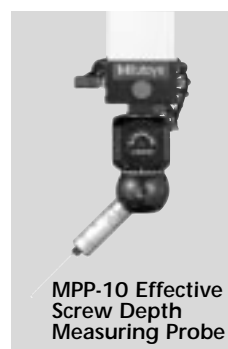
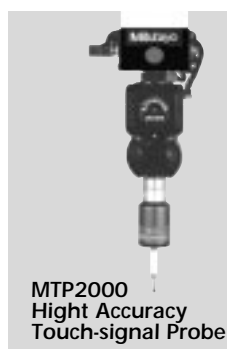
Scanpak-Win allows the user to compare multi-point scanning data obtained from Geopak-Win to the nominal data generated by a CAD system. The result can be output as easy-to-look graphics. Scanpak-Win can also process the measured data to show "best-fit" conditions and feed them back to the manufacturing process.

### STATPAK-WIN

#### Statistical Data Processing Program

Statpak-Win is a statistical analysis module that operates under the M-COSMOS. This module is compatible to many recognized international standards including the Ford EU 883, Q1, QS9000, IASO9000, French, Renault, CNOMO standards as well as German DGC standards.

## Probes for Mitutoyo CMM



# QM-Measure and QM-Data

## SERIES 198

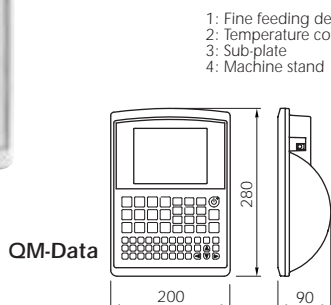
### Flexible Measuring Gage/Data Processor



The QM-Measure employs a unique "open space" structure to make workpiece loading/unloading easy. This also allows the shop operator to approach the workpiece without obstruction by the machine column.

In choosing this unique structure, Mitutoyo has determined the QM-Measure's body design through the FEM (Finite-Element Method) analysis so that the machine deformation during probing is minimized and evened. The optimized machine design achieves a competent measuring accuracy of  $(3.0+4L/1000)\mu\text{m}$  and very smooth probing with minimum operation fatigue.

If the QM-Measure is required to evaluate the workpiece dimension at 20°C temperature, and shop or workpiece temperatures are not at 20°C, an optional Temperature Compensation System can be installed. It can expand the operation temperature range to 15°C - 30°C.



### SPECIFICATIONS

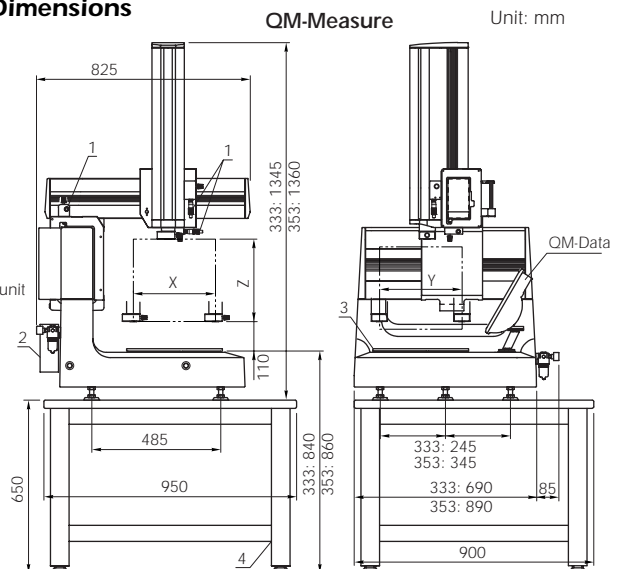
| Model No.            |            | QM-Measure 333  | QM-Measure 353   |
|----------------------|------------|---|------------------|
| Measuring range      | X-axis     | 300mm (12")   | 300mm (12")      |
|                      | Y-axis     | 300mm (12")   | 500mm (20")      |
|                      | Z-axis     | 300mm (12")   | 300mm (12")      |
| Length standard      |            | Precision linear encoder  |                  |
| Resolution           |            | 0.0005mm (.00002")  |                  |
| Accuracy (20°C±1°C)* |            | E = $(3.0+4L/1000)\mu\text{m}$ , R = $4.0\mu\text{m}$ (.00016") |                  |
| Guide method         |            | Air bearing for each axis                                       |                  |
| Clamping method      |            | Clamping screw  |                  |
| Fine feeding device  |            | Optional (10mm/.4" stroke)                                      |                  |
| Z-axis balance       |            | Counterweight   |                  |
| Measuring table      |            | Optional (aluminum or granite sub-plate)                        |                  |
| Machine stand        |            | Optional  |                  |
| Workpiece loading    |            | Maximum height: 410mm (16.14")                                  |                  |
|                      |            | Maximum mass: 30kg (66 lbs.)                                    |                  |
| Air pressure         |            | 0.35MPa or 51PSI  |                  |
| Air consumption      |            | 50L/min. (in normal state) or 1.8CFM                            |                  |
| Mass**               | QM-Measure | 130kg (286 lbs.)  | 170kg (374 lbs.) |
|                      | QM-Data    | 1.2kg (2.6 lbs.)  | 1.2kg (2.6 lbs.) |

\* ISO 10360-2  
 E: Error of indication of volumetric length measurement  
 L: Measuring length (mm)  
 R: Probing error (with TP2 touch signal probe)  
 \*\* Excluding the optional machine stand.

### OPTIONAL ACCESSORIES

|                  |                                       |
|------------------|---------------------------------------|
| <b>06AAV498:</b> | Ceramic master ball                   |
| <b>06AAY484:</b> | Machine stand (table top H=750mm)     |
| <b>06AAX288:</b> | Machine stand (table top H=650mm)     |
| <b>06AAX763:</b> | Granite sub-plate for QM-Measure 333  |
| <b>06AAX917:</b> | Granite sub-plate for QM-Measure 353  |
| <b>06AAD671:</b> | Clamping unit                         |
| <b>06AAY251:</b> | Fine feeding device (10mm/.4" stroke) |
| <b>937179T:</b>  | Foot switch                           |
| <b>06AAX263:</b> | Floppy disk drive                     |
| <b>06AAX265:</b> | Printer (120V)                        |
| <b>06AAX266:</b> | Printer (230V)                        |
| <b>908353:</b>   | Printer paper (5 rolls)               |
| —:—              | Temperature compensation system       |

### Dimensions



## Intuitive Icons\* for Gage-like Measurement

The QM-Data operates as a "Gage-like" instrument. Instead of the troublesome data entry by computer keyboard or pull-down menu selection, the QM-Data provides 5 "Gage-like measurement" menu displays including 43 1D/2D/3D geometric element icons.

Just press the representative function key of the element icon to be measured, and then touch a workpiece feature with a touch trigger probe. The QM-Data immediately calculates the measured geometry and displays the result on the large LCD panel. The shop operator can ignore the complicated 3D coordinate system setup during the measurement.



Simple measurement



Standard measurement



Advanced measurement



\* The copyright of the software and icons used are owned by Mitutoyo Corporation.

## Interactive Graphic Display

After the geometric element is selected, the QM-Data draws a graphic of the feature on the LCD panel including number of input points and position to be required. This allows the operator to perform the measurement with accurate data collection.



The last input point is measured, the QM-Data immediately shows the measurement result.



## Multiple Language Support

The operation language is available in English, Japanese, German, French, Italian, Spanish, Portuguese.



## Mitutoyo "AI" Function

Furthermore when using "AI" function, even the geometric feature selection can be skipped. The QM-Data identifies from the input data what geometric feature is measured, then shows the graphic display and calculates the dimensions automatically. This allows the operator to continue the measurement without interruption using key-stroke.



**Enlarged display mode:**  
Simple indication of XYZ probe position

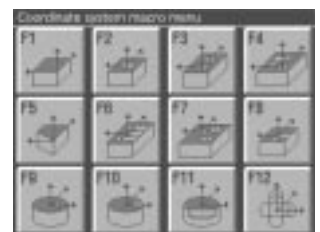
## For Advanced Measurement

In addition to the Gage-like measurement menus the QM-Data provides experienced operators with advanced functions equal to a standard CMM software.



## Coordinate System Customization for Experienced Operators

If the 3D coordinate system automatically generated in the Gage-like measurement is not suitable for your workpiece, the QM-Data offers the operator a choice of twelve additional coordinate system setup patterns.



# Quick Vision ELF, Quick Vision, Quick Vision Hybrid, Quick Vision Accel

## SERIES 359

### Non-contact CNC 3-D Vision Measuring System



Quick Vision ELF 200

Quick Vision 302

Quick Vision 404

Laser scanning system for Quick Vision Hybrid



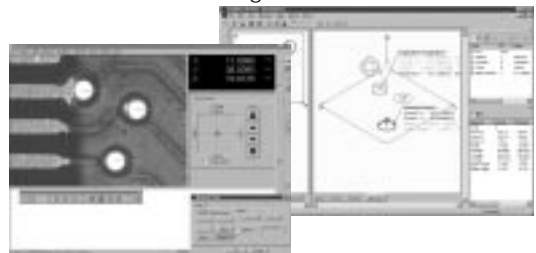
Mitutoyo Quick Vision is a non-contact, CNC 3-D vision measuring machine designed to meet diverse requirements for measuring very thin, small, and complex or delicate components such as IC lead frames, P.C.B., rubber parts accurately and quickly.

### FEATURES

- The programmable ring light (PRL) system allows the operator to easily control the direction, angle, and intensity of surface illumination.
- Quick Vision PRO Series are provided with a programmable power turret tube lens (1X, 2X, 6X) for quick and high accuracy magnification setting; Quick Vision PRO-II Series are provided with a programmable 16X - 240X power zoom lens for excellent operability.
- Optional touch-probe system and laser-probe system are available.
- The 4-quadrant RGB LED ring light featured in the Quick Vision offers effective illumination of your workpiece from desired directions, preventing unwanted shadows.
- Quick Vision ELF, the low cost yet high performance-cost ratio vision measuring machine.

### QVPAK Data Processing Software

The powerful data processing software QVPAK is provided with many features including improved graphics and user macro function. Its new smart tool allows immediate measurements for point, line, arc, circle, surface and edge focus by simply one-clicking the mouse. The 3-D graphics window displays the measurement result and measurement element simultaneously, so that the user can check the work progress and measurement result at a glance.

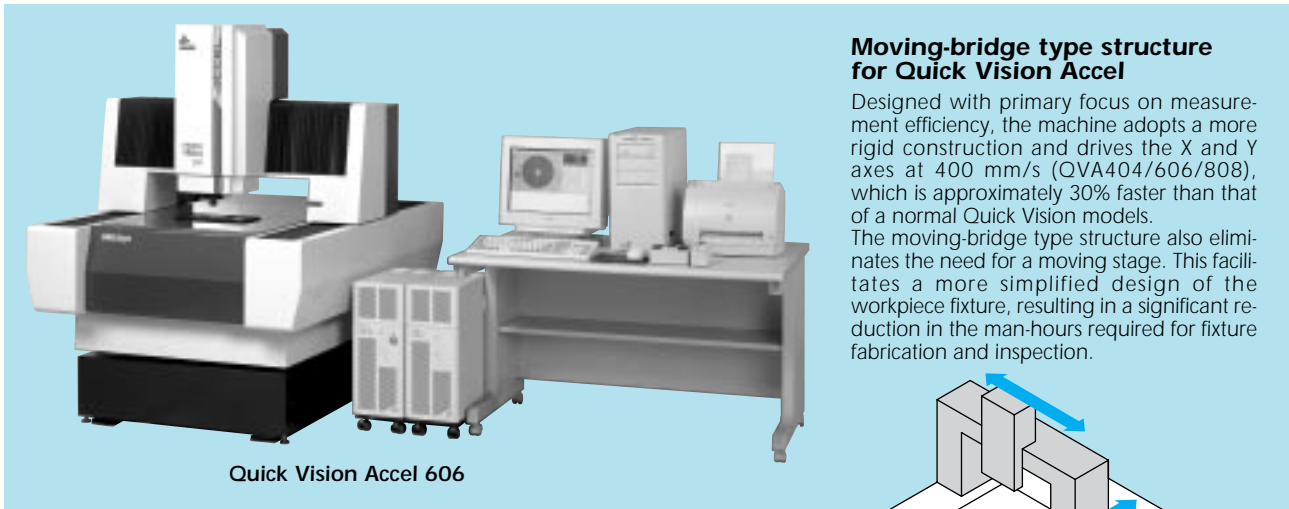


### Applicable models

- R/F: Most simplified configuration with halogen ring-fiber illumination
- P/T: With programmable power turret tube lens and RGB LED\* ring light \*Quick Vision ELF: Halogen light
- PRO: With programmable power turret tube lens and programmable RGB LED\* ring light \*Quick Vision ELF: White LED
- Z/M: With programmable zoom lens and halogen ring-fiber illumination
- PRO-II: With programmable power zoom lens and programmable halogen ring light

|        | Quick Vision ELF | Quick Vision | Quick Vision Hybrid | Quick Vision Accel |
|--------|------------------|--------------|---------------------|--------------------|
| R/F    | ✓ (halogen)      | -----        | -----               | ✓ (halogen)        |
| PRL    | -----            | -----        | -----               | ✓ (halogen)        |
| P/T    | ✓ (halogen)      | ✓ (RGB LED)  | -----               | ✓ (halogen)        |
| PRO    | ✓ (white LED)    | ✓ (RGB LED)  | ✓ (RGB LED)         | ✓ (halogen)        |
| Z/M    | -----            | ✓* (halogen) | -----               | -----              |
| PRO-II | -----            | ✓* (halogen) | -----               | -----              |

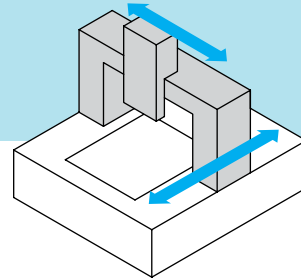
\*not available for Super/Hyper models



Quick Vision Accel 606

### Moving-bridge type structure for Quick Vision Accel

Designed with primary focus on measurement efficiency, the machine adopts a more rigid construction and drives the X and Y axes at 400 mm/s (QVA404/606/808), which is approximately 30% faster than that of a normal Quick Vision models. The moving-bridge type structure also eliminates the need for a moving stage. This facilitates a more simplified design of the workpiece fixture, resulting in a significant reduction in the man-hours required for fixture fabrication and inspection.



### Quick Vision ELF 200/250

| Model                        |        | QVE200  | QVE250      |
|------------------------------|--------|---|-------------|
| Measuring range              | X-axis | 200mm (8")  | 200mm (8")  |
|                              | Y-axis | 200mm (8")  | 250mm (10") |
|                              | Z-axis | 100mm (4")  | 100mm (4")  |
| Resolution                   |        | 0.0001mm  |             |
| Measuring accuracy (at 20°C) |        | U <sub>1xy</sub> : (2.2+3L/1000)µm, U <sub>1z</sub> : (4+5L/1000)µm |             |
| Magnification on 17" monitor | R/F    | 32x/80x/160x*   |             |
|                              | P/T    | 32x - 192x/80x - 480x/160x - 960x*                                  |             |
|                              | PRO    | 32x - 192x/80x - 480x/160x - 960x*                                  |             |

\*using 1x/2.5x/5x objective

### Quick Vision 202/302/404/606, Quick Vision Hybrid 302/404/606

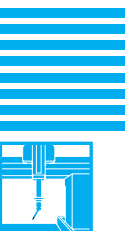
| Model                        | Quick Vision        | QV202   | QV302                   | QV404                    | QV606                    |
|------------------------------|---------------------|---|-------------------------|--------------------------|--------------------------|
|                              | Quick Vision Hybrid | -----   | QVH302                  | QVH404                   | QVH606                   |
| Measuring range              | X-axis              | 200mm (8")  | 300mm (12")/176mm (7")* | 400mm (16")/276mm (11")* | 600mm (24")/476mm (19")* |
|                              | Y-axis              | 200mm (8")  | 200mm (8")              | 400mm (16")              | 650mm (26")              |
|                              | Z-axis              | 200mm (8")  | 200mm (8")              | 250mm (10")              | 250mm (10")              |
| Resolution                   | Normal              | 0.0001mm  |                         |                          |                          |
|                              | Super               | 0.0001mm  |                         |                          |                          |
|                              | Hyper               | 0.00002mm   |                         |                          |                          |
| Measuring accuracy (at 20°C) | Normal              | U <sub>1xy</sub> : (2.2+3L/1000)µm, U <sub>1z</sub> : (4+5L/1000)µm                                     |                         |                          |                          |
|                              | Super               | U <sub>1xy</sub> : (1.5+3L/1000)µm, U <sub>1z</sub> : (3+4L/1000)µm, U <sub>2xy</sub> : (2.5+4L/1000)µm |                         |                          |                          |
|                              | Hyper               | U <sub>1xy</sub> : (0.8+2L/1000)µm, U <sub>1z</sub> : (3+2L/1000)µm, U <sub>2xy</sub> : (1.4+3L/1000)µm |                         |                          |                          |
| Magnification on 17" monitor | P/T                 | 32x - 192x/80x - 480x/160x - 960x**   |                         |                          |                          |
|                              | PRO                 | 32x - 192x/80x - 480x/160x - 960x**   |                         |                          |                          |
|                              | Z/M                 | 16x - 240x (15-step power zoom)   |                         |                          |                          |
|                              | PRO-II              | 16x - 240x (15-step power zoom)   |                         |                          |                          |

\*using laser head (Quick Vision Hybrid) \*\*using 1x/2.5x/5x objective

### Quick Vision Accel 404/606/808/1212/1515

| Model                        |        | QVA404  | QVA606      | QVA808      | QVA1212   | QVA1515      |
|------------------------------|--------|---|-------------|-------------|---|--------------|
| Measuring range              | X-axis | 400mm (16")   | 600mm (24") | 800mm (32") | 1200mm (49")  | 1500mm (59") |
|                              | Y-axis | 400mm (16")   | 600mm (24") | 800mm (32") | 1200mm (49")  | 1500mm (59") |
|                              | Z-axis | 150mm (6")  | 150mm (6")  | 150mm (6")  | 90mm (3.5")   | 90mm (3.5")  |
| Resolution                   | Normal | 0.0001mm  |             |             |   |              |
|                              | super  | 0.0001mm  |             |             |   |              |
| Measuring accuracy (at 20°C) | Normal | U <sub>1xy</sub> : (2.2+3L/1000)µm, U <sub>1z</sub> : (4+5L/1000)µm                                     |             |             | U <sub>1xy</sub> : (3.5+5L/1000)µm, U <sub>1z</sub> : (4+5L/1000)µm                                     |              |
|                              | Super  | U <sub>1xy</sub> : (1.5+3L/1000)µm, U <sub>1z</sub> : (3+4L/1000)µm, U <sub>2xy</sub> : (2.5+4L/1000)µm |             |             | U <sub>1xy</sub> : (2.5+4L/1000)µm, U <sub>1z</sub> : (3+4L/1000)µm, U <sub>2xy</sub> : (2.5+4L/1000)µm |              |
| Magnification on 17" monitor | R/F    | 32x /80x /160x *  |             |             |   |              |
|                              | PRL    | 32x /80x /160x *  |             |             |   |              |
|                              | P/T    | 32x - 192x/80x - 480x/160x - 960x*  |             |             |   |              |
|                              | PRO    | 32x - 192x/80x - 480x/160x - 960x*  |             |             |   |              |

\*using 1x/2.5x/5x objective





## Quick Scope

### SERIES 359

#### Vision Inspecting/Measuring System



QS200Z (CNC)



QS-L1020Z (manual)

#### QS200/250 (CNC)

| Model No.         |        | QS200Z<br>QS200  | QS250Z<br>QS250 |
|-------------------|--------|--|-----------------|
| Range             | X-axis | 200mm (8")   | 200mm (8")      |
|                   | Y-axis | 200mm (8")   | 250mm (10")     |
|                   | Z-axis | 100mm (4")   | 100mm (4")      |
| Resolution        |        | 0.0005mm   |                 |
| Accuracy at 20°C* |        | (3+10L/1000)µm   |                 |
| Magnifications    |        | <b>QS200Z/250Z:</b> 21X - 147X zoom<br><b>QS200/250:</b> 42X/105X/210X |                 |

#### QS-L1020/L1020AF/E1020

| Model No.         |        | QS-L1020Z   | QS-L1020ZAF<br>QS-L1020Z | QS-E1020   |
|-------------------|--------|---|--------------------------|------------|
| Range             | X-axis | 200mm (8")  | 200mm (8")               | 200mm (8") |
|                   | Y-axis | 100mm (4")  | 100mm (4")               | 100mm (4") |
|                   | Z-axis | 150mm (6")  | 150mm (6")               | 150mm (6") |
| Resolution        |        | 0.001mm   |                          |            |
| Accuracy at 20°C* |        | (3+20L/1000)µm  |                          |            |
| Magnifications    |        | <b>QS-L1020ZAF:</b> 21X - 147X zoom<br><b>QS-L1020AF/E1020:</b> 42X/105X/210X |                          |            |

\*When using 2.5X objective or the zoom lens in 2.5X magnification (Magnification on monitor: 105X), L= Measuring length (mm)

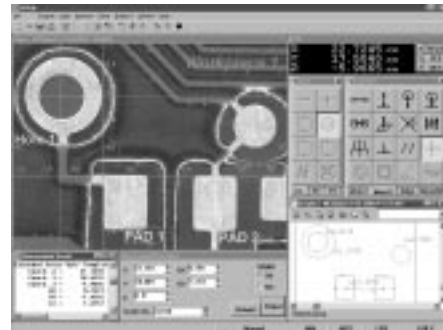
#### FEATURES

- A color CCD camera provides real-life, sharp workpiece images.
- Available in CNC (**QS200/250**) or manual version (**QS-L, QS-E**), with zoom or fixed magnification.
- The QS-E Series are the most affordable, fully-manual-operation models. Magnification can be adjusted by changing objectives.
- Navigation and Graphic functions allow easy operation and movement around the part.
- One-click edge detection.
- Macro icon tools for many common measuring routines.
- Compact design fits where you need it.
- Powerful, Windows®-based software is easy-to-use and intuitive.

#### QS Pak Data Processing Software

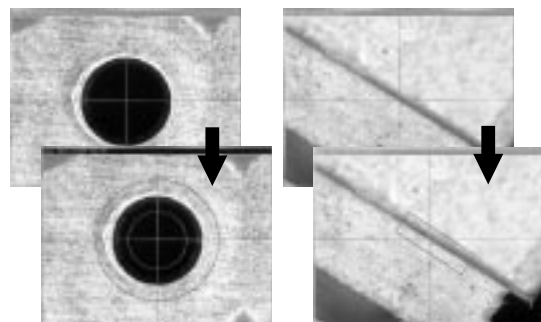
QS Pak is a Windows®-based vision measuring software that provides powerful measuring capabilities and comprehensive measurement analysis. All operations can be performed on-screen for maximum operator efficiency: measuring, workstage drive\*, zoom control, illumination, data processing, and printing. Macros include one-click edge detection for fast distance and angle calculation, and circle measurement. Just by clicking on the icon and then the feature on the screen.

\*QS CNC Type only.



#### One click edge detection

Just by clicking the mouse near the edge of a workpiece, QS Pak automatically scans the edge and detects it, showing its coordinates. This function also works with the point tool, box (line) tool, circle tool, and auto-focus tool.



## LSM-5000/5000S

### SERIES 544

Display Unit for Laser Scan Micrometer



LSM-5000/5000S

#### FEATURES

- Panel-mounted type and DIN size (144mm width x 72mm height). It can be easily incorporated into each system instrument.
- The maximum value, minimum value, and TIR (total indicator reading) measurements are possible.
- With a sub-display for checking preset values.
- The standard RS-232C interface allows easy communication with an external personal computer. LSM-5000 is also provided with an analog signal input/output port.

## LSM-6000/6000S

### SERIES 544

Display Unit for Laser Scan Micrometer



LSM-6000/6000S

#### FEATURES

- Provided with multiple functions including edge specifying, simultaneous measurement, dual-unit measurement (optional), etc. for meeting diverse measuring requirements.
- Sub-display for displaying preset values or the second value at simultaneous measurement.
- The maximum value, minimum value, and TIR (total indicator reading) measurements are possible.
- Statistical data processing function.
- Abnormal data eliminating function.
- With RS-232C interface unit as standard. LSM-6000 is also provided with an analog signal input/output port.

#### SPECIFICATIONS

##### Metric

| Model No.                | LSM5000   | LSM5000S  |
|--------------------------|---|-----------|
| Order No.                | 544-032   | 544-035   |
| Display (main)           | 9-digit LED   |           |
| Functions                | Zero-setting, presetting, GO/±NG judgment, offset value setting, sample measurement, statistical calculation, data output, workpiece position display, mm/inch switching, dual-gage calibration, transparent object measurement, automatic measurement, abnormal data eliminating |           |
| Interface units equipped | • RS-232C<br>• Analog, I/O  | • RS-232C |
| Power supply             | 24V DC±10%, 1A  |           |
| Dimensions (WxDxH)       | 144x245x72mm (DIN size)   |           |
| Mass                     | 1.4kg   |           |

##### Inch/Metric

| Model No.                | LSM5000                    | LSM5000S  |
|--------------------------|----------------------------|-----------|
| Order No.                | 544-033                    | 544-036   |
| Interface units equipped | • RS-232C<br>• Analog, I/O | • RS-232C |

#### SPECIFICATIONS

##### Metric

| Model No.                  | LSM6000   | LSM6000S                   |
|----------------------------|---|----------------------------|
| Order No.                  | 110V AC<br>544-062C   | 544-065C                   |
| *For UK<br>**For Australia | 120V AC   | 544-062A                   |
|                            | 220V AC   | 544-062D                   |
|                            | 240V AC†  | 544-062E                   |
|                            | 240V AC††   | 544-062F                   |
| Main display               | 16-digit fluorescent tube   |                            |
| Functions                  | Zero-setting, presetting, GO/±NG judgment, multi-limit judgment, offset value setting, sample measurement, statistical calculation, group judgment, data output, workpiece position display, mm/inch switching, dual-gage calibration, transparent object measurement, dual-unit measurement (optional), automatic measurement, abnormal data eliminating |                            |
| Interface units equipped   | • RS-232C<br>• Analog, I/O<br>• Foot switch   | • RS-232C<br>• Foot switch |
| Power supply               | 100 - 240V AC±10%, 40VA, 50/60Hz  |                            |
| Dimensions (WxDxH)         | 335x277x134mm   |                            |
| Mass                       | 5kg   |                            |

##### Inch/Metric

| Model No.                  | LSM6000                                     | LSM6000S                   |
|----------------------------|---|----------------------------|
| Order No.                  | 110V AC<br>544-063C                         | 544-066C                   |
| *For UK<br>**For Australia | 120V AC                                     | 544-063A                   |
|                            | 220V AC                                     | 544-063D                   |
|                            | 240V AC†                                    | 544-063E                   |
|                            | 240V AC††                                   | 544-063F                   |
| Interface units equipped   | • RS-232C<br>• Analog, I/O<br>• Foot switch | • RS-232C<br>• Foot switch |

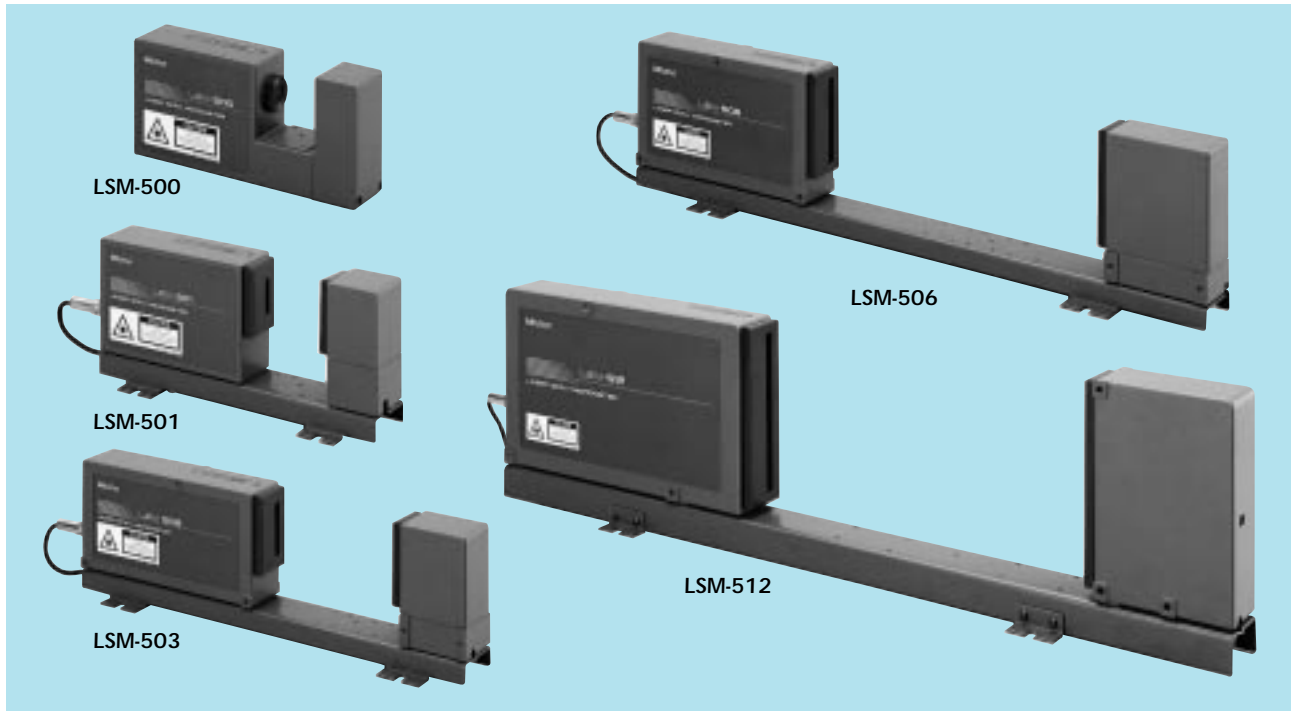


# LSM-500/501/503/506/512

## Laser Scan Micrometer

SERIES 544

Non-contact Measuring Units



Using a high speed scanning laser beam, the Laser Scan Micrometer can accurately measure workpieces which are difficult for conventional instruments, such as: brittle or elastic parts, hot parts, parts which need to be kept clean, and soft parts which may suffer dimensional changes due to measuring force. Transparent part measurement is also possible.

### FEATURES

- High speed laser scanning (1600 scans/sec) for efficient measurement in automated production lines.
- Visible laser type and non-visible laser type (high reliability at high temperature) are available.
- Assemble type structure of the measuring unit allows various applications for measurements (except for LSM-500/500N).
- LSM-500/500N is specially designed to measure fine wires.
- Dust/Water protection grade conforms to IP-64.
- Display unit is optional. (See page 465.)
- The optical characteristic data of each measuring unit is stored in the ID unit supplied.
- Calibration gage sets are optional.

### SPECIFICATIONS

#### LSM Using Visible Semiconductor Laser

| Model No.                  | LSM-500                             | LSM-501     | LSM-503               | LSM-506               | LSM-512             |
|----------------------------|-------------------------------------|-------------|-----------------------|-----------------------|---------------------|
| Order No.                  | 544-453                             | 544-456     | 544-459               | 544-473               | 544-476             |
| Measuring range            | 0.005 - 2mm                         | 0.05 - 10mm | 0.3 - 30mm            | 1 - 60mm              | 1 - 120mm           |
| Resolution                 | 0.00001mm<br>(0.01μm)               |             | 0.00002mm<br>(0.02μm) | 0.00005mm<br>(0.05μm) | 0.0001mm<br>(0.1μm) |
| Linearity at 20°C*         | ±0.3μm                              | ±0.5μm      | ±2μm                  | ±4μm                  | ±8μm                |
| Repeatability (±2σ)        | ±0.06μm                             | ±0.08μm     | ±0.3μm                | ±0.6μm                | ±2μm                |
| Workpiece positional error | ±0.5μm                              | ±1.0μm      | ±2.5μm                | ±5μm                  | ±10μm               |
| Measuring region           | 1x2mm                               | 4x10mm**    | 10x30mm               | 20x60mm               | 30x120mm            |
| Laser wavelength           | 670nm (Visible semiconductor laser) |             |                       |                       |                     |
| Number of scans            | 1600 scans/s                        |             |                       |                       |                     |
| Operating temperature      | 0°C to 40°C                         |             |                       |                       |                     |

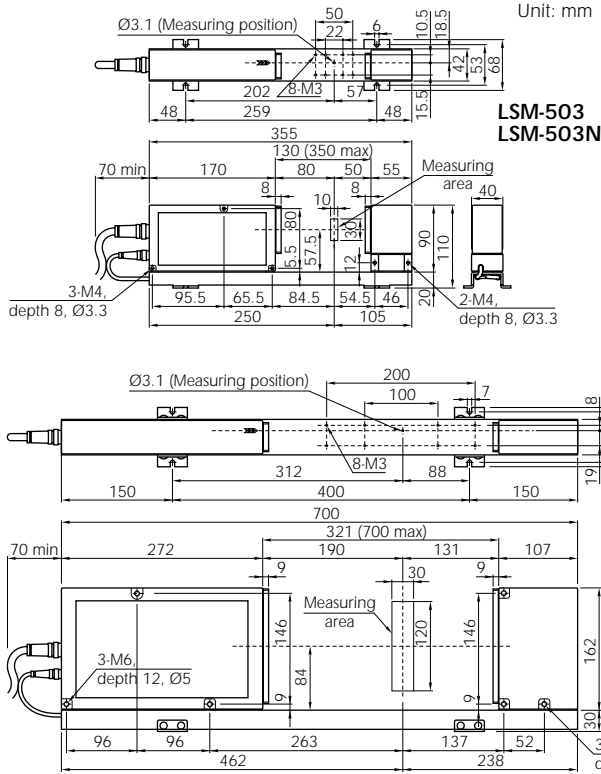
\*At the center of measuring region.  
\*\*2x10mm when measuring workpieces with a diameter from 0.05mm to 0.1mm.

#### LSM Using Invisible Semiconductor Laser

| Model No.                  | LSM-500N                              | LSM-501N    | LSM-503N              | LSM-506N              | LSM-512N            |
|----------------------------|---------------------------------------|-------------|-----------------------|-----------------------|---------------------|
| Order No.                  | 544-463                               | 544-466     | 544-469               | 544-483               | 544-486             |
| Measuring range            | 0.01 - 2mm                            | 0.05 - 10mm | 0.3 - 30mm            | 1 - 60mm              | 1 - 120mm           |
| Resolution                 | 0.00001mm<br>(0.01μm)                 |             | 0.00002mm<br>(0.02μm) | 0.00005mm<br>(0.05μm) | 0.0001mm<br>(0.1μm) |
| Linearity at 20°C*         | ±0.3μm                                | ±0.5μm      | ±2μm                  | ±4μm                  | ±8μm                |
| Repeatability (±2σ)        | ±0.1μm                                | ±0.1μm      | ±0.3μm                | ±0.6μm                | ±2μm                |
| Workpiece positional error | ±0.5μm                                | ±1.0μm      | ±2.5μm                | ±5μm                  | ±10μm               |
| Measuring region           | 1x2mm                                 | 4x10mm**    | 10x30mm               | 20x60mm               | 30x120mm            |
| Laser wavelength           | 780nm (Invisible semiconductor laser) |             |                       |                       |                     |
| Number of scans            | 1600 scans/s                          |             |                       |                       |                     |
| Operating temperature      | 0°C to 45°C                           |             |                       |                       |                     |

\*At the center of measuring region.  
\*\*2x10mm when measuring workpieces with a diameter from 0.05mm to 0.1mm.

## Dimensions



## OPTIONAL ACCESSOIRES

| Order No. | Description                           |
|-----------|---------------------------------------|
| 02AGD110  | Calibration gage set for LSM-500/500N |
| 02AGD120  | Calibration gage set for LSM-501/501N |
| 02AGD130  | Calibration gage set for LSM-503/503N |
| 02AGD140  | Calibration gage set for LSM-506/506N |
| 02AGD150  | Calibration gage set for LSM-512/512N |
| 02AGD170  | Calibration gage set for LSM-9506     |



## LSM-9506 Laser Scan Micrometer SERIES 544 Non-contact Measuring Unit with Display



## FEATURES

- With a design that integrates the display section and measuring section into one unit, the LSM-9506 is best suited for bench-top measurement in an inspection room.
- Provides high measuring accuracy with a linearity of  $\pm 2.5\mu\text{m}$ .
- A statistical calculation function is provided.
- Standard RS-232C interface and SPC output interface are provided.
- Calibration gage sets are optional.

## SPECIFICATIONS

### LSM-9506 Laser Scan Micrometer

#### Metric

| Model No.                       | LSM-9506                               |          |
|---------------------------------|--|----------|
| Order No.                       | 110V AC                                | 544-115C |
| <sup>†</sup> For UK             | 120V AC                                | 544-115A |
| <sup>††</sup> For Australia     | 220V AC                                | 544-115D |
|                                 | 240V AC <sup>†</sup>                   | 544-115E |
|                                 | 240V AC <sup>††</sup>                  | 544-115F |
| Measuring range                 | 0.5 - 60mm                             |          |
| Resolution                      | 0.00005mm (0.05 $\mu\text{m}$ )        |          |
| Linearity at 20°C*              | $\pm 2.5\mu\text{m}$                   |          |
| Repeatability ( $\pm 2\sigma$ ) | $\pm 0.6\mu\text{m}$                   |          |
| Workpiece positional error      | $\pm 2.5\mu\text{m}$                   |          |
| Measuring region                | 10x60mm                                |          |
| Laser wavelength                | 670nm (Visible semiconductor laser)    |          |
| Number of scans                 | 1600 scans/s                           |          |
| Functions                       | Include the same functions as LSM-6000 |          |
| Data output                     | Via RS-232C interface, SPC output port |          |
| Operating temperature           |  |          |

\*At the center of measuring region.

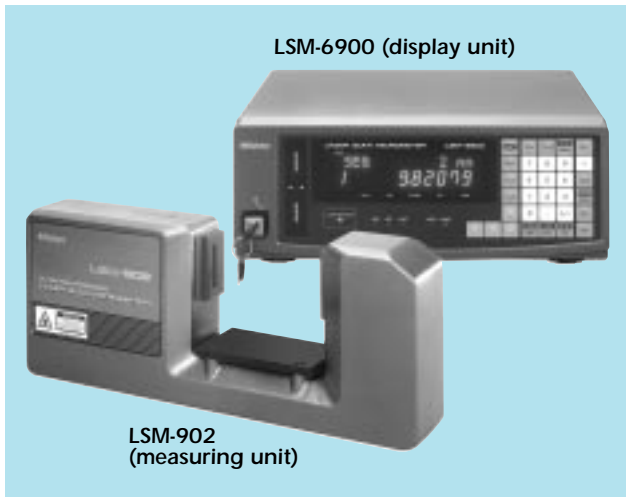
#### Inch / Metric

| Model No.                   | LSM-9506                  |          |
|-----------------------------|---------------------------|----------|
| Order No.                   | 110V AC                   | 544-116C |
| <sup>†</sup> For UK         | 120V AC                   | 544-116A |
| <sup>††</sup> For Australia | 220V AC                   | 544-116D |
|                             | 240V AC <sup>†</sup>      | 544-116E |
|                             | 240V AC <sup>††</sup>     | 544-116F |
| Measuring range             | .02" - 2.36" (0.5 - 60mm) |          |
| Resolution                  | .000002"                  |          |

# LSM-902/6900 Laser Scan Micrometer

## SERIES 544

Ultra-high Accuracy Non-contact Measuring and Display Units



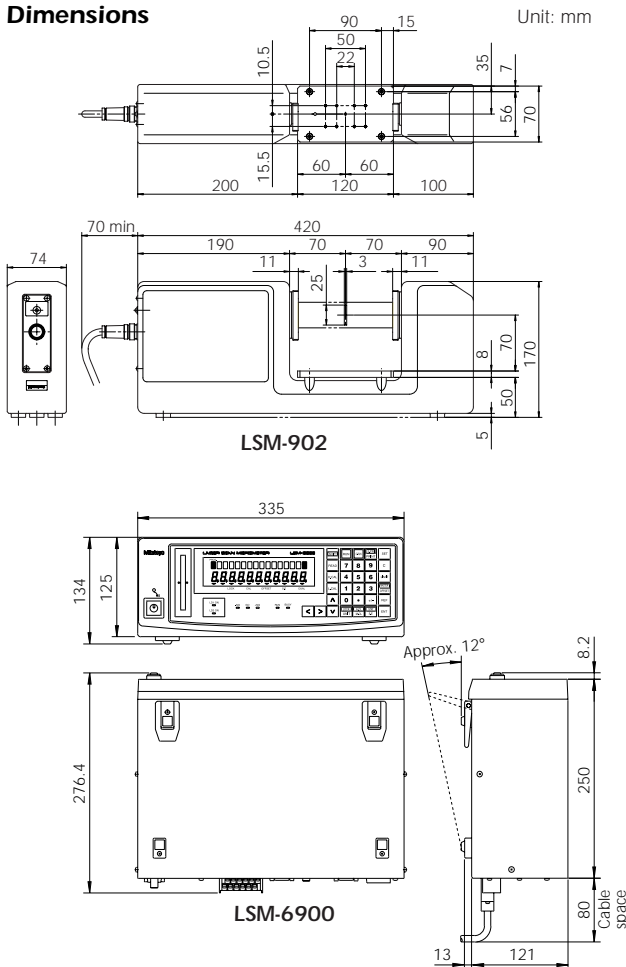
LSM-6900 (display unit)

LSM-902 (measuring unit)

### FEATURES

- Ultra-high accuracy Laser Scan Micrometer that is suitable for an outside diameter inspection of precision components such as pin gauges, limit gauges and plug gauges.
- LSM-902 (measuring unit) and LSM-6900 (display unit) are supplied as a factory-set package.
- A calibration gage set is optional.

### Dimensions



### SPECIFICATIONS

| Set order No.               |                       | Metric   | Metric/Inch |
|-----------------------------|-----------------------|----------|-------------|
|                             |                       | 110V AC  | 544-495C    |
|                             | 120V AC               | 544-495A | 544-496A    |
|                             | 230V AC               | 544-495D | 544-496D    |
| <sup>†</sup> For UK         | 240V AC <sup>†</sup>  | 544-495E | 544-496E    |
| <sup>††</sup> For Australia | 240V AC <sup>††</sup> | 544-495F | 544-496F    |

### Measuring Units

| Model No.                  | LSM-902  |
|----------------------------|--|
| Measuring range            | 0.1 - 25mm (.004" - .98")  |
| Resolution (seleCable)     | 0.00001 - 0.01mm<br>(.000001" - .0005")                                    |
| Linearity                  | Entire range ±0.5μm (±.00002")<br>at 20°C*2<br>Narrow range ±(0.3+0.1ΔD)μm |
| Repeatability (±2σ)        | ±0.5μm (±.0000019")  |
| Workpiece positional error | ±0.5μm (±.00002")  |
| Measuring region           | 3x25mm (.12"x.98")   |
| Laser wavelength           | 650nm, Visible   |
| Number of scans            | 800 scans/s  |
| Operating temperature      | 0°C to 40°C  |
| Mass                       | 6.0kg (13.2 lbs.)  |

\*1: At the center of the measuring region.

### Display Units

| Model No.                | LSM-6900  |
|--------------------------|---|
| Main display             | 16-digit fluorescent tube   |
| Functions                | Zero-setting, presetting, GO/±NG judgment, multi-limit judgment, offset value setting, sample measurement, statistical calculation, group judgment, data output, workpiece position display, mm/inch switching, dual-gage calibration, transparent object measurement, dual-unit measurement (optional), automatic measurement, abnormal data eliminating |
| Interface units equipped | <ul style="list-style-type: none"> <li>• RS-232C</li> <li>• Analog, I/O</li> <li>• Foot switch</li> </ul>   |
| Power supply             | 100 - 240V AC±10%, 40VA, 50/60Hz  |
| Dimensions (WxDxH)       | 335x277x134mm   |
| Mass                     | 5.0kg (11 lbs.)   |

### OPTIONAL ACCESSORIES

| Order No. | Description                           |
|-----------|---------------------------------------|
| 02AGD180  | Calibration gage set for LSM-902/6900 |
| 02AGD270  | Workstage                             |
| 02AGD280  | Adjustable workstage                  |
| 02AGD600A | Thermal printer (w/100V AC adapter)   |
| 02AGD600B | Thermal printer (w/120V AC adapter)   |
| 02AGD600C | Thermal printer (w/130V AC adapter)   |

## Laser Indicator

### SERIES 548

Non-contact Displacement Measuring Unit



### SPECIFICATIONS

#### Measuring Heads for Laser Indicator

| Model No.             | LI-H101                      | LI-H115     |
|-----------------------|------------------------------|-------------|
| Order No.             | 548-201                      | 548-202     |
| Working distance      | 1mm                          | 15.5mm      |
| Measuring range       | 1mm ( $\pm 500\mu\text{m}$ ) |             |
| Resolution            | 0.00001mm                    |             |
| Linearity             | 1.5 $\mu\text{m}$ or less    |             |
| Focusing method       | Knife edge method            |             |
| Laser beam diameter   | 1.5 $\mu\text{m}$            |             |
| Laser wavelength      | 780nm                        |             |
| Operating temperature | 15°C to 30°C                 |             |
| Dimensions (WxDxH)*   | 50x65x55mm                   | 50x163x55mm |
| Mass*                 | 300g                         | 500g        |

\*Not including the mass of the connecting cable.

#### Display Unit for Laser Indicator

| Model No.             | LI-H500P   |
|-----------------------|--|
| Order No.             | 548-021  |
| Display               | 8-digit fluorescent tube   |
| Functions             | Zero-setting, presetting, workpiece search, data output, calibration, data output interval setting, analog signal output range setting |
| Interface equipped    | RS-232C  |
| Operating temperature | 0°C to 40°C  |
| Power supply          | 100 - 240V AC, 50/60Hz   |
| Dimensions (WxDxH)    | 237x115x210mm  |
| Mass                  | 2.8kg  |

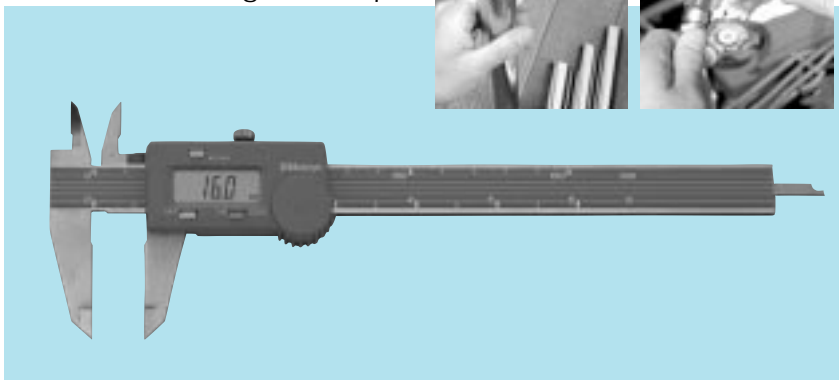
### FEATURES

- Using a semiconductor laser, the LI-H101/115 Laser Indicator can measure precise and elastic workpieces which are difficult to be measured with contact type measuring instruments very accurately.
- The employed Laser Holescale provides 0.01 $\mu\text{m}$  resolution over the entire measuring range of 1mm ( $\pm 500\mu\text{m}$ ).
- Employing the focus point detecting method, the measurement result is not be affected by the material and color of the workpiece surface.
- Monitor Unit (**02AHA200**) is available for assisting the detector positioning.

## MyCAL-Lite

### SERIES 700

Do-It-Yourself Digital Caliper



### FEATURES

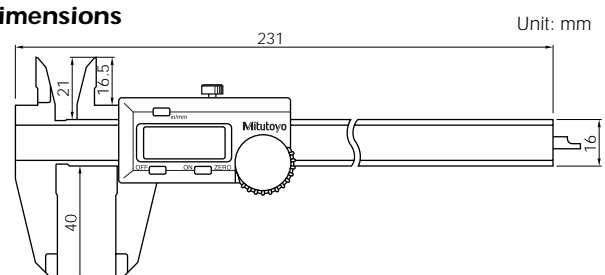
- The "MyCAL-Lite" is an ideal measuring tool for do-it-yourselfers.
- The LCD screen allows error-free read-out of measurements.
- Uses stainless steel as the jaws and the blade.
- With a depth measuring bar.
- With zero-setting key.
- One SR44 battery (**938882**) offers approx. 2 years of use.
- Mass: 140g

### SPECIFICATIONS

#### Metric

| Resolution | Range     | Order No. | Accuracy           |
|------------|-----------|-----------|--------------------|
| 0.1mm      | 0 - 150mm | 700-112   | $\pm 0.2\text{mm}$ |

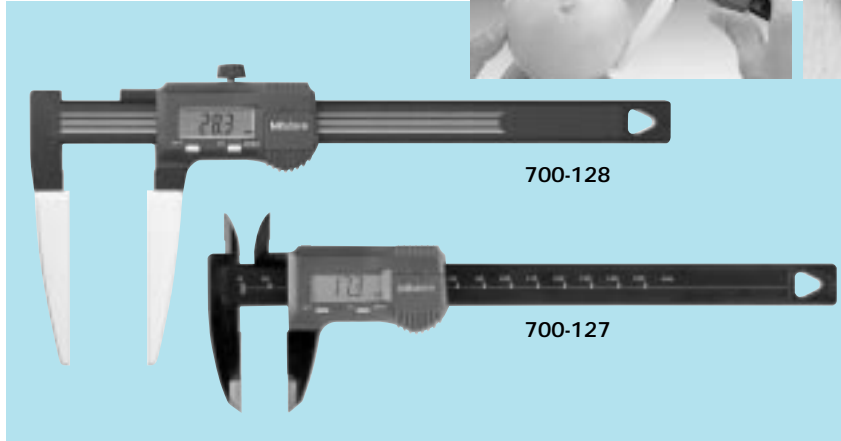
### Dimensions



## Plastic Calipers

### SERIES 700

Do-It-Yourself Digital Calipers



### FEATURES

- Plastic construction for durable and light-weight use.
  - With zero-setting key.
  - Also ideal for use in the Lab, wood-shop, nursery, doctor's office, etc.
  - One SR44 battery (**938882**) offers approx. 2 years of use.
  - Mass: 45g (55g\*)
- \*Deep throat type (**700-128**)

### SPECIFICATIONS

#### Metric

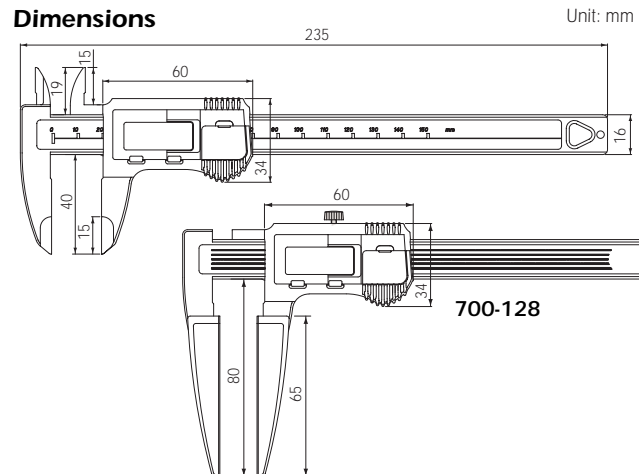
| Resolution | Range     | Order No.       | Accuracy |
|------------|-----------|-----------------|----------|
| 0.1mm      | 0 - 150mm | <b>700-127</b>  | ±0.2mm   |
|            |           | <b>700-128*</b> | ±0.5mm   |

\*Deep throat type without inside measuring jaws

#### Inch/Metric

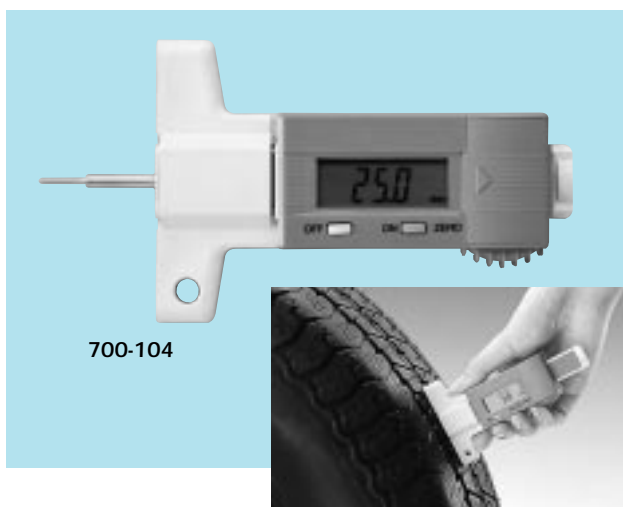
| Resolution | Range     | Order No.      | Accuracy |
|------------|-----------|----------------|----------|
| .001"/     | 0 - 6"/   | <b>700-126</b> | ±.008"   |
| 0.1mm      | 0 - 150mm |                |          |

### Dimensions



## Digital Tire Thread Depth Gage

### SERIES 700



700-104

### SPECIFICATIONS

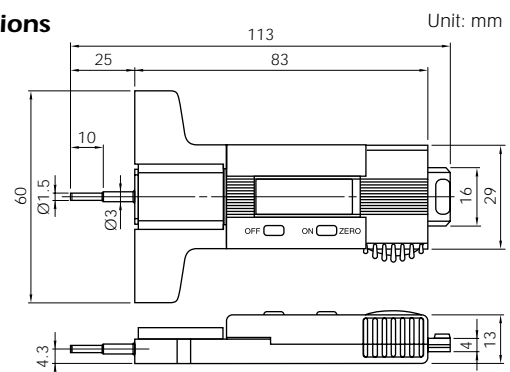
#### Metric

| Resolution | Range    | Order No.      | Accuracy |
|------------|----------|----------------|----------|
| 0.1mm      | 0 - 25mm | <b>700-104</b> | ±0.2mm   |

#### Inch/Metric

| Resolution  | Range           | Order No.      | Accuracy |
|-------------|-----------------|----------------|----------|
| .001"/0.1mm | 0 - 1"/0 - 25mm | <b>700-105</b> | ±.008"   |

### Dimensions



### FEATURES

- Specially designed to measure tire thread depths.
- The large LCD provides error-free reading.
- Plastic construction for light-weight use.
- One SR44 battery (**938882**) offers approx. 2 years of use.

# Quick-Mini

SERIES 700



700-119

A compact comparator designed for carrying convenience, it is very suited for quick inspection of paper thickness, leather, wires, plastic parts, etc. The digital display provides error-free reading with 0.01mm resolution.

### FEATURES

- Functions include power ON/OFF, zero-set, inch/mm conversion (inch/mm type only).
- One SR44 battery (938882) offers approx. 2 years of use.
- Mass: 165g

### SPECIFICATIONS

#### Metric

| Resolution | Range    | Order No. | Accuracy |
|------------|----------|-----------|----------|
| 0.01mm     | 0 - 12mm | 700-119   | ±0.02mm  |
|            | 0 - 25mm | 700-121   | ±0.02mm  |

#### Inch/Metric

| Resolution    | Range    | Order No. | Accuracy |
|---------------|----------|-----------|----------|
| .0005"/0.01mm | 0 - .5"/ | 700-118   | ±.001"   |
|               | 0 - 12mm |           |          |
|               | 0 - 1"/  | 700-122   | ±.001"   |
|               | 0 - 25mm |           |          |

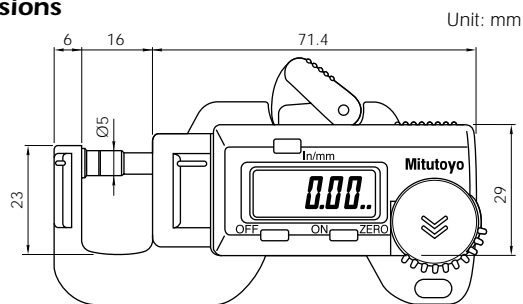
# Digimatic Tape Measures

SERIES 216



216-450

### Dimensions

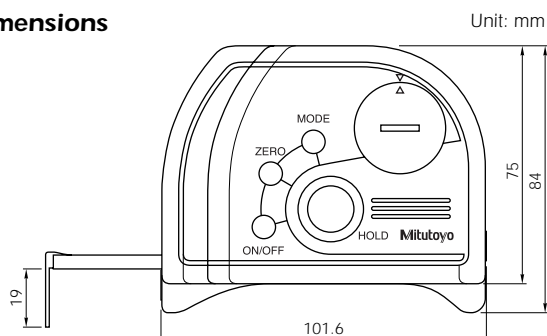


700-118

### FEATURES

- Mitutoyo Digimatic Tape Measure offers the ultra convenience through the direct LCD readout of the tape blade's extension.
- Functions include power ON/OFF, zero-set, data hold, and inside/outside measurement mode switching, auto-OFF.
- One CR2032 lithium battery offers approx. 2500 hours of continuous use.
- Mass: 390g

### Dimensions



### SPECIFICATIONS

#### Metric

| Resolution | Range    | Order No. | Accuracy |
|------------|----------|-----------|----------|
| 0.1mm      | 0 - 5.5m | 216-452   | ±1.0mm   |

#### Inch/Metric

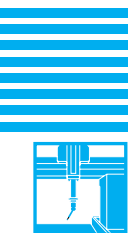
| Resolution   | Range     | Order No. | Accuracy |
|--------------|-----------|-----------|----------|
| .01", 1/32", | 0 - 216"/ | 216-450   | ±.04"    |
| 0.1mm        | 0 - 5.5m  |           |          |





Sole Agent for the Iranian Market:

Seian Corporation  
100 Excel Court Shot,  
Shoto 1-12-14 Shibuya-Ku,  
Tokyo-Japan  
Tel: (813) 5465-2301  
Fax: (813) 5465-2397  
[seian@seian.ne.jp](mailto:seian@seian.ne.jp)



Index for Applications Pages 474 — 478

Alphabetical Index Pages 479 — 484

Numerical Index Pages 485 — 487

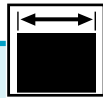
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Fax: (813) 5465-2397  
seian@seian.ne.jp



**STANDARDS**

| Description             | Page      |
|-------------------------|-----------|
| Gauge Blocks            | 262-276   |
| Micrometer Standards    | 122       |
| Optical Flats           | 121       |
| Optical Parallels       | 121       |
| Height Master           | 283       |
| Universal Height Master | 282       |
| Check Master            | 284 - 285 |
| Square Master           | 294       |
| Precision Squares       | 296       |
| Precision Dial Square   | 296       |
| Bore Gage Zero Checker  | 215       |
| Setting Rings           | 141, 215  |
| Caliper Checker         | 286       |
| Inside Micro Checker    | 286       |
| Depth Micro Checker     | 287       |
| Snap Gage Checker       | 288       |
| Standard Scales         | 289       |
| Working Standard Scales | 289       |



**MEASUREMENT OF OUTSIDE DIMENSIONS**

| Description                | Page      |
|----------------------------|-----------|
| <b>ONE-DIMENSIONAL</b>     |           |
| Calipers                   | 34 - 65   |
| Dial Thickness Gages       | 219 - 220 |
| Pocket Thickness Gage      | 221       |
| Digimatic Thickness Gages  | 218 - 219 |
| Dial Caliper Gages         | 223 - 225 |
| Digimatic Caliper Gages    | 222       |
| Dial Snap Gages            | 204       |
| Dial Bench Gage            | 205       |
| Dial Gage Upright Stands   | 202 - 203 |
| Digimatic Upright Gages    | 202 - 203 |
| Outside Micrometers        | 89 - 98   |
| Digit Outside Micrometers  | 94 - 95   |
| Digimatic Micrometers      | 84 - 87   |
| Quickmike                  | 82 - 83   |
| Bench Comparator           | 303       |
| Digimatic Bench Micrometer | 119       |
| Litematic                  | 306       |
| Litematic Head             | 307       |
| Digimatic Tape Measure     | 471       |
| Steel Rules                | 299 - 300 |
| Working Standard Scales    | 289       |
| Quick - Mini               | 471       |
| <b>TWO-DIMENSIONAL</b>     |           |
| Profile Projectors         | 332 - 345 |
| Toolmaker's Microscopes    | 354 - 355 |

|                       |           |
|-----------------------|-----------|
| Measuring Microscopes | 356 - 361 |
| Vision Unit           | 351       |
| Quick Scope           | 464       |

**THREE-DIMENSIONAL**

|                               |           |
|-------------------------------|-----------|
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |



**MEASUREMENT OF INSIDE DIMENSIONS**

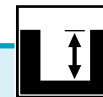
| Description             | Page                     |
|-------------------------|--------------------------|
| <b>ONE-DIMENSIONAL</b>  |                          |
| Digimatic Caliper Gages | 222                      |
| Small Hole Gage Set     | 302                      |
| Telescoping Gage Set    | 302                      |
| Vernier Calipers        | 40 - 45, 48 - 49, 53, 55 |
| Dial Calipers           | 39                       |
| Digimatic Calipers      | 34 - 36, 47, 54          |
| Dial Caliper Gages      | 223 - 225                |
| Inside Micrometers      | 134, 140                 |
| Inside Micro Checker    | 286                      |
| Bore Gages              | 209 - 213                |
| Dial Bore Gages         | 214                      |
| Borematic               | 126 - 127                |
| Holtest                 | 130 - 133                |
| Digimatic Holtest       | 128 - 129                |
| Groove Micrometers      | 123                      |

**TWO-DIMENSIONAL**

|                         |           |
|-------------------------|-----------|
| Profile Projectors      | 332 - 345 |
| Toolmaker's Microscopes | 354 - 355 |
| Measuring Microscopes   | 356 - 361 |
| Vision Unit             | 351       |
| Quick Scope             | 464       |

**THREE-DIMENSIONAL**

|                               |           |
|-------------------------------|-----------|
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |



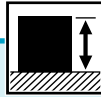
**DEPTH MEASUREMENT**

| Description                      | Page                     |
|----------------------------------|--------------------------|
| <b>ONE-DIMENSIONAL</b>           |                          |
| Vernier Calipers                 | 40 - 45, 48 - 49, 53, 55 |
| Dial Calipers                    | 39                       |
| Digimatic Calipers               | 34 - 36, 47, 54          |
| Depth Micrometers                | 124 - 125                |
| Digimatic Depth Micrometers      | 124 - 125                |
| Digit Depth Micrometers          | 124 - 125                |
| Vernier Depth Gages              | 67 - 68                  |
| Digimatic Depth Gages            | 66, 217                  |
| Digimatic Tire Groove Depth Gage | 470                      |

|   |               |
|---|---------------|
| Dial Depth Gages                        | 68, 216 - 217 |
| Digimatic Depth Gages                   | 66, 217       |
| Depth Base Attachment (Vernier Caliper) | 69            |
| Depth Gage Attachment (Height Gage)     | 80            |

**THREE-DIMENSIONAL**

|                               |           |
|-------------------------------|-----------|
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |

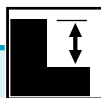


**HEIGHT MEASUREMENT**

| Description                  | Page    |
|------------------------------|---------|
| <b>ONE-DIMENSIONAL</b>       |         |
| Vernier Height Gages         | 78      |
| Dial Height Gages            | 77      |
| Digimatic Height Gages       | 74 - 76 |
| Height Master                | 283     |
| Universal Height Master      | 282     |
| Linear Height                | 70 - 71 |
| QM-Hite                      | 72 - 73 |
| Black Granite Surface Plates | 290     |

**THREE-DIMENSIONAL**

|                               |           |
|-------------------------------|-----------|
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |

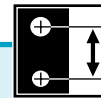


**STEP MEASUREMENT**

| Description            | Page                 |
|------------------------|----------------------|
| <b>ONE-DIMENSIONAL</b> |                      |
| Vernier Calipers       | 34 - 65              |
| Dial Calipers          | 34 - 65              |
| Digimatic Calipers     | 34 - 65              |
| Vernier Height Gages   | 78                   |
| Dial Height Gages      | 77                   |
| Digimatic Height Gages | 74 - 76              |
| Dial Indicators        | 175 - 195            |
| Digimatic Indicators   | 164 - 172            |
| Dial Test Indicators   | 226 - 230            |
| Linear Gages           | 173 - 174, 236 - 242 |
| Linear Height          | 70 - 71              |
| QM-Hite                | 72 - 73              |
| Mu-Checker             | 248 - 259            |
| Laser Indicator        | 471                  |
| Uni - Mike             | 118                  |

**THREE-DIMENSIONAL**

|                               |           |
|-------------------------------|-----------|
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |



**MEASUREMENT OF CENTER-TO-CENTER DISTANCES**

| Description                            | Page    |
|--|---------|
| <b>ONE-DIMENSIONAL</b>                 |         |
| Digimatic Calipers (Offset Centerline) | 57      |
| Vernier Calipers (Offset Centerline)   | 57      |
| Center Probe (Height Gage)             | 80      |
| Linear Height                          | 70 - 71 |
| QM-Hite                                | 72 - 73 |
| Black Granite Surface Plates           | 290     |

**TWO-DIMENSIONAL**

|                         |           |
|-------------------------|-----------|
| Profile Projectors      | 332 - 345 |
| Toolmaker's Microscopes | 354 - 355 |
| Measuring Microscopes   | 356 - 361 |
| Vision Unit             | 351       |
| Quick Scope             | 464       |

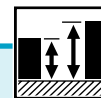
**THREE-DIMENSIONAL**

|                               |           |
|-------------------------------|-----------|
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |



**MEASUREMENT OF COMPLEX 3D PARTS**

| Description                   | Page      |
|-------------------------------|-----------|
| <b>THREE-DIMENSIONAL</b>      |           |
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 457 - 460 |
| Quick Vision                  | 464       |



**COMPARISON MEASUREMENT**

| Description                | Page            |
|----------------------------|-----------------|
| <b>ONE-DIMENSIONAL</b>     |                 |
| Gauge Blocks               | 262 - 276       |
| Gauge Block Comparator     | 278 - 279       |
| Ring Master                | 287             |
| Digimatic Calipers         | 34 - 36, 47, 54 |
| Telescoping Gage Set       | 302             |
| Bench Comparator           | 303             |
| Digimatic Bench Micrometer | 119             |
| Dial Bore Gages            | 214             |
| Dial Indicators            | 175 - 192       |
| Digimatic Indicators       | 164 - 172       |
| Dial Test Indicators       | 226 - 230       |
| Dial Snap Meters           | 99              |
| Digimatic Micrometers      | 84 - 118        |
| Indicating Micrometers     | 100             |
| Borematic                  | 126 - 127       |

|                                 |                           |
|---------------------------------|---------------------------|
| Digimatic Holtest               | 128 - 129                 |
| Dial Snap Gages                 | 204                       |
| Female Screw Thread Comparators | 221                       |
| Digimatic Height Gages          | 74 - 76                   |
| Height Master                   | 283                       |
| Linear Height                   | 70 - 71                   |
| QM-Hite                         | 72 - 73                   |
| Litematic                       | 306                       |
| Litematic Head                  | 307                       |
| Laser Scan Micrometer           | 465 - 468                 |
| Laser Indicator                 | 469                       |
| Mu-Checker                      | 254 - 259                 |
| Linear Gages                    | 173 - 174, 236 - 242, 248 |
| Dial Gage Stands                | 199 - 200                 |
| Comparator Stands               | 200, 202                  |
| Calibration Tester              | 196                       |

**TWO-DIMENSIONAL**

|                         |           |
|-------------------------|-----------|
| Profile Projectors      | 332 - 345 |
| Toolmaker's Microscopes | 354 - 355 |
| Measuring Microscopes   | 356 - 361 |
| Vision Unit             | 351       |
| Quick Scope             | 464       |

**THREE-DIMENSIONAL**

|                               |           |
|-------------------------------|-----------|
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |



**ANGLE MEASUREMENT**

| Description                    | Page      |
|--------------------------------|-----------|
| Digimatic Universal Protractor | 298       |
| Universal Bevel Protractor     | 298       |
| Bevel Protractor               | 298       |
| Precision Sine Bar             | 296       |
| Profile Projectors             | 332 - 345 |
| Toolmaker's Microscopes        | 354 - 355 |
| Measuring Microscopes          | 356 - 361 |
| Flexible Measuring Gage        | 460 - 461 |
| Coordinate Measuring Machines  | 454 - 458 |
| Vision Unit                    | 351       |
| Quick Vision                   | 462 - 463 |
| Quick Scope                    | 464       |



**MEASUREMENT OF ELASTIC PARTS**

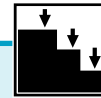
| Description                 | Page |
|-----------------------------|------|
| Low Force Digimatic Caliper | 46   |
| Low Force Dial Caliper      | 46   |
| Low Force Micrometers       | 119  |
| Litematic                   | 306  |
| Litematic Head              | 307  |

|                               |           |
|-------------------------------|-----------|
| Toolmaker's Microscopes       | 354 - 355 |
| Measuring Microscopes         | 356 - 361 |
| Flexible Measuring Gage       | 460 - 461 |
| Coordinate Measuring Machines | 454 - 458 |
| Vision Unit                   | 351       |
| Quick Vision                  | 462 - 463 |
| Quick Scope                   | 464       |



**NON-CONTACT MEASUREMENT**

| Description              | Page      |
|--------------------------|-----------|
| <b>ONE-DIMENSIONAL</b>   |           |
| Laser Scan Micrometer    | 465 - 468 |
| Laser Indicator          | 469       |
| <b>TWO-DIMENSIONAL</b>   |           |
| Profile Projectors       | 332 - 345 |
| Toolmaker's Microscopes  | 354 - 355 |
| Measuring Microscopes    | 356 - 361 |
| Vision Unit              | 351       |
| Quick Scope              | 464       |
| <b>THREE-DIMENSIONAL</b> |           |
| Quick Vision             | 462 - 463 |



**MULTI-POINT MEASUREMENT**

| Description                   | Page                      |
|-------------------------------|---------------------------|
| Dial Indicators               | 175 - 192                 |
| Digimatic Indicators          | 164 - 172, 208            |
| Linear Gages                  | 173 - 174, 236 - 242, 248 |
| Digimatic Display Units       | 24, 313 - 315             |
| Digimatic Multi-Unit          | 25                        |
| Digimatic Difference/Sum Unit | 26                        |
| Digimatic Extension Unit      | 26                        |
| Mu-Checker                    | 254 - 255                 |



**MEASURING INSTRUMENTS TO BE USED AS SENSOR**

| Description           | Page                      |
|-----------------------|---------------------------|
| Dial Indicators       | 175 - 192                 |
| Dial Test Indicators  | 226 - 230                 |
| Digimatic Indicators  | 164 - 172, 208            |
| Linear Gages          | 173 - 174, 236 - 242, 248 |
| Mu-Checker            | 248 - 255, 257 - 259      |
| Laser Scan Micrometer | 465 - 468                 |
| Laser Indicator       | 469                       |
| Linear Scale          | 316, 323 - 326, 328 - 330 |
| Digimatic Scale Units | 312 - 315                 |



**MEASUREMENT OF FORM (SURFACE ROUGHNESS, ROUNDNESS), SQUARENESS, AND PARALLELISM**

| Description                   | Page                      |
|-------------------------------|---------------------------|
| Surftest                      | 406 - 419                 |
| Contracer                     | 388 - 392                 |
| Roundtest                     | 428 - 432, 434 - 435      |
| Coordinate Measuring Machines | 454 - 458                 |
| Precision Squares             | 296                       |
| Precision Dial Square         | 296                       |
| Square Master                 | 294                       |
| Precision Levels              | 298                       |
| Formtracer                    | 394 - 397, 400 - 402      |
| Dial Test Indicators          | 226 - 230                 |
| Linear Gages                  | 173 - 174, 236 - 242, 248 |
| Mu-Checker                    | 254 - 255, 257 - 259      |
| Bench Centers                 | 303                       |
| Black Granite Surface Plates  | 290                       |
| Optical Flats                 | 121                       |
| Optical Parallels             | 121                       |



**HARDNESS MEASUREMENT**

| Description               | Page      |
|---------------------------|-----------|
| Hardness Testing Machines | 442 - 451 |
| Durometers                | 452       |



**MEASUREMENT OF COATING THICKNESS**

| Description | Page |
|-------------|------|
| Neo-Derm    | 308  |
| Digi-Derm   | 309  |



**MEASUREMENT OF SHEET METALS**

| Description             | Page      |
|-------------------------|-----------|
| Sheet Metal Micrometers | 111       |
| Laser Scan Micrometer   | 465 - 468 |
| Laser Indicator         | 469       |



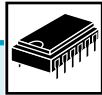
**MEASUREMENT OF GEARS**

| Description                   | Page      |
|-------------------------------|-----------|
| <b>ONE-DIMENSIONAL</b>        |           |
| Disk Micrometers              | 106 - 108 |
| Gear Tooth Micrometers        | 114       |
| <b>TWO-DIMENSIONAL</b>        |           |
| Profile Projectors            | 332 - 345 |
| Toolmaker's Microscopes       | 354 - 355 |
| Measuring Microscopes         | 356 - 361 |
| Vision Unit                   | 351       |
| Quick Scope                   | 464       |
| <b>THREE-DIMENSIONAL</b>      |           |
| Coordinate Measuring Machines | 454 - 458 |
| Quick Vision                  | 462 - 463 |



**SCREW THREAD MEASUREMENT**

| Description                     | Page      |
|---------------------------------|-----------|
| <b>ONE-DIMENSIONAL</b>          |           |
| Screw Thread Micrometers        | 100 - 101 |
| Universal Micrometers           | 115       |
| Outside Micrometers             | 82 - 118  |
| Digit Outside Micrometers       | 94 - 95   |
| Digimatic Micrometers           | 92 - 109  |
| 3-Wire Units                    | 95        |
| V-Anvil Micrometers             | 112       |
| Point Micrometers               | 104 - 105 |
| Pitch Gages                     | 301       |
| Female Screw Thread Comparators | 221       |
| <b>TWO-DIMENSIONAL</b>          |           |
| Profile Projectors              | 332 - 345 |
| Toolmaker's Microscopes         | 354 - 355 |
| Measuring Microscopes           | 356 - 361 |
| Vision Unit                     | 351       |
| Quick Scope                     | 464       |
| Contracer                       | 388 - 392 |
| <b>THREE-DIMENSIONAL</b>        |           |
| Coordinate Measuring Machines   | 454 - 458 |
| Quick Vision                    | 462 - 463 |



**MEASUREMENT ASSOCIATED WITH SEMICONDUCTOR/LCD FABRICATION**

| Description                             | Page                      |
|---|---------------------------|
| <b>ONE-DIMENSIONAL</b>                  |                           |
| Vernier Calipers                        | 40 - 45, 48 - 49, 53, 55  |
| Dial Calipers                           | 39                        |
| Digimatic Calipers                      | 34 - 36, 47, 54           |
| Dial Indicators                         | 175 - 192                 |
| Digimatic Indicators                    | 164 - 172, 208            |
| Dial Test Indicators                    | 226 - 230                 |
| Outside Micrometers                     | 89 - 98                   |
| Digit Outside Micrometers               | 94 - 95                   |
| Digimatic Micrometers                   | 84 - 87                   |
| Mu-Checker                              | 254 - 255, 257 - 259      |
| Linear Gages                            | 173 - 174, 236 - 242, 248 |
| Litematic                               | 306                       |
| Litematic Head                          | 307                       |
| Laser Scan Micrometer                   | 465 - 468                 |
| <b>TWO-DIMENSIONAL</b>                  |                           |
| Stereo Microscopes                      | 376 - 378                 |
| Inspection Microscope FS-300            | 364 - 365                 |
| Microscope Unit FS-70                   | 366 - 367                 |
| Assembly Type Microscope Unit VM-ZOOM40 | 368                       |
| Long Working Distance Objectives        | 370 - 375                 |
| Toolmaker's Microscopes                 | 354 - 355                 |
| Measuring Microscopes                   | 356 - 361                 |
| Video Microscope Unit VMU               | 369                       |
| Profile Projectors                      | 334 - 345                 |
| Vision Unit                             | 351                       |
| Quick Scope                             | 464                       |
| <b>THREE-DIMENSIONAL</b>                |                           |
| Quick Vision                            | 462 - 463                 |



**MEASUREMENT IN ROLL FORMING**

| Description                | Page                     |
|----------------------------|--------------------------|
| Vernier Calipers           | 40 - 45, 48 - 49, 53, 55 |
| Dial Calipers              | 39                       |
| Digimatic Calipers         | 34 - 36, 47, 54          |
| Vernier Height Gages       | 78                       |
| Dial Height Gages          | 77                       |
| Digimatic Height Gages     | 74 - 76                  |
| Digimatic Indicators       | 164 - 172, 208           |
| Dial Test Indicators       | 226 - 230                |
| Outside Micrometers        | 89 - 98                  |
| Digit Outside Micrometers  | 94 - 95                  |
| Digimatic Micrometers      | 84 - 87                  |
| Bench Comparator           | 303                      |
| Digimatic Bench Micrometer | 119                      |
| Bore Gages                 | 209 - 213                |

|                               |                      |
|-------------------------------|----------------------|
| Mu-Checker                    | 254 - 255, 257 - 259 |
| Linear Gages                  | 173 - 174, 238 - 241 |
| Linear Height                 | 70 - 71              |
| QM-Hite                       | 72 - 73              |
| Laser Scan Micrometer         | 465 - 468            |
| Laser Indicator               | 469                  |
| Flexible Measuring Gage       | 460 - 461            |
| Coordinate Measuring Machines | 454 - 458            |
| Quick Vision                  | 462 - 463            |
| Roundtest                     | 428 - 432, 434 - 435 |
| Surftest                      | 406 - 419            |
| Black Granite Surface Plates  | 290                  |



**DIGITAL READOUT AND POSITION FEEDBACK OF MACHINE TOOLS**

| Description           | Page                      |
|-----------------------|---------------------------|
| Linear Scale          | 316, 323 - 326, 328 - 330 |
| Digimatic Scale Units | 312 - 315                 |
| Linear Gages          | 173 - 174, 236 - 242, 248 |



**STATISTICAL PROCESS CONTROL**

| Description                     | Page |
|---------------------------------|------|
| Digimatic Mini-Processor DP-1VR | 23   |



**QUICK GUIDE TO PRECISION MEASUREMENT**

| Description                    | Page |
|--------------------------------|------|
| SPC Terminology                | 32   |
| Micrometer Terminology         | 160  |
| Micrometer Head Terminology    | 161  |
| Gauge Block Terminology        | 292  |
| Optical Instrument Terminology | 379  |

| Description                             | Page           |
|---|----------------|
| <b>A</b>                                |                |
| AAV → Hardness Testing Machines         |                |
| ABK → Hardness Testing Machines         |                |
| AR → Hardness Testing Machines          |                |
| ARK → Hardness Testing Machines         |                |
| ATK → Hardness Testing Machines         |                |
| AT102 → Linear Scales                   |                |
| AT111 → Linear Scales                   |                |
| AT112 → Linear Scales                   |                |
| AT115 → Linear Scales                   |                |
| AT181 → Linear Scales                   |                |
| AT202 → Linear Scales                   |                |
| AT211 → Linear Scale                    |                |
| AT332 → Linear Scales                   |                |
| AT353 → Linear Scales                   |                |
| AT553 → Linear Scales                   |                |
| Accessories                             |                |
| Black Granite Surface Plate             | 290            |
| Coordinate Measuring Machine            | 459            |
| Contracer                               | 386 - 387, 393 |
| Dial Indicator                          | 193 - 195      |
| Dial Test Indicator                     | 231            |
| Gauge Block                             | 271, 276       |
| Height Gage                             | 80             |
| Height Master                           | 283, 288       |
| Linear Gage                             | 239            |
| Linear Gage Counter                     | 247            |
| Linear Scale                            | 327            |
| Microscope                              | 353, 363       |
| Mu-Checker                              | 256            |
| Pocket Type Dial Test Indicator         | 234            |
| Profile Projector                       | 346 - 347, 353 |
| Roundtest                               | 433, 436       |
| SPC                                     | 27             |
| Surftest                                | 420 - 421, 425 |
| Absolute Coolant Proof Caliper          | 37             |
| A/D Conversion Unit                     | 260            |
| Analog Mu-Checker → Mu-Checker          |                |
| Assembly Type Microscope Unit VM-ZOOM40 | 368            |

**B**

|   |           |
|---|-----------|
| BH-V → Coordinate Measuring Machine   |           |
| Bench Centers   | 303       |
| Bench Comparator  | 303       |
| Bevel Protractor  | 298       |
| BEYOND Crysta   | 456       |
| Black Granite Surface Plates  | 290       |
| Blade Micrometers → Digimatic Micrometers, Digit Outside Micrometers, Outside Micrometers |           |
| Bore Gages  | 209 - 215 |
| Bore Gage Zero Checker  | 215       |
| Borematic   | 126 - 127 |
| Bright STRATO → Coordinate Measuring Machine  |           |
| Brinell Hardness Testing Machine → Hardness Testing Machine                               |           |

| Description  | Page      |
|--|-----------|
| <b>C</b>   |           |
| CV → Contracer   |           |
| Calibration Tester   | 196       |
| Calipers → Digimatic Calipers, Dial Calipers, Vernier Calipers                                   |           |
| Caliper Checker  | 286       |
| Caliper Type Micrometers → Digimatic Micrometers, Outside Micrometers                            |           |
| Can Seam Micrometers → Outside Micrometers   |           |
| CERA Block → Gauge Blocks  |           |
| CERA Height Master   | 280       |
| Check Master   | 284 - 285 |
| Clear Loupe  | 305       |
| Combination Square Sets  | 297       |
| Comparator Stands  | 200, 202  |
| Contracer  |           |
| CV   | 388 - 392 |
| Coordinate Measuring Machine   |           |
| BEYOND Crysta  | 456       |
| BH-V   | 455       |
| Bright STRATO  | 457       |
| Crysta Plus  | 455       |
| LEGEX  | 458       |
| MACH   | 458       |
| RV-II  | 458       |
| Crimp Height Micrometers → Digimatic Micrometers, Digit Outside Micrometers, Outside Micrometers |           |
| Crysta Plus → Coordinate Measuring Machine   |           |

**D**

|   |               |
|---|---------------|
| DP-1VR → Digimatic Mini-Processor                   |               |
| Depth Base Attachment                               | 69            |
| Depth Gages → Dial Depth Gages, Vernier Depth Gages |               |
| Depth Micro Checker                                 | 287           |
| Depth Micrometers                                   | 124 - 125     |
| Dial Bench Gage                                     | 205           |
| Dial Bore Gages                                     | 214           |
| Dial Calipers                                       | 39            |
| Dial Calipers                                       |               |
| Inside  | 64 - 65       |
| Low Force   | 46            |
| Offset  | 56            |
| Offset Centerline                                   | 57            |
| Point   | 58            |
| Dial Caliper Gages                                  | 222 - 225     |
| Dial Depth Gages                                    | 68, 216 - 217 |
| Dial Gage Stands                                    | 199 - 200     |
| Dial Gage Tester UDT                                | 196           |
| Dial Gage Upright Stands                            | 202 - 203     |
| Dial Height Gages                                   | 77            |
| Dial Indicators                                     | 175 - 192     |
| Dial Snap Gages                                     | 204           |
| Dial Snap Meters                                    | 99            |
| Dial Square → Precision Dial Square                 |               |





| Description   | Page |
|---|------|
| Granite Surface Plates → Black Granite Surface Plates |      |
| Groove Micrometers                                    | 123  |



|                                      |           |
|--------------------------------------|-----------|
| Hardmatic                            | 440 - 441 |
| Hardness Testing Machines            |           |
| AAV                                  | 451       |
| ABK                                  | 451       |
| AR                                   | 450       |
| ARK                                  | 450       |
| AT                                   | 445       |
| ATK                                  | 450       |
| HM                                   | 442 - 444 |
| HR                                   | 448 - 449 |
| HV                                   | 446 - 447 |
| MZT                                  | 451       |
| Height Master                        | 283       |
| Hicator-II                           | 235       |
| Holtest                              | 130 - 133 |
| Hub Micrometer → Outside Micrometers |           |



|   |           |
|---|-----------|
| IDC → Digimatic Indicators  |           |
| IDF → Digimatic Indicators  |           |
| IDS → Digimatic Indicators  |           |
| IDU → Digimatic Indicators  |           |
| Image Edge Sensor → OPTOEYE A2, OPTOEYE M2                            |           |
| Indicating Micrometers  | 100       |
| Input Tools   | 22        |
| Inside Calipers → Digimatic Calipers, Dial Calipers, Vernier Calipers |           |
| Inside Micro Checker  | 286       |
| Inside Micrometers  | 134, 140  |
| Inside Micrometers → Tubular Inside Micrometers                       |           |
| Inside Spring Calipers  | 296       |
| Inspection Microscope   | 364 - 365 |




|                                     |  |
|-------------------------------------|--|
| KC Counter → Linear Scale Counters  |  |
| KL Counter → Linear Scale Counters  |  |
| KLD Counter → Linear Scale Counters |  |
| KLL Counter → Linear Scale Counters |  |
| KM Counter → Linear Scale Counters  |  |
| KS Counter → Linear Scale Counters  |  |

| Description | Page |
|-------------|------|
|             |      |



|  |                |
|--|----------------|
| LGB → Linear Gages                                     |                |
| LGD → Linear Gages                                     |                |
| LGE → Linear Gages                                     |                |
| LGF → Linear Gages                                     |                |
| LGS → Linear Gages                                     |                |
| LG-L1 → Linear Gage Counters                           |                |
| LI-H → Laser Indicator                                 |                |
| LSM → Laser Scan Micrometer                            |                |
| Laser Hologage   | 248 - 249      |
| Laser Indicator  | 469            |
| Laser Scan Micrometer                                  | 465 - 468      |
| LEGEX → Coordinate Measuring Machine                   |                |
| Levels → Precision Levels                              |                |
| Limit Micrometers                                      | 98             |
| Linear Gages   |                |
| 100mm Stroke Linear Gage                               | 242            |
| LGB  | 238 - 239, 248 |
| LGD  | 173            |
| LGE  | 241            |
| LGF  | 240            |
| LGS  | 174            |
| Linear Gage Counters                                   |                |
| EB Counter   | 244            |
| EF Counter   | 245            |
| ES Counter   | 243            |
| EV Counter   | 246            |
| Linear Height  | 70 - 71        |
| Linear Scales  |                |
| AT102  | 324            |
| AT111  | 325            |
| AT112  | 325            |
| AT115  | 323            |
| AT181  | 326            |
| AT202  | 328            |
| AT211  | 328            |
| AT332  | 329            |
| AT353  | 329            |
| AT553  | 329            |
| PSU200   | 326            |
| ST34C  | 329            |
| AT322/323  | 330            |
| AT422  | 330            |
| Linear Scale Counters                                  |                |
| KC Counter   | 319            |
| KL Counter   | 318            |
| KLD Counter  | 322            |
| KLL Counter  | 318            |
| KM Counter   | 319            |
| KS Counter   | 321            |
| Litematic  | 306            |
| Litematic Head   | 307            |
| Long Working Distance Objectives                       | 370 - 375      |
| Loupe → Clear Loupe, Zoom Loupe                        |                |
| Low Force Calipers → Digimatic Calipers, Dial Calipers |                |
| Low Force Micrometers → Outside Micrometers            |                |

| Description   | Page                      |
|---|---------------------------|
|  |                           |
| MACH → Coordinate Measuring Machines  |                           |
| MF → Measuring Microscopes  |                           |
| MSM → Stereo Microscopes  |                           |
| MUX-10F   | 22                        |
| MZT → Hardness Testing Machines   |                           |
| Magnetic Stands   | 198                       |
| Measuring Microscopes   |                           |
| MF-A500/1000  | 356 - 359                 |
| MF-UA500/1000   | 360 - 362                 |
| Multi Mu-Checker  | 257 - 259                 |
| Micro Jack  | 304                       |
| Micro-Vickers Hardness Testing Machines → MVK                                     |                           |
| Micrometers → Digimatic Micrometers, Digit Outside                                |                           |
| Micrometers, Outside Micrometers  |                           |
| Micrometer Heads  | 142 - 154, 158 - 159, 352 |
| Micrometer Stands   | 122                       |
| Micrometer Standards  | 120                       |
| Microscope Unit FS-70   | 366 - 367                 |
| Mu-Checker  |                           |
| Analog Mu-Checker   | 255                       |
| Digital Mu-Checker  | 254                       |
| Multi Mu-Checker  | 258 - 259                 |
| Mu-Checker Probes   | 250 - 251                 |
| Multi Mu-Checker → Mu-Checker   |                           |
| Multiplexer → MUX-10F   |                           |



|          |     |
|----------|-----|
| Neo-Derm | 308 |
|----------|-----|





|  |           |
|--|-----------|
| Objective Lenses → Long Working Distance Objectives                              |           |
| Offset Calipers → Digimatic Calipers, Dial Calipers, Vernier Calipers            |           |
| Offset Centerline Calipers → Digimatic Calipers, Dial Calipers, Vernier Calipers |           |
| Optical Flats  | 121       |
| Optical Parallels  | 121       |
| OPTOEYE A2   | 350       |
| Outside Micrometers  | 89 - 98   |
| Outside Micrometers  |           |
| Blade  | 109       |
| Caliper Type   | 113       |
| Can Seam   | 116       |
| Crimp Height   | 105       |
| Disk   | 106 - 108 |
| Gear Tooth   | 114       |
| Hub  | 117       |
| Low Force  | 119       |
| Paper Thickness  | 107       |
| Point  | 104 - 105 |
| Screw Thread   | 100 - 101 |


| Description             | Page      |
|-------------------------|-----------|
| Sheet Metal             | 111       |
| Spline                  | 110       |
| Tube                    | 102 - 103 |
| Uni-Mike                | 118       |
| Universal               | 115       |
| V-Anvil                 | 112 - 113 |
| Wire                    | 117       |
| Outside Spring Calipers | 296       |





|  |           |
|--|-----------|
| PH → Profile Projectors  |           |
| PJ → Profile Projectors  |           |
| PV → Profile Projectors  |           |
| Paper Thickness Micrometers → Outside Micrometers                    |           |
| Pitch Gages  | 301       |
| Plastic Caliper  | 470       |
| Pocket Comparators   | 305       |
| Pocket Magnifiers  | 305       |
| Pocket Thickness Gage  | 221       |
| Pocket Type Dial Test Indicators                                     | 232 - 233 |
| Point Calipers → Digimatic Calipers, Dial Calipers, Vernier Calipers |           |
| Point Micrometers → Digimatic Micrometers, Digit Outside             |           |
| Micrometers, Outside Micrometers                                     |           |
| Portable Hardness Tester → Hardmatic                                 |           |
| Precision Dial Square  | 296       |
| Precision Levels   | 298       |
| Precision Squares  | 296       |
| Precision Vise   | 423       |
| Precision V-Block  | 423       |
| Prober Station Microscope FS-60                                      | 366 - 367 |
| Profile Projectors   |           |
| PH   | 344 - 345 |
| PJ   | 338 - 339 |
| PJ-A   | 332 - 333 |
| PJ-H   | 334 - 337 |
| PV   | 340 - 343 |
| PSU200   | 326       |


| Description   | Page                 |
|---|----------------------|
|  |                      |
| QM-Data   | 348 - 349, 460 - 461 |
| QM-Hite   | 72 - 73              |
| QM-Measure  | 460 - 461            |
| QS → Quick Scope  |                      |
| QS-L → Quick Scope  |                      |
| QV → Quick Vision   |                      |
| QVA → Quick Vision  |                      |
| QV ELF → Quick Vision   |                      |
| QVH → Quick Vision  |                      |
| Quickmike   | 82                   |
| Quick-Mini  | 471                  |
| Quick Scope   |                      |
| QS  | 464                  |
| QS-L  | 464                  |
| Quick Vision  |                      |
| QVA   | 462 - 463            |
| QV  | 462 - 463            |
| QV ELF  | 462 - 463            |
| QVH   | 462 - 463            |

| Description   | Page                 |
|---|----------------------|
|  |                      |
| RA → Roundtest  |                      |
| Radius Gages  | 301                  |
| Rectangular Gauge Blocks → Gauge Blocks   |                      |
| Ring Master   | 287                  |
| Rockwell Hardness Testing Machines → AR, ARK, ATK                                   |                      |
| Rockwell Superficial Hardness Testing Machines → ASK, ATK                           |                      |
| Roll Caliper  | 205                  |
| Roundpak  | 426                  |
| Roundtest   |                      |
| RA-100, RA-1400/1500, RA-2000, RA-H5000   | 428 - 432, 434 - 435 |
| RV II → Coordinate Measuring Machine  |                      |

| Description   | Page      |
|---|-----------|
|              |           |
| SJ → Surftest   |           |
| ST34C → Linear Scale  |           |
| ST322/323 → Linear Scale  |           |
| ST422 → Linear Scale  |           |
| SV → Surftest   |           |
| SV-C → Formtracer   |           |
| Screw Thread Micrometers → Digimatic Micrometers, Outside Micrometers                           |           |
| Scribers for Height Gages   | 79        |
| Setting Rings   | 141, 215  |
| Sheet Metal Micrometers → Digimatic Micrometers, Digit Outside Micrometers, Outside Micrometers |           |
| Sine Bar → Precision Sine Bar   |           |
| Small Hole Gage Set   | 302       |
| Snap Gage Checker   | 288       |
| Spline Micrometers → Digimatic Micrometers, Outside Micrometers                                 |           |
| Spring Dividers   | 296       |
| Square → Precision Square   |           |
| Square Gauge Blocks → Gauge Blocks  |           |
| Square Master   | 294       |
| Standard Bars → Micrometer Standards  |           |
| Standard Scales   | 289       |
| Stands → Comparator Stands, Dial Gage Stands, Magnetic Stands, Transfer Stands                  |           |
| Steel Rules   | 299 - 300 |
| Stereo Microscopes  | 376 - 378 |
| Surftest  |           |
| SJ-201, SJ-301, SJ-400  | 406 - 411 |
| SV-2000/3000  |           |
| SURFPAK-SJ, SURFPAK-SV, SURFPAK-PRO   | 404 - 405 |

| Description  | Page      |
|--|-----------|
|     |           |
| TM → Toolmaker's Microscopes   |           |
| Telescoping Gage Set   | 302       |
| Tension Gages → Dial Tension Gages   |           |
| Test Indicators → Dial Test Indicators   |           |
| Thickness Gages  | 300       |
| Thickness Gages → Dial Thickness Gages, Pocket Thickness Gage                            |           |
| Toolmaker's Microscopes TM-500   | 354 - 355 |
| Transfer Stands  | 199       |
| Tube Micrometers → Digimatic Micrometers, Digit Outside Micrometers, Outside Micrometers |           |
| Tubular Inside Micrometers   | 136 - 139 |

| Description   | Page |
|---|------|
|  |      |
| UDT → Dial Gage Tester  |      |
| Uni-Mike → Digimatic Micrometers, Outside Micrometers                                 |      |
| Universal Bevel Protractor  | 298  |
| Universal Height Master   | 282  |
| Universal Micrometers → Outside Micrometers   |      |

| Description   | Page                     |
|---|--------------------------|
|  |                          |
| VM-ZOOM40 → Assembly Type Microscope Unit   |                          |
| VMU → Video Microscope Unit   |                          |
| V-Anvil Micrometers → Digimatic Micrometers, Outside Micrometers                  |                          |
| V-Block Set   | 304                      |
| Vernier Calipers  | 40 - 45, 48 - 49, 53, 55 |
| Vernier Calipers  |                          |
| Blade Type  | 59                       |
| Hook Type   | 65                       |
| Inside  | 64 - 65                  |
| Neck Type   | 60                       |
| Offset  | 56                       |
| Offset Centerline   | 57                       |
| Outside Point Type  | 60                       |
| Point   | 58                       |
| Scribing  | 62                       |
| Swivel Type   | 61                       |
| Tube Thickness Type   | 61                       |
| Vernier Depth Gages   | 67 - 68                  |
| Vernier Height Gages  | 78                       |
| Video Microscope Unit VMU   | 369                      |
| Video System → Vision Unit  |                          |
| Vision Unit   | 351                      |



|  |     |
|--|-----|
| Wire Micrometers → Outside Micrometers |     |
| 3-Wire Units                           | 95  |
| Working Standard Scales                | 289 |



|            |     |
|------------|-----|
| Zoom Loupe | 305 |
|------------|-----|

| Series No. | Description                | Page           |
|------------|----------------------------|----------------|
|            |                            |                |
| 0          | Dial Indicators            | 175            |
|            |                            |                |
| 1          | Dial Indicators            | 176 - 178, 189 |
| 101        | Outside Micrometers        | 89             |
| 102        | Outside Micrometers        | 90 - 91        |
| 103        | Outside Micrometers        | 92 - 93        |
| 104        | Outside Micrometers        | 96             |
| 105        | Outside Micrometers        | 97             |
| 106        | Outside Micrometers        | 93             |
| 107        | Outside Micrometers        | 98             |
| 110        | Micrometer Heads           | 143            |
| 111        | Outside Micrometers        | 110            |
| 112        | Outside Micrometers        | 104 - 105      |
| 113        | Limit Micrometers          | 98             |
| 114        | Outside Micrometers        | 112 - 113      |
| 115        | Outside Micrometers        | 102 - 103      |
| 116        | Outside Micrometers        | 115            |
| 117        | Outside Micrometers        | 118            |
| 118        | Outside Micrometers        | 111            |
| 119        | Outside Micrometers        | 111            |
| 121        | Digimatic Bench Micrometer | 119            |
| 122        | Outside Micrometers        | 109            |
| 123        | Outside Micrometers        | 106 - 107      |
| 124        | Outside Micrometers        | 114            |
| 125        | Outside Micrometers        | 100            |
| 126        | Outside Micrometers        | 101            |
| 128        | Depth Micrometers          | 125            |
| 129        | Depth Micrometers          | 124 - 125      |
| 133        | Tubular Inside Micrometers | 138 - 139      |
| 137        | Tubular Inside Micrometers | 136 - 137      |
| 139        | Tubular Inside Micrometers | 136 - 137      |
| 140        | Tubular Inside Micrometers | 136 - 137      |
| 141        | Inside Micrometers         | 140            |
| 142        | Digit Outside Micrometers  | 104 - 105      |
| 143        | Outside Micrometers        | 113            |
| 145        | Inside Micrometers         | 134            |
| 146        | Groove Micrometers         | 123            |
| 147        | Outside Micrometers        | 116 - 117      |
| 148        | Micrometer Heads           | 144 - 147      |
| 149        | Micrometer Heads           | 148            |
| 150        | Micrometer Heads           | 149            |
| 151        | Micrometer Heads           | 150            |
| 152        | Micrometer Heads           | 151 - 152      |
| 153        | Micrometer Heads           | 153            |
| 154        | Small Hole Gages           | 302            |
| 155        | Telescoping Gages          | 302            |
| 156        | Micrometer Stands          | 122            |
| 157        | Optical Parallels          | 121            |
| 158        | Optical Flats              | 121            |
| 160        | Vernier Calipers           | 48 - 49        |

| Series No. | Description                    | Page      |
|------------|--------------------------------|-----------|
| 162        | Bench Comparator               | 303       |
| 164        | Digimatic Micrometer Heads     | 155       |
| 167        | Micrometer Standards           | 120       |
| 169        | Outside Micrometers            | 107 - 108 |
| 170        | Dial Gage Tester               | 196       |
| 172        | Profile Projectors             | 344 - 347 |
| 174        | Linear Scale Counters          | 318 - 322 |
| 176        | Measuring Microscopes          | 356 - 363 |
|            | Toolmaker's Microscope         | 354 - 355 |
| 177        | Setting Rings                  | 141, 215  |
| 178        | Surftest                       | 406 - 425 |
| 179        | Neo-Derm                       | 308       |
|            | Digi-Derm                      | 309       |
| 180        | Combination Square Sets        | 297       |
| 181        | V-Blocks                       | 304       |
| 182        | Standard Scales                | 289       |
|            | Steel Rules                    | 299 - 300 |
| 183        | Pocket Magnifiers              | 305       |
|            | Loupe                          | 305       |
|            | Pocket Comparators             | 305       |
| 184        | Thickness Gages                | 300       |
| 186        | Radius Gages                   | 301       |
| 187        | Bevel Protractor               | 298       |
|            | Digimatic Universal Protractor | 298       |
| 188        | Pitch Gages                    | 301       |
| 189        | Digit Outside Micrometers      | 111       |
| 191        | Coordinate Measuring Machines  | 455 - 456 |
| 192        | Digimatic Height Gages         | 74 - 75   |
|            | Dial Height Gages              | 77        |
| 193        | Digit Outside Micrometers      | 94 - 95   |
| 196        | Coordinate Measuring Machines  | 455       |
| 197        | Micrometer Heads               | 154       |
| 198        | QM-Data                        | 460 - 461 |
|            | QM-Measure                     | 460 - 461 |

| Series No. | Description                     | Page        |
|------------|---------------------------------|-------------|
| 2          | Dial Indicators                 | 179 - 185   |
| 201        | Dial Snap Gage                  | 204         |
| 209        | Dial Caliper Gages              | 223 - 225   |
|            | Digimatic Caliper Gages         | 222         |
| 211        | Roundtest                       | 428 - 436   |
| 215        | Comparator Stands               | 200         |
| 216        | Digimatic Tape Measure          | 471         |
| 218        | Contracer                       | 388 - 395   |
| 223        | Digit Outside Micrometers       | 106 - 107   |
| 227        | Outside Micrometers             | 119         |
| 229        | Digit Depth Micrometers         | 124 - 125   |
| 243        | Female Screw Thread Comparators | 221         |
| 264        | DP-1VR                          | 23          |
|            | MUX-10F                         | 22          |
|            | Input Tools                     | 22          |
| 293        | Digimatic Micrometers           | 84, 86 - 88 |
|            | Quickmike                       | 82 - 83     |
| 295        | Digit Outside Micrometers       | 102 - 103   |

| Series No. | Description                             | Page           |
|------------|---|----------------|
| <b>3</b>   |   |                |
| 3          | Dial Indicators                         | 186 - 187, 189 |
| 302        | Profile Projectors                      | 332 - 333      |
| 303        | Profile Projectors                      | 334 - 339      |
| 304        | Profile Projectors                      | 340 - 341      |
| 305        | Profile Projectors                      | 342 - 343      |
| 310        | Roll Calipers                           | 205            |
| 311        | Square Master                           | 294            |
| 313        | 3-Wire Units                            | 95             |
| 314        | Digimatic Micrometers                   | 112 - 113      |
| 317        | Digimatic Micrometers                   | 118            |
| 318        | Litematic                               | 306            |
|            | Litematic Head                          | 307            |
| 323        | Digimatic Micrometers                   | 106 - 107      |
| 324        | Digimatic Micrometers                   | 114            |
| 326        | Digimatic Micrometers                   | 101            |
| 329        | Digimatic Depth Micrometers             | 124 - 125      |
| 331        | Digimatic Micrometers                   | 110            |
| 332        | OPTOEYE A2                              | 350            |
| 337        | Digimatic Tubular Inside Micrometers    | 135            |
| 339        | Digimatic Tubular Inside Micrometers    | 135            |
| 340        | Digimatic Micrometers                   | 96             |
| 342        | Digimatic Micrometers                   | 104 - 105      |
| 343        | Digimatic Micrometers                   | 113            |
| 345        | Digimatic Inside Micrometers            | 134            |
| 350        | Digimatic Micrometer Heads              | 156 - 157      |
| 355        | Coordinate Measuring Machines           | 457            |
| 356        | Coordinate Measuring Machines           | 458            |
| 359        | Quick Vision                            | 462 - 463      |
|            | Quick Scope                             | 464            |
|            | Vision Unit                             | 351            |
| 360        | Coordinate Measuring Machines           | 458            |
| 368        | Holtest                                 | 130 - 133      |
| 369        | Digimatic Micrometers                   | 108            |
|            | Quickmike                               | 82 - 83        |
| 375        | Measuring Microscopes                   | 363            |
| 377        | Stereo Microscopes                      | 376 - 378      |
| 378        | Inspection Microscope FS-300            | 364 - 365      |
|            | Eyepiece Sets                           | 370            |
|            | Long Working Distance Objectives        | 370 - 375      |
|            | Video Microscope Unit VMU               | 369            |
|            | Microscope Unit FS-70                   | 366 - 367      |
|            | Assembly Type Microscope Unit VM-ZOOM40 | 368            |
| 389        | Digimatic Micrometers                   | 111            |
| 395        | Digimatic Micrometers                   | 102 - 103      |

**4**

|     |                       |           |
|-----|-----------------------|-----------|
| 4   | Dial Indicators       | 188 - 189 |
| 406 | Digimatic Micrometers | 93        |
| 422 | Digimatic Micrometers | 109       |
|     | Quickmike             | 82 - 83   |
| 468 | Digimatic Holtest     | 128 - 129 |

| Series No. | Description                     | Page                      |
|------------|---------------------------------|---------------------------|
| <b>5</b>   |                                 |                           |
| 500        | Digimatic Calipers              | 34 - 38                   |
| 505        | Dial Calipers                   | 39                        |
| 506        | Vernier Height Gages            | 78                        |
| 509        | Dial Height Gages               | 77                        |
| 510        | Indicating Micrometers          | 100                       |
| 511        | Bore Gages                      | 207                       |
| 513        | Dial Test Indicators            | 226 - 234                 |
| 514        | Vernier Height Gages            | 78                        |
| 515        | Height Master                   | 280 - 283, 288            |
|            | Check Master                    | 284 - 285                 |
|            | Caliper Checker                 | 286                       |
|            | Inside Micro Checker            | 286                       |
|            | Depth Micro Checker             | 287                       |
|            | Bore Gage Zero Checker          | 215                       |
|            | Snap Gage Checker               | 288                       |
| 516        | Gauge Blocks                    | 262 - 277                 |
| 517        | Black Granite Surface Plates    | 290 - 291                 |
| 518        | Linear Height                   | 70 - 71                   |
|            | QM-Hite                         | 72 - 73                   |
| 519        | Mu-Checker                      | 250 - 258                 |
|            | Transfer Stands                 | 199                       |
| 521        | Calibration Tester              | 196                       |
| 522        | Vernier Calipers                | 43                        |
| 523        | Dial Snap Meters                | 99                        |
| 524        | Hicator-II                      | 235                       |
| 525        | Formtracer                      | 394 - 395                 |
| 526        | Bore Gages                      | 209                       |
| 527        | Vernier Depth Gages             | 67 - 68                   |
|            | Dial Depth Gages                | 68                        |
| 530        | Vernier Calipers                | 40                        |
| 531        | Vernier Calipers                | 44                        |
| 532        | Vernier Calipers                | 45                        |
| 533        | Vernier Calipers                | 55                        |
| 534        | Vernier Calipers                | 53                        |
| 536        | Vernier Calipers                | 42, 46, 56 - 62, 64 - 65  |
| 539        | Linear Scales                   | 316 - 317, 323 - 326, 329 |
| 542        | Linear Gages                    | 237 - 242, 248            |
|            | Linear Gage Counters            | 243 - 246                 |
|            | Laser Hologage                  | 248 - 249                 |
| 543        | Digimatic Indicators            | 164 - 171                 |
| 544        | Laser Scan Micrometer           | 465 - 468                 |
| 545        | Dial Bore Gages                 | 214                       |
| 546        | Dial Tension Gages              | 304                       |
| 547        | Digimatic Depth Gages           | 217                       |
|            | Digimatic Thickness Gages       | 218 - 219                 |
|            | Digimatic Upright Gages         | 202 - 203                 |
| 548        | Laser Indicator                 | 469                       |
| 550        | Digimatic Calipers              | 47                        |
| 551        | Digimatic Calipers              | 54                        |
| 552        | Digimatic Carbon Fiber Calipers | 50 - 52                   |
| 560        | Vernier Calipers                | 42                        |
| 565        | Gauge Block Comparator          | 278 - 279                 |
| 568        | Borematic                       | 126                       |
| 570        | Digimatic Height Gages          | 76                        |

| Series No. | Description                   | Page          |
|------------|-------------------------------|---------------|
| 571        | Digimatic Depth Gages         | 66            |
| 572        | Digimatic Scale Units         | 312 - 313     |
|            | Digimatic Display Units       | 24, 313 - 315 |
|            | Digimatic Multi-Unit          | 25            |
|            | Digimatic Difference/Sum Unit | 26            |
|            | Digimatic Extension Unit      | 26            |
| 573        | Digimatic Calipers            | 46, 56 - 65   |
|            | Digimatic Snap Caliper        | 62            |
| 575        | Digimatic Indicators          | 172           |
|            | Linear Gages                  | 173 - 174     |
| 579        | Linear Scale                  | 329           |

## 7

|     |                               |           |
|-----|-------------------------------|-----------|
| 7   | Magnetic Stands               | 198       |
|     | Dial Gage Stands              | 199 - 200 |
|     | Dial Upright Gages            | 202 - 203 |
|     | Dial Bench Gage               | 205       |
|     | Dial Depth Gages              | 216 - 217 |
|     | Dial Thickness Gages          | 219 - 220 |
|     | Pocket Thickness Gage         | 221       |
|     | Precision Dial Square         | 296       |
|     | Micro Jack                    | 304       |
| 700 | Plastic Caliper               | 469 - 470 |
|     | Digital Tire ThreadDepth Gage | 470       |
|     | Quick-Mini                    | 471       |

## 8

|     |                           |           |
|-----|---------------------------|-----------|
| 810 | Hardmatic                 | 440 - 441 |
|     | Hardness Testing Machines | 442 - 451 |
| 811 | Durometers                | 452       |

## 9

|     |                         |     |
|-----|-------------------------|-----|
| 916 | Precision Squares       | 296 |
| 950 | Spring Dividers         | 296 |
|     | Outside Spring Calipers | 296 |
|     | Inside Spring Calipers  | 296 |
| 960 | Precision Levels        | 298 |
| 967 | Bench Centers           | 303 |



| Description               | Quantity | Order No.       |
|---------------------------|----------|-----------------|
| <b>Battery Sell</b>       |          |                 |
| Silver-Oxide Battery SR44 | 1 pc.    | <b>938882</b>   |
| Lithium Battery CR2032    | 1pc.     | <b>05SAA217</b> |

| <b>DP-1VR</b> |              |                 |
|---------------|--------------|-----------------|
| Printer paper | 10 rolls/set | <b>09EAA084</b> |

| <b>Linear Height</b> |             |                |
|----------------------|-------------|----------------|
| Printer paper        | 10 pcs./set | <b>12AA802</b> |

| <b>Neo-Derm, Digi-Derm</b>                               |              |               |
|--|--------------|---------------|
| Calibration film (25µm)                                  | 1 sheet      | <b>527599</b> |
| Calibration film (50µm)                                  | 1 sheet      | <b>527600</b> |
| Calibration film (100µm)                                 | 1 sheet      | <b>527601</b> |
| Calibration film (250µm)                                 | 1 sheet      | <b>527602</b> |
| Calibration film (0.5mm)                                 | 1 sheet      | <b>527603</b> |
| Calibration film (1.0mm)                                 | 1 sheet      | <b>527604</b> |
| Calibration film (1.5mm)                                 | 1 sheet      | <b>685013</b> |
| Calibration film (2.0mm)                                 | 1 sheet      | <b>527605</b> |
| Film set (25µm, 50µm)                                    | 2 sheets/set | <b>937287</b> |
| Film set (25µm, 50µm, 100µm, 250µm, 250µm)               | 5 sheets/set | <b>937288</b> |
| Film set (100µm, 250µm, 0.5mm, 1.0mm, 2.0mm)             | 5 sheets/set | <b>937289</b> |
| Film set (25µm, 50µm, 100µm, 250µm, 0.5mm, 1.0mm, 1.5mm) | 7 sheets/set | <b>945014</b> |
| Film set (25µm, 50µm, 100µm, 250µm, 0.5mm, 1.0mm)        | 6 sheets/set | <b>945049</b> |
| Metallic base (magnetic)                                 | 1 pc.        | <b>933038</b> |
| Metallic base (nonmagnetic)                              | 1 pc.        | <b>937305</b> |

| Description                          | Quantity | Order No.       |
|--------------------------------------|----------|-----------------|
| <b>Contracer CP-1000/2000 Series</b> |          |                 |
| RAM card                             | 1 pc.    | <b>12AAA841</b> |

| <b>Surftest SJ-301, SJ-400 Series</b> |             |                 |
|---------------------------------------|-------------|-----------------|
| Standard printer paper (25m)          | 5 rolls/set | <b>270732</b>   |
| Durable printer paper (25m)           | 5 rolls/set | <b>12AAA876</b> |

| <b>Roundtest RA-100 Series</b> |              |               |
|--------------------------------|--------------|---------------|
| Printer paper                  | 10 rolls/set | <b>998698</b> |
| Element for air filter         | 1 pc.        | <b>358592</b> |
| Element for air regulator      | 10 pcs./set  | <b>358593</b> |

| <b>Roundtest RA-1500 Series</b> |       |               |
|---------------------------------|-------|---------------|
| Element for air filter          | 1 pc. | <b>358592</b> |
| Element for air regulator       | 1 pc. | <b>358593</b> |

| <b>Roundtest RA-2000 Series</b> |       |               |
|---------------------------------|-------|---------------|
| Element for air filter          | 1 pc. | <b>358592</b> |
| Element for air regulator       | 1 pc. | <b>358593</b> |

| <b>Roundtest RA-H5000 Series</b> |       |               |
|----------------------------------|-------|---------------|
| Element for air filter           | 1 pc. | <b>354320</b> |
| Element for mist separator       | 1 pc. | <b>354321</b> |
| Element for micro-mist separator | 1 pc. | <b>354322</b> |

| <b>Hardness Testing Machine HM, HV</b> |       |                 |
|--|-------|-----------------|
| Illumination lamp                      | 1 pc. | <b>19BAA219</b> |

| <b>Hardness Testing Machine ARK, ATK, AR</b> |              |                 |
|--|--------------|-----------------|
| Illumination lamp                            | 10 pcs./set  | <b>19BAA097</b> |
| Printer paper                                | 50 rolls/set | <b>19BAA103</b> |

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# Message from the President

I would like to take this opportunity to express our sincerest gratitude to you for your patronage of our Mitutoyo products. Since its foundation in 1934, Mitutoyo has been providing the ever-expanding global markets with a variety of measuring tools, such as micrometers and calipers, along with precision measuring systems, such as coordinate measuring machines, contour measuring instruments, vision measuring units and optical instruments. Thanks to the support and patronage of faithful Mitutoyo customers over the years, we have grown to become a comprehensive manufacturer, whose products today are measuring instruments of choice for users around the world. As a world's leading manufacturer of precision measuring devices, Mitutoyo is contributing to society with the advancement of technologies.

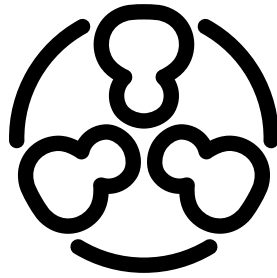
As the world enters the 21st century, technological innovation is expected to continue, as is seen in the field of nanotechnology. In the new century we'll continue our tireless efforts to advance the technological frontier, to satisfy the needs of the ever-changing industrial world. We will also work to fulfill our responsibilities as the world's leading company in the areas of measuring, developmental, and production technologies. The value of mitutoyo lies foremost in the reliability its products promise our users. We'll expand our sphere of business by delivering quality products with absolute reliability to the global marketplace.



President  
**Kazusaku Tezuka**

## **Corporate motto:**

**Good environment,  
Good people,  
Good techniques**



## In the Spirit of Mitutoyo

To become a complete man, one must acquire Wisdom, Benevolence and Valor.

With Wisdom only, one tends to be cold. Benevolence alone makes one weaker.

With valor only, one may reach beyond his capabilities. When the three qualities are combined, however, one will become a complete man. Similarly, success in enterprise lies in the knowledge of Heaven, Earth and Man. Business will succeed only when these factors, "heavensent" chances, natural opportunities, and harmony of man are present.

Without even one factor, success is remote. In Buddhism, Butsu (Buddha), Po (Doctrine) and So (Priest) are three principle treasures for its promotion of the teaching. In Christianity, God, Bible and Minister.

The word MITUTOYO signifies three abundances. "Mitsu" means three, while "Toyo" stands for a state of abundance. The name MITUTOYO was selected, with a sincere wish to see more complete men, to create a prosperous enterprise and to introduce righteous religion to all, along with the lasting wish for a peaceful world and fulfillment of meaningful life.

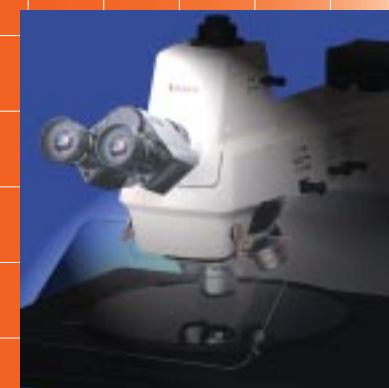
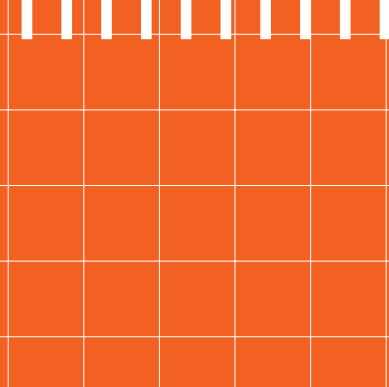
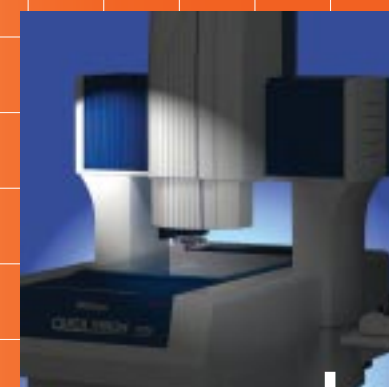
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