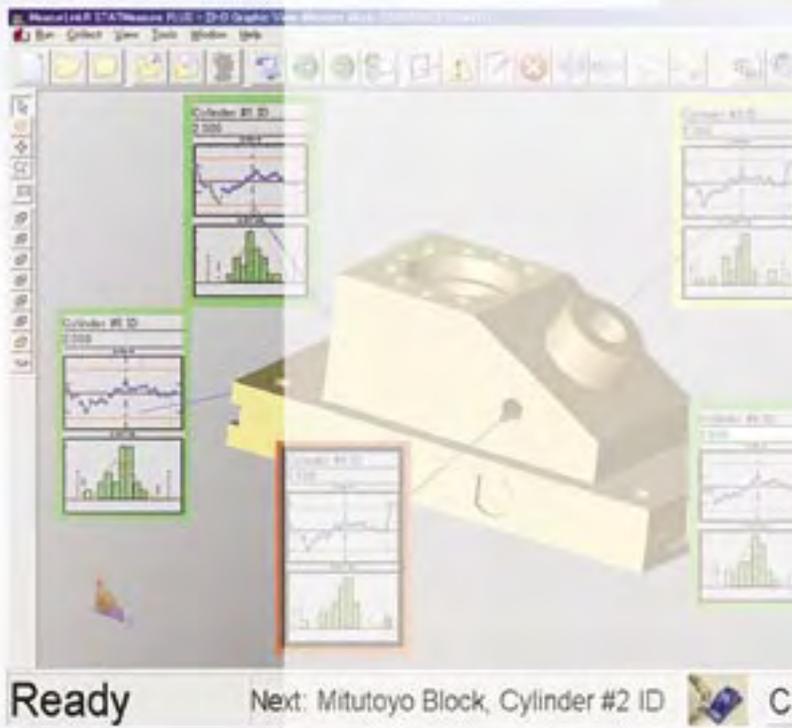


Measurement
Data Management

INDEX

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Input Tools

SERIES 264 — Digimatic Gage/PC Data Input Device

FEATURES

- The input tool is an interface enabling you to easily input measurement data from a Mitutoyo measuring instrument with the digimatic output feature to your PC.
- An USB keyboard signal conversion input tool, IT-012U converts measurement data to keyboard signals and directly inputs them to cells in off-the-shelf spreadsheet software such as Excel. An RS-232C communication input tool, IT-007R is also available to input data through RS-232C communication.
- More accurate measurement is possible using an optional foot switch.



USB keyboard signal conversion model

Order No.: **264-012-10**

Input: Digimatic signal x 1 channel
 Output: USB keyboard signal x 1 channel (USB 2.0)
 Power supply: 5V from the PC bus power
 Weight: 61g (including cable)

PS/2 keyboard signal conversion model

Order No.: **264-005**

Input: Digimatic signal x 1 channel
 Output: PS/2 keyboard signal x 1 channel
 Power supply: 5V from the PC bus power
 Weight: 70g (including cable)

RS-232C conversion model

Order No.: **264-007**

Input: Digimatic signal x 1 channel
 Output: RS-232C x 1 channel
 Power supply: 12V from the PC bus power (power storage)
 Weight: 91g (including cable)

Common to all models

DATA switch: Switch life of one million times

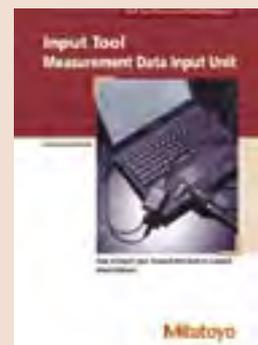
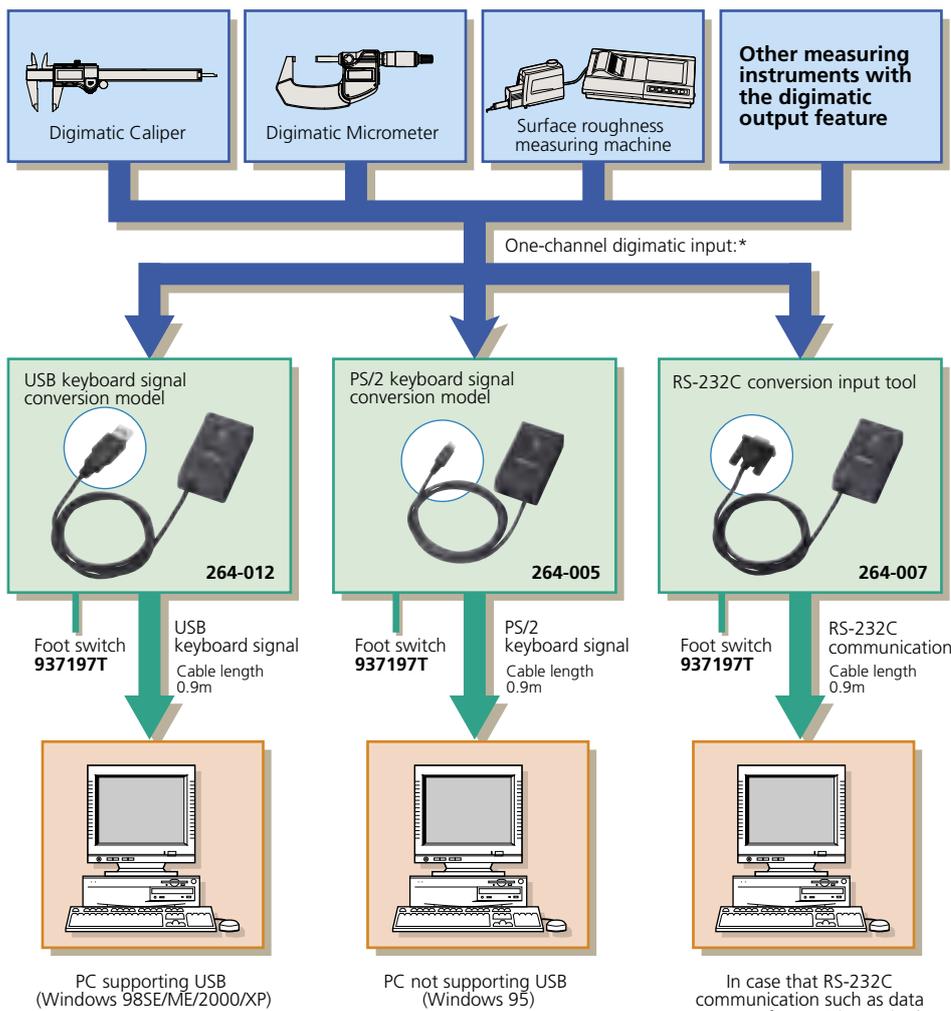
Dimensions (W x D x H): 72 x 44 x 23.5mm (main body)

Optional Accessory

937197T: Foot switch

939039: Gage selector

Connection Configuration



Refer to the Input Tools leaflet (E4250) for more details.

* When you use an optional gage selector 3 (refer to page 16), you can connect up to three measuring gages and select an input by switching them. When using **264-012**, you can connect multiple input tools at the same time with an off-the-shelf USB hub. Simultaneous input, however, is not supported. For cables used to connect each measuring gage and input tool, refer to page 22.

Mu-Wave System

Measurement Data Wireless Transfer System

Mu Wave transmitter

Order No.: **02AZB580A/C/E/G/H**
 Communication distance: About 10 m*1
 Transmission frequency: VHF bandwidth,
 Transmission speed: 2400 bps
 Power supply: One CR2032 (lithium battery)
 Battery life: About 6 months under normal use
 Number of IDs: 100 (0 to 99)
 Antenna: Built-in
 Mass: 50g

Mu Wave receiver

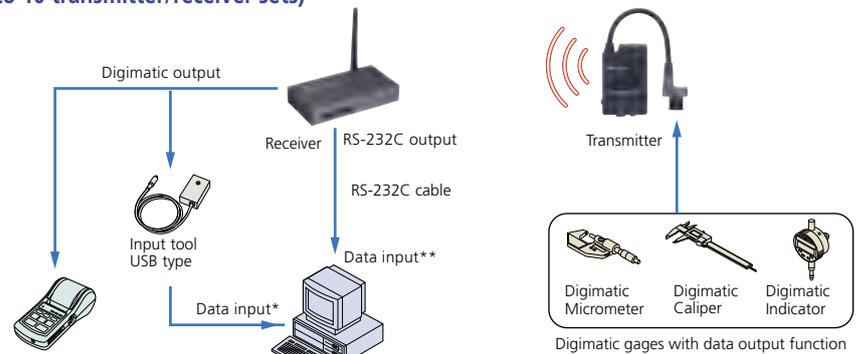
Order No.: **02AZC740**
 Reception: Double super heterodyne
 Output: Conforming to RS-232C
 (connector specifications: D-sub 9 pins)
 Digimatic output x 1 channel
 (flat type 10 pins)
 Display: Power LED and data transmission
 confirmation LED
 Buzzer: Data transmission confirmation
 (ON/OFF switching allowed)
 ID reception settings:
 All ID reception mode: Receive all IDs (00 to 99).
 Group ID reception mode: Receive IDs from a specified
 group only.
 Grouping: 0 to 9, 10 to 19, 20 to 29, 30 to 39, ... 90 to 99
 Antenna: Inverted dedicated rubber antenna
 Wired input: Digimatic signal x 2 ports

FEATURES

- Cordless connection can be realized between a digimatic gage, digimatic mini processor, PC and other device.



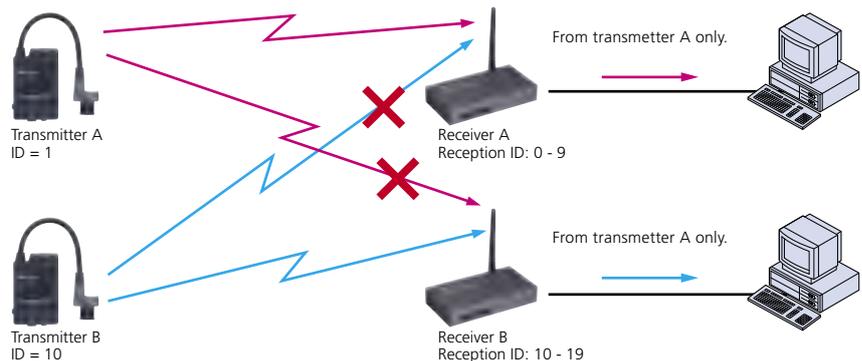
• System Configuration Example (up to 10 transmitter/receiver sets)



* Directly inputs the data to cells in the spread sheet software such as Excel.
 ** Requires a software having a RS-232C communication function such as MeasurLink Real-Time PLUS.

• Grouping by ID Number (up to 10 groups)

Usage example: To prevent lines from getting crossed when multiple sets are used nearby



Multiplexer-10F

SERIES 264 — Digimatic/RS-232C Interface Unit

FEATURES

- A measurement data transfer device, multiplexer MUX-10F converts digimatic output measurement data to RS-232C and outputs it to an external device such as PC.
- Up to four measuring instruments with the digimatic output feature can be connected.



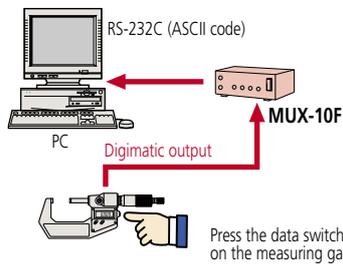
264-002



Usage Example

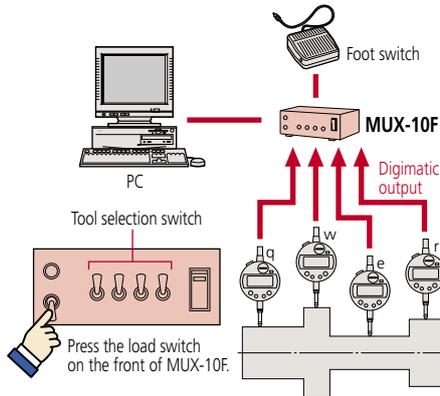
Data input using the data switch on the digimatic gage

- If the digimatic gage has a data switch, press it to input data, convert it according to the RS-232C specifications and output it.



Data input using the load switch

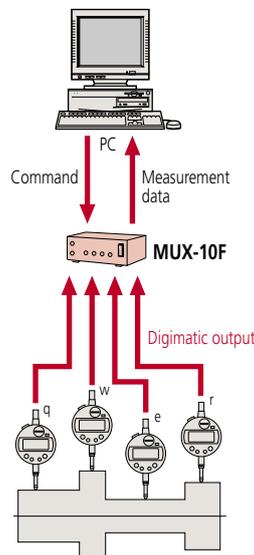
- If the digimatic gage does not have a data switch or when you perform simultaneous measurement, use the load switch to input data from the measuring gage selected by the tool selection switch, convert it according to the RS-232C specifications and output it.
- If multiple measuring gages are selected by the tool selection switch, data is input in the order of channels 1 through 4.
- Optional foot switch (937179T) is available for quick data entry.



Data input using the external commands

- You can input data from the specified measuring gage connected with MUX-10F (ch 1 - 4) by inputting a command on your PC.

Commands (ASCII)	Transfer channels
1 (ASCII corde31) CR	1
2 (ASCII corde32) CR	2
3 (ASCII corde33) CR	3
4 (ASCII corde34) CR	4
A (ASCII corde41) CR	1, 2, 3, 4
B (ASCII corde42) CR	1, 2, 4
C (ASCII corde43) CR	1, 3, 4
D (ASCII corde44) CR	2, 3, 4
E (ASCII corde45) CR	1, 2, 3
F (ASCII corde46) CR	1, 2
G (ASCII corde47) CR	1, 3
H (ASCII corde48) CR	1, 4
I (ASCII corde49) CR	2, 3
J (ASCII corde50) CR	2, 4
K (ASCII corde51) CR	3, 4



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)

Technical Data

Data input port: 4 channels for Digimatic gages
 Data output: Via RS-232C interface
 Data output format: RS-232C (D-SUB 9P in connector)
 Data transmission method: Half-duplex transmission
 Data transmission code: ASCII/IIIS
 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
 Power supply: AC adaptor
 Dimensions (W x D x H): 91.4 x 92.5 x 50.4mm

Optional Accessory

- 937179T: Foot switch

DP-1VR

SERIES 264 — Digimatic Mini-Processor

Order No.

- 264-504:** (w/100V AC adaptor)
- 264-504A:** (w/120V AC adaptor)
- 264-504D:** (w/220V AC adaptor)
- 264-504E:** (w/240-220V AC adaptor)

Technical Data

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
 Approx. 12000 lines for normal characters
 Processing capacity: 9999 data (mode 1/2/3)
 100000 data (mode 0)
 Printing data: Measurement data, GO/±NG judgment,
 No. of data, Max/min value, Range, Average,
 Standard deviation, No. 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
 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)
 Dimensions (W x D x H): 94 x 201 x 75.2mm
 Mass: 390g

FEATURES

- This is a palm-sized printer used to print measurement data from the digimatic gage or to perform statistical analysis.
- This printer offers excellent functionality. You can use it not only to print measurement data, perform a variety of statistical analyses, and draw a histogram or D chart but also to perform complicated operations for X-R control chart.
- Equipped with RS-232C output and GO/NG judgment output as standard functions, this processor ensures high reliability as an advanced quality inspection machine.
- The line thermal printer enables fast and quiet printing.



264-504



Mode 0:
Record the measurement data and tolerance judgment.

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

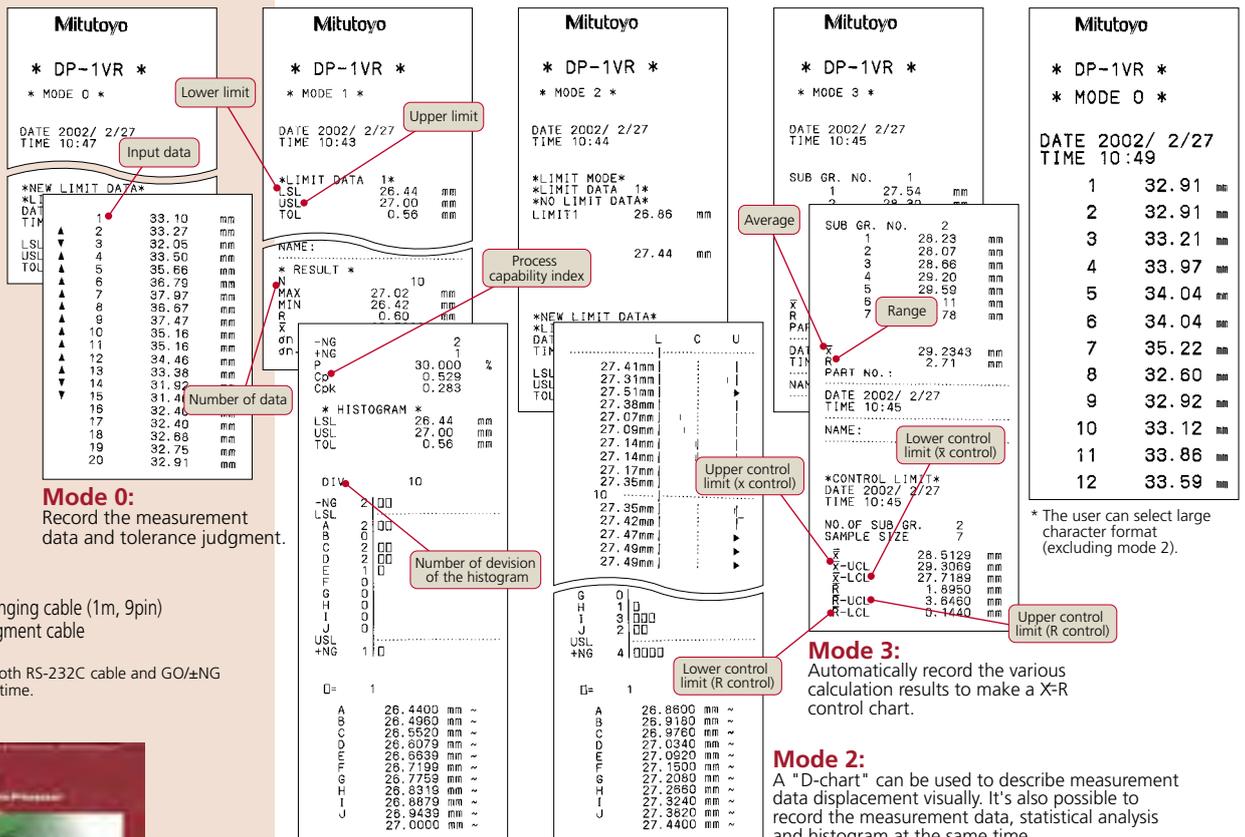
Mode 2:
A "D-chart" can be used to describe measurement data displacement visually. It's also possible to record the measurement data, statistical analysis and histogram at the same time.

Mode 3:
Automatically record the various calculation results to make a X-R control chart.

Optional Accessory

- 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.



Refer to the DP-1VR leaflet (0) for more details.

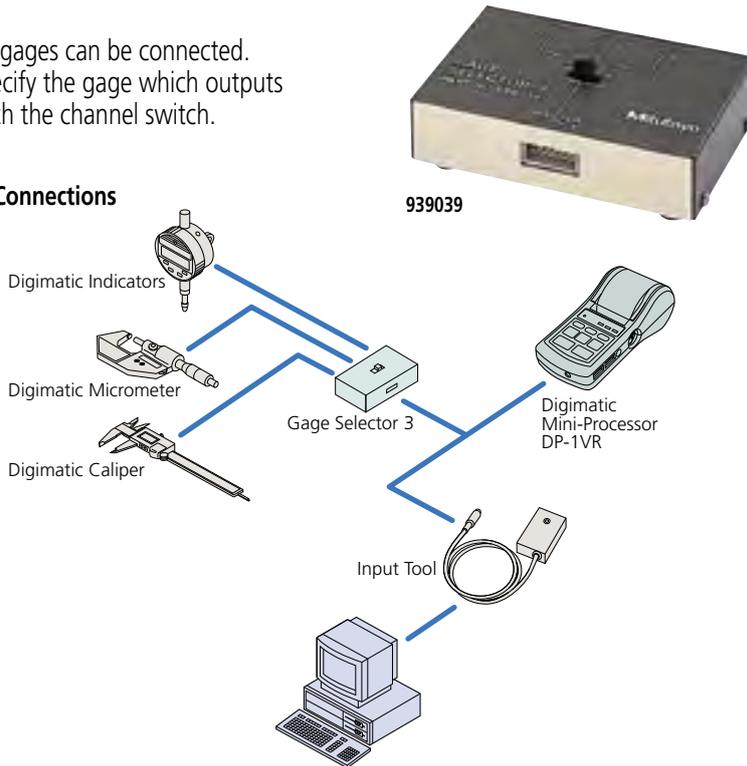
Gage Selector 3

3-channel Switching Box for Data Transmission

FEATURES

- 3 Digimatic gages can be connected.
- You can specify the gage which outputs the data with the channel switch.

Examples of Connections



Order No.

939039:

Technical Data

Connection: Up to three gages
 Signal: Digimatic code format
 Connection: Bidirectional
 External dimensions (W x D x H): 100 x 70 x 33mm

EC Counter

SERIES 542 — Low-cost, Assembly Type Display Unit

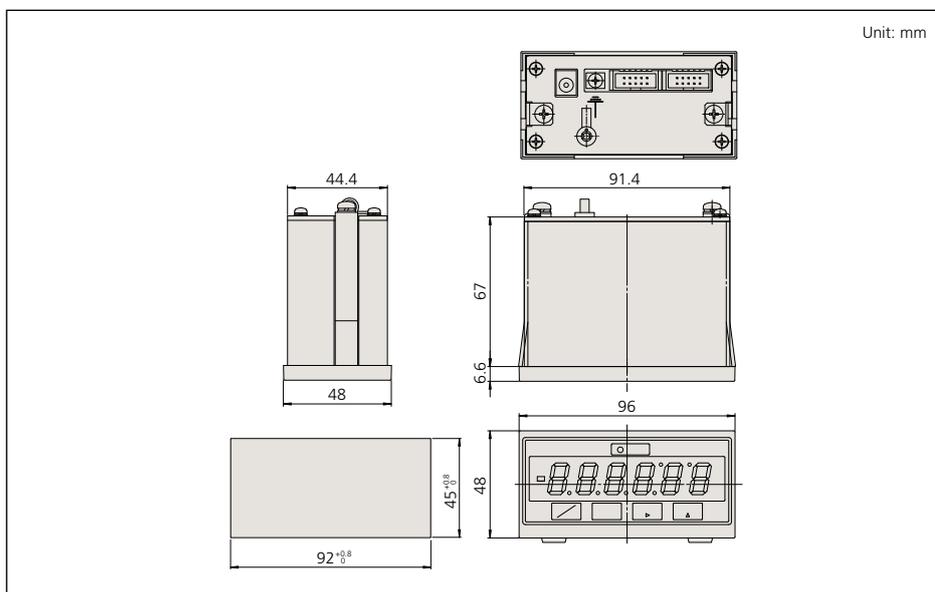
FEATURES

- Compact panel mounting type and DIN size. It can be easily incorporated into each system.

542-007



DIMENSION



Order No.

542-007

Technical Data

Applicable gage: LGD, LGS
 Resolution: 0.001mm, 0.01mm
 No. of gage input: 1
 Display: 6-digit LED and a negative [-] sign
 Function: Preset
 GO/±NG judgment
 Output (open-collector): 3-step limit signal, Normal signal
 External control: Preset, Data hold
 Power supply: Via AC adaptor
 Dimensions (W x D x H): 96 x 48 x 84.6mm
 Mass: 50g

Digimatic Multi-Unit

SERIES 572 — 6-channel Multi-point Measuring Unit

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)

Technical Data

- Data input port: 6
- Functions: MAX/MIN measurement
- Range (MAX-MIN) measurement
- Zero-Setting
- Presetting
- GO/±NG judgment (Buzzer and LED)
- GO/±NG signal output
- Error alarm
- SPC data output
- Power supply: 9V DC, 500mA (via AC adaptor)
- Dimensions (W x D x H): 236 x 120 x 66mm
- Mass: 1.3kg

Optional Accessory

- 936937: SPC cable for data output (1m)
- 965014: SPC cable for data output (2m)
- 907020: GO/±NG signal output cable (2m)
- 937179T: Foot switch

Order No.

- 572-041: (w/100V AC adaptor)
- 572-041A: (w/120V AC adaptor)
- 572-041D: (w/220V AC adaptor)
- 572-041E: (w/240-220V AC adaptor)

Technical Data

- Data input port: 2
- Calculation mode: A+B, A-B, A, B
- Functions: Zero-Setting
- SPC data output
- Power supply: 9V DC, 500mA (via AC adaptor)
- Dimensions (W x D x H): 76 x 120 x 66mm
- Mass: 0.55kg

FEATURES

- The Digimatic Multi-Unit receives measurement data from multiple (up to six) Digimatic gages.
- By connecting a Display Unit (EC Counter) 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.



572-052

Digimatic Difference/Sum Unit

SERIES 542 — For Multiple-gage Measurements

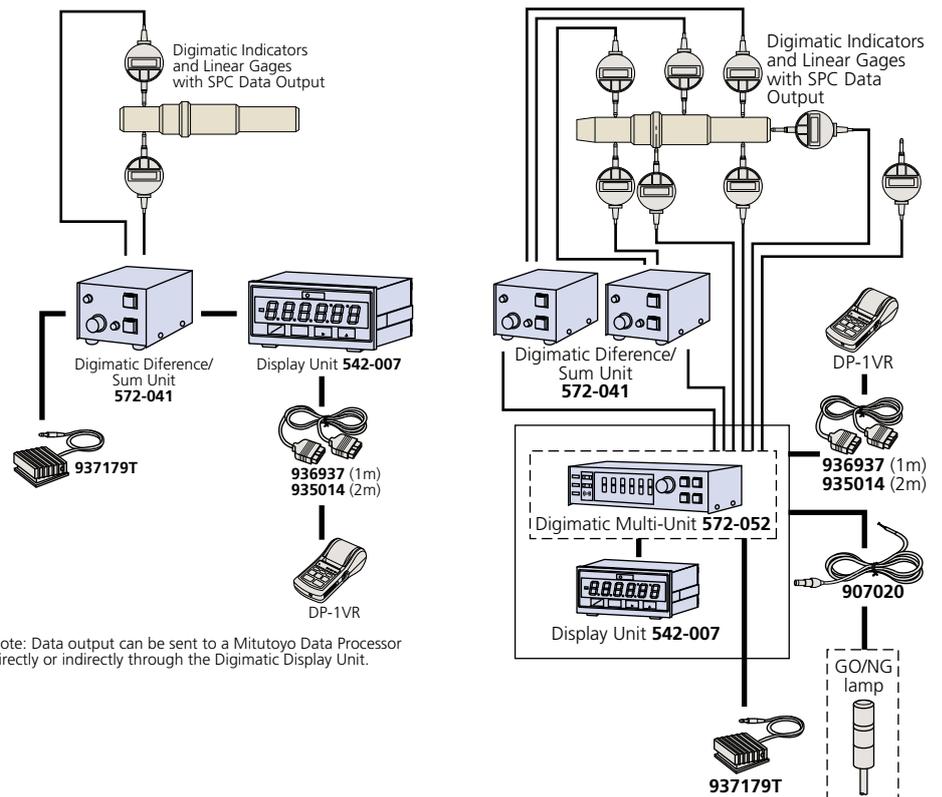
FEATURES

- The Digimatic Difference/Sum Unit will add or subtract the measurements from two Digimatic gages and output results to a display Unit or SPC data processor.



572-041

Examples of Connections



MeasurLink

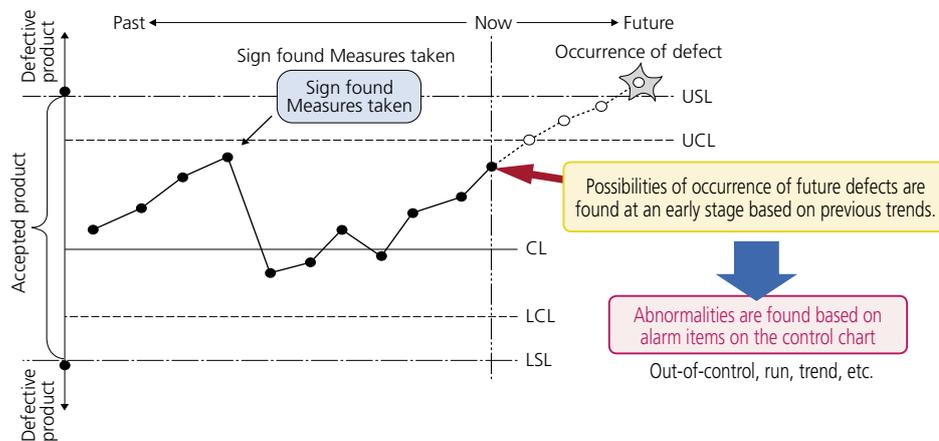
Measurement Data Network System

The MeasurLinks® program that has been developed by U.S. Mitutoyo and incorporates over a decade of expertise in the U.S., the birthplace of SPC. Industries have become increasingly borderless worldwide, and there will be more business with overseas companies, including Japanese manufacturers, in the future. In this scenario it is likely the acquisition of certified ISO9000-based quality control

standards, such as QS-9000 of the automobile industry in the U.S., will be increasingly mandated, and this trend is expected to spread to other industries. In Japan today, most systems utilize inspection certificates, but process control will be required in more cases in the acquisition of international standard certificates.

Preventive control via real-time control chart

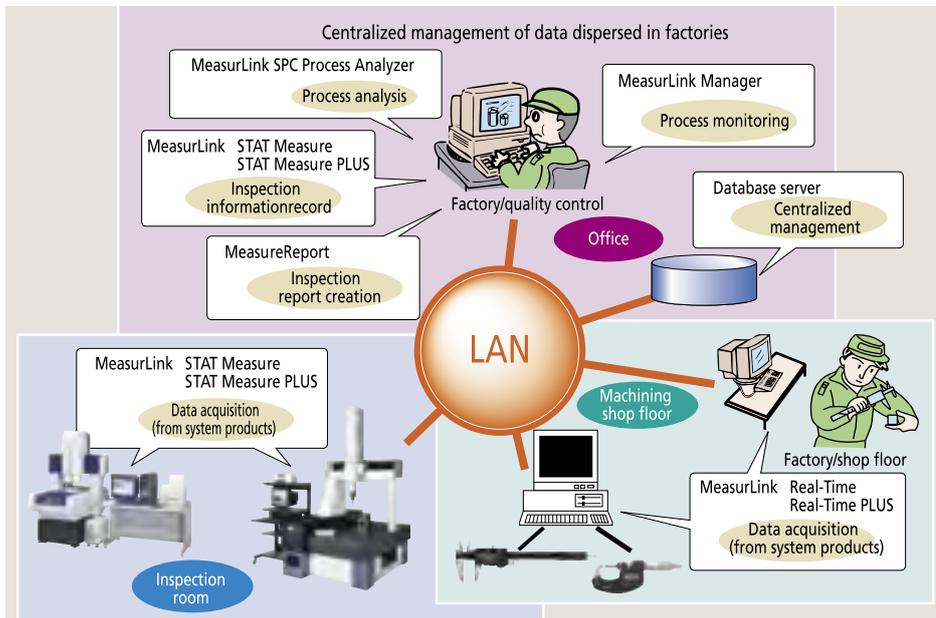
Real-time control charts are utilized to find abnormalities at an early stage in the workshop, to effectively prevent defects from occurring.



Expansion to the measurement network system

MeasurLink® supports anything from stand-alone, small-scale systems to large-scale systems utilizing a PC network environment. You can choose from the 7 types of package software as shown in the right hand figure, according to your budget and application. Expansion from a stand-alone to a network system is easy, so you can gradually upgrade test operation in one section into full-scale operation.

Centralized measurement data management by networking



MICAT

Mitutoyo Intelligent Computer Aided Technology

the standard in world metrology software

MeasurLink

MeasurLink programs

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.

Recommended operating environments

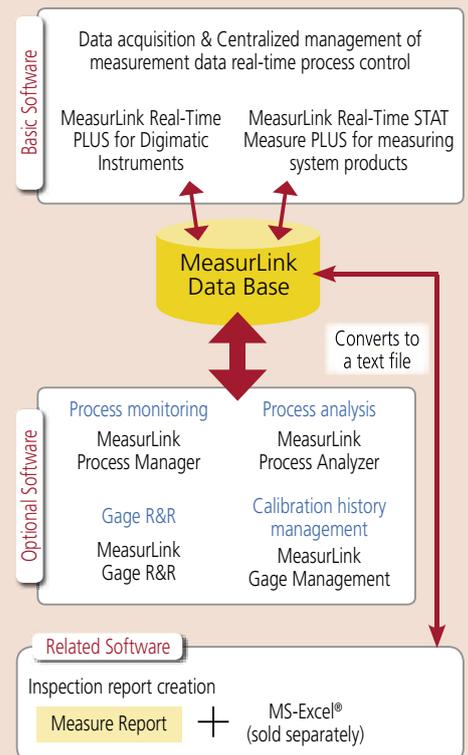
*The specification in parentheses () indicates that of servers.

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.

Program configuration of MeasurLink

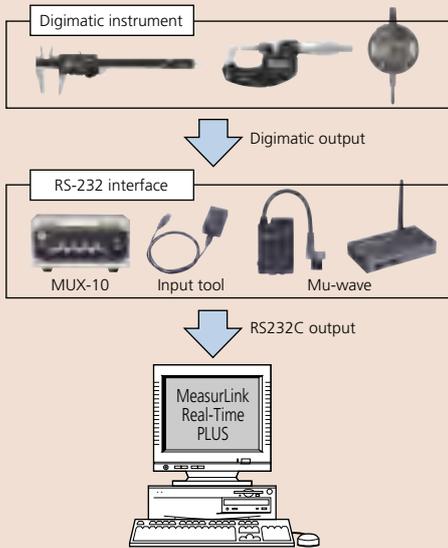


Basic Software

MeasurLink Real-Time PLUS (for Digimatic instruments)

MeasurLink STATMeasure PLUS (for measuring instrument products)

MeasurLink Real-Time PLUS (for Digimatic instruments)
MeasurLink Real-Time PLUS transmits measurement data in real time from measuring tools with Digimatic output with RS-232C communication via the interface.



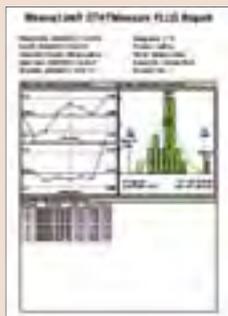
MeasurLink STATMeasure PLUS (for measuring instrument products)

MeasurLink STATMeasure PLUS, which resides on the data processing PC, transmits measurement data in real time when the measurement program is executed with inter-program communication (DDE communication).

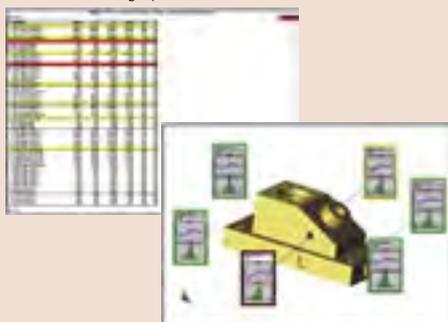
Report output

Results of statistical processing can be output in various types of report.

<Report by measurement item>



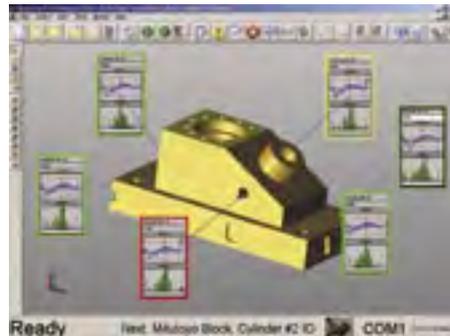
<Printout of the graphic window>



*By using the optional MeasureReport package, you can create inspection tables in a format previously defined using Excel.

Real-time process control

Result of statistical analysis



Measured values and Judgment by workpiece

The screenshot shows a data table with columns for 'Work No.', 'switch', and 'Total judgment'. The rows contain numerical data for each workpiece. The 'Total judgment' column uses color coding: green for 'OK', yellow for 'Close to out-of-tolerance', and red for 'Out-of-tolerance'.

Narrow-down function to show results for a single workpiece at a glance.

Statistical analysis result display

Wide range of statistical analysis/display functions provides results according to characteristics and purposes.

Individual item chart

- Xbar-R control chart (a)
- Xbar-S control chart
- X-Rs control chart
- EWMA control chart
- Histogram (b)
- Run chart (c)
- Pre-control chart (d)
- Tear chart (e)

All item chart

- Multivariate control chart (f)
- Column indicator (g)
- All item Cpk sheet (h)
- Multivariate defect ratio (bar graph)
- Manager display (4 columns x 3 rows) (Histogram, meter, box and whiskers plot, Cpk)

Measured value

- Measured value data sheet (Individual item n count x sub Gr)
- Part data sheet

Statistics

- Maximum value
- Minimum value
- Average
- Standard deviation S, Rbar/d2
- Process capability Cp, Cpk, Pp, Ppk
- Defect ratio
- Average $\pm 3\sigma / 4\sigma / 6\sigma$ etc.



The content of the measurement item balloon display can be configured as desired



Character information (item information calculation result)

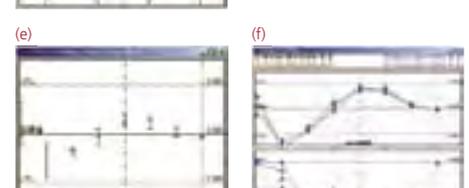
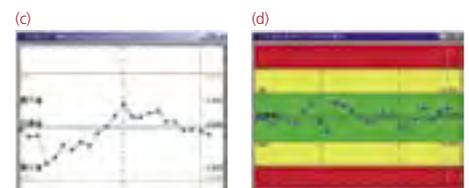
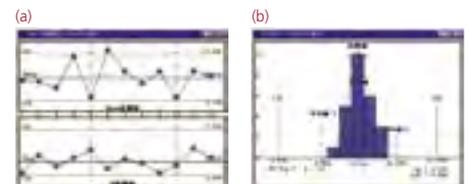
Item name, measured value, error value, upper/lower limits, Cp, Cpk, Pp, Ppk, standard deviation, average, maximum value, minimum value, defect rate, etc. (All selectable.)

Chart display (control charts, etc.)

Xbar-R control chart, Xbar-S control chart, X-Rs control chart, histogram, tear chart, run chart, pre-control chart, statistic, etc. (All selectable.)

Color-coding of judgment of GO/NG results

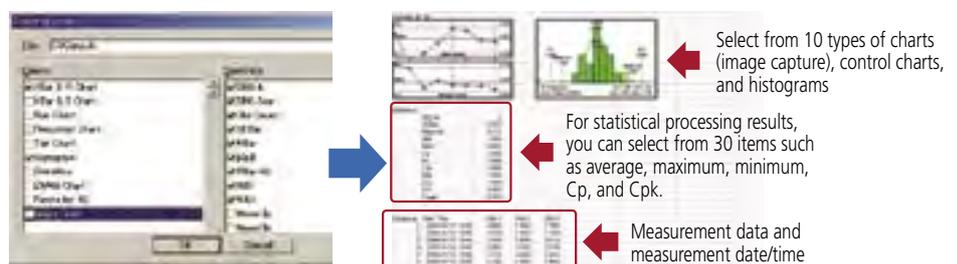
The color of the outer frame of the call-out corresponds to the GO/NG result



File output

Results for the specified inspection lot (data, graph, calculation result, etc.) can be output to files in Excel format. (1 sheet is created for each item.)

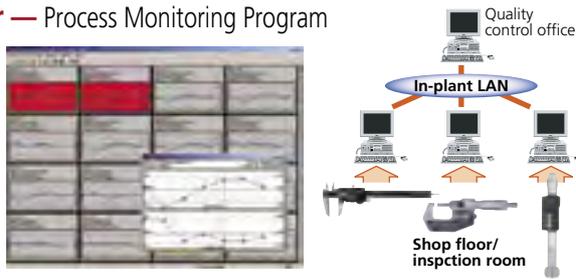
You can easily extract the necessary results and provide them to any department not using MeasurLink. Other file output formats, such as text file and MeasurLink's dedicated format, are also available.



Optional Software

MeasurLink Process Manager — Process Monitoring Program

- 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.



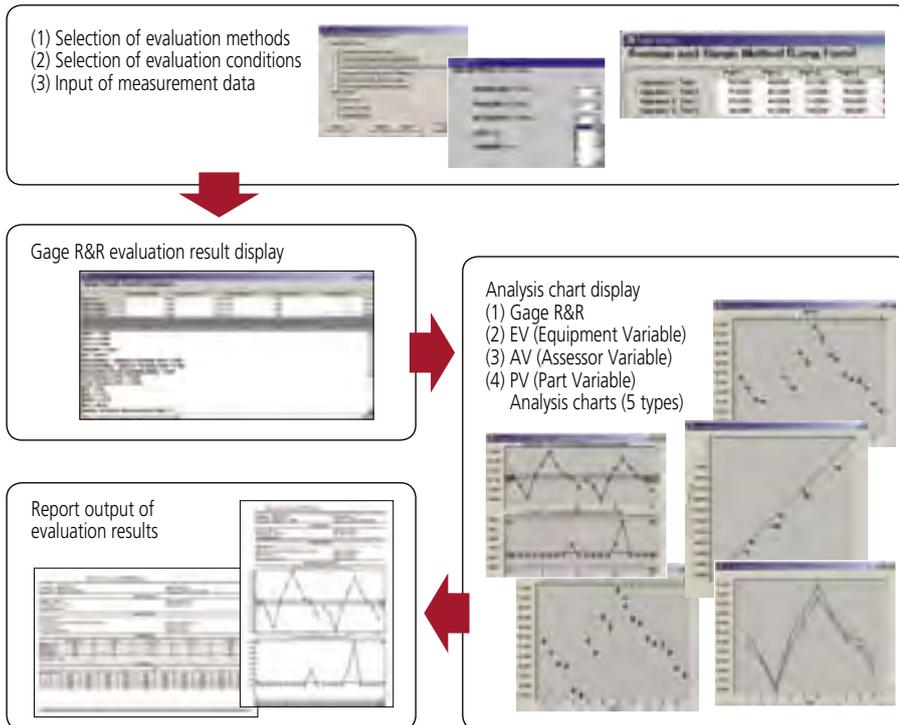
MeasurLink Process Analyzer — Process Analysis Program

- 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.



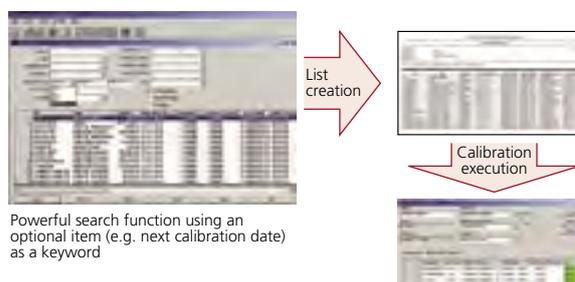
MeasurLink Gage R&R — Gage R&R Assessment Program

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



MeasurLink Gage Management — Calibration History Management Program

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



Refer to the MeasurLink leaflet (E4297) for more details.

MeasureReport

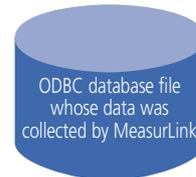
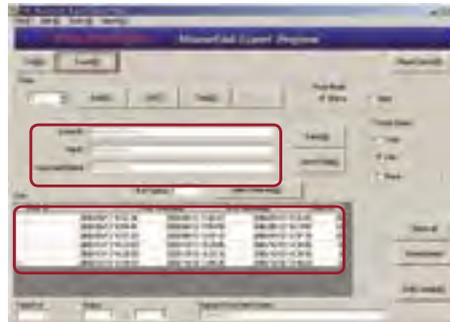
Data Conversion Program into inspection Certificates in MS-Excel Format

FEATURES

- You can output data from a measurement result file generated with a CMM, vision measuring machine or other machine to an inspection table generated with Excel. Data from multiple measuring machines can be combined into a single inspection table (up to 200 measurement items).
- You can also generate an inspection table by inputting data from the measuring gage with the digimatic output feature via the interface. Calculation results of optical measuring machine, QM-Data200 and the counter values for the X-axis and Y-axis output through RS-232C can be processed in the same way.
- You can generate an original Excel form using an attached sample form as template and making simple editing (such as copy and paste).
- The computation function is available for tolerance judgment, workpiece judgment, statistical calculation and other processing at generation of inspection table.

MR-MeasurLink export program

Converts selected data from the database collected by MeasurLink and outputs it to a file, and starts up MS-Excel and executes macro processing.



After the part ID and lot number (date/time) are specified, file conversion is performed to create an Excel file.

File conversion

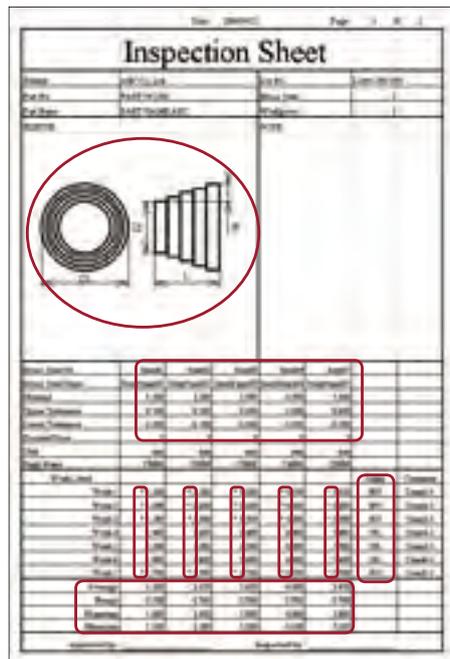


Excel starts up. Macro is executed.

Data file in the Excel format (Part ID, item ID, design value, tolerance value, measurement data, measurement date/time, etc.)

Inspection table creation macro program

Based on the data file created, the inspection table creation macro adds OK/NG judgment and statistical calculation results by macro processing, and displays them in Excel inspection table format.



- Creation of a new format file
You can create your original format easily by editing the attached sample format file.
 - Workpiece shape display
The workpiece shape file used in the data acquisition of MeasurLink is automatically displayed.
 - Design/tolerance values
The design and tolerance values registered in MeasurLink are used as they are.
 - Error value display
Errors in the design values can be displayed.
 - NG marking
You can add any mark in front of NG data.
 - Workpiece judgment
OK/NG judgment is performed by work. (OK/NG is displayed.)
 - Statistical calculation
Desired calculation results can be displayed from 15 types of statistical items.
 - Maximum value
 - Minimum value
 - Range
 - Average
 - Standard deviation
 - Cp ((U_{TL}-L_{TL})/3σ)
 - CpU ((U_{SL}-X_{bar})/3σ)
 - CpL ((X_{bar}-L_{SL})/3σ)
 - CpU or CpL, whichever is better
 - Defect count (data count outside tolerances)
 - Defect % (Defect count/Data count x 100)
 - Data count
 - Skew
 - Kurtosis
 - Coefficient of variation %
- Note: Items in parentheses indicate the Excel functions or calculation methods used.



- Multiplexer MUX-10F
- Input Tool



- QM-Data
- Linear Height



- Coordinate Measuring Machine
- Vision Measuring System



*For file conversion, up to 200 items are convertible.



- Digimatic gages



SPC Connecting Cables

- These cables are used to output measurement data from the digimatic gage with the output feature to the digimatic mini processor, digimatic display unit, multiplexer or other device.
- Cables of one or two meters are available.
- Note that the shape of connector differs depending on the model.

Order No.	
Straight type	
905338: 1m (40")	
905409: 2m (80")	
Back type	
905689: 1m (40")	
905690: 2m (80")	
Right type	
905691: 1m (40")	
905692: 2m (80")	
Left type	
905693: 1m (40")	
905694: 2m (80")	
With data out switch type	
959149: 1m (40")	
959150: 2m (80")	
With data out switch type	
05CZA624: 1m (40")	
05CZA625: 2m (80")	
With data out switch type	
05CZA662: 1m (40")	
05CZA663: 2m (80")	
6 pins type	
937387: 1m (40")	
965013: 2m (80")	
10 pins type	
936937: 1m (40")	
965014: 2m (80")	

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Micrometers



Micrometer Heads



New Products



**Coolant Proof
Micrometer**



**Digimatic
Micrometer**



**Ratchet Thimble
Micrometer**



**Digimatic Spline
Micrometer**



**Fine Pitch
Micrometer Head**

Coolant Proof Micrometer

SERIES 293 — with Dust/Water Protection Conforming to IP65 Level

FEATURES

- IP65 protection level, enabling use in environments exposed to cutting oil, etc*.
*Anti-corrosion treatment is required after use.
- Measurement data output function is available with a water-resistant connection cable.
- Oil-resistance materials are used in all plastic components.
- $\pm 1\mu\text{m}$ instrumental error (75mm or less range models)
- Auto power ON/OFF function.
- Certificate of inspection* is included. (50mm or less range models)
*It is not the type used to obtain calibration certificates.



293-230



293-252



Oil-resistance materials are used in all plastic components.



(Refer to the page 9 for details.)



(Refer to the page 9 for details.)



Certificate of inspection

Technical Data

- Accuracy: Refer to the list of specifications. (excluding quantizing error)
- Resolution: 0.001mm, .00005"/0.001mm (up to 4") or .0001"/0.001mm (over 4")
- Flatness: 0.3 μm
- Parallelism: 1 μm for models up to 50mm
2 μm for models up to 100mm
3 μm for models up to 175mm
4 μm for models up to 275mm
5 μm for models over 275mm
- Measuring faces: Carbide tipped
- Display: LCD
- Battery: SR44 (1 pc.), **938882**
- Battery life: Approx. 1.2 years under normal use (8 months: over 100mm models)
- Dust/Water protection level: IP65

Function

- Origin-set, Preset (over 100mm models), Zero-setting, Automatic power ON/OFF, Data hold, Data output, inch/mm conversion (inch/mm models)
- Alarm: Low voltage, Counting value composition error

Optional Accessory

- 05CZA662:** SPC cable with data switch (1m)
05CZA663: SPC cable with data switch (2m)

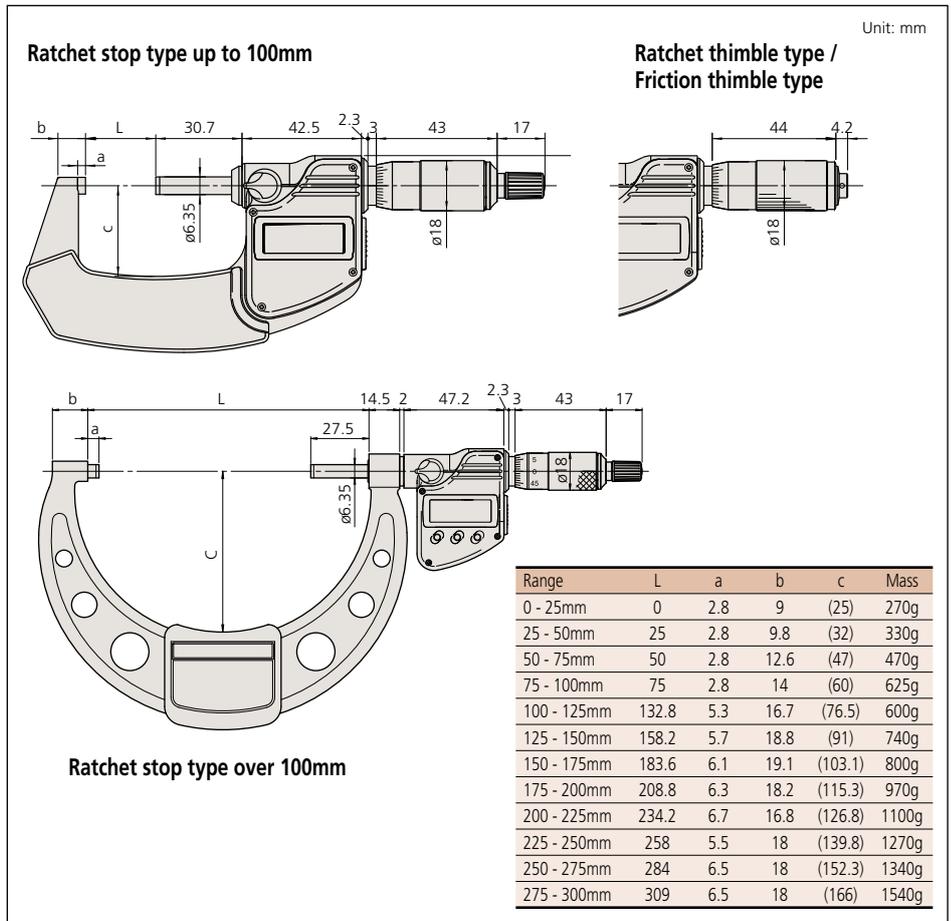


SPC cable with data switch



Measurement data output function is available with a water-resistant connection cable.

DIMENSION AND MASS



SPECIFICATIONS

Metric _____ With ratchet stop

Range	Order No.	Accuracy
0 - 25mm	293-230 / 293-240*	±1μm
25 - 50mm	293-231 / 293-241*	±1μm
50 - 75mm	293-232 / 293-242*	±1μm
75 - 100mm	293-233 / 293-243*	±2μm
100 - 125mm	293-250	±2μm
125 - 150mm	293-251	±2μm
150 - 175mm	293-252	±3μm
175 - 200mm	293-253	±3μm
200 - 225mm	293-254	±3μm
225 - 250mm	293-255	±4μm
250 - 275mm	293-256	±4μm
275 - 300mm	293-257	±4μm

*without SPC data output

Metric _____ With ratchet thimble

Range	Order No.	Accuracy
0 - 25mm	293-234 / 293-244*	±1μm
25 - 50mm	293-235 / 293-245*	±1μm
50 - 75mm	293-236 / 293-246*	±1μm
75 - 100mm	293-237 / 293-247*	±2μm

*without SPC data output

Metric _____ With friction thimble

Range	Order No.	Accuracy
0 - 25mm	293-238 / 293-248*	±1μm

*without SPC data output

Inch/Metric _____ With ratchet stop

Range	Order No.	Accuracy
0 - 1"	293-330 / 293-340*	±.00005"
1" - 2"	293-331 / 293-341*	±.00005"
2" - 3"	293-332 / 293-342*	±.00005"
3" - 4"	293-333 / 293-343*	±.0001"
4" - 5"	293-350	±.0001"
5" - 6"	293-351	±.0001"
6" - 7"	293-352	±.00015"
7" - 8"	293-353	±.00015"
8" - 9"	293-354	±.00015"
9" - 10"	293-355	±.0002"
10" - 11"	293-356	±.0002"
11" - 12"	293-357	±.0002"

*without SPC data output

Inch/Metric _____ With ratchet thimble

Range	Order No.	Accuracy
0 - 1"	293-334 / 293-344*	±.00005"
1" - 2"	293-345*	±.00005"
2" - 3"	293-346*	±.00005"
3" - 4"	293-347*	±.0001"

*without SPC data output

Inch/Metric _____ With friction thimble

Range	Order No.	Accuracy
0 - 1"	293-335 / 293-348*	±.00005"
1" - 2"	293-336	±.00005"

*without SPC data output



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.001mm or .00005"/0.001mm
Flatness: 0.3μm
Parallelism: 2μm
Measuring faces: Carbide tipped
Display: LCD
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 3 years under normal use
(1 year for 15-30mm range model)

Function

Origin-set, Power ON/OFF, Data hold, Data output, Preset
(15-30mm range model), inch/mm conversion (inch/mm
models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

937387: SPC cable (1m)
965013: SPC cable (2m)

ABSOLUTE 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.
- Non-rotating spindle and the new ratchet friction thimble.
- Speedy spindle feed of 10mm/rev.
- With absolute linear scale.
- With SPC data output.
- With a standard bar to set the origin point (for models with 15 - 30mm range).



227-201

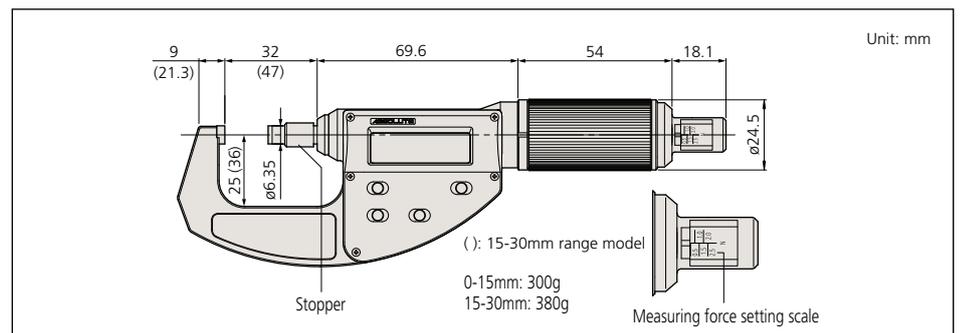
SPECIFICATION

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

Inch/Metric			
Range	Order No.	Accuracy	Measuring force
0 - .6"	227-211	±.0001"	0.5N - 2.5N
	227-212	±.0001"	2N - 10N
.6" - 1.2"	227-213	±.0001"	0.5N - 2.5N
	227-214	±.0001"	2N - 10N



DIMENSION AND MASS



Quickmike

SERIES 293 — IP-54 ABSOLUTE Digimatic Micrometers

The Quickmike 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.

FEATURES

- Non-rotating spindle and the new ratchet friction thimble.
- Speedy spindle feed of 10mm/rev.
- With absolute linear scale.
- IP54 dust/water protection (when not connected with data output cable).
- With SPC data output.
- With a standard bar to set the origin point (for models with a range over 30mm).



(Refer to the page 9 for details.)



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.001mm or .00005"/0.001mm
Flatness: 0.3µm
Parallelism: 2µm for models up to 80mm
3µm for models up to 105mm
Measuring faces: Carbide tipped
Display: LCD
Battery: SR44 (1 pc.), 938882
Battery life: Approx. 3 years under normal use
(1 year for models over 30mm)
Dust/Water protection level: IP54

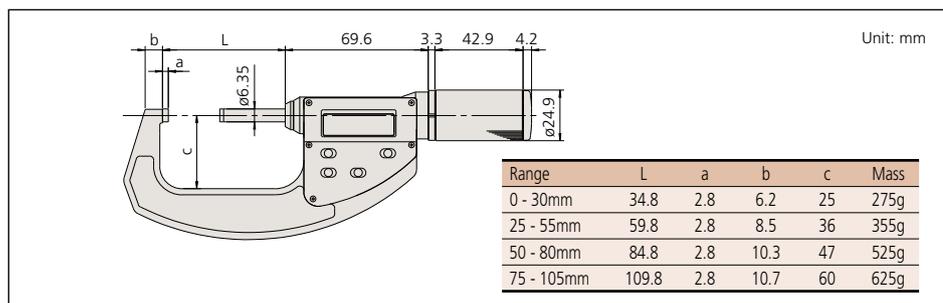
SPECIFICATION

Metric		
Range	Order No.	Accuracy
0 - 30mm	293-666	±2µm
	293-661-10*	±2µm
25 - 55mm	293-667	±2µm
50 - 80mm	293-668	±3µm
75 - 105mm	293-669	±3µm

Inch/Metric		
Range	Order No.	Accuracy
0 - 1.2"	293-676	±.0001"
1" - 2.2"	293-677	±.0001"
2" - 3.2"	293-678	±.00015"
3" - 4.2"	293-679	±.00015"

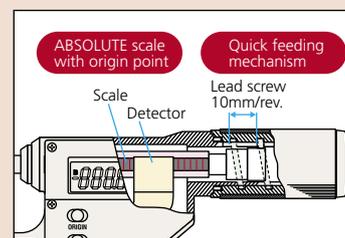
*Without SPC data output

DIMENSION AND MASS



Function

Origin-set, Zero-setting, Power ON/OFF, Data hold, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error



Optional Accessory

- 937387: SPC cable (1m)
- 965013: SPC cable (2m)

Outside Micrometers

SERIES 102

FEATURES

- Heat-insulated frame, tapered (on the anvil side) for hard-to-reach places.
- With a standard except for 25mm model.
- A ratchet stop or friction thimble for a constant measuring force.



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm, 0.001mm, .001" or .0001"
 Flatness: 0.6μm
 Parallelism: 2μm for 25mm model
 3μm for models up to 100mm
 Measuring faces: Carbide tipped

Ratchet stop type



Friction thimble type



SPECIFICATIONS

Metric With ratchet stop		
Range	Order No.	Accuracy
0 - 25mm	102-301	±2μm
	102-307*	±2μm
25 - 50mm	102-302	±2μm
	102-308*	±2μm
50 - 75mm	102-303	±2μm
75 - 100mm	102-304	±3μm

*0.001mm reading is obtained with vernier.

Inch With ratchet stop		
Range	Order No.	Accuracy
0 - 1"	102-321	±.0001"
	102-327*	±.0001"
1" - 2"	102-322	±.0001"
	102-328*	±.0001"
2" - 3"	102-323	±.0001"
3" - 4"	102-324	±.00015"

*.0001" reading is obtained with vernier.

Metric With friction thimble		
Range	Order No.	Accuracy
0 - 25mm	102-305	±2μm
	102-309*	±2μm
25 - 50mm	102-306	±2μm
	102-310	±2μm

*0.001mm reading is obtained with vernier.

Inch With friction thimble		
Range	Order No.	Accuracy
0 - 1"	102-325	±.0001"
	102-329*	±.0001"
1" - 2"	102-326	±.0001"
	102-330*	±.0001"

*.0001" reading is obtained with vernier.

Metric Micrometer set		
Range	Order No.	Assortment of micrometers
0 - 100mm (4 mikes/set)	102-911-01	<ul style="list-style-type: none"> • 102-701* • 102-302 • 102-303 • 102-304 • 3 micrometer standards

*Ratchet thimble micrometer.

DIMENSION

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.

Outside Micrometers

SERIES 103

FEATURES

- Hammertone-green, baked-enamel-finished frame.
- Ratchet Stop or Friction Thimble for exact repetitive readings.
- With a standard except for 25mm model.



103-137



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm, 0.001mm, .001" or .0001"
 Flatness: 0.6μm for models up to 300mm
 1μm for models over 300mm
 Parallelism: (2+R/100)μm, R = max. range (mm)
 *fraction rounded down
 Measuring faces: Carbide tipped

SPECIFICATIONS

Metric With ratchet stop

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

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

*0.001mm reading is obtained with vernier.

Metric With friction thimble

Range	Order No.	Accuracy
0 - 25mm	103-125	±2μm
	103-133*	±2μm
25 - 50mm	103-126	±2μm

*0.001mm reading is obtained with vernier.

Metric Micrometer set

Range	Order No.	Assortment of micrometers
0 - 75mm (3 pcs./set)	103-927-10	103-137, 103-138, 103-139-10, 2 micrometer standards
0 - 150mm (6 pcs./set)	103-913-31	102-701*, 103-138, 103-139-10, 103-140-10, 103-141-10, 103-142-10, 5 micrometer standards
150 - 300mm (6 pcs./set)	103-915-10	103-143-10, 103-144-10, 103-145-10, 103-146-10, 103-147-10, 103-148-10, 6 micrometer standards
0 - 300mm (12 pcs./set)	103-914-31	All micrometers of 103-913-31 and 103-915-10 in one set, 11 micrometer standards

*Ratchet thimble micrometer

Inch With ratchet stop

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

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

*.0001" reading is obtained with vernier.

Inch With friction thimble

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

*.0001" reading is obtained with vernier.

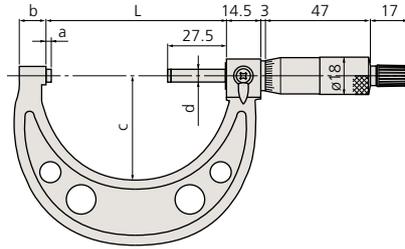
Inch Micrometer set

Range	Order No.	Assortment of micrometers
0 - 3" (3 pcs./set)	103-929	103-177, 103-178, 103-179, 2 micrometer standards
0 - 4" (4 pcs./set)	103-930	103-177, 103-178, 103-179, 103-180, 3 micrometer standards
0 - 6" (6 pcs./set)	103-904-01	101-711*, 101-106, 103-179, 103-180, 103-181, 103-182, 5 micrometer standards
6" - 12" (6 pcs./set)	103-906	103-183, 103-184, 103-185, 103-186, 103-187, 103-188, 6 micrometer standards
0 - 12" (12 pcs./set)	103-905-01	All micrometers of 103-904-01 and 103-906 in one set, 11 micrometer standards

*Ratchet thimble micrometer

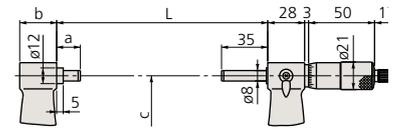
DIMENSION AND MASS

Models up to 300mm



Range	L	a	b	c	d
0 - 25mm	30.3	2.8	9	28	ø6.35
25 - 50mm	55.3	2.8	10	38	ø6.35
50 - 75mm	80.3	2.8	12	49	ø6.35
75 - 100mm	105.3	2.8	14	60	ø6.35
100 - 125mm	132.8	5.3	17	79	ø6.35
125 - 150mm	158.2	5.7	19	94	ø6.35
150 - 175mm	183.6	6.1	20	106	ø6.35
175 - 200mm	208.8	6.3	19	118	ø6.35
200 - 225mm	234.2	6.7	18	130	ø6.35

Models over 300mm



Range	L	a	b	c	d
225 - 250mm	258	5.5	18	143	ø6.35
250 - 275mm	284	6.5	18	156	ø6.35
275 - 300mm	309	6.5	18	169	ø6.35
300 - 325mm	353	18	28	187	ø8
325 - 350mm	378	18	28	199	ø8
350 - 375mm	403	18	28	212	ø8
375 - 400mm	428	18	28	224	ø8
400 - 425mm	453	18	28	236	ø8
425 - 450mm	478	18	28	248	ø8
450 - 475mm	503	18	28	261	ø8
475 - 500mm	528	18	28	273	ø8

Outside Micrometers

SERIES 101

FEATURES

- Satin-chrome-finished frame, tapered (on the anvil side) for hard-to-reach places.
- With a standard except for .5"/1" models.



SPECIFICATIONS

Metric With ratchet stop

Range	Order No.	Accuracy
0 - 15mm	101-101	±2μm
	101-227*	±2μm

*0.001mm reading is obtained with vernier.

Inch With ratchet stop

Range	Order No.	Accuracy
0 - 1"	101-105	±.0001"
	101-113*	±.0001"
1" - 2"	101-106	±.0001"
	101-114*	±.0001"
2" - 3"	101-119*	±.0001"
3" - 4"	101-120*	±.00015"

*.0001" reading is obtained with vernier.

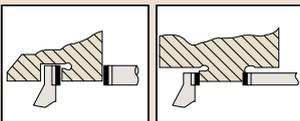
Inch With friction thimble

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

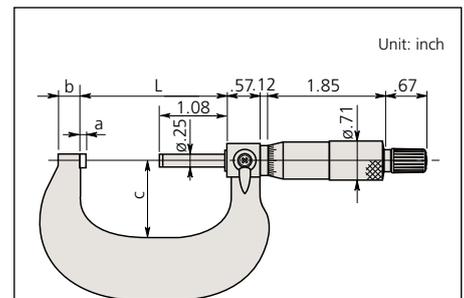
*.0001" reading is obtained with vernier.

Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm, 0.001mm, .001" or .0001"
 Flatness: 0.6μm
 Parallelism: 1.3μm (.00005") for models up to 15mm
 .00008" for models up to 3"
 .00012" for models over 3"
 Measuring faces: Carbide tipped



DIMENSION



Range	L	a	b	c
0 - 1"	1.18	.10	.20	1.10
1 - 2"	2.16	.08	.31	1.28
2 - 3"	3.19	.11	.33	1.77
3 - 4"	4.19	.11	.33	2.28

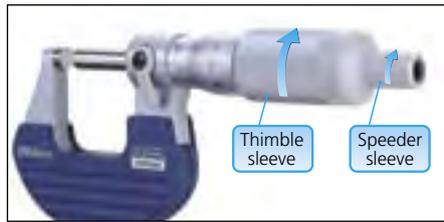
Note: The shape of the thimble changes on the model with friction thimble.

Ratchet Thimble Micrometer

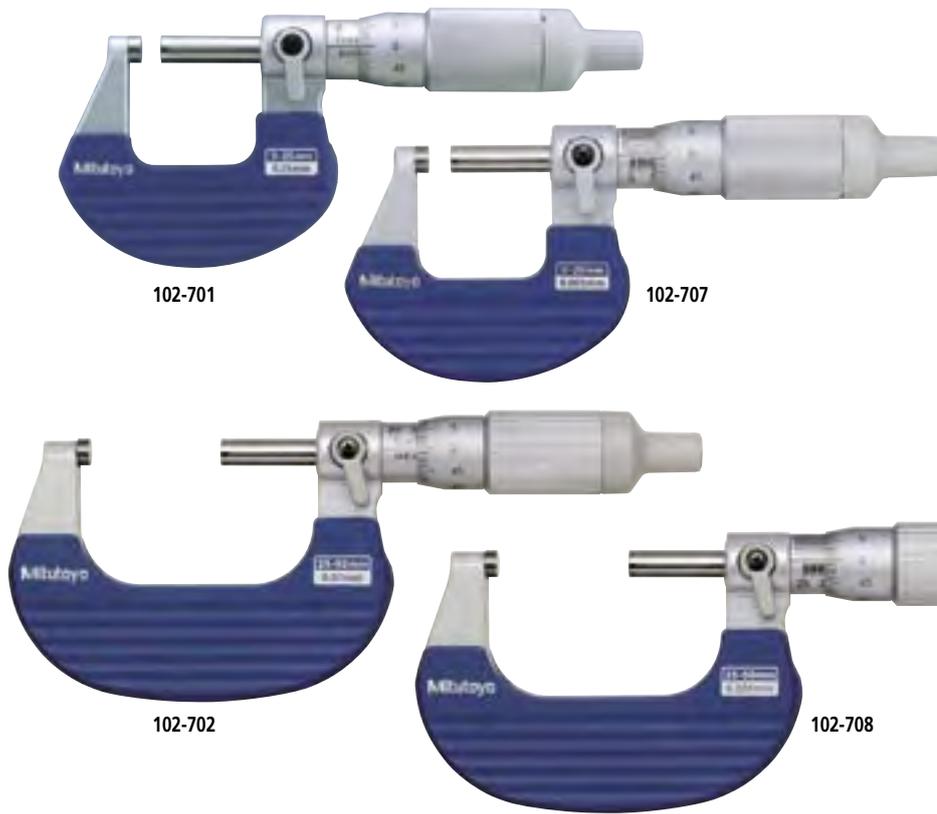
SERIES 101, 102 — New smoother action Ratchet Thimble

FEATURES

- Ratchet function works both from the thimble and the speeder, allowing easy one-handed operation.
- Clearly audible ratchet operation for reassurance that measurement is being performed at constant, preset force.
- Provided with a Certificate of Inspection.

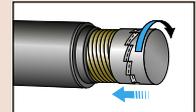


(Refer to the page 9 for details.)

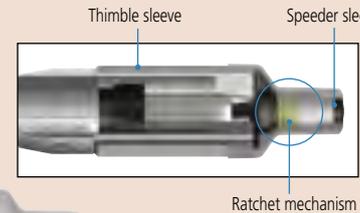


Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm, 0.001mm, .001" or .0001"
 Flatness: 0.6µm
 Parallelism: 2µm
 Measuring faces: Carbide tipped
 Measuring force: 5 - 10N



Rotating the thimble/speeder sleeve when the workpiece is between the anvil and spindle causes the ratchet mechanism to tap the spindle and apply a constant measuring force to the workpiece.



SPECIFICATIONS

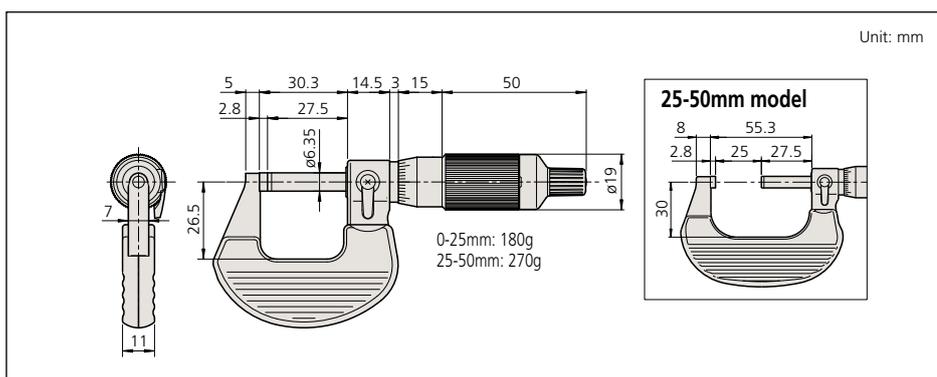
Metric		
Range	Order No.	Accuracy
0 - 25mm	102-701	±2µm
	102-707*	±2µm
25 - 50mm	102-702	±2µm
	102-708*	±2µm

*0.001mm reading is obtained with vernier.

Inch		
Range	Order No.	Accuracy
0 - 1"	101-711	±.0001"
	101-717*	±.0001"
0 - 1"	102-711	±.0001"
	102-717	±.0001"
1 - 2"	102-712	±.0001"
	102-718*	±.0001"

*.0001" reading is obtained with vernier.
 101-711/101-717: Stain-chrome-finished frame model

DIMENSION AND MASS





Outside Micrometers

SERIES 406, 106 — Non-Rotating Spindle Type

FEATURES

- Easy-to-read with large vernier on the thimble (series 106).
- With a standard except for 25mm model.
- With SPC output (series 406).

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.001mm or .0001"
Flatness: 0.3μm
Parallelism: 3μm for models up to 75mm*
4μm for models over 75mm*
1.6μm for models up to 50mm**
2μm for models over 50mm**
Measuring faces: Carbide tipped
Display*: LCD
Battery*: SR44 (1 pc.), 938882
Battery life*: Approx. 1.2 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data hold, Data output, inch/mm conversion (inch/mm models), Automatic power ON/OFF
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

05CZA662: SPC cable with data switch (1m)
05CZA663: SPC cable with data switch (2m)



406-250



106-101

SPECIFICATIONS

Metric Digital model with ratchet stop		
Range	Order No.	Accuracy
0 - 25mm	406-250	±3μm
25 - 50mm	406-251	±3μm
50 - 75mm	406-252	±3μm
75 - 100mm	406-253	±4μm

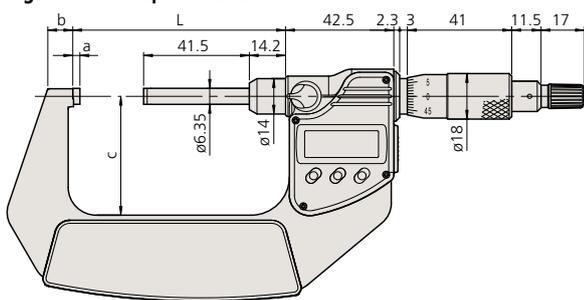
Metric With ratchet thimble		
Range	Order No.	Accuracy
0 - 25mm	106-101	±2μm
25 - 50mm	106-103	±2μm
50 - 75mm	106-105	±3μm
75 - 100mm	106-106	±3μm

Inch/Metric Digital model with ratchet stop		
Range	Order No.	Accuracy
0 - 1"	406-350	±.00015"
1" - 2"	406-351	±.00015"
2" - 3"	406-352	±.00015"
3" - 4"	406-353	±.0002"

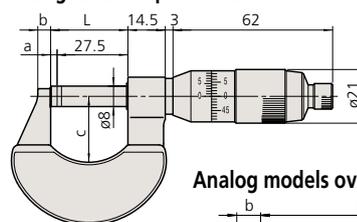
Inch With friction thimble		
Range	Order No.	Accuracy
0 - 1"	106-102	±.0001"
1" - 2"	106-104	±.0001"

DIMENSION

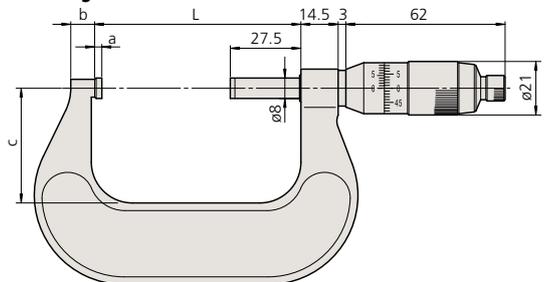
Digital models up to 75mm



Analog models up to 50mm

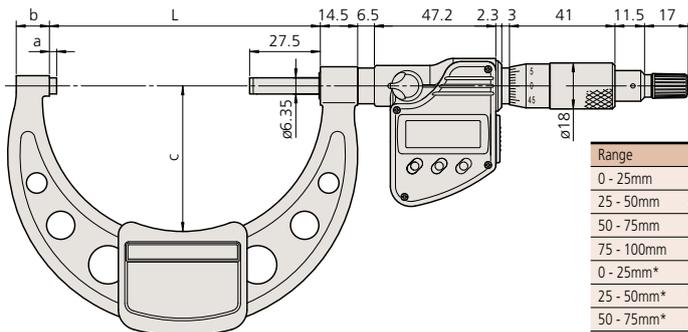


Analog models over 50mm



Unit: mm

Digital models over 75mm



Range	L	a	b	c
0 - 25mm	58.2	2.5	7.3	32
25 - 50mm	83.2	2.5	10.1	47
50 - 75mm	108.2	2.5	11.5	60
75 - 100mm	105.3	2.8	14.1	57
0 - 25mm*	30	2.5	5	25.8
25 - 50mm*	55	2.5	8	32.3
50 - 75mm*	80.3	2.8	10.3	45
75 - 100mm*	105.3	2.8	10.7	58

*Analog model

Quick-Setting Outside Micrometers

SERIES 293,102

FEATURES

- 1mm spindle thread pitch for quick setting.
- The measurement can be read directly from the thimble due to the 100 step graduation.
- With Ratchet Thimble or Ratchet Stop for constant force.
- With a standard except for 25mm model.
- With SPC output (series 293).



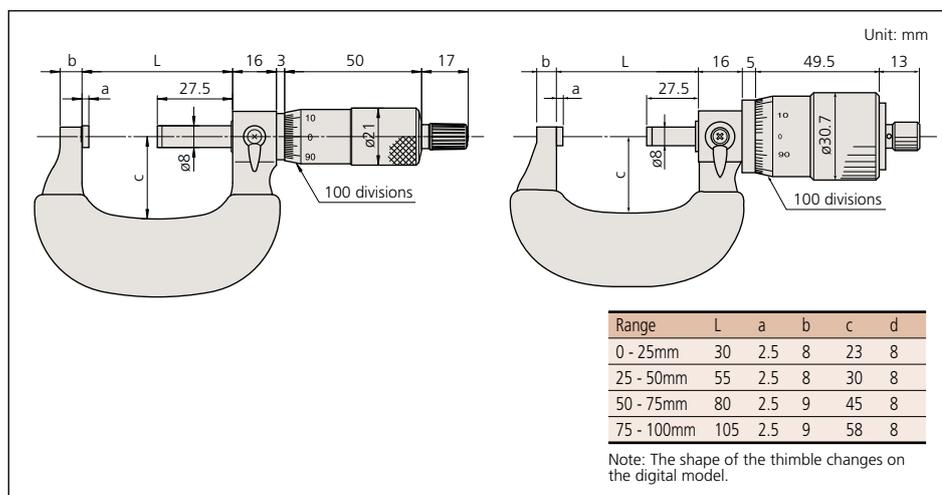
SPECIFICATIONS

Metric Digital model with ratchet stop		
Range	Order No.	Accuracy
0 - 25mm	293-151-30	±1μm
25 - 50mm	293-152-30	±1μm
50 - 75mm	293-153-30	±1μm
75 - 100mm	293-154-30	±2μm

Metric With ratchet thimble		
Range	Order No.	Accuracy
0 - 25mm	102-650	±2μm
25 - 50mm	102-651	±2μm
50 - 75mm	102-652	±2μm
75 - 100mm	102-653	±3μm

Metric With ratchet stop		
Range	Order No.	Accuracy
0 - 25mm	102-450	±2μm
25 - 50mm	102-451	±2μm

DIMENSION



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm
Graduation**: 0.01mm
Flatness: 0.6μm
Parallelism: 1μm (digital), 2μm (analog)
Measuring faces: Carbide tipped
Display*: LCD
Battery*: SR44 (1pc.), **938882**
Battery life*: Approx. 1.2 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data hold, Data output
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

937387: SPC cable (1m)
965013: SPC cable (2m)



(Refer to the page 9 for details.)

Technical Data

- Accuracy: $\pm(4+R/75)\mu\text{m}$, R = max. range (mm) (excluding quantizing error for digital models) *fraction rounded up
- Resolution*: 0.001mm or .0001"/0.001mm (.00005"/0.001mm: **340-351**)
- Graduation***: 0.01mm
- Flatness: 0.6 μm for models up to 300mm
1 μm for models over 300mm
- Parallelism: 2 μm for models up to 75mm
3 μm for models up to 150mm
(2+R/100) μm for models over 150mm, R = max. range (mm) *fraction rounded up
- Measuring faces: Carbide tipped
- Display*: LCD
- Battery*: SR44 (2 pc.), **938882** (1 pc.: **340-251, 252, 340-351, 352**)
- Battery life*: Approx. 1.8 years under normal use (8 months for **340-251, 252, 340-351, 352**)
- Dust/Water protection level*: IP65
- *Digital models **Analog models

Function of Digital Model

- Zero-setting, Data hold, Preset, Power ON/OFF*, Data output, inch/mm conversion (inch/mm models)
- *Not available for **340-251, 252, 340-351, 352**
- Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662**: SPC cable with data switch (1m)
- 05CZA663**: SPC cable with data switch (2m)



Outside Micrometers

SERIES 340, 104 — with Interchangeable Anvils

FEATURES

- IP65 water/dust protection (340 series*).
*Models with a range up to 300mm.
- Wide measuring range with interchangeable anvils.
- With a Ratchet Stop for constant force.
- Supplied with zero-setting standards for each range.
- With SPC output (series 340).

Digital model



SPECIFICATIONS

Metric	Digital model	
Range	Order No.	Interchangeable anvils
0 - 150mm	340-251	0, 25, 50, 75, 100, 125mm
150 - 300mm	340-252	0, 25, 50, 75, 100, 125mm
300 - 400mm	340-513	0, 25, 50, 75mm
400 - 500mm	340-514	0, 25, 50, 75mm
500 - 600mm	340-515	0, 25, 50, 75mm
600 - 700mm	340-516	0, 25, 50, 75mm
700 - 800mm	340-517	0, 25, 50, 75mm
800 - 900mm	340-518	0, 25, 50, 75mm
900 - 1000mm	340-519	0, 25, 50, 75mm

Inch/Metric	Digital model	
Range	Order No.	Interchangeable anvils
0 - 6"	340-351	0, 1", 2", 3", 4", 5"
6" - 12"	340-352	0, 1", 2", 3", 4", 5"
12" - 18"	340-713	0, 1", 2", 3", 4", 5"
18" - 24"	340-714	0, 1", 2", 3", 4", 5"
24" - 30"	340-715	0, 1", 2", 3", 4", 5"
30" - 36"	340-716	0, 1", 2", 3", 4", 5"

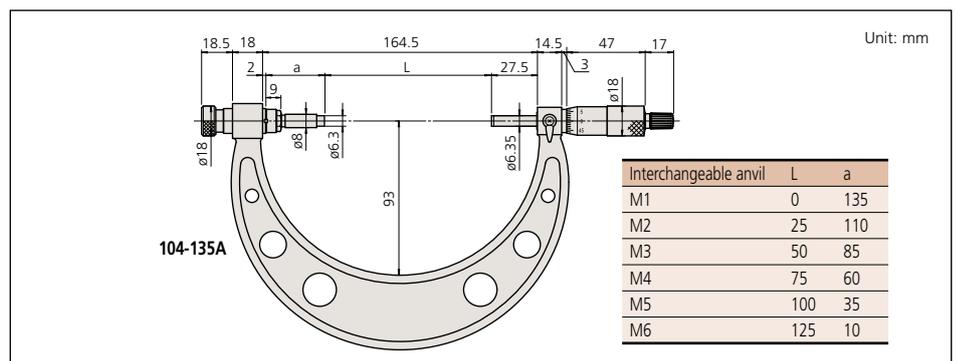
Metric		
Range	Order No.	Interchangeable anvils
0 - 50mm	104-171*	0, 25mm
0 - 100mm	104-139A	0, 25, 50, 75mm
0 - 150mm	104-135A	0, 25, 50, 75, 100, 125mm
50 - 150mm	104-161A	0, 25, 50, 75mm
100 - 200mm	104-140A	0, 25, 50, 75mm
150 - 300mm	104-136A	0, 25, 50, 75, 100, 125mm
200 - 300mm	104-141A	0, 25, 50, 75mm
300 - 400mm	104-142A	0, 25, 50, 75mm
400 - 500mm	104-143A	0, 25, 50, 75mm
500 - 600mm	104-144A	0, 25, 50, 75mm
600 - 700mm	104-145A	0, 25, 50, 75mm
700 - 800mm	104-146A	0, 25, 50, 75mm
800 - 900mm	104-147A	0, 25, 50, 75mm
900 - 1000mm	104-148A	0, 25, 50, 75mm

Inch		
Range	Order No.	Interchangeable anvils
0 - 2"	104-165*	0, 1"
0 - 4"	104-149	0, 1", 2", 3"
0 - 6"	104-137	0, 1", 2", 3", 4", 5"
2 - 6"	104-162	0, 1", 2", 3"
4 - 8"	104-150	0, 1", 2", 3"
8 - 12"	104-151	0, 1", 2", 3"
6" - 12"	104-138	0, 1", 2", 3", 4", 5"
12" - 18"	104-201	0, 1", 2", 3", 4", 5"
18" - 24"	104-202	0, 1", 2", 3", 4", 5"
24" - 30"	104-203	0, 1", 2", 3", 4", 5"
30" - 36"	104-204	0, 1", 2", 3", 4", 5"
36" - 42"	104-205	0, 1", 2", 3", 4", 5"

*.0001" reading is obtained with vernier.

*The frame in a heat insulating cover

DIMENSION



Outside Micrometers

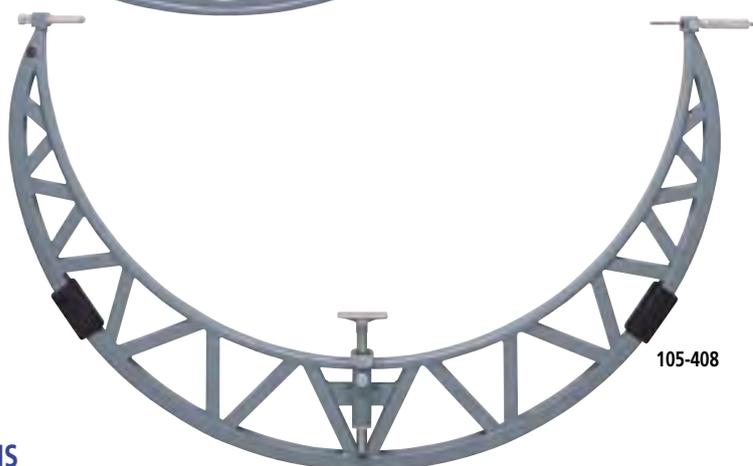
SERIES 105 — with Extension Anvil Collars

FEATURES

- Wide measuring range with extension anvil collars.
- 50mm spindle stroke.
- 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).



105-105



105-408

SPECIFICATIONS

Metric

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

Technical Data

Accuracy: $\pm(6+R/75)\mu\text{m}$, R = max. range (mm)
*fraction rounded up

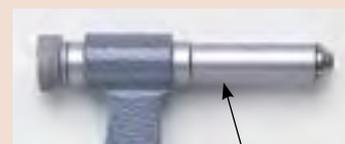
Graduation: 0.01mm

Flatness: 1.3 μm

Parallelism: $(2+R/100)\mu\text{m}$, R = max. range (mm)
*fraction rounded down

Measuring faces: Carbide tipped

Extension anvil collar



Anvil collar



Outside Micrometers

SERIES 107

FEATURES

- With dial indicator for direct GO/NG-GO judgment for mass-produced parts.
- Anvil retracting trigger for quick measurement.
- With a standard except for 25mm model.



Technical Data

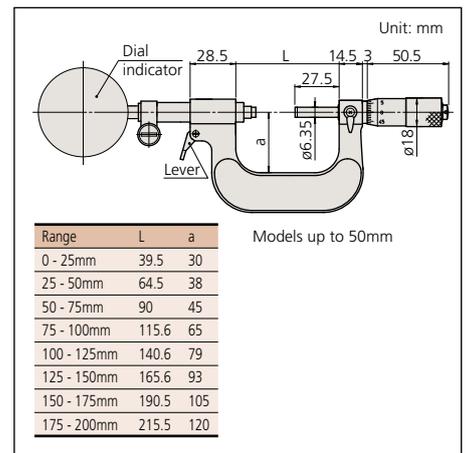
Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm (thimble)
 Flatness: 0.6μm
 Parallelism: (2+R/100)μm, R = max. range (mm)
 Measuring faces: Carbide tipped



SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 25mm	107-201	±2μm
25 - 50mm	107-202	±2μm
50 - 75mm	107-203	±2μm
75 - 100mm	107-204	±3μm
100 - 125mm	107-205	±3μm
125 - 150mm	107-206	±3μm
150 - 175mm	107-207	±4μm
175 - 200mm	107-208	±4μm

DIMENSION



Technical Data

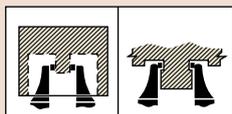
Accuracy: Refer to the list of specifications.
 (excluding quantizing error for digital models)
 Resolution*: 0.001mm or .00005"/0.001mm
 Graduation***: 0.01mm
 Flatness: 0.3μm
 Parallelism: (3+R/75)μm, R = max. range (mm)
 *Fraction rounded down
 Measuring faces: Carbide tipped
 Display*: LCD
 Battery*: SR44 (1 pc.), 938882
 Battery life*: Approx. 1.2 years under normal use
 *Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Automatic power ON/OFF, Data hold, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662: SPC cable with data switch (1m)
- 05CZA663: SPC cable with data switch (2m)



Caliper Type Micrometers

SERIES 343, 143

FEATURES

- With Ratchet Stop for constant force.
- With SPC output (series 343).



SPECIFICATIONS

Metric			Digital model
Range	Order No.	Accuracy	
0 - 25mm	343-250	±5μm	
25 - 50mm	343-251	±6μm	
50 - 75mm	343-252	±7μm	
75 - 100mm	343-253	±8μm	

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

Models with a range up to 300mm are available.

Inch/Metric			Digital model
Range	Order No.	Accuracy	
0 - 1"	343-350	±.00025"	
1" - 2"	343-351	±.0003"	
2" - 3"	343-352	±.00035"	
3" - 4"	343-353	±.0004"	

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

Models with a range up to 3" are available.

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.



125-103

SPECIFICATIONS

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

Technical Data

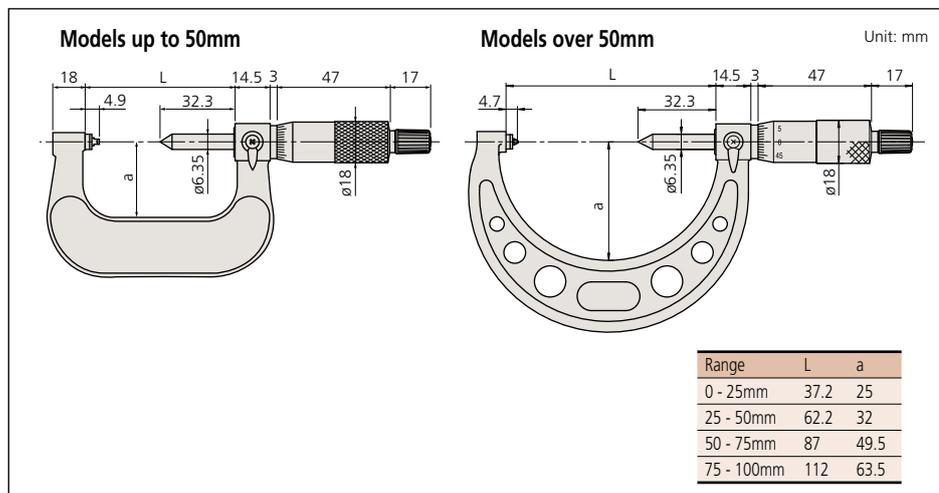
Accuracy: $\pm(2+R/75)\mu\text{m}$, R = max. range (mm)
*fraction rounded up

Graduation: 0.01mm

Spindle feed error: 3μm



DIMENSION





(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm or .001"
Spindle feed error: 3µm
Display*: LCD
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 8 months under normal use
Dust/Water protection level*: IP65
*Digital models **Analog models

Function of Digital Model

Zero-setting, Data hold, Automatic power ON/OFF, Data output, Preset, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

05CZA662: SPC cable with data switch (1m)*

05CZA663: SPC cable with data switch (2m)*

*Only for digital models

(See page 69.): Standard for screw thread micrometer

Anvil-spindle tip set:

For Metric/Unified screws (60° threads)

Order No.	Assortment of anvil-spindle tips
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)

For Whitworth screws (55° threads)

Order No.	Assortment of anvil-spindle tips
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)



Screw Thread Micrometers

SERIES 326, 126 — Interchangeable Anvil-Spindle Tip Type

FEATURES

- IP65 water/dust protection (326 series).
- 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.
- With Ratchet Stop for constant force.
- With SPC output (series 326).



326-251



126-125

SPECIFICATIONS

Metric	Digital model	
Range	Order No.	Accuracy
0 - 25mm	326-251	±4µm
25 - 50mm	326-252	±4µm
50 - 75mm	326-253	±4µm
75 - 100mm	326-254	±5µm

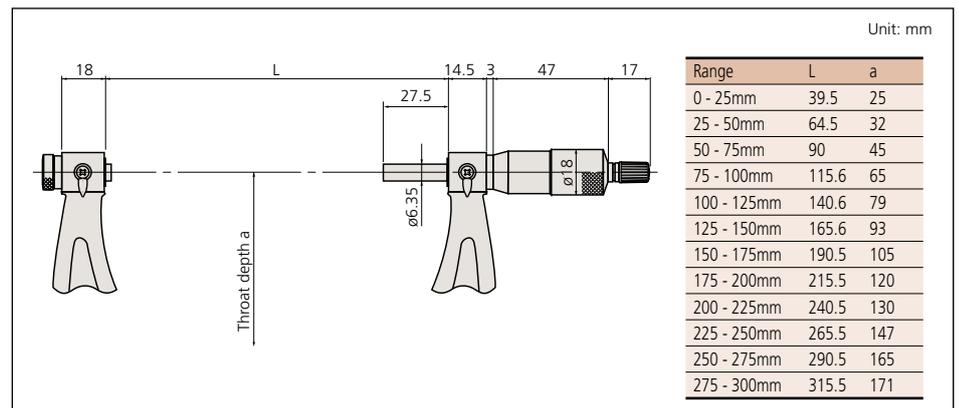
Metric		
Range	Order No.	Accuracy
0 - 25mm	126-125	±4µm
25 - 50mm	126-126	±4µm
50 - 75mm	126-127	±4µm
75 - 100mm	126-128	±5µm
100 - 125mm	126-129	±5µm
125 - 150mm	126-130	±5µm
150 - 175mm	126-131	±6µm
175 - 200mm	126-132	±6µm
200 - 225mm	126-133	±6µm
225 - 250mm	126-134	±7µm
250 - 275mm	126-135	±7µm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

Inch/Metric	Digital model	
Range	Order No.	Accuracy
0 - 1"	326-351	±.0002"
1" - 2"	326-352	±.0002"
2" - 3"	326-353	±.0002"
3" - 4"	326-354	±.00025"

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

(Models with a range up to 7" are available.)

DIMENSION



Universal Micrometers

SERIES 116 — Interchangeable Anvil Type

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.



116-101

SPECIFICATIONS

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

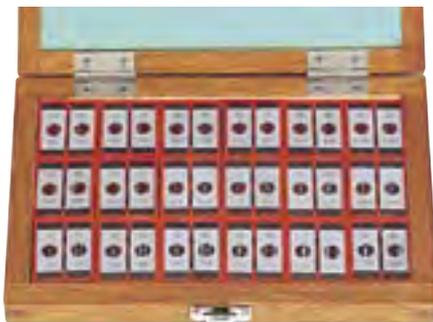
Inch		
Range	Order No.	Accuracy
0 - 1"	116-105	±.0002"
1" - 2"	116-106	±.0002"

3-Wire Units

SERIES 313

FEATURES

- Facilitates measurement of the pitch diameter of screw threads with a standard micrometer.
- 18 sizes of wires are assorted in a set.



313-101

SPECIFICATIONS

Application	Order No.	Assortment of wire units
ø6.35mm (.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 (.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 Data

Accuracy: Refer to the list of specifications.
Graduation: 0.01mm or .001"
Spindle feed error: 3μm

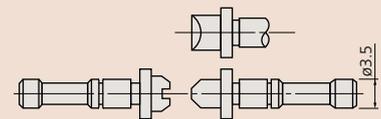
Optional Accessory

Interchangeable V-anvil and conical spindle tip set:
For Metric/Unified screw

Order No.	Assortment of anvils and tips
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)

For Whitworth screw

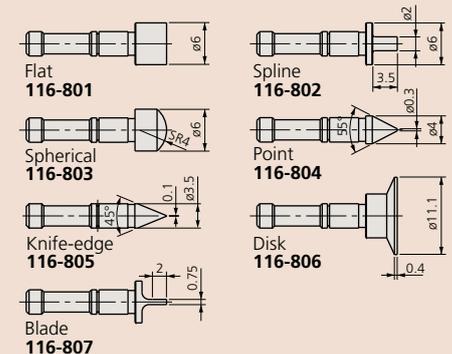
Order No.	Assortment of anvils and tip
116-840	60 - 48TPI (116-841) 48 - 40TPI (116-842) 40 - 32TPI (116-843) 32 - 24TPI (116-844) 24 - 18TPI (116-845) 18 - 14TPI (116-846) 14 - 10TPI (116-847) 10 - 7TPI (116-848) 7 - 4.5TPI (116-849) 4.5 - 3.5TPI (116-850)



116-830

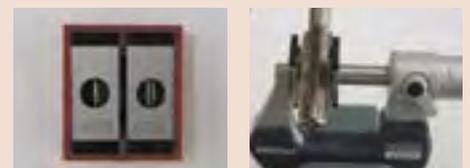
Interchangeable anvils set

Order No.	Assortment of anvils
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)



Technical Data

Roundness of wire: within 0.5μm
Cylindricity of wire: within 1μm
Hardness of wire: 63-66 HRC
Accuracy of wire diameter: ±2μm





(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation***: 0.01mm
Display*: LCD
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 8 months under normal use
Dust/Water protection level*: IP65
*Digital models **Analog models

Function of Digital Model

Zero-setting, Data hold, Automatic power ON/OFF, Data output, Preset, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

05CZA662: SPC cable with data switch (1m)*
05CZA663: SPC cable with data switch (2m)*
*Only for digital models

Interchangeable ball anvil-spindle tip set:

Diameter	Order No.	Gear module	Dia. 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 type



Gear Tooth Micrometers

SERIES 324, 124 — Interchangeable Ball Anvil-Spindle Tip Type

FEATURES

- IP65 water/dust protection (324 series).
- Measures over-pin diameter of gears with precision steel (carbide) ball-tipped measuring faces.
- Interchangeable ball anvil-spindle tips for various gear modules (0.5 - 5.25) are optional.
- With Ratchet Stop for constant force.
- With SPC output (series 324).



SPECIFICATIONS

Metric	Digital model	
Range	Order No.	Accuracy
0 - 25mm	324-251	±4μm
25 - 50mm	324-252	±4μm
50 - 75mm	324-253	±4μm
75 - 100mm	324-254	±5μm

Inch/Metric	Digital model	
Range	Order No.	Accuracy
0 - 1"	324-351	±.0002"
1" - 2"	324-352	±.0002"
2" - 3"	324-353	±.0002"
3" - 4"	324-354	±.00025"

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

DIMENSION

(): 275-300mm model

Range	L	a
0 - 25mm	64.5	32
25 - 50mm	90	45
50 - 75mm	115.6	65
75 - 100mm	140.6	79
100 - 125mm	165.6	93
125 - 150mm	190.5	105
150 - 175mm	215.5	120
175 - 200mm	240.5	130
200 - 225mm	265.5	147
225 - 250mm	290.5	165
250 - 275mm	315.5	171
275 - 300mm	353	187

Disk Micrometers

SERIES 323, 223, 123

FEATURES

- Diameter of measuring disk: 20mm (30mm: models over 100mm)
- 0.7mm (1mm: models over 100mm) edge thickness to enter narrow recesses.
- With Ratchet Stop for constant force.
- With a standard except for 25mm model.
- With SPC output (series 323).
- The 223 series is provided with a mechanical digit counter for quick reading of measurements.



SPECIFICATIONS

Metric Digital model		
Range	Order No.	Accuracy
0 - 25mm	323-250	±4µm
25 - 50mm	323-251	±4µm
50 - 75mm	323-252	±6µm
75 - 100mm	323-253	±6µm

Metric Mechanical counter model		
Range	Order No.	Accuracy
0 - 25mm	223-101	±4µm
25 - 50mm	223-102	±4µm

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

*The measuring disks have carbide tips.

Inch/Metric Digital model		
Range	Order No.	Accuracy
0 - 1"	323-350	±.0002"
1" - 2"	323-351	±.0002"
2" - 3"	323-352	±.0003"
3" - 4"	323-353	±.0003"

Inch Mechanical counter model		
Range	Order No.	Accuracy
0 - 1"	223-125	±.0002"

Inch		
Range	Order No.	Accuracy
0 - 1"	123-125	±.0002"
1" - 2"	123-126	±.0002"
2" - 3"	123-127	±.0003"
3" - 4"	123-128	±.0003"



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)
 Resolution*: 0.001mm or .00005"/0.001mm
 Graduation**: 0.01mm or .001"
 Flatness: 1µm for models up to 100mm
 1.6µm for models over 100mm
 Parallelism: 4µm for models up to 50mm
 (4+R/50)µm for models up to 100mm
 (5+R/75)µm for models over 100mm,
 R = max. range (mm) *Fraction rounded up
 Measurable module: 0.5 - 6 (0.7 - 11: models over 100mm)
 Display*: LCD
 Battery*: SR44 (1 pc.), **938882**
 Battery life*: Approx. 1.2 years under normal use
 *Digital models **Analog models

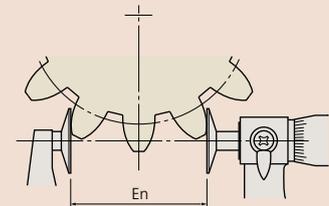
Function of Digital Model

Origin-set, Zero-setting, Data hold, Data output, inch/mm conversion (inch/mm models), Automatic power ON/OFF
 Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662**: SPC cable with data switch (1m)
- 05CZA663**: SPC cable with data switch (2m)

Root tangent length of gear (En)



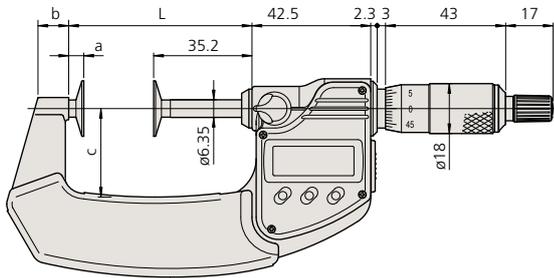
Note: Root tangent length measurement is not available for some types gears.



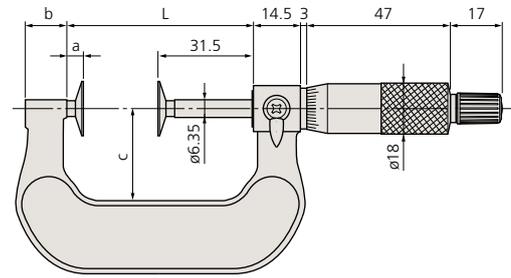
DIMENSION

Unit: mm

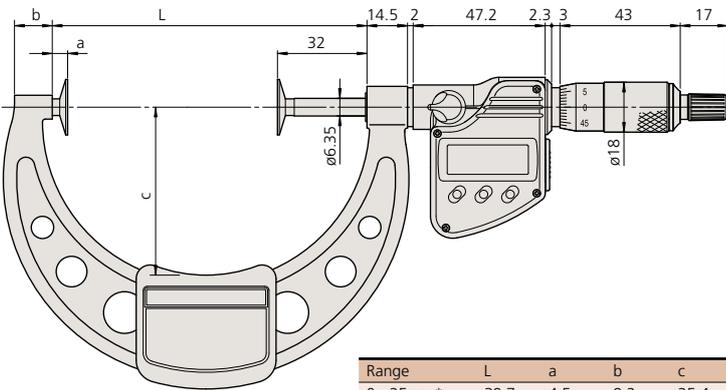
Digital models up to 75mm



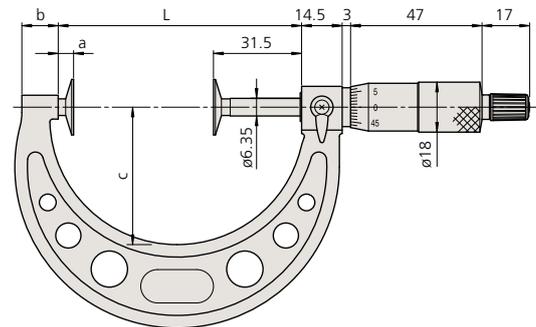
Analog models up to 50mm



Digital models up to 75mm

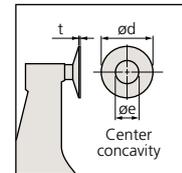


Analog over 50mm



Range	L	a	b	c	d	e	t
0 - 25mm*	39.7	4.5	9.2	25.4	20	8	0.7
25 - 50mm*	65.6	5.4	11	31.9	20	8	0.7
50 - 75mm*	90.7	5.5	12.2	50	20	8	0.7
75 - 100mm*	112.5	5.5	13.5	60.5	20	8	0.7
0 - 25mm	37.5	6	14	25	20	8 (9.8)	0.7 (0.7)
25 - 50mm	62.5	6	14	32	20	8 (9.8)	0.7 (0.7)
50 - 75mm	87	5.5	11	49	20	8 (9.8)	0.7 (0.7)
75 - 100mm	112	5.5	11	63	20	8 (9.8)	0.7 (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. *Digital models

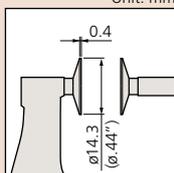


Technical Data

Accuracy: Refer to the list of specifications
 Graduation: 0.01mm or .001"
 Flatness: 1µm
 Parallelism: 3µm



Unit: mm



(): Inch model

Paper Thickness Micrometers

SERIES 169 — Non-Rotating Spindle Type Designed for Paper Thickness Measurement

FEATURES

- Non-rotating spindle.
- With Ratchet Stop for constant force.

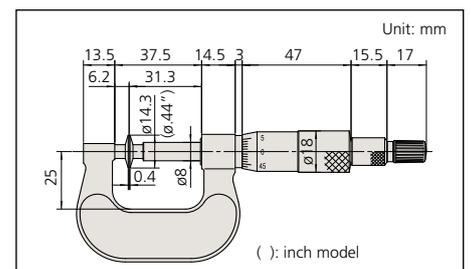


169-101

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 25mm	169-101	±4µm

DIMENSION



Unit: mm

(): inch model

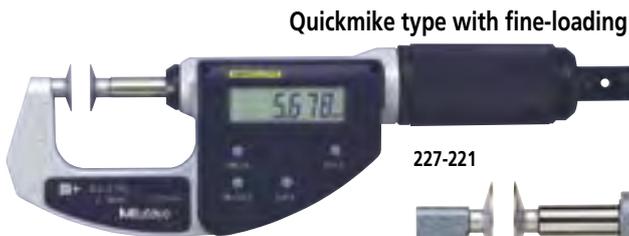
Inch		
Range	Order No.	Accuracy
0 - 1"	169-103	±.0002"

Disk Micrometers

SERIES 369, 227, 169 — Non-Rotating Spindle Type

FEATURES

- The Disk Micrometer is designed to easily measure root tangent length of spur gears and herical gears.
- Non-rotating spindle eliminates torque on workpiece.
- Speedy spindle feed of 10mm/rev. (Quickmike type).
- Diameter of measuring disk: 20mm
- With Ratchet Stop for constant force.
- With SPC output (series 369).



ABSOLUTE
Model System Powered by METRO

IP54

ABSOLUTE
Model System Powered by METRO



Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)
 Resolution*: 0.001mm or .00005"/0.001mm
 Graduation**: 0.01mm or .001"
 Flatness: 1µm
 Parallelism: 4µm for models up to 50mm
 6µm for models over 50mm
 (3µm: Quickmike type with fine-loading)
 Measurable module: 0.5-6,
 (0.4 - 3: Quickmike type with fine-loading)
 Display*: LCD
 Battery*: SR44 (1 pc.), **938882**
 Battery life*: Approx. 1.2 years under normal use
 (1 year: Quickmike type, 3 years: Quickmike type with fine-loading)
 Series 227: Refer to the page 27 for more information.
 *Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data hold, Automatic power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662**: SPC cable with data switch (1m)
- 05CZA663**: SPC cable with data switch (2m)
- 937387**: SPC cable for Quickmike type (1m)
- 965013**: SPC cable for Quickmike type (2m)

SPECIFICATIONS

Metric — Digital model		
Range	Order No.	Accuracy
0 - 25mm	369-250	±4µm
25 - 50mm	369-251	±4µm
50 - 75mm	369-252	±6µm
75 - 100mm	369-253	±6µm

Inch/Metric — Digital model		
Range	Order No.	Accuracy
0 - 1"	369-350	±.0002"
1" - 2"	369-351	±.0002"
2" - 3"	369-352	±.0003"
3" - 4"	369-353	±.0003"

Metric — Quickmike type		
Range	Order No.	Accuracy
0 - 30mm	369-411	±4µm
25 - 55mm	369-412	±4µm

Inch/Metric — Quickmike type		
Range	Order No.	Accuracy
0 - 1.2"	369-421	±.0002"
1" - 2.2"	369-422	±.0002"

Metric — Quickmike type with fine-loading			
Range	Order No.	Accuracy	Measuring force
0 - 15mm	227-221	±4µm	0.5N - 2.5N
	227-222	±4µm	2N - 10N

Inch/Metric — Quickmike type with fine-loading			
Range	Order No.	Accuracy	Measuring force
0 - .6"	227-231	±.0002"	0.5N - 2.5N
	227-232	±.0002"	2N - 10N

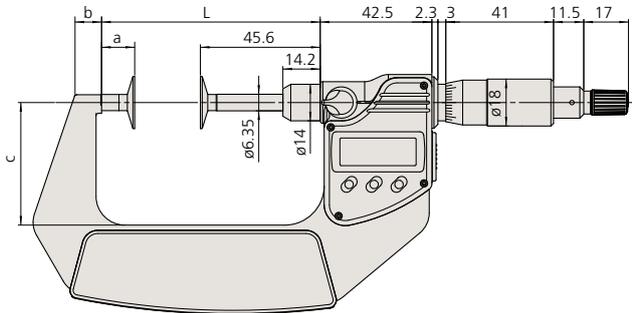
Metric —		
Range	Order No.	Accuracy
0 - 25mm	169-201	±4µm
25 - 50mm	169-202	±4µm
50 - 75mm	169-205	±6µm
75 - 100mm	169-207	±6µm

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

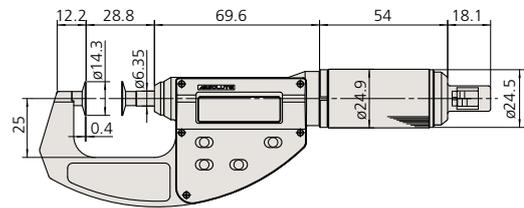
DIMENSION

Unit: mm

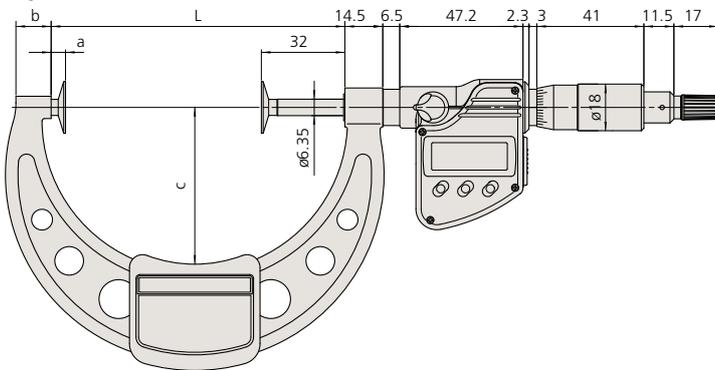
Digital models up to 75mm



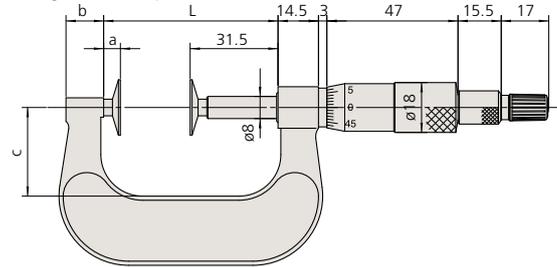
Fine-loading type



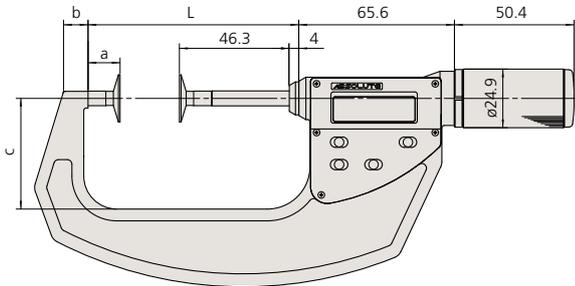
Digital models over 75mm



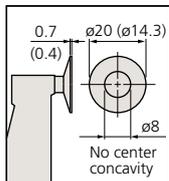
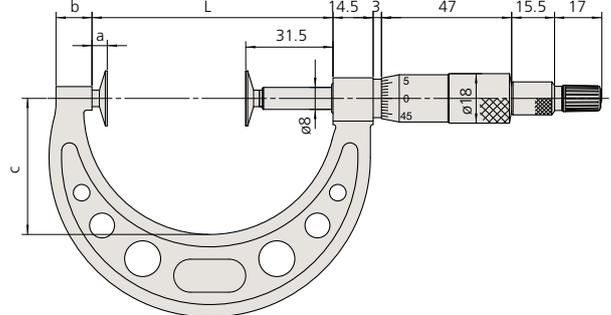
Analog models up to 50mm



Quickmike type



Analog models over 50mm



(): Fine-loading type

Digital model

Range	L	a	b	c
0 - 25mm	58.5	12.9	7	32
25 - 50mm	83.5	12.9	9.8	47
50 - 75mm	108.5	12.9	11.2	60
75 - 100mm	112.5	5.5	13.5	60.5
0 - 30mm*	63.8	13.5	8.5	36
25 - 55mm*	88.8	13.5	10.3	47

*Quickmike type

Analog model

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

Sheet Metal Micrometers

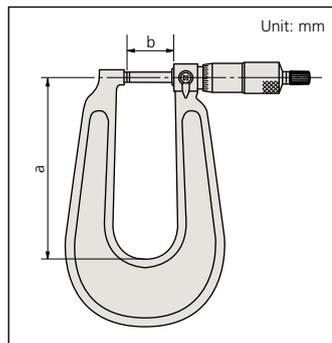
SERIES 389, 189, 119, 118

FEATURES

- Measures thickness of sheet metal, and rubber parts.
- With Ratchet Stop for constant force.
- With a standard except for 25mm model.
- IP65 water/dust protection (389 series*).
- *Except for **389-513**
- With digit counter (series 189).



DIMENSION



SPECIFICATIONS

Metric Digital model			
Range	Order No.	Accuracy	a/b
0 - 25mm	389-251	±4µm	160/27.5mm
	389-261 ^{S-F}	±4µm	160/27.5mm
	389-271 ^{S-S}	±4µm	160/27.5mm
	389-513	±5µm	330/35mm
25 - 50mm	389-252	±4µm	165/27.5mm
	389-262 ^{S-F}	±4µm	165/27.5mm
	389-272 ^{S-S}	±4µm	165/27.5mm

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle

Inch/Metric Digital model			
Range	Order No.	Accuracy	a/b
0 - 1"	389-351	±.0002"	160/27.5mm
	389-361 ^{S-F}	±.0002"	160/27.5mm
	389-371 ^{S-S}	±.0002"	160/27.5mm
	389-713	±.00025"	330/35mm
	389-352	±.0002"	165/27.5mm
1" - 2"	389-362 ^{S-F}	±.0002"	165/27.5mm
	389-372 ^{S-S}	±.0002"	165/27.5mm

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle

Metric Mechanical counter model			
Range	Order No.	Accuracy	a/b
0 - 25mm	189-102	±4µm	160/27.5mm

Inch Mechanical counter model			
Range	Order No.	Accuracy	a/b
0 - 1"	189-129*	±.0002"	160/27.5mm

*.0001" reading is obtained with vernier.

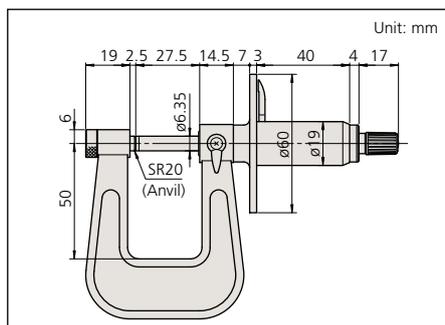
Metric			
Range	Order No.	Accuracy	a/b
0 - 25mm	118-101	±4µm	110/27.5mm
	118-102	±4µm	160/27.5mm
	118-114 ^{S-F}	±4µm	160/27.5mm
	118-118 ^{S-S}	±4µm	160/27.5mm
	118-103	±5µm	330/35mm
25 - 50mm	118-110	±4µm	165/27.5mm

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle

Inch			
Range	Order No.	Accuracy	a/b
0 - 1"	118-129*	±.0002"	160/27.5mm
	118-116 ^{S-F*}	±.0002"	160/27.5mm
	118-120 ^{S-S*}	±.0002"	160/27.5mm
	118-107	±.00025"	330/35mm
1" - 2"	118-112	±.0002"	165/27.5mm

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle
*.0001" reading is obtained with vernier.

DIMENSION



Metric Dial reading model			
Range	Order No.	Accuracy	Throat
0 - 25mm	119-202 ^{S-F}	±4µm	50mm

S-F: Spherical anvil and flat spindle



(Refer to the page 9 for details.)

Anvil-Spindle Combinations



Standard, Flat-Flat



Spherical-Flat (S-F)



Spherical-Spherical (S-S)

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm, .001" or .0001"
Flatness: 0.6µm for models with 150mm throat
1µm for models with 300mm throat
Parallelism: 3µm
Measuring faces: Carbide tipped
Display*: LCD
Battery*: SR44 [1 pc. (2 pcs.: **389-513** and **389-713**)], **938882**
Battery life*: Approx. 1.2 years under normal use (1.8 years: **389-513** and **389-713**)
Dust/Water protection level*: IP65
*Digital models **Analog models

Function of Digital Model

Origin-set (Preset*), Zero-setting, Data hold, Power ON/OFF*, Data output, inch/mm conversion (inch/mm models)
Preset zero-setting Power ON/OFF Data hold Data output inch/mm conversion (inch/mm models) *Only for **389-513**, **389-713**
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662**: SPC cable with data switch (1m)
- 05CZA663**: SPC cable with data switch (2m)
- 937387**: SPC cable for **389-513/389-713** (1m)
- 965013**: SPC cable for **389-513/389-713** (2m)

The 119 series is provided with a dial for making easy and quick reading.



Spline Micrometers

SERIES 331, 111



(Refer to the page 9 for details.)

FEATURES

- IP65 water/dust protection (series 331).
- The anvil and spindle have a small diameter for measuring splined shafts, slots, and keyways.
- With Ratchet Stop for constant force.
- With SPC output (series 331).



331-251



111-115

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm, .001" or .0001"
Flatness: 0.3μm
Parallelism: (2+R/100)μm, R = max. range (mm)
*fraction rounded up
Measuring faces: Carbide tipped
Display*: LCD
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 1.2 years under normal use
Dust/Water protection level*: IP65
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data hold, Automatic power ON/OFF, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

05CZA662: SPC cable with data switch (1m)
05CZA663: SPC cable with data switch (2m)



SPECIFICATIONS

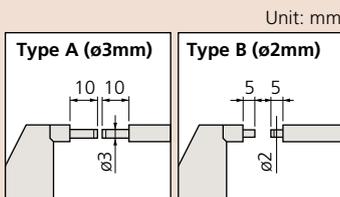
Metric	Digital model		
Range	Order No.	Accuracy	Remarks
0 - 25mm	331-251	±2μm	Type A
	331-261	±2μm	Type B
25 - 50mm	331-252	±2μm	Type A
	331-262	±2μm	Type B
50 - 75mm	331-253	±2μm	Type A
	331-263	±2μm	Type B
75 - 100mm	331-254	±3μm	Type A
	331-264	±3μm	Type B

Inch/Metric	Digital model		
Range	Order No.	Accuracy	Remarks
0 - 1"	331-351	±.0001"	Type A
	331-361	±.0001"	Type B
1" - 2"	331-352	±.0001"	Type A
	331-362	±.0001"	Type B
2" - 3"	331-353	±.0001"	Type A
	331-363	±.0001"	Type B
3" - 4"	331-354	±.00015"	Type A
	331-364	±.00015"	Type B

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

Inch	Order No.	Accuracy	Remarks
0 - 1"	111-166*	±.00015"	Type A
1" - 2"	111-142	±.00015"	Type A
2" - 3"	111-143	±.00015"	Type A

*.0001" reading is obtained with vernier.



DIMENSION

Digital model

Models up to 75mm

Range	L	a	b	c
0 - 25mm*	58.2	17.5	7.3	32
25 - 50mm*	83.2	17.5	10.1	47
50 - 75mm*	108.2	17.5	11.5	60
0 - 25mm	55.3	17.8	10	38
25 - 50mm	80.3	17.8	12	49
50 - 75mm	105.3	17.8	14	60

*Digital models

Digital model

Models over 75mm

Range	L	a	b	c
75 - 100mm*	132.8	17.5	16.7	76.5
75 - 100mm	132.8	20.3	17	79
100 - 125mm	158.2	20.7	19	94
125 - 150mm	183.6	21.1	20	106
150 - 175mm	208.8	21.3	19	118
175 - 200mm	234.2	21.7	18	130

*Digital models

Tube Micrometers

SERIES 395, 295, 115 — Spherical and Cylindrical Anvils

FEATURES

- IP65 water/dust protection (395 series).
- 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.
- With SPC output (series 395).
- With digit counter (series 295).



395-251

Spherical Anvil Type



115-115



395-271



115-215



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm, .001" or .0001"
Flatness: 0.6μm
Display*: LCD
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 1.2 years under normal use
Dust/Water protection level*: IP65
*Digital models **Analog models

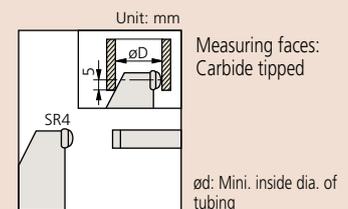
Function of Digital Model

Origin-set, Zero-setting, Data hold, Automatic power ON/OFF, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

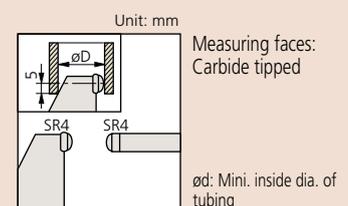
Optional Accessory for Digital Model

05CZA662: SPC cable with data switch (1m)
05CZA663: SPC cable with data switch (2m)

Spherical anvil type



Spherical anvil-spindle type

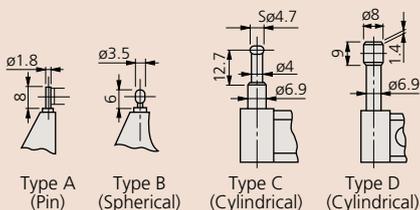


Cylindrical Anvil Type



395-261

Cylindrical anvil type

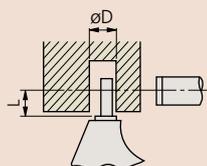


Type A
(Pin)

Type B
(Spherical)

Type C
(Cylindrical)

Type D
(Cylindrical)



øD: Mini. inside dia. of tubing
Spindle face: Carbide tipped

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

SPECIFICATIONS

Metric Digital model with spherical anvil

Range	Order No.	Accuracy	Remarks
0 - 25mm	395-251 ^{S-F}	±2µm	D: 15mm
	395-271 ^{S-S}	±2µm	D: 15mm
25 - 50mm	395-252 ^{S-F}	±2µm	D: 15mm
	395-272 ^{S-S}	±2µm	D: 15mm
50 - 75mm	395-253 ^{S-F}	±2µm	D: 19mm
	395-273 ^{S-S}	±2µm	D: 19mm
75 - 100mm	395-254 ^{S-F}	±3µm	D: 20mm
	395-274 ^{S-S}	±3µm	D: 20mm

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle

Metric Digital model with cylindrical anvil

Range	Order No.	Accuracy	Remarks
0 - 25mm	395-261	±3µm	Type A
	395-262	±3µm	Type B
	395-263	±3µm	Type C
	395-264	±3µm	Type D

Metric Mechanical counter model with spherical anvil

Range	Order No.	Accuracy	Remarks
0 - 25mm	295-115 ^{S-F}	±3µm	D: 10mm
	295-215 ^{S-S}	±3µm	D: 10mm

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle

Metric With spherical anvil

Range	Order No.	Accuracy	Remarks
0 - 25mm	115-115 ^{S-F}	±3µm	D: 10mm
	115-215 ^{S-S}	±3µm	D: 10mm
25 - 50mm	115-116 ^{S-F}	±3µm	D: 11mm
	115-216 ^{S-S}	±3µm	D: 11mm
50 - 75mm	115-117 ^{S-F}	±3µm	D: 17mm
	115-217 ^{S-S}	±3µm	D: 17mm
75 - 100mm	115-118 ^{S-F}	±4µm	D: 18mm
	115-218 ^{S-S}	±4µm	D: 18mm

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle

Metric With cylindrical anvil

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

Inch/Metric Digital model with spherical anvil

Range	Order No.	Accuracy	Remarks
0 - 1"	395-351 ^{S-F}	±.0001"	D: .59"
	395-371 ^{S-S}	±.0001"	D: .59"
1" - 2"	395-352 ^{S-F}	±.0001"	D: .59"
	395-372 ^{S-S}	±.0001"	D: .59"
2" - 3"	395-353 ^{S-F}	±.0001"	D: .75"
	395-373 ^{S-S}	±.0001"	D: .75"
3" - 4"	395-354 ^{S-F}	±.00015"	D: .79"
	395-374 ^{S-S}	±.00015"	D: .79"

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle

Inch/Metric Digital model with cylindrical anvil

Range	Order No.	Accuracy	Remarks
0 - 1"	395-362	±.00015"	Type B
	395-363	±.00015"	Type C
	395-364	±.00015"	Type D

Inch Mechanical counter model with spherical anvil

Range	Order No.	Accuracy	Remarks
0 - 1"	295-153 ^{S-F*}	±.00015"	D: .40"
	295-253 ^{S-S*}	±.00015"	D: .40"

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle
*.0001" reading is obtained with vernier.

Inch With spherical anvil

Range	Order No.	Accuracy	Remarks
0 - 1"	115-153 ^{S-F*}	±.00015"	D: .40"
	115-253 ^{S-S*}	±.00015"	D: .40"
1" - 2"	115-242 ^{S-S}	±.00015"	D: .44"
2" - 3"	115-243 ^{S-S}	±.00015"	D: .67"

S-F: Spherical anvil and flat spindle
S-S: Spherical anvil and spherical spindle
*.0001" reading is obtained with vernier.

Inch With cylindrical anvil

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

*.0001" reading is obtained with vernier.

Point Micrometers

SERIES 342, 142, 112

FEATURES

- IP65 water/dust protection (342 series).
- 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 radius.
- With Ratchet Stop for constant force.
- With SPC output (series 342).
- With digit counter (series 142).
- With digit counter (series 142).



SPECIFICATIONS

Metric Digital model			
Range	Order No.	Accuracy	Point
0 - 25mm	342-251	±2µm	15°
	342-261	±2µm	30°
25 - 50mm	342-252	±2µm	15°
	342-262	±2µm	30°
50 - 75mm	342-253	±2µm	15°
	342-263	±2µm	30°
75 - 100mm	342-254	±3µm	15°
	342-264	±3µm	30°

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

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

*The points have not carbide tips.

Inch/Metric Digital model			
Range	Order No.	Accuracy	Point
0 - 1"	342-351	±.0001"	15°
	342-361	±.0001"	30°
1" - 2"	342-352	±.0001"	15°
	342-362	±.0001"	30°
2" - 3"	342-353	±.0001"	15°
	342-363	±.0001"	30°
3" - 4"	342-354	±.00015"	15°
	342-364	±.00015"	30°

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

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

*The points have not carbide tips.



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm or .001"
Display*: LCD
Battery*: SR44 (1 pc.), 938882
Battery life*: Approx. 1.2 years under normal use
Dust/Water protection level*: IP65
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data hold, Automatic power ON/OFF, inch/mm conversion (inch/mm models) Data hold
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662: SPC cable with data switch (1m)
- 05CZA663: SPC cable with data switch (2m)



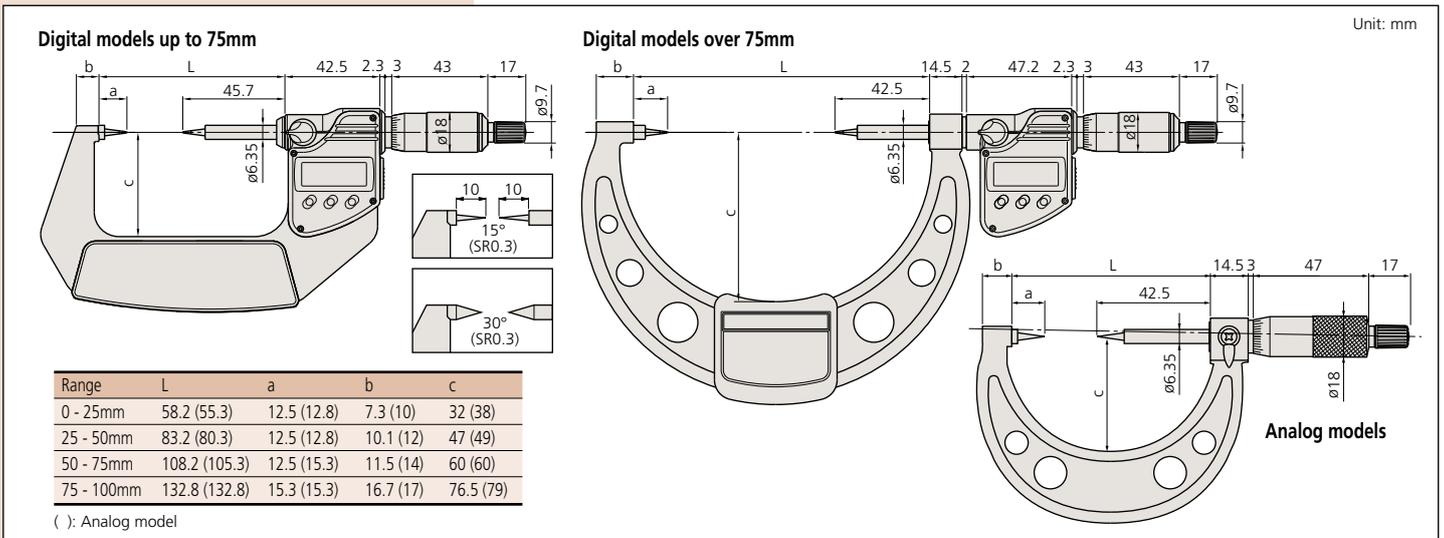
Tip angle: 15° (SR0.3)



Tip angle: 30° (SR0.3)



DIMENSION



(Refer to the page 9 for details.)

Technical Data

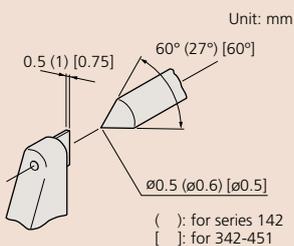
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm or .001"
Display*: LCD
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 1.2 years under normal use
(3 years: Quickmike type)
Dust/Water protection level*: IP65
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data hold, Power ON/OFF*, Data output, inch/mm conversion (inch/mm models)
*Only for Quickmike type
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

05CZA662: SPC cable with data switch (1m)
05CZA663: SPC cable with data switch (2m)
937387: SPC cable for Quickmike type (1m)
965013: SPC cable for Quickmike type (2m)

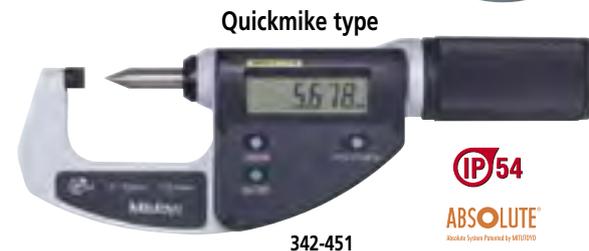


Crimp Height Micrometers

SERIES 342, 142, 112 — Point Spindle and Blade Anvil

FEATURES

- IP54/65 water/dust protection (342 series).
- Measures the height of crimp contacts.
- With Ratchet Stop for constant force.
- With SPC output (series 342).
- With digit counter (series 142).



SPECIFICATIONS

Metric	Digital model
Range	Order No.
0 - 20mm	342-271
Accuracy	±3µm

Metric	Quickmike type
Range	Order No.
0 - 15mm	342-451
Accuracy	±3µm

Metric	Mechanical counter model
Range	Order No.
0 - 25mm	142-402/142-403*
Accuracy	±3µm

* 0.001mm reading is obtained with vernier.

Inch/Metric	Digital model
Range	Order No.
0 - 0.8"	342-371
Accuracy	±.00015"

Metric	Digital model
Range	Order No.
0 - 25mm	112-401
Accuracy	±3µm

V-Anvil Micrometers

SERIES 314, 114 — 3 Flutes and 5 Flutes

FEATURES

- Measures the outside diameter of cutting heads (such as taps, reamers, end mills) with an odd number of flutes.
- 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.
- With SPC output (series 314).



314-251



114-121



114-102



114-204

SPECIFICATIONS

Metric — Digital model for 3 flutes cutting head			
Range	Order No.	Accuracy	Remarks
1 - 15mm	314-251	±4μm	w/ groove
	314-261	±4μm	—
10 - 25mm	314-252	±4μm	w/ groove
	314-262	±4μm	—
25 - 40mm	314-253	±5μm	—

Inch/Metric — Digital model for 3 flutes cutting head			
Range	Order No.	Accuracy	Remarks
.05 - .6"	314-351	±.0002"	w/ groove
	314-361	±.0002"	—
.4" - 1"	314-352	±.0002"	w/ groove
	314-362	±.0002"	—
1" - 1.6"	314-353	±.00025"	—



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm, .001" or .0001"
Flatness (spindle/anvil): 0.6μm /1.3μm** (0.3μm /1.0μm)*
Spindle face: Carbide tipped
Display*: LCD
Battery*: SR44 (1 pc.), 938882
Battery life*: Approx. 8 months under normal use
*Digital models **Analog models

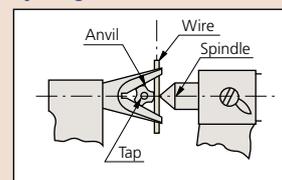
Function of Digital Model

Zero-setting, Data hold, Preset, Automatic power ON/OFF,
Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

05CZA662: SPC cable with data switch (1m)
05CZA663: SPC cable with data switch (2m)

Pitch Diameter Measurement of Tap by Single-wire Method



Metric For 3 flutes cutting head

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

*Carbide-tipped anvil

Inch For 3 flutes cutting head

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

*Carbide-tipped anvil and .0001" reading is obtained with vernier

Metric For 5 flutes cutting head

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

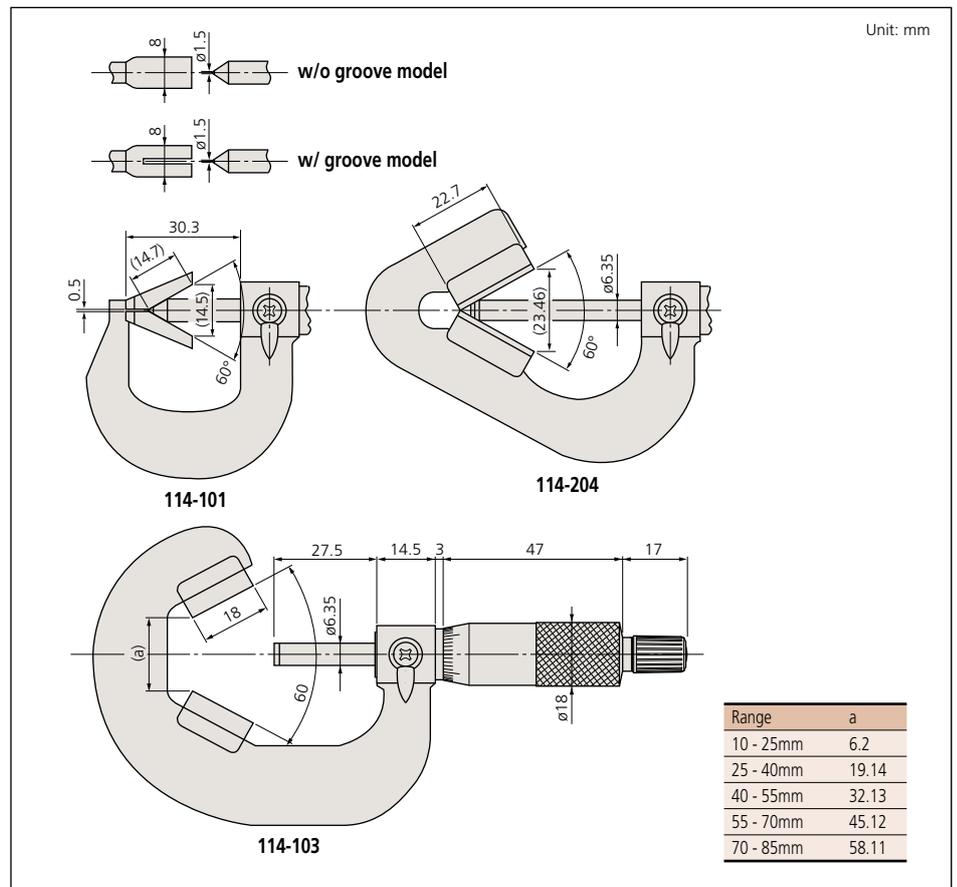
*Carbide-tipped anvil

Inch For 5 flutes cutting head

Range	Order No.	Accuracy	Remarks
.09" - 1"	114-135*	±.0002"	—

*Carbide-tipped anvil and .0001" reading is obtained with vernier

DIMENSION



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.
- With Ratchet Stop for constant force.
- Speedy spindle feed of 10mm/rev. (Quickmike type).



422-230

Quickmike type



422-411

IP54

ABSOLUTE
Absolute System Protected by MEMO/000



122-101

SPECIFICATIONS

Metric Digital model			
Range	Order No.	Accuracy	Remarks
0 - 25mm	422-230	±3µm	Type A
	422-260	±3µm	Type B
	422-270	±3µm	Type C
	422-271	±3µm	Type D
	422-231	±3µm	Type A
25 - 50mm	422-261	±3µm	Type B
	422-232	±3µm	Type A
50 - 75mm	422-233	±4µm	Type A

Metric Quickmike type		
Range	Order No.	Accuracy
0 - 30mm	422-411	±3µm
25 - 55mm	422-412	±3µm

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

Inch/Metric Digital model			
Range	Order No.	Accuracy	Remarks
0 - 1"	422-330	±.00015"	Type A
	422-360	±.00015"	Type B
	422-370	±.00015"	Type C
	422-371	±.00015"	Type D
	422-331	±.00015"	Type A
1" - 2"	422-361	±.00015"	Type B
	422-332	±.00015"	Type A
2" - 3"	422-333	±.0002"	Type A

Inch/Metric Quickmike type		
Range	Order No.	Accuracy
0 - 1.2"	422-421	±.00015"
1" - 2.2"	422-422	±.00015"

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



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm or .0001"
Parallelism: 3µm for models up to 75mm
(3+R/100)µm for models over 75mm,
R = max. range (mm) *fraction rounded up
Display*: LCD
Battery*: SR44 (1 pc.), 938882
Battery life*: Approx. 1.2 years under normal use
*Digital models **Analog models

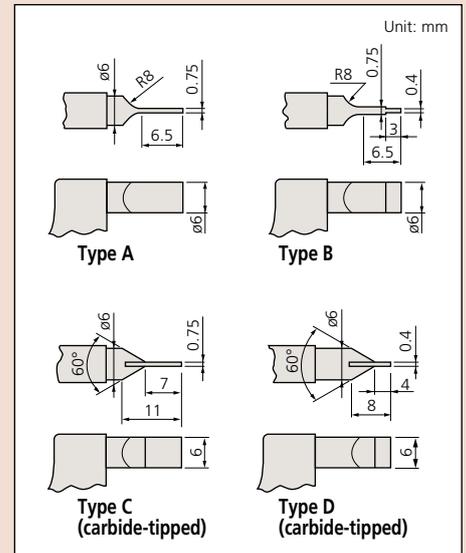
Function of Digital Model

Origin-set, Zero-setting, Data hold, Automatic power ON/OFF, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662: SPC cable with data switch (1m)
- 05CZA663: SPC cable with data switch (2m)
- 937387: SPC cable for Quickmike type (1m)
- 965013: SPC cable for Quickmike type (2m)

TYPE AND DIMENSION



Can Seam Micrometers

SERIES 147

FEATURES

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



147-103

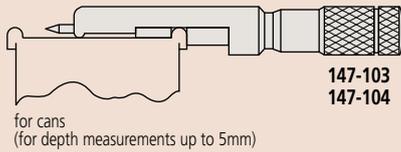
Technical Data

Accuracy: $\pm 3\mu\text{m}$
 Graduation: 0.01mm or .001"

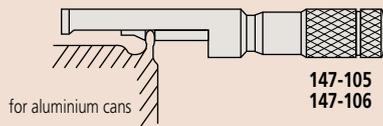
SPECIFICATIONS

Metric		
Range	Order No.	Remarks
0 - 13mm	147-103	for steel cans
	147-105	for aluminum cans
	147-202	for sprayer cans

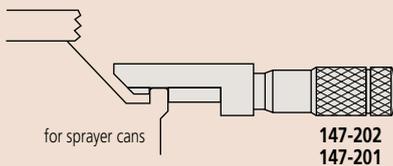
Inch		
Range	Order No.	Remarks
0 - .5"	147-104	for steel cans
	147-106	for aluminum cans
	147-201	for sprayer cans



147-103
147-104



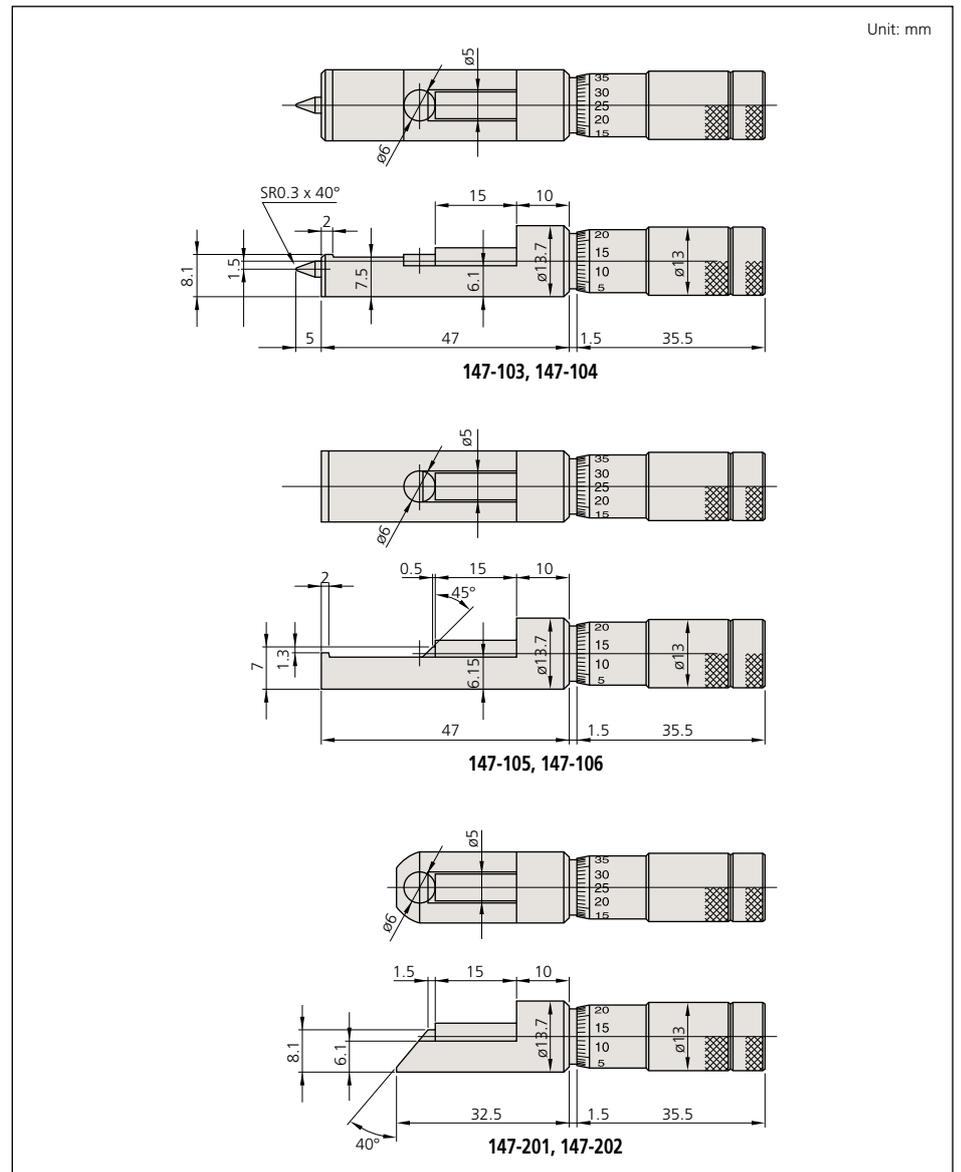
147-105
147-106



147-202
147-201



DIMENSION



Hub Micrometers

SERIES 147

FEATURES

- Measures hub thickness and shoulders inside a bore.
- With Ratchet Stop for constant force.
- With a standard except for 25mm model.



147-301

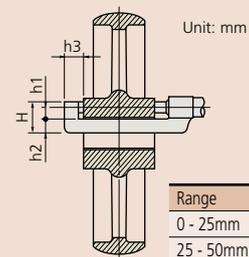
SPECIFICATIONS

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

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

Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm or .0001"
 Flatness: 0.6µm
 Parallelism: (2+R/100)µm, R = max. range (mm)
 *fraction rounded up
 Measuring faces: Carbide tipped



Unit: mm

Range	h1	h2	h3	H
0 - 25mm	6	8.5	13.5	17.5
25 - 50mm	6.5	11	14	20.5
50 - 75mm	6.5	11	13	20.5
75 - 100mm	6.5	11	13	20.5

Wire Micrometers

SERIES 147

FEATURES

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



147-401

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 10mm	147-401	±3µm

Inch		
Range	Order No.	Accuracy
0 - .4"	147-402	±.00015"

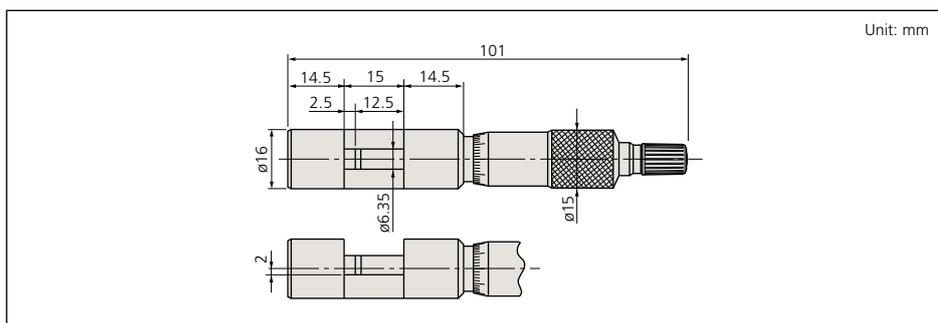
*.0001" reading is obtained with vernier.

Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm or .0001"
 Flatness: 0.6µm
 Parallelism: 1.3µm
 Measuring faces: Carbide tipped



DIMENSION



Digit Outside Micrometers

SERIES 193

FEATURES

- Mechanical digit counter with 0.01mm or .001" reading for quick and error-free reading.
- With a standard except for 25mm model.



193-101

Technical Data

Accuracy: Refer to the list of specifications.
 Counter reading: 0.01mm or .001"
 Graduation: 0.01mm, 0.001mm, .001" or .0001"
 Flatness: 0.6μm
 Parallelism: (2+R/100)μm, R = max. range (mm)
*fraction rounded down
 Measuring faces: Carbide tipped



193-916

SPECIFICATIONS

Metric <small>With ratchet stop</small>		
Range	Order No.	Accuracy
0 - 25mm	193-101	±2μm
	193-111*	±2μm
25 - 50mm	193-102	±2μm
	193-112*	±2μm
50 - 75mm	193-103	±2μm
	193-113*	±2μm
75 - 100mm	193-104	±3μm
	193-114*	±3μm
100 - 125mm	193-305	±3μm
125 - 150mm	193-306	±3μm
150 - 175mm	193-307	±4μm
175 - 200mm	193-308	±4μm
200 - 225mm	193-309	±4μm
225 - 250mm	193-310	±5μm

*0.001mm reading is obtained with vernier.

Inch <small>With ratchet stop</small>		
Range	Order No.	Accuracy
2" - 3"	193-213*	±.0001"
3" - 4"	193-214*	±.00015"
4" - 5"	193-415*	±.00015"
5" - 6"	193-416*	±.00015"
6" - 7"	193-417*	±.0002"
7" - 8"	193-418*	±.0002"
8" - 9"	193-419*	±.0002"
9" - 10"	193-420*	±.00025"
10" - 11"	193-421*	±.00025"

*.0001" reading is obtained with vernier.

Inch <small>With friction thimble</small>		
Range	Order No.	Accuracy
0 - 1"	193-201	±.0001"
	193-211*	±.0001"
1" - 2"	193-212*	±.0001"

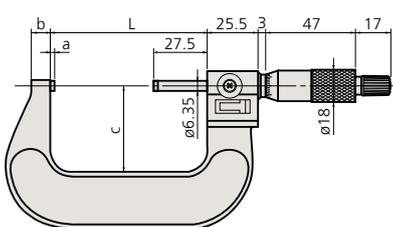
*.0001" reading is obtained with vernier.

Metric <small>Micrometer set</small>		
Range	Order No.	Assortment of micrometers
0 - 75mm (3 pcs./set)	193-901	• 193-101, 193-102, 193-103 • 2 micrometer standards
0 - 100mm (4 pcs./set)	193-902	• 193-101, 193-102, 193-103, 193-104 • 3 micrometer standards
0 - 150mm (6 pcs./set)	193-908	• 193-101, 193-102, 193-103, 193-104, 193-305, 193-306 • 5 micrometer standards

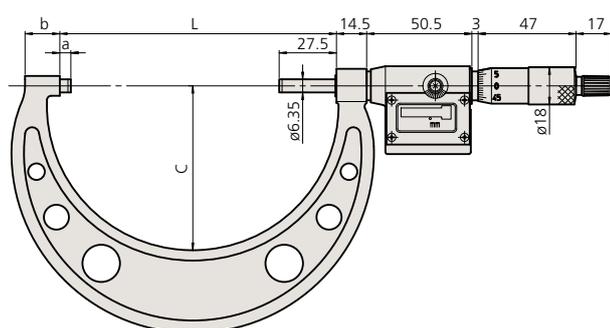
Inch <small>Micrometer set</small>		
Range	Order No.	Assortment of micrometers
0 - 3" (3 pcs./set)	193-923	• 193-211, 193-212, 193-213 • 2 micrometer standards
0 - 6" (6 pcs./set)	193-930	• 193-211, 193-212, 193-213, 193-214, 193-415, 193-416 • 5 micrometer standards

DIMENSION

Models up to 100mm



Models over 100mm



Unit: mm

Range	L	a	b	c
0 - 25mm	30	2.5	5	26
25 - 50mm	55	2	8	32
50 - 75mm	80	2	9	45
75 - 100mm	105	2	9	57
100 - 125mm	132.8	5.3	17	79
125 - 150mm	158.2	5.7	19	94
150 - 175mm	183.6	6.1	19	106
175 - 200mm	208.8	6.3	18	118
200 - 225mm	234.2	6.7	17	130
225 - 250mm	258.0	5.5	18	143

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

"Uni-Mike"

SERIES 317, 117 — Interchangeable Anvil Type

FEATURES

- IP65 water/dust protection (317 series).
- 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: $\varnothing 3$ mm rod anvil (201217) for 0-25mm models, $\varnothing 5$ mm (201379) for 25-50mm model.
- With special Disk Anvils. The Uni-Mike is used as a height micrometer. The disks have a lapped, mirror surface.



317-251



117-101

SPECIFICATIONS

Metric — Digital model with ratchet stop		
Range	Order No.	Accuracy
0 - 25mm	317-251	$\pm 4\mu\text{m}$
25 - 50mm	317-252	$\pm 4\mu\text{m}$

Excluding quantizing error

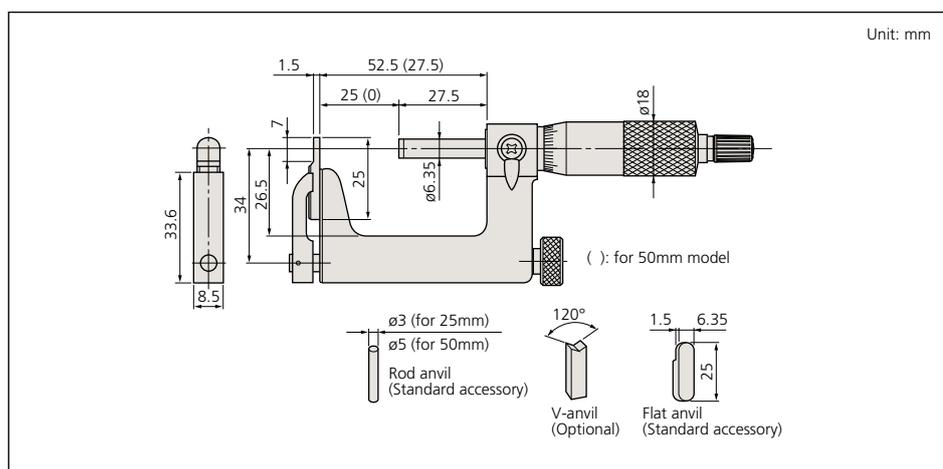
Metric — With ratchet stop		
Range	Order No.	Accuracy
0 - 25mm	117-101	$\pm 4\mu\text{m}$
25 - 50mm	117-102	$\pm 4\mu\text{m}$

Inch/Metric — Digital model with friction thimble		
Range	Order No.	Accuracy
0 - 1"	317-351	± 0.002 "
1" - 2"	317-352	± 0.002 "

Excluding quantizing error

Inch — With friction thimble		
Range	Order No.	Accuracy
0 - 1"	117-107	± 0.002 "
1" - 2"	117-108	± 0.002 "

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.001mm or .00005"/0.001mm
Graduation**: 0.01mm or .0001"
Spindle face: Carbide tipped
Display*: LCD
Battery*: SR44 (1 pc.), 938882
Battery life*: Approx. 1.2 years under normal use
Dust/Water protection level*: IP65
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data hold, Automatic power ON/OFF, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

- 05CZA662: SPC cable with data switch (1m)*
- 05CZA663: SPC cable with data switch (2m)*
- 201218: V-anvil
- 950758: Disk anvil for 25mm (1") models
- 950759: Disk anvil for 50mm (2") models

*Only for digital models



Limit Micrometers

SERIES 113

FEATURES

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



113-102

Technical Data

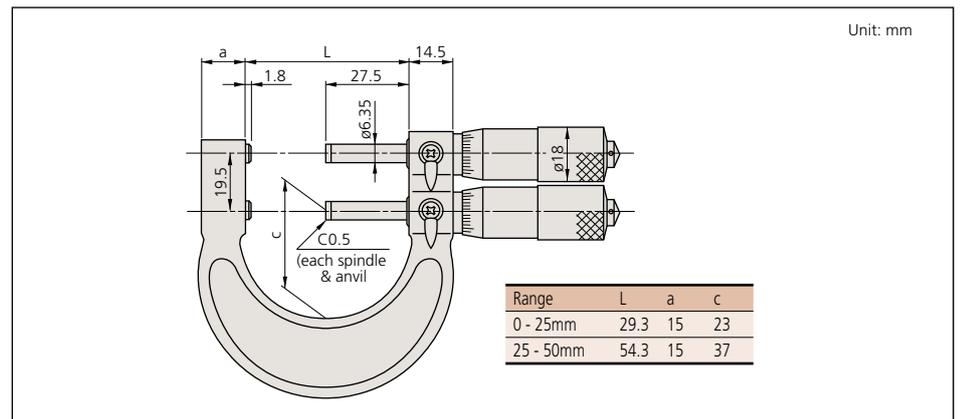
Accuracy: Refer to the list of specifications.
 Graduation: 0.01mm
 Flatness: 0.6μm
 Parallelism: $(3+R/100)\mu\text{m}$, R = max. range (mm)
*fraction rounded down
 Measuring faces: Carbide tipped

SPECIFICATIONS

Metric

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

DIMENSION



Indicating Micrometers

SERIES 510

FEATURES

- Retractable anvil with indicator for three-wire measurements of pitch diameter of precision screws, roundness and parallelism measurements.
- With a standard except for 25mm model.
- IP protection level: 54



510-121

Retractable anvil button

SPECIFICATIONS

Metric		
Range	Order No.	Indicating range
0 - 25mm	510-141/510-121*	±0.060mm
25 - 50mm	510-122	±0.060mm
50 - 75mm	510-123	±0.060mm
75 - 100mm	510-124	±0.060mm

*Retractable anvil button on the right side.

Inch		
Range	Order No.	Indicating range
0 - 1"	510-151/510-131*	±.0023"
1" - 2"	510-132	±.0023"
2" - 3"	510-133	±.0023"
3" - 4"	510-134	±.0023"

*Retractable anvil button on the right side.

Snap Meters

SERIES 523

FEATURES

- Various types of indicator can be selected according to the measurement applications.



523-141

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"	523-151	.078"
1" - 2"	523-152	.078"
2" - 3"	523-153	.078"
3" - 4"	523-154	.078"

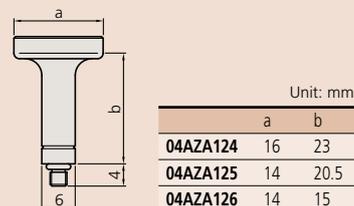


Technical Data

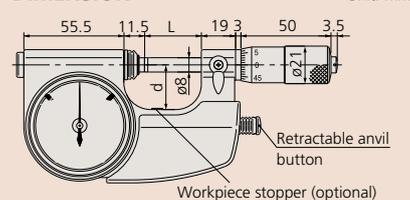
Spindle feed error: 3µm
 Dial indication accuracy: 1µm
 Dispersion of indication: 0.4µm
 Graduation: 0.001mm or .0001"
 Dial reading: 0.001mm or .00005"
 Flatness: 0.3µm
 Parallelism: 0.6µm for models up to 50mm
 1µm for models over 50mm
 Measuring force: 5 - 10N (500 - 1000gf)
 Measuring faces: Carbide tipped

Optional Accessory

- 04AZA124: ø16mm workpiece stopper (not available for 25mm model)
- 04AZA125: ø14mm workpiece stopper
- 04AZA126: ø14mm workpiece stopper



DIMENSION

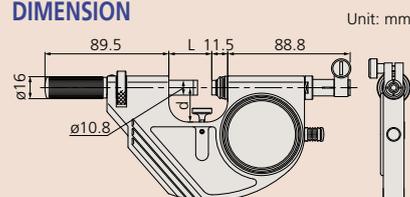


Range	L	d
0 - 25mm	31.5	25
25 - 50mm	56.5	38
50 - 75mm	81.5	50
75 - 100mm	106.5	63

Technical Data

Flatness: 0.3µm
 Parallelism: 0.6µm for models up to 50mm
 1µm for models over 50mm
 Measuring force*: 5 - 10N (500 - 1000gf)
 Measuring faces: Carbide tipped
 *Measured at the position where the anvil is retracted by 1mm from the free position without installing the indicator.

DIMENSION



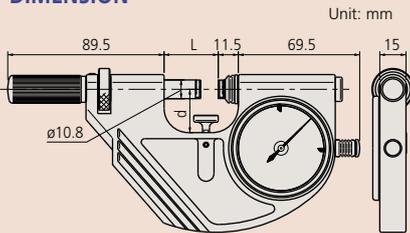
Range	d	L
0 - 25mm	25	31
25 - 50mm	35	56
50 - 75mm	47.5	81
75 - 100mm	60	106



Technical Data

Dial indication accuracy: 1µm
 Dispersion of indication: 0.4µm
 Dial reading: 0.001mm or .00005"
 Flatness: 0.3µm
 Parallelism: 0.6µm for models up to 50mm
 1µm for models over 50mm
 Measuring force: 5 - 10N (500 - 1000gf)
 Measuring faces: Carbide tipped

DIMENSION



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

FEATURES

- Direct GO/NO-GO judgment for mass-produced parts.
- Spindle diameter: 10.8mm (.425")
- IP protection level: 54



523-121

SPECIFICATIONS

Metric		
Range	Order No.	Indicating range
0 - 25mm	523-121	±0.060mm
25 - 50mm	523-122	±0.060mm
50 - 75mm	523-123	±0.060mm
75 - 100mm	523-124	±0.060mm

Inch		
Range	Order No.	Indicating range
0 - 1"	523-131	±.0023"
1" - 2"	523-132	±.0023"
2" - 3"	523-133	±.0023"
3" - 4"	523-134	±.0023"

Technical Data

Accuracy: ±2.5µm for up to ±50µm range
 ±5µm for ±50µm to ±150µm range
 (including dispersion of indication)
 Dial reading: 0.005mm
 Flatness: 0.3µm
 Parallelism: 1.3µm for models up to 150mm
 1.6µm for models over 150mm
 Measuring force: 5 - 15N (500 - 1500gf)
 Measuring faces: Carbide tipped

Dial Snap Meters

SERIES 523

FEATURES

- Direct GO/NO-GO judgment for mass-produced parts.
- Spindle diameter: 10.8mm (.425")



523-105

SPECIFICATIONS

Metric		
Range	Order No.	Indicating range
100 - 125mm	523-105	±0.15mm
125 - 150mm	523-106	±0.15mm
150 - 175mm	523-113	±0.15mm
175 - 200mm	523-114	±0.15mm

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.
- With a ratchet stop for constant force.
- Provided with a standard to set the origin for 25-50mm measurement.



SPECIFICATION

Metric		
Range	Order No.	Accuracy
0 - 50mm	121-145	±2µm

Excluding quantizing error

Inch/Metric		
Range	Order No.	Accuracy
0 - 2"	121-155	±.0001"

Excluding quantizing error



Technical Data

Accuracy: Refer to the list of specifications.
 Resolution: 0.001mm or .00005"/0.001mm
 Measuring force: 6 – 10N (600 – 1000gf)
 Display rotation: 330°
 Display: LCD
 Battery: SR44 (2 pcs.), **938882**
 Battery life: Approx. 1.8 years under normal use

Function

Zero-setting, Preset, Data hold, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

937387: SPC cable (1m)
965013: SPC cable (2m)

Groove Micrometers

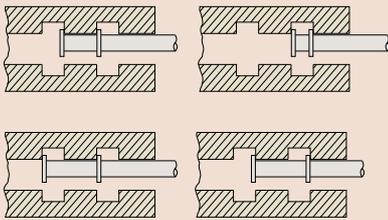
SERIES 146

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.

Technical Data

Accuracy: $\pm 10\mu\text{m}$
Parallelism: $10\mu\text{m}$



SPECIFICATIONS

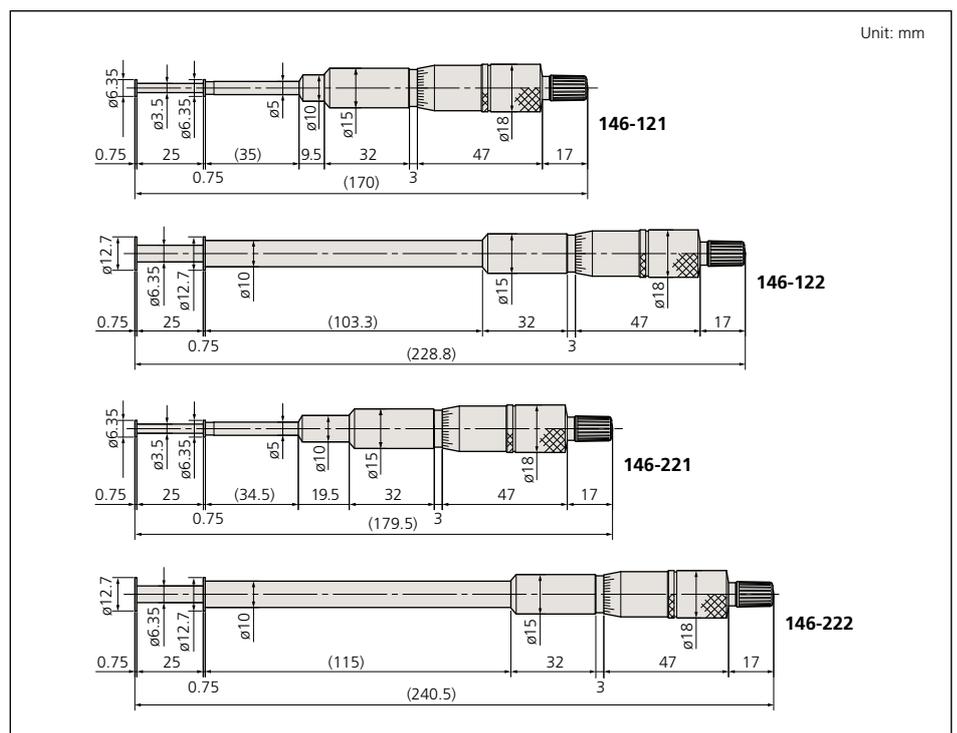
Metric Rotating spindle type			
Range Outside	Range Inside	Order No.	Flange
0 - 25mm	1.6 - 26.5mm	146-121	$\phi 6.35\text{mm}$
		146-122	$\phi 12.7\text{mm}$
25 - 50mm	26.5 - 51.5mm	146-123	$\phi 12.7\text{mm}$
50 - 75mm	51.5 - 76.5mm	146-124	$\phi 12.7\text{mm}$
75 - 100mm	76.5 - 101.5mm	146-125	$\phi 12.7\text{mm}$

Inch Rotating spindle type			
Range Outside	Range Inside	Order No.	Flange
0 - 1"	.055" - 1.05"	146-131	$\phi .25"$
		146-132	$\phi .5"$
1" - 2"	1.05" - 2.05"	146-133	$\phi .5"$
2" - 3"	2.05" - 3.05"	146-134	$\phi .5"$
3" - 4"	3.05" - 4.05"	146-135	$\phi .5"$

Metric Non-rotating spindle type			
Range Outside	Range Inside	Order No.	Flange
0 - 25mm	1.6 - 26.5mm	146-221	$\phi 6.35\text{mm}$
		146-222	$\phi 12.7\text{mm}$
25 - 50mm	26.5 - 51.5mm	146-223	$\phi 12.7\text{mm}$
50 - 75mm	51.5 - 76.5mm	146-224	$\phi 12.7\text{mm}$
75 - 100mm	76.5 - 101.5mm	146-225	$\phi 12.7\text{mm}$

Inch Non-rotating spindle type			
Range Outside	Range Inside	Order No.	Flange
0 - 1"	.055" - 1.05"	146-231	$\phi .25"$
		146-232	$\phi .5"$
1" - 2"	1.05" - 2.05"	146-233	$\phi .5"$
2" - 3"	2.05" - 3.05"	146-234	$\phi .5"$
3" - 4"	3.05" - 4.05"	146-235	$\phi .5"$

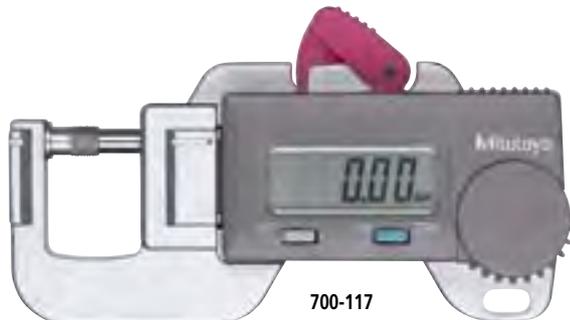
DIMENSION



Quick-Mini

SERIES 700

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.



700-117



700-121

Technical Data

Accuracy: Refer to the list of specifications.
 Resolution: 0.01mm or .0005"/0.01mm
 Display: LCD
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 2 years under normal use

Function

Zero-setting, Data hold, Power ON/OFF, inch/mm conversion (inch/mm models)

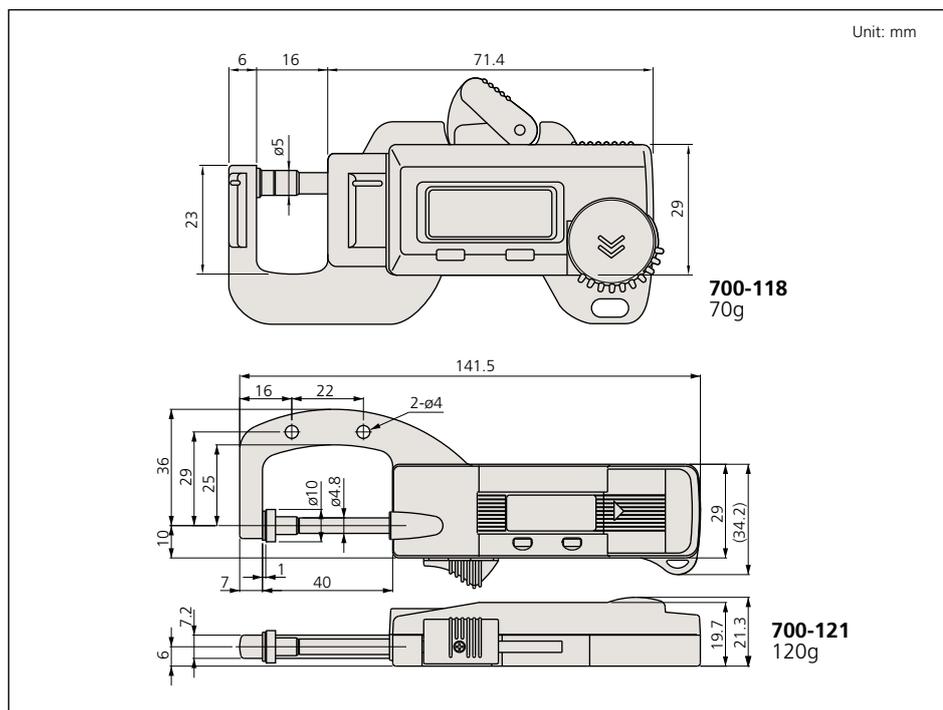


SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 12mm	700-119	±0.02mm
0 - 25mm	700-121	±0.02mm

Inch/Metric		
Range	Order No.	Accuracy
0 - .5"/0 - 12mm	700-118	±.001"
0 - 1"/0 - 25mm	700-122	±.001"

DIMENSION AND MASS



Small Hole Gage Set

SERIES 154

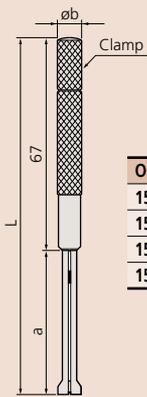
FEATURES

- 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.



154-902

DIMENSION



Unit: mm

Order No.	L	a	b
154-101 / 105	90	22.5	5.5
154-102 / 106	97.6	30	5.5
154-103 / 107	102.8	35	8.5
154-104 / 108	108	40	8.5

SPECIFICATIONS

Metric		
Total range	Order No.	Assortment of gages
ø3 - 13mm (4-gage set)	154-902	ø3 - 5mm gage (154-101)
		ø5 - 7.5mm gage (154-102)
		ø7.5 - 10mm gage (154-103)
		ø10 - 13mm gage (154-104)

Inch		
Total range	Order No.	Assortment of gages
.125" - .5" DIA. (4-gage set)	154-901	.125" - .2" DIA. gage (154-105)
		.2" - .3" DIA. gage (154-106)
		.3" - .4" DIA. gage (154-107)
		.4" - .5" DIA. gage (154-108)

Telescoping Gage Set

SERIES 154

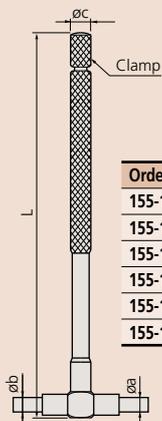
FEATURES

- Spring-loaded plunger expands within the bore (or groove), allowing determination of the internal diameter (or groove width).
- With a knurled clamp.



155-905

DIMENSION



Unit: mm

Order No.	L	a	b	c
155-127 / 121	110	4	3	5
155-128 / 122	110	5	3.5	5.5
155-129 / 123	110	5	3.5	5.5
155-130 / 124	150	7.5	6	8
155-131 / 125	150	7.5	6	8
155-132 / 126	150	7.5	6	8

SPECIFICATIONS

Metric		
Total range	Order No.	Assortment of gages
8 - 150mm (6-gage set)	155-905	8 - 12.7mm gage (155-127)
		12.7 - 19mm gage (155-128)
		19 - 32mm gage (155-129)
		32 - 54mm gage (155-130)
		54 - 90mm gage (155-131)
		90 - 150mm gage (155-132)

Inch		
Total range	Order No.	Assortment of gages
.313" - 6" (6-gage set)*	155-903	.313" - .5" gage (155-121)
		.5" - .75" gage (155-122)
		.75" - 1.25" gage (155-123)
		1.25" - 2.125" gage (155-124)
		2.125" - 3.5" gage (155-125)
		3.5" - 6" gage (155-126)

*4-gage set (Total range: .313" - 2.125" (155-907)) and 5-gage set (Total range: .5" - 6" (155-904)) are also available.

Color Ratchet & Color Speeder

Color ratchet



SPECIFICATIONS

Order No.	Color
985056	Black
985061	Red
985081	Blue
985071	Yellow
985076	Green
985066	Brown
04GZA241*	Gray
04GZA239	Gray

*for 293 series digital model

Color speeder for Ratchet Thimble Micrometer



SPECIFICATIONS

Order No.	Color
04GAA899	Black
04GAA900	Red
04GAA901	Yellow
04GAA902	Green
04GAA903	Blue
04AAB208	Gray

Spindle Attachment Tip



DIMENSION

Order No.	Dimension
208062	
208063	
208064	

Order No.	Dimension
208065	
208066	

Technical Data

Tip length: 10mm \pm 5 μ m



Micrometer Oil

207000 (30ml)



Optical Parallels

SERIES 157

FEATURES

- Designed to inspect parallelism and flatness of measuring faces of micrometers.
- Each set consists of 4 thicknesses.
- Supplied with fitted carrying case.



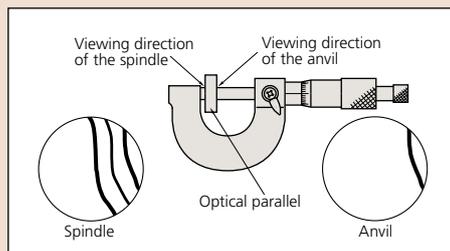
Technical Data

Flatness: 0.1μm
 Parallelism: 0.2μm
 Diameter: 30mm

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 ($0.32\mu\text{m} \times 3 = 0.96\mu\text{m}$).
 Fringe on the anvil side must not be more than one.



SPECIFICATIONS

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

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

Optical Flats

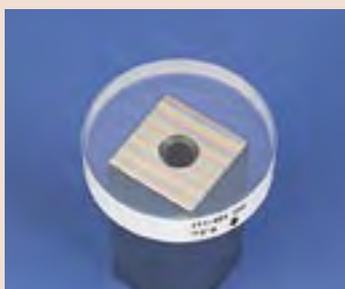
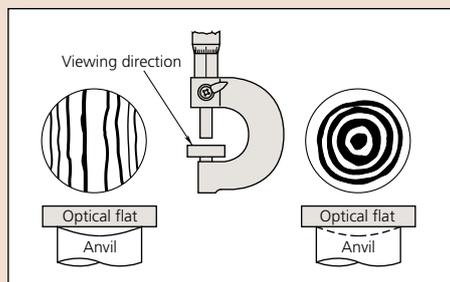
SERIES 158

FEATURES

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



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



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"

Micrometer Standards

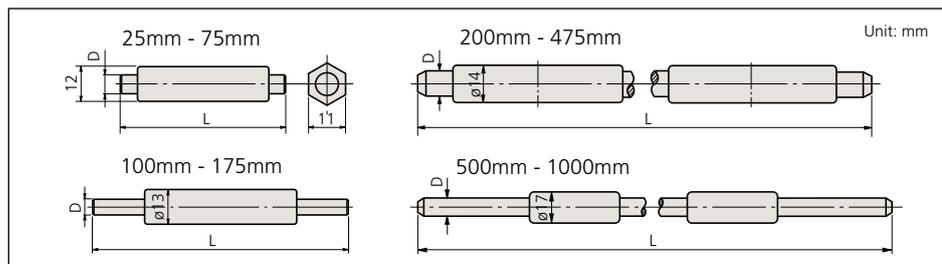
SERIES 167

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.



DIMENSION



SPECIFICATIONS

Metric			
Length (L)	Order No.	Diameter (D)	Tolerance
25mm	167-101	6.35mm	±1.5µm
50mm	167-102	6.35mm	±2.0µm
75mm	167-103	6.35mm	±2.5µm
100mm	167-104	7.9mm	±3µm
125mm	167-105	7.9mm	±3.5µm
150mm	167-106	7.9mm	±4µm
175mm	167-107	7.9mm	±4.5µm
200mm	167-108	9.4mm	±5.0µm
225mm	167-109	9.4mm	±5.5µm
250mm	167-110	9.4mm	±6.0µm
275mm	167-111	9.4mm	±6.5µm
300mm	167-112	9.4mm	±7µm
325mm	167-113	9.4mm	±7.5µm
350mm	167-114	9.4mm	±8µm
375mm	167-115	9.4mm	±8.5µm
400mm	167-116	9.4mm	±9µm
425mm	167-117	9.4mm	±9.5µm
450mm	167-118	9.4mm	±10µm
475mm	167-119	9.4mm	±10.5µm
500mm	167-120	11.9mm	±11µm
525mm	167-121	11.9mm	±11.5µm
550mm	167-122	11.9mm	±12µm
575mm	167-123	11.9mm	±12.5µm
600mm	167-124	11.9mm	±13µm
625mm	167-125	11.9mm	±13.5µm
650mm	167-126	11.9mm	±14µm
675mm	167-127	11.9mm	±14.5µm
700mm	167-128	11.9mm	±15µm
725mm	167-129	11.9mm	±15.5µm
750mm	167-130	11.9mm	±16µm
775mm	167-131	11.9mm	±16.5µm
800mm	167-132	11.9mm	±17µm
825mm	167-133	11.9mm	±17.5µm
850mm	167-134	11.9mm	±18µm
875mm	167-135	11.9mm	±18.5µm
900mm	167-136	11.9mm	±19µm
925mm	167-137	11.9mm	±19.5µm
950mm	167-138	11.9mm	±20µm
975mm	167-139	11.9mm	±20.5µm
1000mm	167-140	11.9mm	±21µm

Available up to 2000mm.

Inch			
Length (L)	Order No.	Diameter (D)	Tolerance
1"	167-141	.25"	±1.5µm
2"	167-142	.25"	±2.0µm
3"	167-143	.25"	±2.5µm
4"	167-144	.31"	±3µm
5"	167-145	.31"	±3.5µm
6"	167-146	.31"	±4µm
7"	167-147	.31"	±4.5µm
8"	167-148	.37"	±5.0µm
9"	167-149	.37"	±5.5µm
10"	167-150	.37"	±6.0µm
11"	167-151	.37"	±6.5µm
12"	167-152	.37"	±7µm
13"	167-153	.37"	±7.5µm
14"	167-154	.37"	±8µm
15"	167-155	.37"	±8.5µm
16"	167-156	.37"	±9µm
17"	167-157	.37"	±9.5µm
18"	167-158	.37"	±10µm
19"	167-159	.37"	±10.5µm
20"	167-160	.47"	±11µm
21"	167-161	.47"	±11.5µm
22"	167-162	.47"	±12µm
23"	167-163	.47"	±12.5µm
24"	167-164	.47"	±13µm
25"	167-165	.47"	±13.5µm
26"	167-166	.47"	±14µm
27"	167-167	.47"	±14.5µm
28"	167-168	.47"	±15µm
29"	167-169	.47"	±15.5µm
30"	167-170	.47"	±16µm
31"	167-171	.47"	±16.5µm
32"	167-172	.47"	±17µm
33"	167-173	.47"	±17.5µm
34"	167-174	.47"	±18µm
35"	167-175	.47"	±18.5µm
36"	167-176	.47"	±19µm
37"	167-177	.47"	±19.5µm
38"	167-178	.47"	±20µm
39"	167-179	.47"	±20.5µm
40"	167-180	.47"	±21µm

Available up to 79".

Technical Data

Tolerance*: Refer to the list of specifications.
 *Tolerance on deviation of measured central length from nominal at 20°C
 Flatness: 0.3µm
 Parallelism: 2µm



Standards for Screw Thread Micrometers

SERIES 167 — 60 degree and 55 degree

FEATURES

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



167-264 (60°)



167-262 (60°)

SPECIFICATIONS

Metric			
Length	Order No.	Thread angle	Accuracy
25mm	167-261	60°	±4μm
	167-272	55°	±4μm
50mm	167-262	60°	±5μm
	167-273	55°	±5μm
75mm	167-263	60°	±6μm
	167-274	55°	±6μm
100mm	167-264	60°	±7μm
	167-275	55°	±7μm

Inch			
Length	Order No.	Thread angle	Accuracy
1"	167-294	60°	±4μm
	167-283	55°	±4μm
2"	167-295	60°	±5μm
	167-284	55°	±5μm
3"	167-296	60°	±6μm
	167-285	55°	±6μm
4"	167-297	60°	±7μm
	167-286	55°	±7μm

Technical Data

Accuracy: Refer to the list of specifications.
Thread angle: 55° or 60°

Standards for V-Anvil Micrometers

SERIES 167

FEATURES

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



167-329

SPECIFICATIONS

Metric			
Length	Order No.	Type	Accuracy
5mm	167-327	Plug	±2μm
10mm	167-328	Plug	±2μm
25mm	167-329	Plug	±2μm
40mm	167-330	Ring	±3μm
55mm	167-331	Ring	±3μm
70mm	167-332	Ring	±3μm
85mm	167-333	Ring	±3μm

Inch			
Length	Order No.	Type	Accuracy
.2"	167-337	Plug	±2μm
.4"	167-338	Plug	±2μm
1"	167-339	Plug	±2μm
1.6"	167-340	Ring	±3μm
2.2"	167-341	Ring	±3μm
2.8"	167-342	Ring	±3μm
3.4"	167-343	Ring	±3μm

Technical Data

Accuracy: Refer to the list of specifications.

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.



156-105



156-101



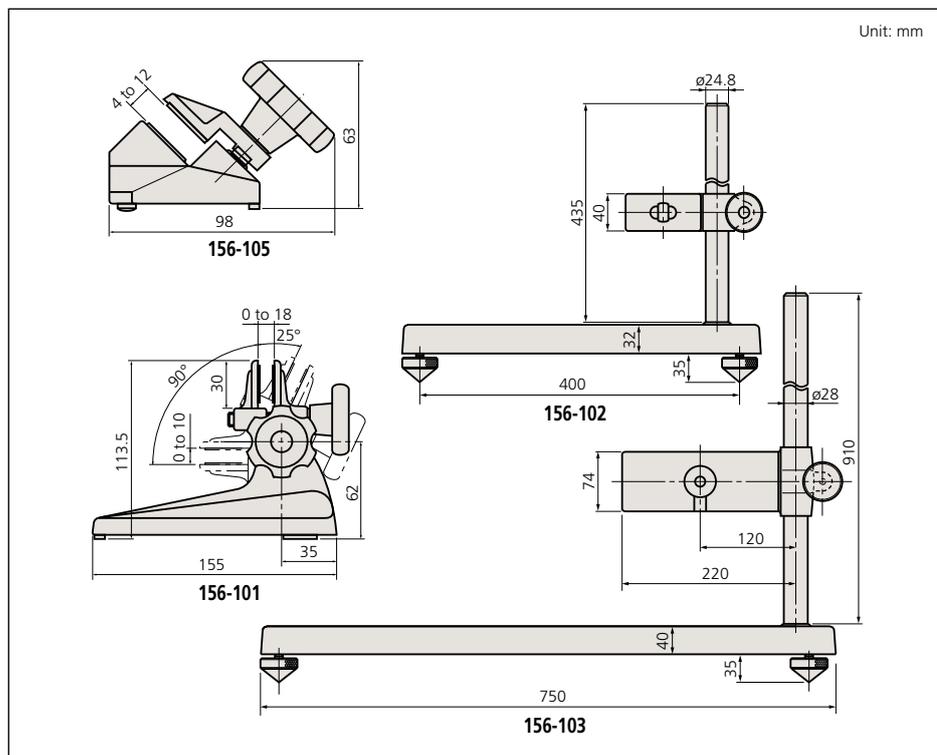
156-102

SPECIFICATIONS

Micrometer ranges	Order No.	Remarks
0-25mm (0-1"), 25-50mm (1"-2")	156-105	Fixed angle type
Up to 100mm (4")	156-101	Adjustable angle type
125-300mm (5"-12")	156-102	Vertical type
300-1000mm (12"-40")	156-103	Vertical type

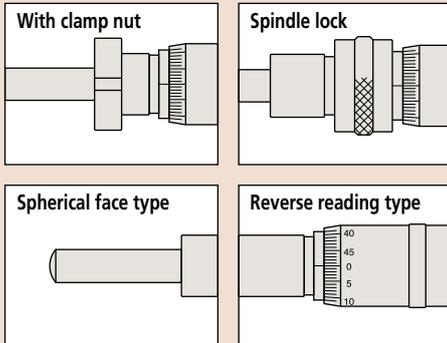


DIMENSION



Micrometer Head Selection Guide

Variety of Specifications

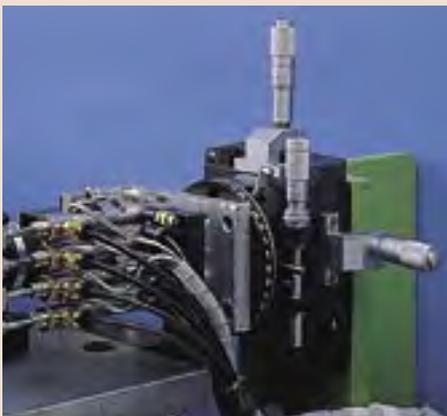
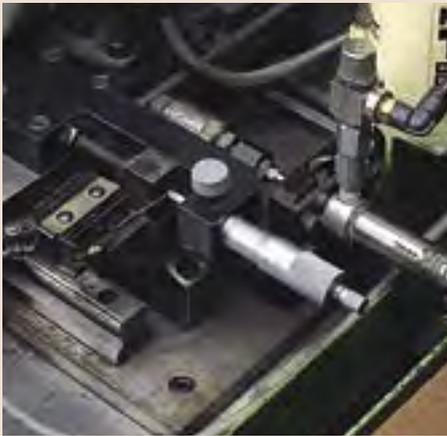


The table below provides an outline of Mitutoyo micrometer heads for each series so you can locate the pages to refer to select the micrometer head most appropriate to your specific application. When selecting consider the following points:

- Dimensions
- Graduation/resolution and accuracy
- With or without spindle lock
- With or without clamping nut
- Normal or reverse reading
- With or without Ratchet Stop

SELECTION TABLE

Range	Series	Remarks	Page
0 - 1mm	110	Differential screw translator (extra-fine feeding) type	86
0 - 2.5mm	110	Differential screw translator (extra-fine feeding) type	86
0 - 5mm	148	Ultra small type	77
0 - 6.5mm	148	Fine spindle feeding of 0.1mm/rev.	75
	148	Fine spindle feeding of 0.25mm/rev.	76
	148	Small type	77
	148	Large thimble diameter for easy reading	78
0 - 10mm	152	Fine feeding type	85
0 - 13mm	148	Common type in small size	79
	148	Spindle feeding of 0.25mm/rev.	76
	148	Zero-adjustable thimble type	80
	148	Large thimble diameter for easy reading	78
	110	Differential screw translator (extra-fine feeding) type	86
0 - 15mm	149	with carbide-tipped spindle type	81
	153	Non-rotating spindle type	84
	152	Quick spindle feeding of 1mm/rev.	85
	227	with constant and adjustable fine-loading device	74
0 - 25mm	164	Digital type	72
	350	Compact digital type	72
	150	Common type in middle size	82
	153	Non-rotating spindle type	84
	153	Fine graduation type	88
	151	Heavy duty type (ø8mm spindle)	83
	152	Quick spindle feeding of 1mm/rev.	85
	152	Fine feeding type	85
	152	for XY-stage	87
	164	High resolution and high accuracy type	89
	250	with digit counter type	90
0 - 50mm	164	Digital type	72
	151	Heavy duty type (ø8mm spindle)	83
	152	Quick spindle feeding of 1mm/rev.	85
	152	Fine feeding type	85
	197	Non rotating spindle and large thimble	88



Digimatic Micrometer Heads

SERIES 164, 350

FEATURES

- The Digimatic Micrometer Heads...



SPECIFICATIONS: Series 350

Metric		Inch/Metric		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
25mm	350-251	1"	350-351	Plain	Flat (carbide tip)	—
25mm	350-252	1"	350-352	w/ clamp nut	Flat (carbide tip)	—
25mm	350-253	1"	350-353	Plain	Spherical (SR4)	—
25mm	350-254	1"	350-354	w/ clamp nut	Spherical (SR4)	—
25mm	350-271*	—	—	Plain	Flat (carbide tip)	w/ 18mm stem bush
25mm	350-272-10	—	—	w/ clamp nut	Flat (carbide tip)	—
25mm	350-273*	—	—	Plain	Spherical (SR4)	w/ 18mm stem bush
25mm	350-274-10	—	—	w/ clamp nut	Spherical (SR4)	—
25mm	350-281*	1"	350-381*	Plain	Flat (carbide tip)	—
25mm	350-282*	1"	350-382*	w/ clamp nut	Flat (carbide tip)	—
25mm	350-283*	1"	350-383*	Plain	Spherical (SR4)	—
25mm	350-284*	1"	350-384*	w/ clamp nut	Spherical (SR4)	—
25mm	350-261*	1"	350-361*	Plain	Flat	w/ non-rotating device

*IP65 dust/water protection type

SPECIFICATIONS: Series 164

Metric		Inch/Metric		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
25mm	164-171	1"	164-172	Plain	Flat (carbide tip)	Non-rotating spindle
50mm	164-161	2"	164-162	Plain	Flat (carbide tip)	Non-rotating spindle

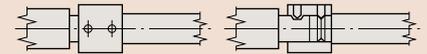
SPC

IP65

(Refer to the page 9 for details.)

Non-rotating device

The non-rotating device provides no radial torsion on the workpiece surface so that workpiece wear and deformation are minimized.



Technical Data

Accuracy and stem diameter:

Order No.	Accuracy*	Stem dia.
350-251	±2µm	10mm / .375"
350-252	±2µm	10mm / .375"
350-253	±2µm	10mm / .375"
350-254	±2µm	10mm / .375"
350-271	±2µm	12mm**
350-272	±2µm	12mm
350-273	±2µm	12mm**
350-274	±2µm	12mm
350-281	±2µm	12mm / .5"
350-282	±2µm	12mm / .5"
350-283	±2µm	12mm / .5"
350-284	±2µm	12mm / .5"
350-261	±2µm	12mm / .5"
164-171	±2µm	18mm / .71"
164-161	±3µm	18mm / .71"

*Excluding quantizing error
**with 18mm stem bush

Resolution: 0.001mm or .00005" / 0.001mm

Display: LCD

Battery: SR44 (1 pc. / 2 pcs.*), 938882

Battery life: Approx. 8 months under normal use
(1.8 years: 164-161 and 164-162)
(1.2 years: 164-171 and 164-172)

Dust/Water protection level: IP65 (series 350)**
* 164-161 and 164-162

** 350-271, 350-273, 350-261, 350-381, 350-382, 350-383, 350-384, 350-361, 350-281, 350-282, 350-283, 350-284

Function

Preset, Zero-setting, Automatic power ON/OFF*, Power ON/OFF**, Data hold, Data output, +/- conversion**, inch/mm conversion (inch/mm models)

*Only for 350 series **Only for 164 series

Optional Accessory

05CZA662: SPC cable with data switch (1m)*

05CZA663: SPC cable with data switch (2m)*

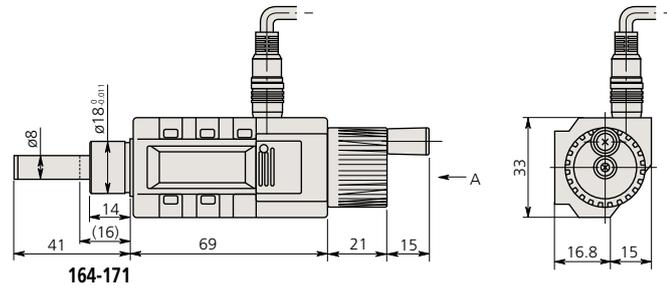
937387: SPC cable for series 164 (1m)

965013: SPC cable for series 164 (2m)

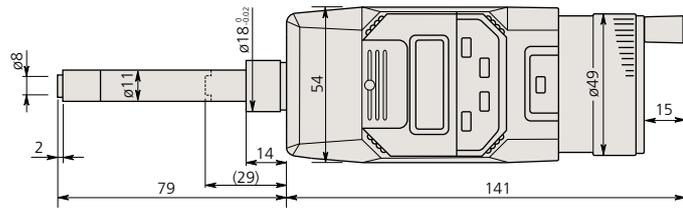
*for series 350

DIMENSION

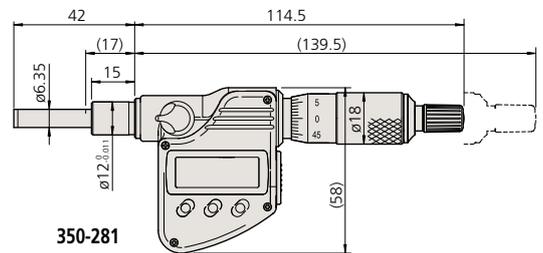
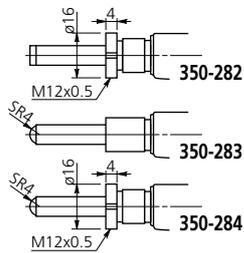
Unit: mm



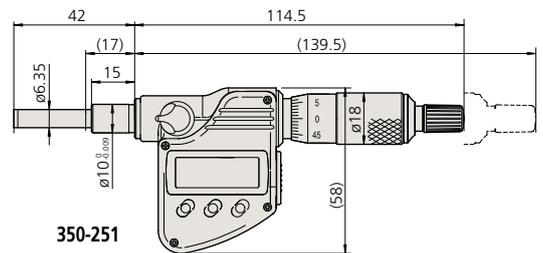
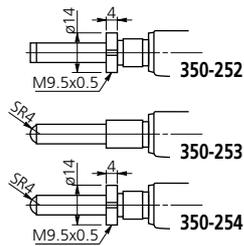
164-171



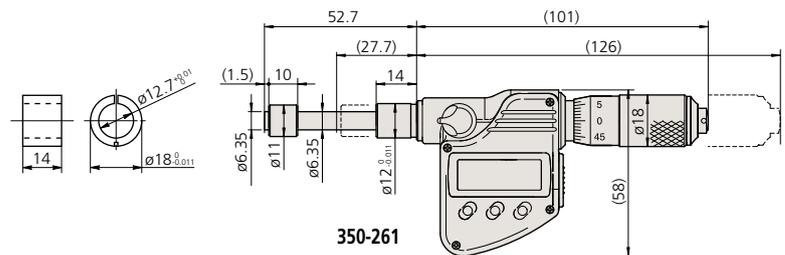
164-161



350-281



350-251



350-261

(): when retracting the spindle until its stroke end.

ABSOLUTE Digimatic Micrometer Heads

SERIES 227 — with constant & adjustable fine-loading device

FEATURES

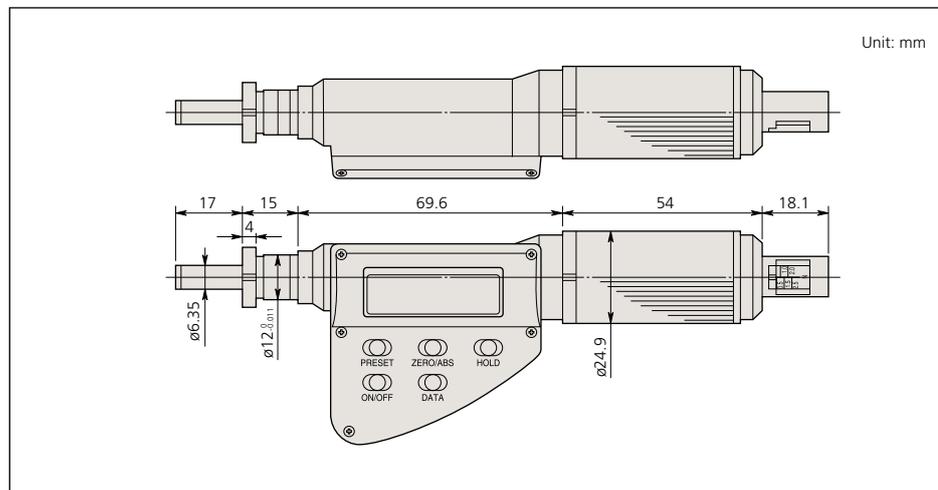
- Constant and low measuring force mechanism (adjustable: 0.5N - 2.5N or 2N - 10N) in the thimble.
- Non-rotating spindle.
- Speedy spindle feed of 10mm/rev.
- With ABSOLUTE linear encoder.



SPECIFICATIONS

Metric		Inch/Metric		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
15mm	227-241	.6"	227-251	w/ clamp nut	Flat (carbide tip)	0.5 - 2.5N measuring force
15mm	227-242	.6"	227-252	w/ clamp nut	Flat (carbide tip)	2 - 10N measuring force

DIMENSION



SPC

ABSOLUTE[®]
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Accuracy and stem diameter:

Order No.	Accuracy*	Stem dia.	
227-241	227-251	±2μm	12mm
227-242	227-252	±2μm	12mm

*Excluding quantizing error

Resolution: 0.001mm or .00005"/0.001mm
 Display: LCD
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 1 year under normal use

Function

Zero-setting, Data hold, Power ON/OFF, Data output, Preset, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

937387: SPC cable (1m)
965013: SPC cable (2m)

Micrometer Heads

SERIES 148 — Fine Spindle Feeding of 0.1mm/rev

Technical Data

Graduations: 0.002mm
 Spindle pitch: 0.1mm
 Spindle face: Spherical of SKS3 (more than HRC60), lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 6mm (4mm: **148-243**)
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
148-142	±2μm	9.5mm
148-143	±2μm	9.5mm
148-342	±2μm	9.5mm
148-343	±2μm	9.5mm
148-242	±5μm	6mm
148-243	±5μm	6mm

Spindle pitch



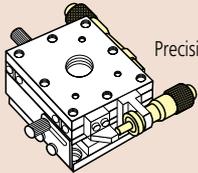
Screw Thread pitch= 0.1mm



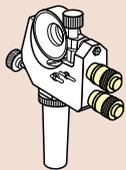
Screw Thread pitch= 0.5mm

Applications

Semiconductor-wafer positioning machinery and optical component alignment units, etc.

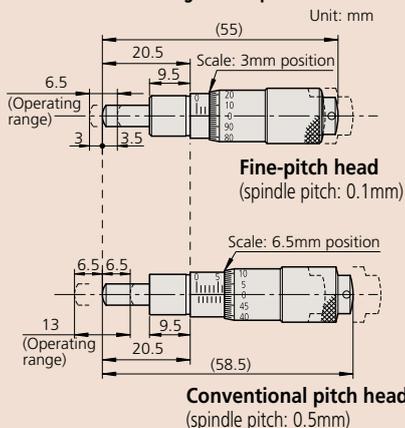


Precision X-Y table positioning



Precision adjustment of mirror in holder

Comparison of mounting dimensions between a standard fine-pitch head and a standard conventional pitch head at the mid-range travel position



While the fine-pitch micrometer head has a measuring range of 6.5mm, the conventional head has a larger range of 13mm. When replacing a conventional head, the fine-pitch type can use the common range in the middle of the spindle travel. The standard and compact types of fine-pitch head are completely interchangeable.

FEATURES

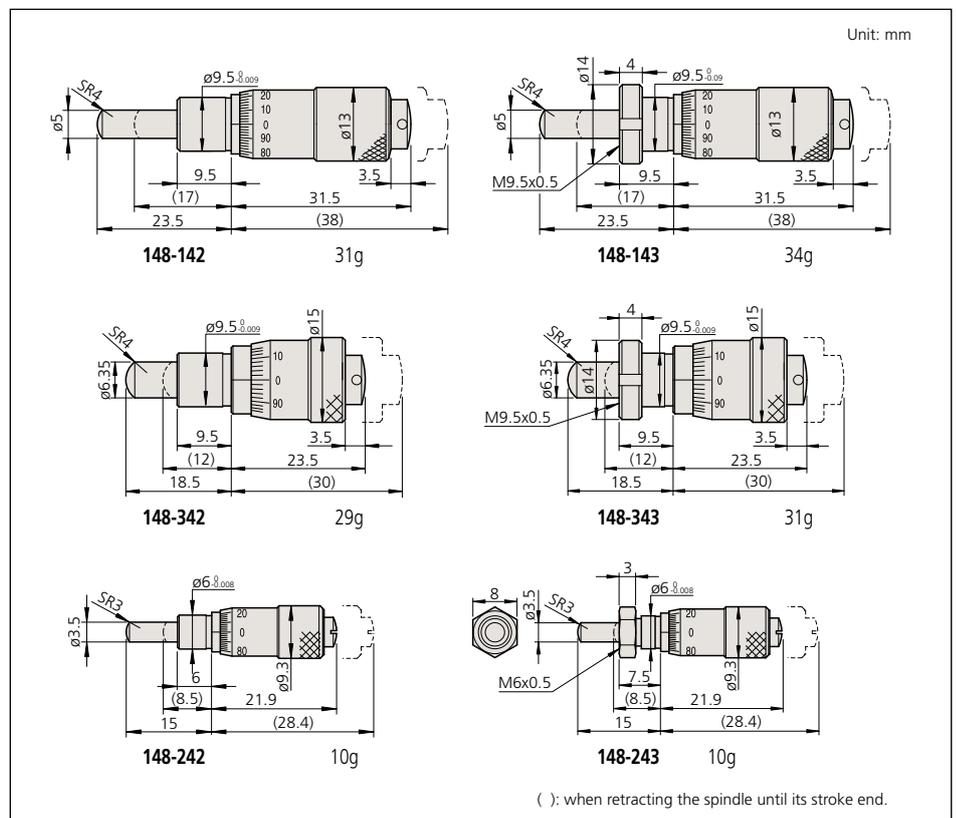
- Fine spindle feeding of just 0.1mm/rev for extra-fine adjustment and positioning.
- External dimensions are compatible with conventional 0.5mm pitch heads.



SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
6.5mm	148-142	—	—	Plain	Spherical (SR4)	—
6.5mm	148-143	—	—	w/ clamp nut	Spherical (SR4)	—
6.5mm	148-342	—	—	Plain	Spherical (SR4)	Thicker & shorter thimble
6.5mm	148-343	—	—	w/ clamp nut	Spherical (SR4)	Thicker & shorter thimble
6.5mm	148-242	—	—	Plain	Spherical (SR3)	Small thimble diameter
6.5mm	148-243	—	—	w/ clamp nut	Spherical (SR3)	Small thimble diameter

DIMENSION AND MASS



Micrometer Heads

SERIES 148 — Fine Spindle Feeding of 0.25mm/rev

FEATURES

- Fine spindle feeding of just 0.25mm/rev for fine adjustment and positioning.



148-132

SPECIFICATIONS

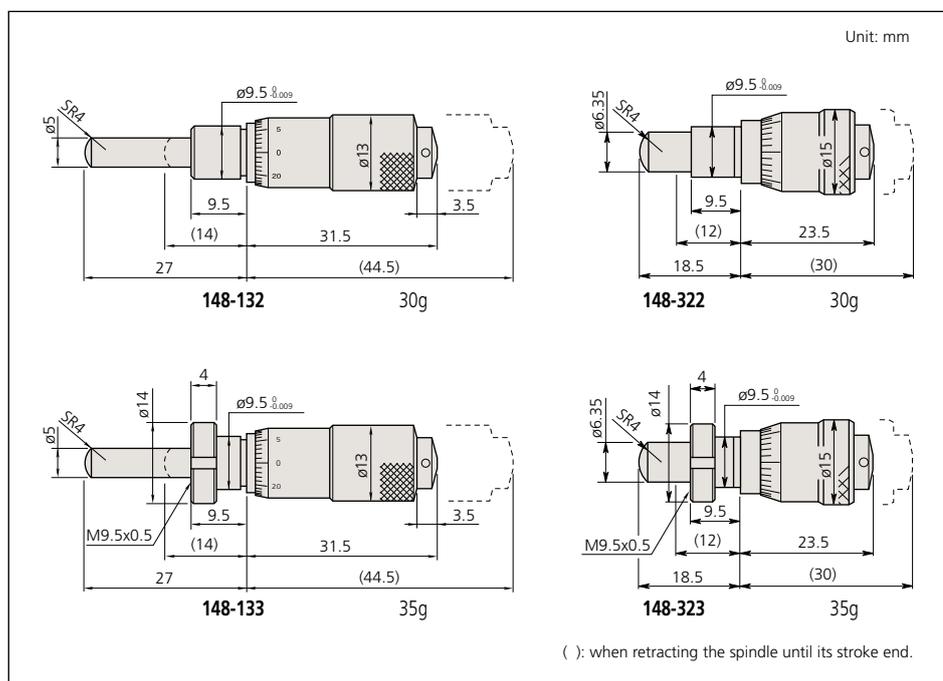
Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
13mm	148-132	—	—	Plain	Spherical (SR4)	—
13mm	148-133	—	—	w/ clamp nut	Spherical (SR4)	—
6.5mm	148-322	—	—	Plain	Spherical (SR4)	—
6.5mm	148-323	—	—	w/ clamp nut	Spherical (SR4)	—

Technical Data

Graduations: 0.01mm
 Spindle pitch: 0.25mm
 Spindle face: Spherical of SKS3 (more than HRC60), lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 6mm
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
148-132	±2μm	9.5mm
148-133	±2μm	9.5mm
148-322	±2μm	9.5mm
148-323	±2μm	9.5mm

DIMENSION AND MASS



Micrometer Heads

SERIES 148 — Ultra-small / Small Type

Technical Data

Graduations: 0.02mm (148-215, 148-216), 0.01mm or .001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat or spherical of SKS3 (more than HRC60),
 lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 3mm (4mm: 148-216, 148-218)
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
148-215	±5μm	3.5mm / .156"
148-216	±5μm	3.5mm / .156"
148-201	±5μm	6mm / .25"
148-203	±5μm	6mm / .25"
148-205	±5μm	6mm / .25"
148-207	±5μm	6mm / .25"
148-209	±5μm	6mm / .25"
148-211	±5μm	6mm / .25"

FEATURES

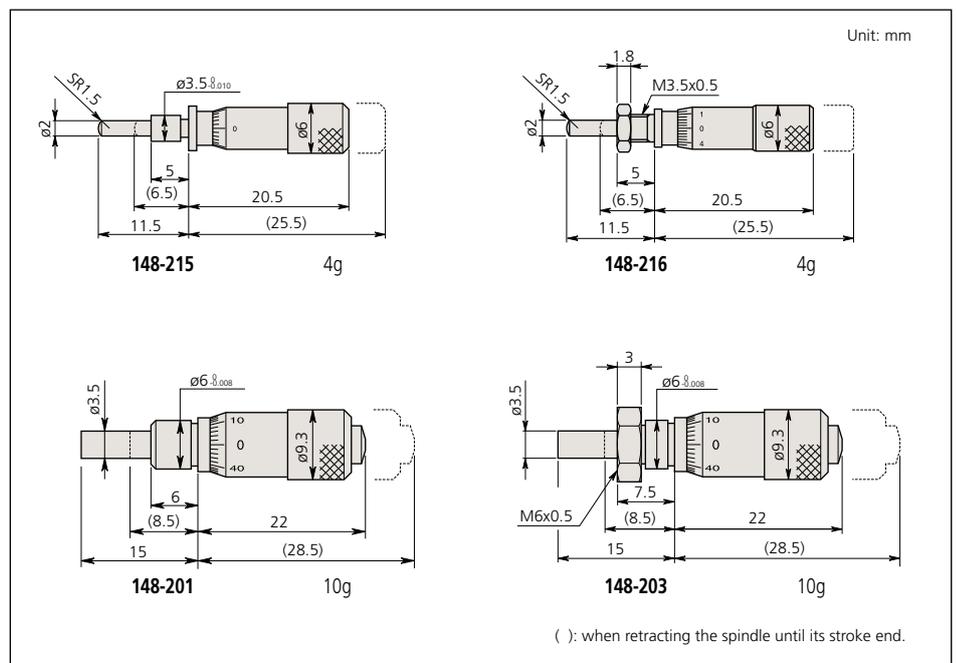
- Miniature micrometer heads for ease of incorporating into machines.



SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
5mm	148-215	.2"	148-217	Plain	Spherical (SR1.5)	—
5mm	148-216	.2"	148-218	w/ clamp nut	Spherical (SR1.5)	—
6.5mm	148-201	.25"	148-202	Plain	Flat	—
6.5mm	148-203	.25"	148-204	w/ clamp nut	Flat	—
6.5mm	148-205	.25"	148-206	Plain	Spherical (SR3)	—
6.5mm	148-207	.25"	148-208	w/ clamp nut	Spherical (SR3)	—
6.5mm	148-209	.25"	148-210	Plain	Flat	Reverse reading
6.5mm	148-211	.25"	148-212	w/ clamp nut	Flat	Reverse reading

DIMENSION AND MASS



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.)



SPECIFICATIONS

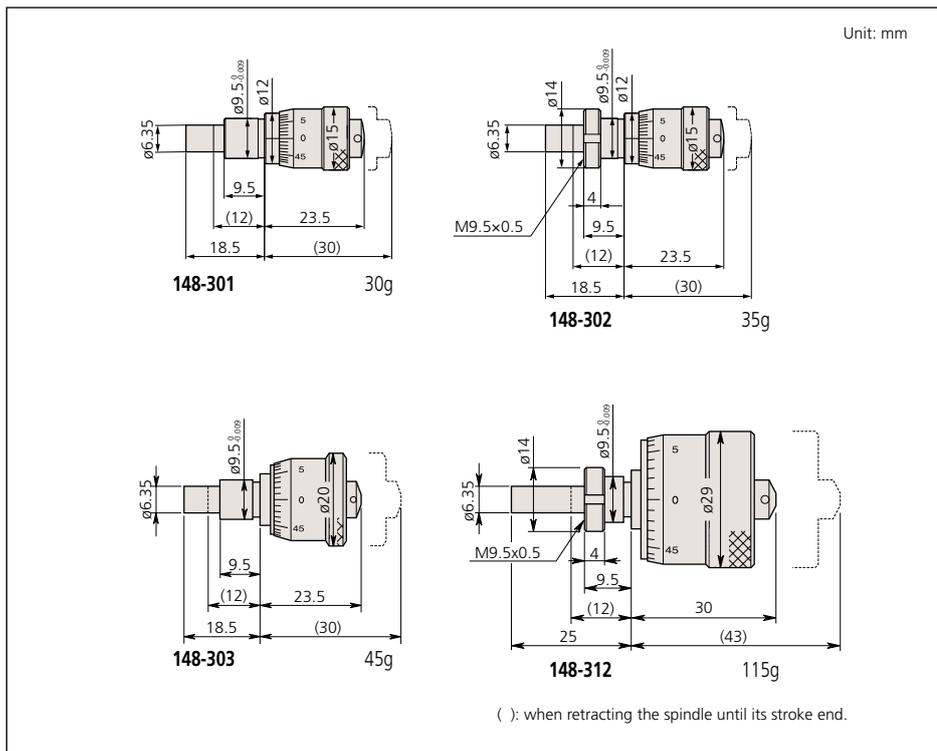
Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
6.5mm	148-301	.25"	148-351	Plain	Flat	15mm / .59" thimble dia.
6.5mm	148-302	.25"	148-352	w/ clamp nut	Flat	15mm / .59" thimble dia.
6.5mm	148-303	.25"	148-353	Plain	Flat	20mm / .79" thimble dia.
6.5mm	148-304	.25"	148-354	w/ clamp nut	Flat	20mm / .79" thimble dia.
6.5mm	148-305	.25"	148-355	Plain	Flat	29mm / 1.14" thimble dia.
6.5mm	148-306	.25"	148-356	w/ clamp nut	Flat	29mm / 1.14" thimble dia.
13mm	148-307	.5"	148-357	Plain	Flat	15mm / .59" thimble dia.
13mm	148-308	.5"	148-358	w/ clamp nut	Flat	15mm / .59" thimble dia.
13mm	148-309	.5"	148-359	Plain	Flat	20mm / .79" thimble dia.
13mm	148-310	.5"	148-360	w/ clamp nut	Flat	20mm / .79" thimble dia.
13mm	148-311	.5"	148-361	Plain	Flat	29mm / 1.14" thimble dia.
13mm	148-312	.5"	148-362	w/ clamp nut	Flat	29mm / 1.14" thimble dia.

Technical Data

Graduations: 0.01mm or .001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat of SKS3 (more than HRC60),
 lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 6mm
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
148-301	±2μm	9.5mm / .375"
148-302	±2μm	9.5mm / .375"
148-303	±2μm	9.5mm / .375"
148-304	±2μm	9.5mm / .375"
148-305	±2μm	9.5mm / .375"
148-306	±2μm	9.5mm / .375"
148-307	±2μm	9.5mm / .375"
148-308	±2μm	9.5mm / .375"
148-309	±2μm	9.5mm / .375"
148-310	±2μm	9.5mm / .375"
148-311	±2μm	9.5mm / .375"
148-312	±2μm	9.5mm / .375"

DIMENSION AND MASS



Micrometer Heads

SERIES 148 — Common Type in Small Size

Technical Data

Graduations: 0.01mm or .001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat or spherical of SKS3 (more than HRC60),
 lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 6mm
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
148-104	±2μm	9.5mm / .375"
148-103	±2μm	9.5mm / .375"
148-121	±2μm	9.5mm / .375"
148-120	±2μm	9.5mm / .375"
148-801	±2μm	9.5mm / .375"
148-802	±2μm	9.5mm / .375"
148-803	±2μm	9.5mm / .375"
148-804	±2μm	9.5mm / .375"
148-821	±2μm	9.5mm / .375"
148-822	±2μm	9.5mm / .375"
148-823	±2μm	9.5mm / .375"
148-824	±2μm	9.5mm / .375"

FEATURES

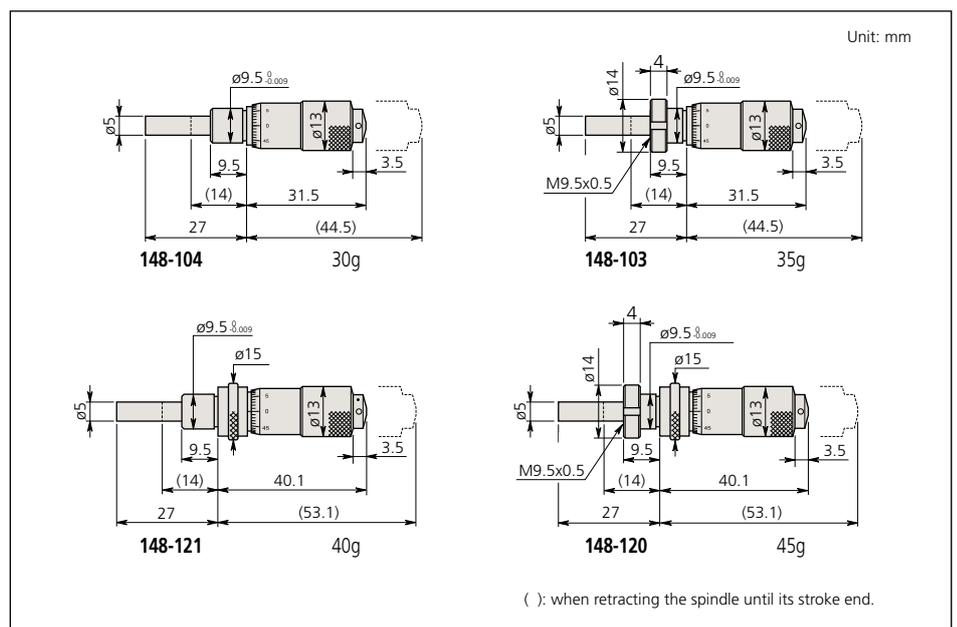


SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
13mm	148-104	.5"	148-112	Plain	Flat	—
13mm	148-103	.5"	148-111	w/ clamp nut	Flat	—
13mm	148-121	.5"	148-123	Plain*	Flat	—
13mm	148-120	.5"	148-122	w/ clamp nut*	Flat	—
13mm	148-801	.5"	148-811	Plain	Spherical (SR4)	—
13mm	148-802	.5"	148-812	w/ clamp nut	Spherical (SR4)	—
13mm	148-803	.5"	148-813	Plain*	Spherical (SR4)	—
13mm	148-804	.5"	148-814	w/ clamp nut*	Spherical (SR4)	—
13mm	148-821	.5"	148-831	Plain	Flat	Reverse reading
13mm	148-822	.5"	148-832	w/ clamp nut	Flat	Reverse reading
13mm	148-823	.5"	148-833	Plain*	Flat	Reverse reading
13mm	148-824	.5"	148-834	w/ clamp nut*	Flat	Reverse reading

*with spindle lock

DIMENSION AND MASS



Micrometer Heads

SERIES 148 — Common Type in Small Size with Zero-Adjustable Thimble

FEATURES

- The thimble can be set to zero at any position by loosening the setscrew



Technical Data

Graduations: 0.01mm or .001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat or spherical of SKS3 (more than HRC60), lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 6mm
 Accuracy and stem diameter

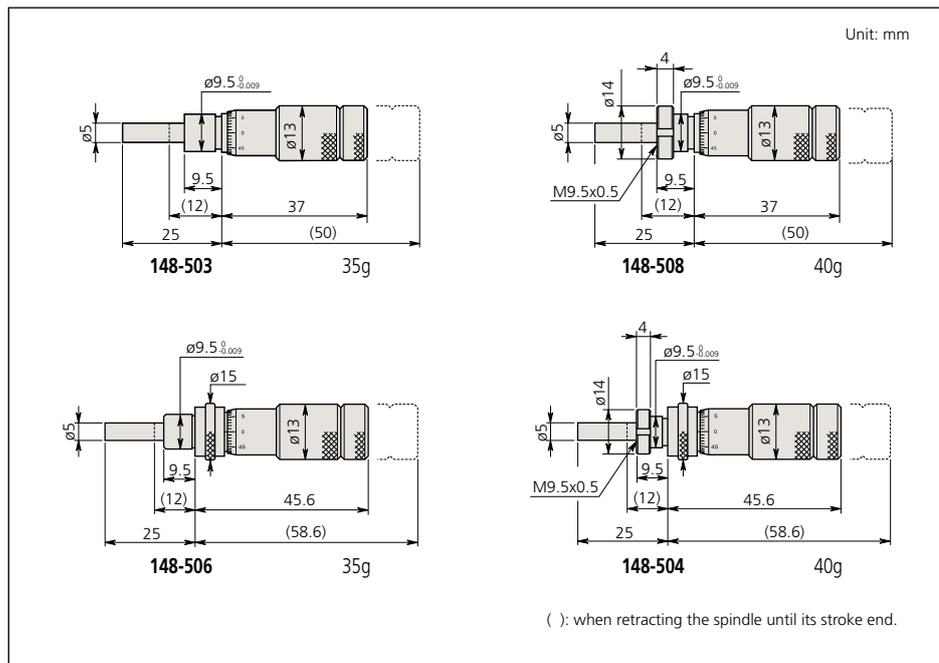
Order No.	Accuracy	Stem dia.
148-503	±2μm	9.5mm / .375"
148-513	±2μm	9.5mm / .375"
148-508	±2μm	9.5mm / .375"
148-506	±2μm	9.5mm / .375"
148-504	±2μm	9.5mm / .375"
148-853	±2μm	9.5mm / .375"
148-854	±2μm	9.5mm / .375"
148-863	±2μm	9.5mm / .375"
148-864	±2μm	9.5mm / .375"

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
13mm	148-503	.5"	148-501	Plain	Flat	—
13mm	148-513	.5"	148-511	Plain	Flat	Stainless steel throughout
13mm	148-508	.5"	148-507	w/ clamp nut	Flat	—
13mm	148-506	.5"	148-505	Plain*	Flat	—
13mm	148-504	.5"	148-502	w/ clamp nut*	Flat	—
13mm	148-853	.5"	148-851	Plain	Spherical (SR4)	—
13mm	148-854	.5"	148-852	w/ clamp nut*	Spherical (SR4)	—
13mm	148-863	.5"	148-861	Plain	Flat	Reverse reading
13mm	148-864	.5"	148-862	w/ clamp nut*	Flat	Reverse reading

*with spindle lock

DIMENSION AND MASS



Micrometer Heads

SERIES 149 — Common Type in Small Size with Carbide-tipped Spindle

Technical Data

Graduations: 0.01mm or .001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90) or spherical, lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 6mm
 (11.5mm: **149-131, 149-147, 149-802, 149-812, 149-822, 149-832**)

Accuracy and stem diameter

Order No.	Order No.	Accuracy	Stem dia.
149-132	149-148	±2μm	9.5mm / .375"
149-131	149-147	±2μm	9.5mm / .375"
149-183	149-185	±2μm	9.5mm / .375"
149-184	149-182	±2μm	9.5mm / .375"
149-801	149-811	±2μm	9.5mm / .375"
149-802	149-812	±2μm	9.5mm / .375"
149-821	149-831	±2μm	9.5mm / .375"
149-822	149-832	±2μm	9.5mm / .375"

FEATURES

- Carbide tipped measuring face.

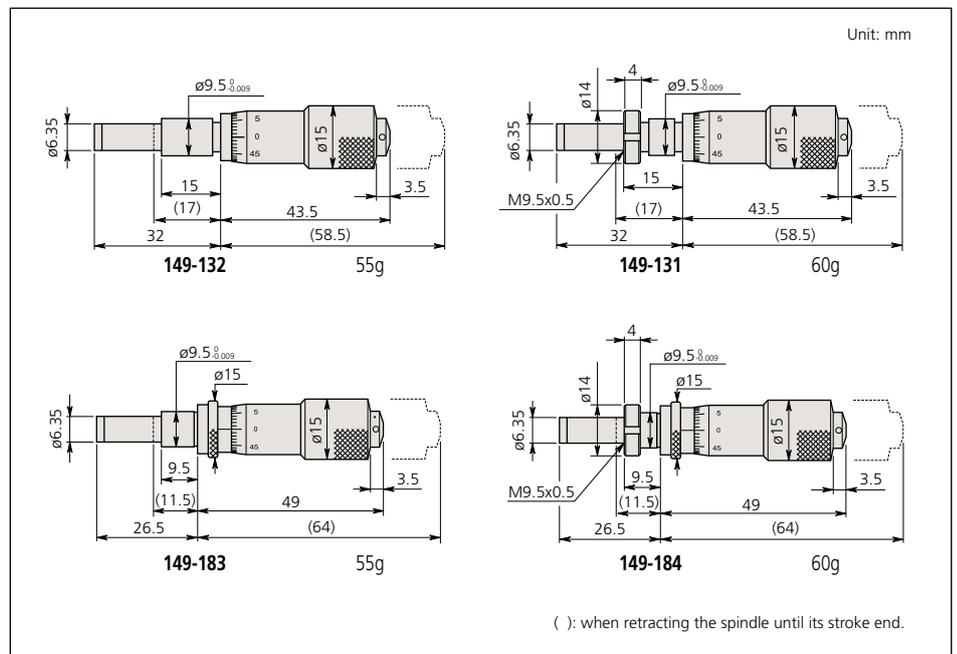


SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
15mm	149-132	.6"	149-148	Plain	Flat (carbide tip)	—
15mm	149-131	.6"	149-147	w/ clamp nut	Flat (carbide tip)	—
15mm	149-183	.6"	149-185**	Plain*	Flat (carbide tip)	—
15mm	149-184	.6"	149-182	w/ clamp nut*	Flat (carbide tip)	—
15mm	149-801	.6"	149-811	Plain	Spherical (SR4)	—
15mm	149-802	.6"	149-812	w/ clamp nut	Spherical (SR4)	—
15mm	149-821	.6"	149-831	Plain	Flat (carbide tip)	Reverse reading
15mm	149-822	.6"	149-832	w/ clamp nut	Flat (carbide tip)	Reverse reading

*with spindle lock **w/ratchet model (**149-181**) is available.

DIMENSION AND MASS



Micrometer Heads

SERIES 150 — Common Type in Middle Size

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		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
25mm	150-192	1"	150-208	Plain	Flat (carbide tip)	—
25mm	150-191	1"	150-207	w/ clamp nut	Flat (carbide tip)	—
25mm	150-209	1"	150-213	Plain*	Flat (carbide tip)	—
25mm	150-210	1"	150-214	w/ clamp nut*	Flat (carbide tip)	—
25mm	150-801	1"	150-811	Plain	Spherical (SR4)	—
25mm	150-802	1"	150-812	w/ clamp nut	Spherical (SR4)	—
25mm	150-821	1"	150-831	Plain	Flat (carbide tip)	Reverse reading
25mm	150-822	1"	150-832	w/ clamp nut	Flat (carbide tip)	Reverse reading
25mm	150-190	1"	150-206	Plain	Flat (carbide tip)	w/ vernier (0.001mm / .0001")
25mm	150-189	1"	150-205	w/ clamp nut	Flat (carbide tip)	w/ vernier (0.001mm / .0001")
—	—	1"	150-215	Plain*	Flat (carbide tip)	w/ vernier (.0001")
—	—	1"	150-216	w/ clamp nut*	Flat (carbide tip)	w/ vernier (.0001")
25mm	150-196	—	—	Plain	Flat (carbide tip)	w/o ratchet stop
25mm	150-195	—	—	w/ clamp nut	Flat (carbide tip)	w/o ratchet stop
25mm	150-211	1"	150-217	Plain*	Flat (carbide tip)	w/o ratchet stop
25mm	150-212	1"	150-218	w/ clamp nut*	Flat (carbide tip)	w/o ratchet stop
25mm	150-219	1"	150-221	Plain	Flat	Long spindle
25mm	150-220	1"	150-222	w/ clamp nut	Flat	Long spindle

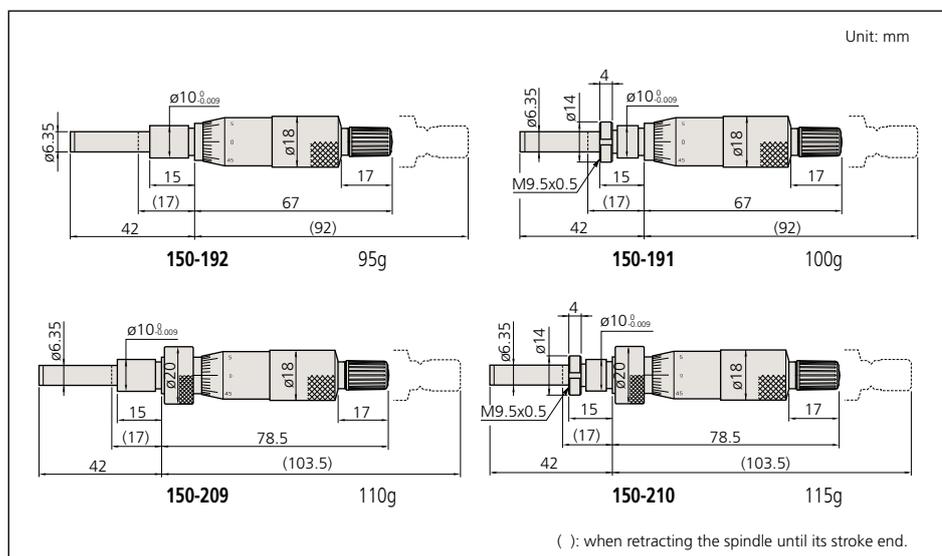
*with spindle lock

Technical Data

Graduations: 0.01mm, 0.001mm, .001" or .0001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90)* or spherical, lapped surface
 *(SKS3 (more than HRC60): Long spindle type)
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 11.5mm
 Accuracy and stem diameter

Order No.	Order No.	Accuracy	Stem dia.
150-192	150-208	±2μm	10mm / .375"
150-191	150-207	±2μm	10mm / .375"
150-209	150-213	±2μm	10mm / .375"
150-210	150-214	±2μm	10mm / .375"
150-801	150-811	±2μm	10mm / .375"
150-802	150-812	±2μm	10mm / .375"
150-821	150-831	±2μm	10mm / .375"
150-822	150-832	±2μm	10mm / .375"
150-190	150-206	±2μm	10mm / .375"
150-189	150-205	±2μm	10mm / .375"
—	150-215	±2μm	10mm / .375"
—	150-216	±2μm	10mm / .375"
150-196	—	±2μm	10mm / .375"
150-195	—	±2μm	10mm / .375"
150-211	150-217	±2μm	10mm / .375"
150-212	150-218	±2μm	10mm / .375"
150-219	150-221	±2μm	10mm / .375"
150-220	150-222	±2μm	10mm / .375"

DIMENSION AND MASS



Micrometer Heads

SERIES 151 — Common Type in Middle Size with 8mm diameter spindle

Technical Data

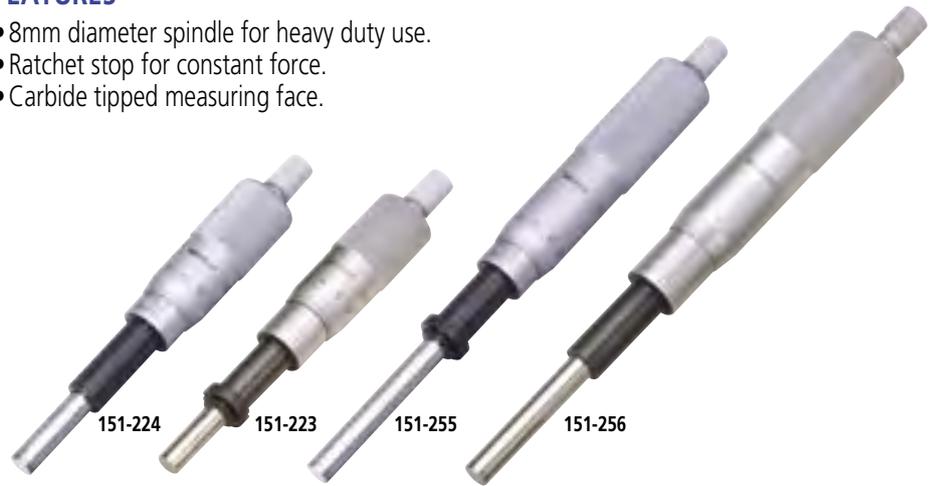
Graduations: 0.01mm, 0.001mm, .001" or .0001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90), lapped surface
 Scale surface: Hard-chrome plating
 Fixture thickness for clamp nut: 25.5mm
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
151-224	±2μm	12mm / .5"
151-223	±2μm	12mm / .5"
151-214*	±2μm	12mm / .5"
151-213*	±2μm	12mm / .5"
151-222	±2μm	12mm / .5"
151-221	±2μm	12mm / .5"
151-212*	±2μm	12mm / .5"
151-211*	±2μm	12mm / .5"
151-227*	±2μm	12mm / .5"
151-228*	±2μm	12mm / .5"
151-225	±2μm	12mm / .5"
151-226	±2μm	12mm / .5"
151-256	±4μm	12mm / .5"
151-255	±4μm	12mm / .5"
151-260	±4μm	12mm / .5"
151-259	±4μm	12mm / .5"

*Order-to-made models

FEATURES

- 8mm diameter spindle for heavy duty use.
- Ratchet stop for constant force.
- Carbide tipped measuring face.

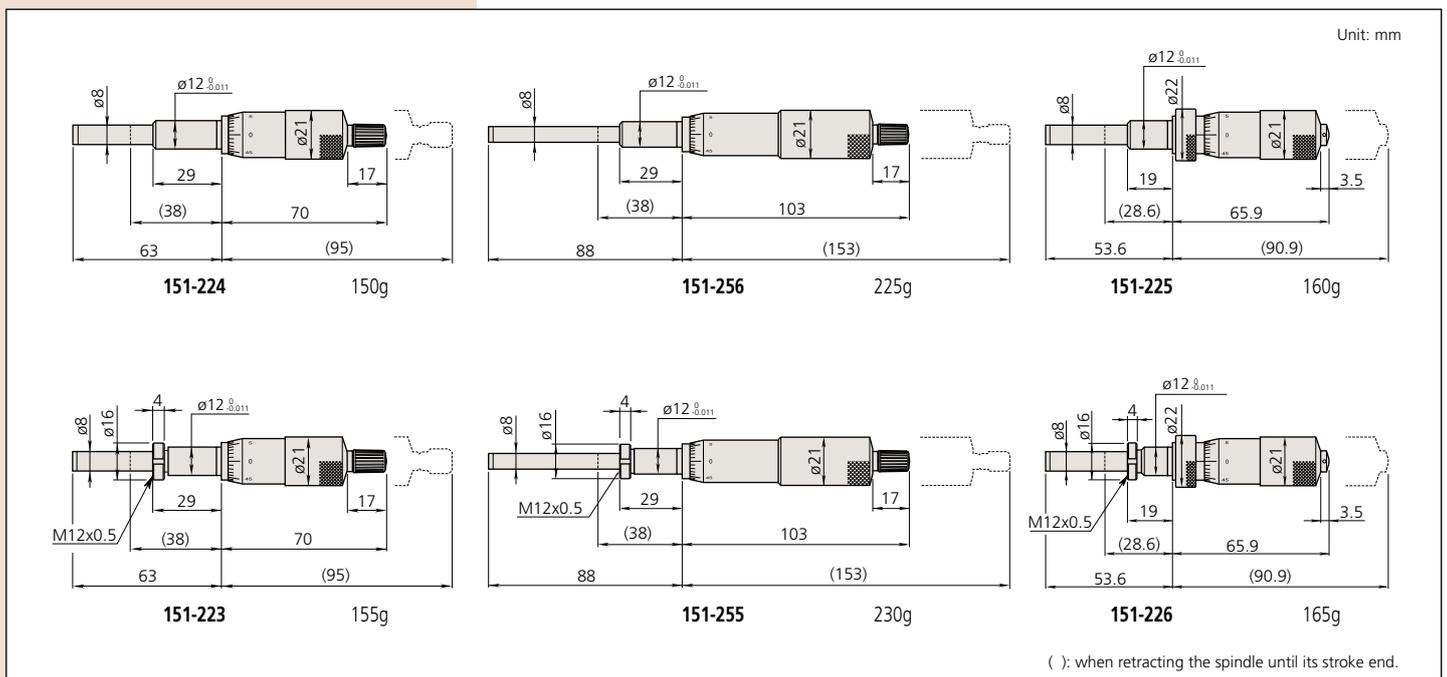


SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
25mm	151-224	1"	151-240	Plain	Flat (carbide tip)	—
25mm	151-223	1"	151-239	w/ clamp nut	Flat (carbide tip)	—
25mm	151-214***	1"	—	Plain*	Flat (carbide tip)	—
25mm	151-213***	1"	—	w/ clamp nut*	Flat (carbide tip)	—
25mm	151-222	1"	151-238	Plain	Flat (carbide tip)	w/ vernier (0.001mm / .0001")
25mm	151-221	1"	151-237	w/ clamp nut	Flat (carbide tip)	w/ vernier (0.001mm / .0001")
25mm	151-212***	1"	151-243**	Plain*	Flat (carbide tip)	w/ vernier (0.001mm / .0001")
25mm	151-211***	1"	151-244**	w/ clamp nut*	Flat (carbide tip)	w/ vernier (0.001mm / .0001")
25mm	151-227***	1"	—	Plain	Flat (carbide tip)	w/o ratchet stop
25mm	151-228***	1"	—	w/ clamp nut	Flat (carbide tip)	w/o ratchet stop
25mm	151-225	1"	151-241	Plain*	Flat (carbide tip)	w/o ratchet stop
25mm	151-226	1"	151-242	w/ clamp nut*	Flat (carbide tip)	w/o ratchet stop
50mm	151-256	2"	151-272	Plain	Flat (carbide tip)	—
50mm	151-255	2"	151-271	w/ clamp nut	Flat (carbide tip)	—
50mm	151-260	2"	—	Plain	Flat (carbide tip)	w/o ratchet stop
50mm	151-259	2"	—	w/ clamp nut	Flat (carbide tip)	w/o ratchet stop

*with spindle lock **with ratchet stop ***Order-to-made

DIMENSION AND MASS



Micrometer Heads

SERIES 153 — Non-Rotating Spindle Type

FEATURES

- Carbide tipped measuring face.
- Non-rotating spindle.



Technical Data

Graduations: 0.01mm, 0.001mm, .001" or .0001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90),
 lapped surface
 Scale surface: Hard-chrome plating
 Accuracy and stem diameter

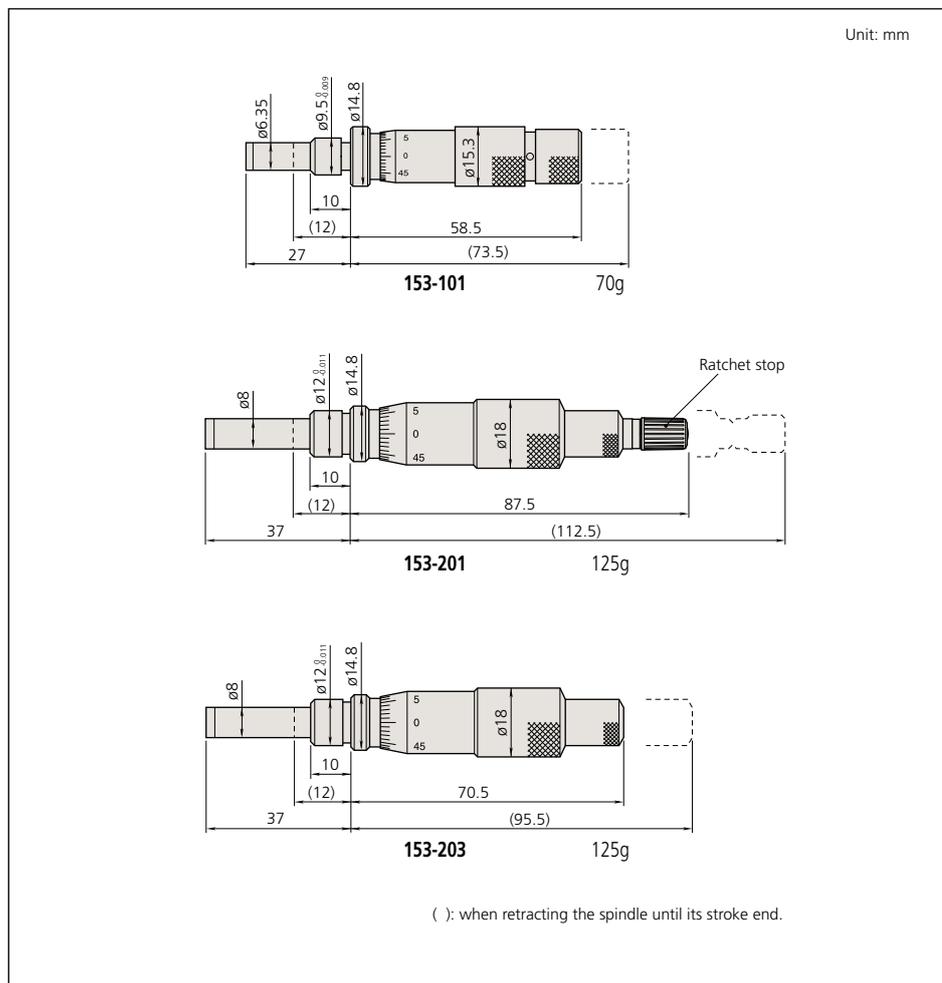
Order No.	Accuracy	Stem dia.
153-101	±3µm	9.5mm / .375"
153-201	±3µm	12mm / .5"
153-202	±3µm	12mm / .5"
153-203	±3µm	12mm / .5"
153-204	±3µm	12mm/.5"

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
15mm	153-101	.5"	153-108	Plain	Flat (carbide tip)	w/ vernier (.0001")
25mm	153-201*	1"	153-205*	Plain	Flat (carbide tip)	—
25mm	153-202*	1"	153-206*	Plain	Flat (carbide tip)	w/ vernier (0.001mm / .0001")
25mm	153-203	1"	153-207	Plain	Flat (carbide tip)	—
25mm	153-204	1"	153-208	Plain	Flat (carbide tip)	w/ vernier (0.001mm / .0001")

*with ratchet stop

DIMENSION AND MASS



Micrometer Heads

SERIES 152 — Quick Spindle Feeding of 1mm/rev

Technical Data

Graduations: 0.01mm or .001"
 Spindle pitch: 1mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90),
 lapped surface
 Scale surface: Hard-chrome plating
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
152-101	±2μm	12mm / .5"
152-102	±2μm	12mm / .5"
152-103	±4μm	12mm / .5"

FEATURES

- Quick spindle feeding of 1mm/rev.
- Carbide tipped measuring face.

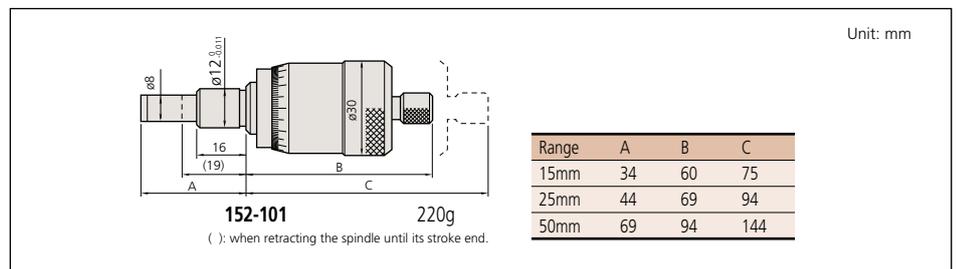


152-102

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
15mm	152-101	.5"	152-110	Plain	Flat (carbide tip)	—
25mm	152-102	1"	152-111	Plain	Flat (carbide tip)	—
50mm	152-103	2"	152-112	Plain	Flat (carbide tip)	—

DIMENSION AND MASS



Technical Data

Graduations: 0.002mm or .0001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90),
 lapped surface
 Scale surface: White anodized aluminum
 Fixture thickness for clamp nut: 22.5mm
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
152-283	±2μm	12mm
152-332	±2μm	12mm
152-348	±2μm	12mm / .5"
152-380	±4μm	12mm / .5"

Micrometer Heads

SERIES 152 — Large Thimble Type for Fine Feeding

FEATURES

- The large diameter thimble for fine adjustment and positioning.
- Carbide tipped measuring face.

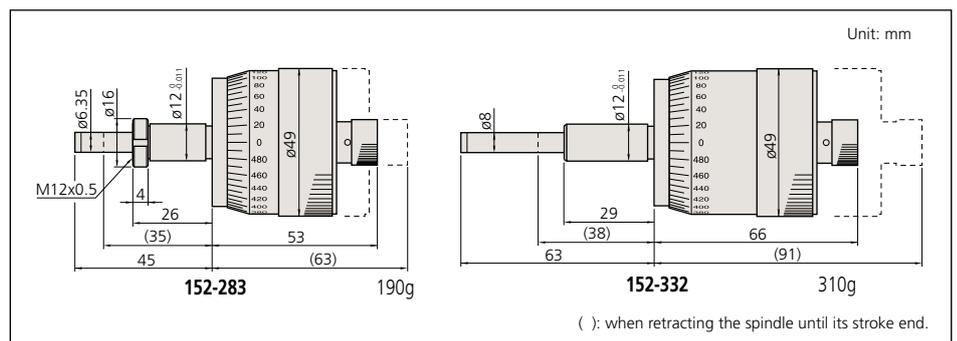


152-283

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
10mm	152-283	—	—	w/ clamp nut	Flat (carbide tip)	—
25mm	152-332	—	—	Plain	Flat (carbide tip)	—
25mm	152-348	1"	152-372	Plain	Flat (carbide tip)	Bidirectional graduation
50mm	152-380	2"	152-388	Plain	Flat (carbide tip)	Bidirectional graduation

DIMENSION AND MASS



Micrometer Heads

SERIES 110 — Differential Screw Translator (Extra-Fine Feeding) Type

FEATURES

- Differential movements of spindle threads and units allow fine spindle feeding (0.05mm/rev*), resulting in high resolution measurements.

*0.025mm/rev / .001rev (fine feeding): **110-502, 110-504**

- Carbide tipped measuring face.
- Non-rotating spindle.



Technical Data

Graduations: 0.001mm, 0.0005mm, 0.0001mm, .00005" or .00002", .000005"

Spindle face: Flat with carbide tip (more than HRA90) or spherical, lapped surface

Scale surface: Hard-chrome plating

Fixture thickness for clamp nut: 9.5mm

(11.5mm: **110-502, 110-504**)

Accuracy and stem diameter

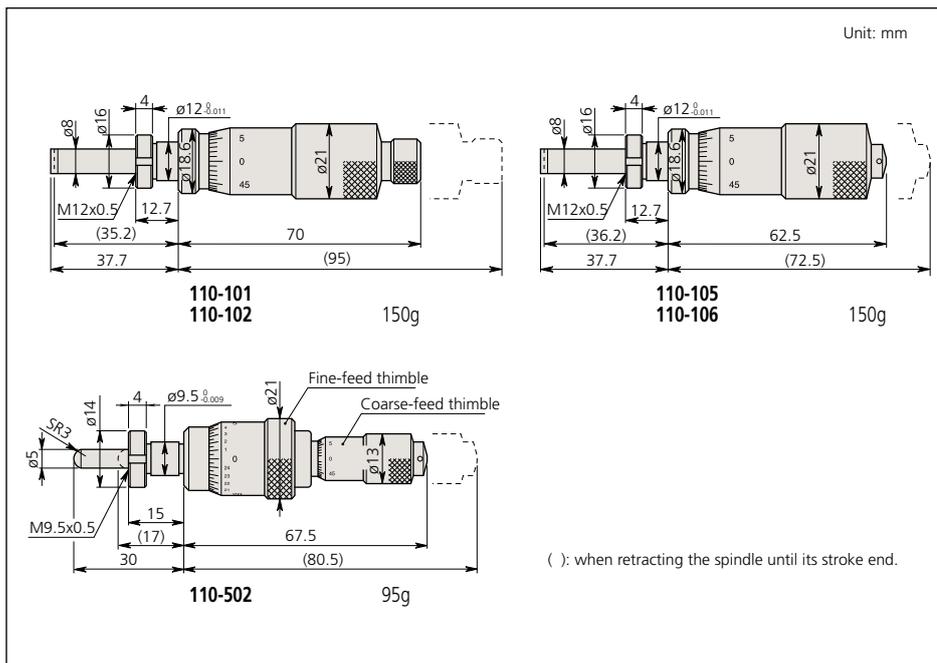
Order No.	Accuracy*	Stem dia.	
110-105	110-115	±3 / ±1.5µm	12mm / .5"
110-106	110-116	±3 / ±1.5µm	12mm / .5"
110-107	110-117	±3 / ±1.5µm	12mm / .5"
110-108	110-118	±3 / ±1.5µm	12mm / .5"
110-101	110-111	±5 / ±1.5µm	12mm / .5"
110-102	110-112	±5 / ±1.5µm	12mm / .5"
110-502	110-504	±3 / ±1.5µm	9.5mm / .375"

*Wide range / narrow range

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
1mm	110-105	.02"	110-115	w/ clamp nut	Flat (carbide tip)	—
1mm	110-106	.02"	110-116	w/ clamp nut	Flat (carbide tip)	0.0001mm / .000005" graduations
1mm	110-107	.02"	110-117	w/ clamp nut	Spherical (SR10)	—
1mm	110-108	.02"	110-118	w/ clamp nut	Spherical (SR10)	0.0001mm / .000005" graduations
2.5mm	110-101	.05"	110-111	w/ clamp nut	Flat (carbide tip)	—
2.5mm	110-102	.05"	110-112	w/ clamp nut	Flat (carbide tip)	0.0001mm / .000005" graduations
13mm	110-502	.5"	110-504	w/ clamp nut	Spherical (SR3)	0.0005mm / .00002" graduations 0.2mm / .006" fine feeding range

DIMENSION AND MASS



Micrometer Heads

SERIES 152 — for XY-Stage

Technical Data

Graduations: 0.005mm, 0.001mm* or .0001"

*vernier reading

Spindle pitch: 1mm or .025"

Spindle face: Flat (hardened) or spherical with carbide tip
(more than HRA90), lapped surface

Scale surface: White anodized aluminum

Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
152-390	±2μm	18mm / .709"
152-389	±2μm	18mm / .709"
152-402	±2μm	18mm / .709"
152-401	±2μm	18mm / .709"

FEATURES

152-390, 152-389, 152-391, 152-392

- Non-rotating device is attached to the spindle tip.
- Floating thimble allows easy zero setting at any spindle position.
- Bidirectional graduation for easy reading in both directions.

152-390, 152-389, 152-391, 152-392

- Adjustable spindle can be moved with the thimble held at any position, allowing easy zero-setting.

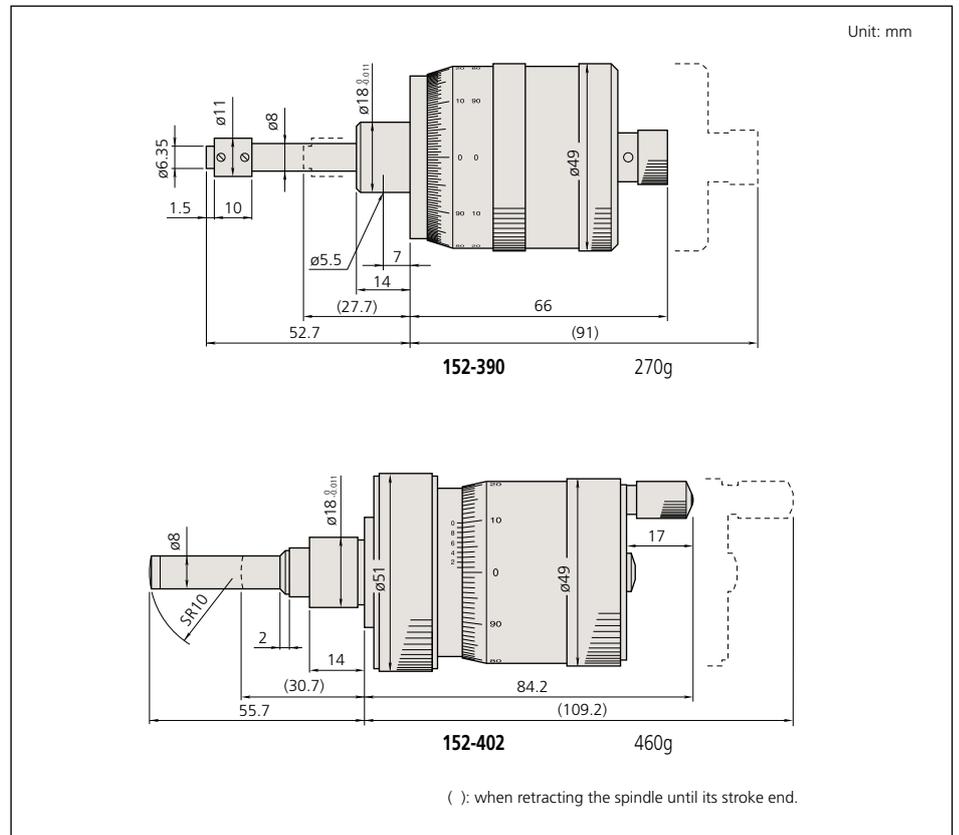


152-390

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
25mm	152-390	1"	152-392	Plain	Flat (hardened) with non-rotating device	for X-axis, Bidirectional grad.
25mm	152-389	1"	152-391	Plain	Flat (hardened) with non-rotating device	for Y-axis, Bidirectional grad.
25mm	152-402*	—	—	Plain	Spherical with carbide tip (SR10)	for X-axis, with vernier
25mm	152-401*	—	—	Plain	Spherical with carbide tip (SR10)	for Y-axis, with vernier

DIMENSION AND MASS



Micrometer Heads

SERIES 197 — Non-rotating Spindle and Large Thimble

FEATURES

- Large thimble micrometer head with non-rotating spindle.
- Floating thimble allows easy zero setting at any spindle position.
- Bidirectional graduation for easy reading in both directions.
- Dual-spindle mechanism for quick feeding of 1mm/rev.
- Carbide tipped measuring face.

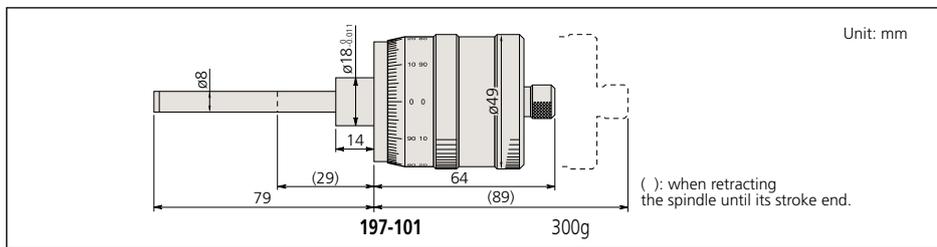


197-101

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
50mm	197-101	2"	197-201	Plain	Flat (carbide tip)	Bidirectional graduation

DIMENSION AND MASS



Micrometer Heads

SERIES 153 — Fine Graduation and High Accuracy

FEATURES

- Fine graduation and high resolution model.
- Large thimble micrometer head with non-rotating spindle.
- Bidirectional graduation for easy reading in both directions.
- Carbide tipped measuring face.

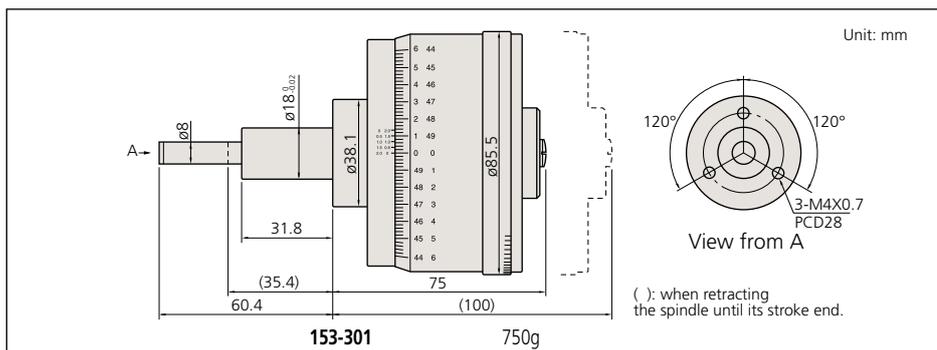


153-301

SPECIFICATIONS

Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
25mm	153-301	1"	153-302	Plain	Flat (carbide tip)	Bidirectional graduation

DIMENSION AND MASS



Technical Data

Graduations: 0.005mm or .0002"
 Spindle pitch: 1mm or .05"
 Spindle face: Flat with carbide tip (more than HRA90), lapped surface

Scale surface: White anodized aluminum
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
197-101	±5μm	18mm / .709"

Technical Data

Graduations: 0.0005mm or .00001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90), lapped surface

Scale surface: White anodized aluminum
 Accuracy and stem diameter

Order No.	Accuracy*	Stem dia.
153-301	±1 / ±0.5μm	18mm / .709"

*Wide range / narrow range

Digital Micrometer Heads

SERIES 164 — High Resolution and High Accuracy



(Refer to the page 9 for details.)

Technical Data

Accuracy: $\pm 1\mu\text{m}$ (wide range), $\pm 0.5\mu\text{m}$ (narrow range)
(excluding quantizing error)

Stem diameter: 18mm

Resolution: 0.0001mm

When using the external KA counter

FEATURES

- Connecting with an external display unit, the Electronic Micrometer Head provides the most efficient means of obtaining precision measurement on XY-stages and similar applications.

- External display units (KA Counter) are optional.



164-141



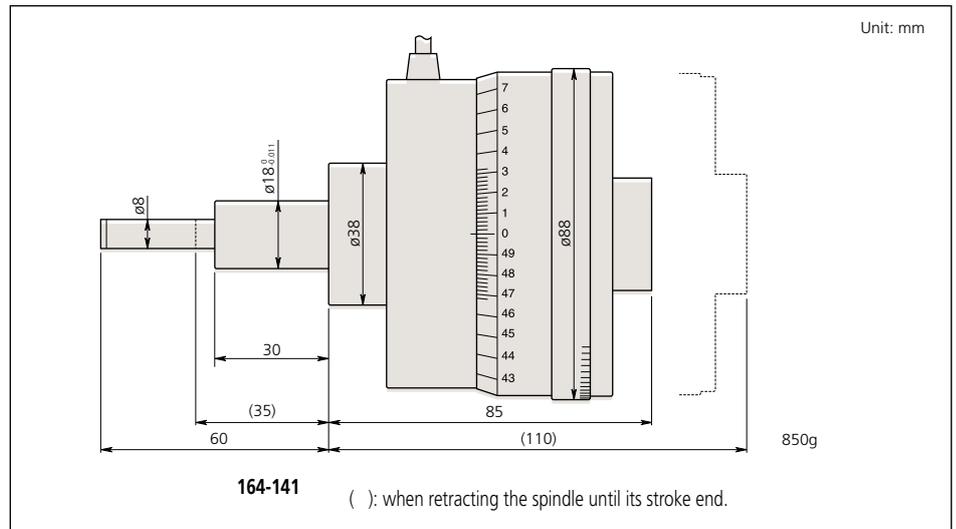
174-173

SPECIFICATIONS

Metric

Range	Order No.	Stem	Spindle face	Remarks
25mm	164-141	Plain	Flat (carbide tip)	High accuracy model

DIMENSION AND MASS



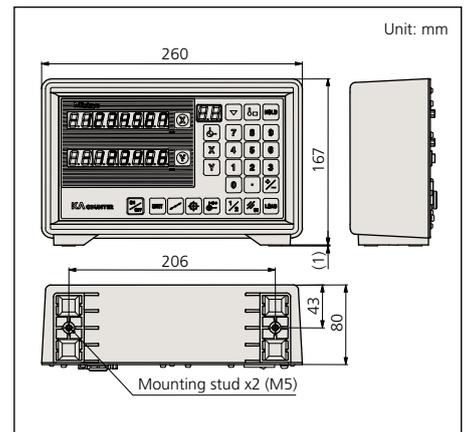
SPECIFICATIONS: KA counter

Order No.	174-173*
Resolution	0.001mm, 0.005mm, .0001", .0005" (selectable)
Mass	1.1kg

* To denote your AC line voltage add the following suffixes to the order No.

- A: for UL/CSA
- D: for CEE
- E: for BS
- F: for SAA
- DC: for China
- K: for Korea

DIMENSION



Micrometer Heads

SERIES 250 — with Digit Counter

FEATURES

- Digit counter for easy reading of spindle movement.
- Carbide tipped measuring face.
- Ratchet Stop for constant force.



250-301

SPECIFICATIONS

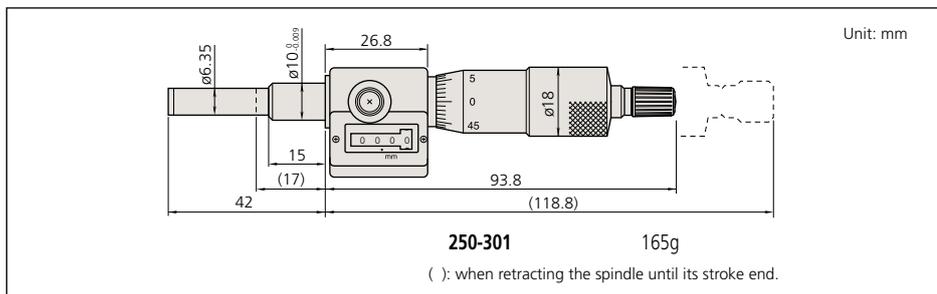
Metric		Inch		Stem	Spindle face	Remarks
Range	Order No.	Range	Order No.			
25mm	250-301	1"	250-312*	Plain	Flat (carbide tip)	Vernier reading

Technical Data

Graduations: 0.01mm or .0001"
 Spindle pitch: 0.5mm or .025"
 Spindle face: Flat with carbide tip (more than HRA90), lapped surface
 Scale surface: Hard-chrome plating
 Accuracy and stem diameter

Order No.	Accuracy	Stem dia.
250-301	±2μm	10mm / .375"

DIMENSION AND MASS



Micro Jack

SERIES 7

FEATURES

- Used for accurate leveling of machines, surface plates, and other precision instruments.
- Easy adjustment under heavy load.



7850

SPECIFICATIONS

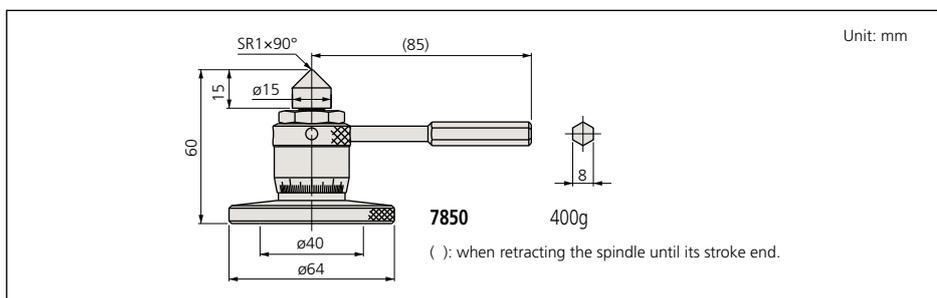
Metric			Inch		
Range	Order No.	Remarks	Range	Order No.	Remarks
60 - 75mm	7850	Max. load: 400kg	2.5" - 3"	7851	Max. load: 400kg

Technical Data

Graduations: 0.01mm or .001"



DIMENSION AND MASS

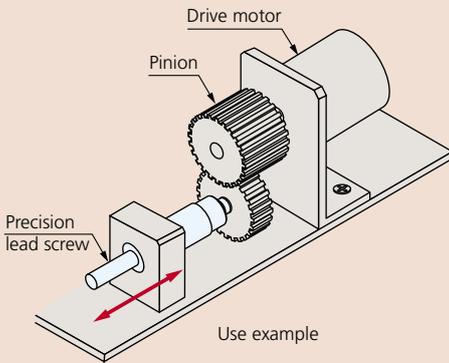


Precision Lead Screw

FEATURES

- Mitutoyo manufactures simple and less expensive precision lead screws for precise positioning mechanisms and fine feed mechanisms, in addition to the conventional micrometer heads.
- Mitutoyo also manufactures screws with special specifications, such as 0.25 mm pitch, as well as those with the standard 0.5 mm feed pitch and with dimensions and forms that meet customer's requirements.

- Durability: 100 thousand times are guaranteed (use condition: 4 kg load; 2 kg for AS-6.5 and BS-6.5)
- Main applications
 - Precision feed stages
 - Fine adjustment of optical elements (mirrors, prisms)
 - Fiber optic centering devices
 - Various assembly and adjustment jigs



SPECIFICATIONS

Order No.	04AZA160	04AZA161	04AZA162	04AZA163	04AZA164	04AZA165
Model	AS-6.5	BS-6.5	AS-13	BS-13	AS-25	BS-25
Stroke	6.5		13		25	
Feeding pitch	0.5					
Feeding accuracy	±5μm			±2μm		
Stem diameter	ø6 ^{-0.008}		ø9.5 ^{-0.009}		ø10 ^{-0.009}	
Tip diameter	ø3.5		ø5		ø6.35	
Tail diameter	ø3 ^{-0.01}		ø5 ^{-0.012}		ø6 ^{-0.015}	
Screw nominal diameter	M4.5 x 0.5			M7.35 x 0.5		
Sleeve diameter	ø7		ø10.5		ø12	
Measuring face	Hardening				With Carbide tip	
Mass (g)	10	11	27	30	61	64
Others	•AS type: Flat spindle tip without nut •BS type: Spherical spindle tip with nut					

DIMENSION

Unit: mm

Type A: Straight type

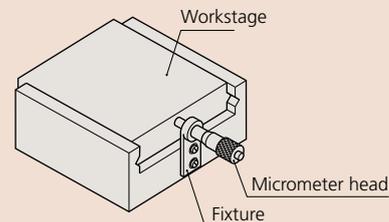
Type B: Stem with nut

Order No.	L	L1	L2	L3	L4	L5
04AZA160	39	15	14.5	9	6	—
04AZA161	39	15	14.5	7.5	6	3
04AZA162	57.5	25	21.5	15.5	8	—
04AZA163	57.5	25	21.5	15.5	8	4
04AZA164	98.5	42	39.5	27	10	—
04AZA165	98.5	42	39.5	27	10	4

Fixtures for Micrometer Heads

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.



DIMENSION: Fixtures for plain stem type micrometer heads

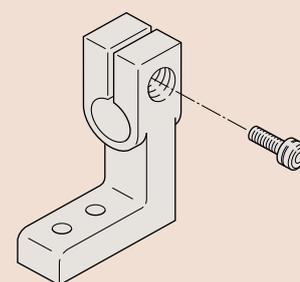
Unit: mm

Order No.	303560	303569	303579
A	ø9.5	ø9.5	ø10
B	9	14.5	14.5
C	14.5	19.5	19.5
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.	303564	303573	303583
A	ø9.5	ø9.5	ø10
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

Order No.	303562	303571	303581
A	ø9.5	ø9.5	ø10
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.	303566	303575	303585
A	ø9.5	ø9.5	ø10
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

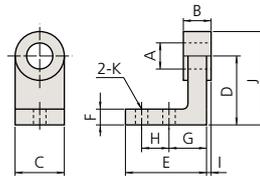


Note: Supplied with a socket head screw (M3x0.5x12mm) for the fixtures to be used with a micrometer head without clamp nut (plain stem type micrometer head).

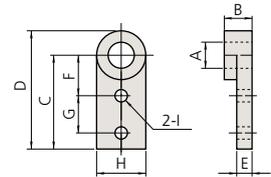


DIMENSION: Fixtures for micrometer heads with clamp nut

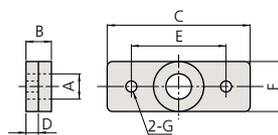
Unit: mm



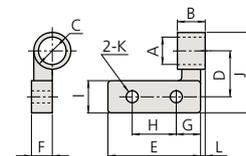
Order No.	303559	303568	303578
A	ø9.5	ø9.5	ø10
B	6	11.5	11.5
C	14.5	19.5	19.5
D	20	30	30
E	24	35	35
F	5	7	7
G	11	16	16
H	8	12	12
I	0.5	1.75	1.75
J	27.5	40	40
K	ø3.4	ø4.5	ø4.5



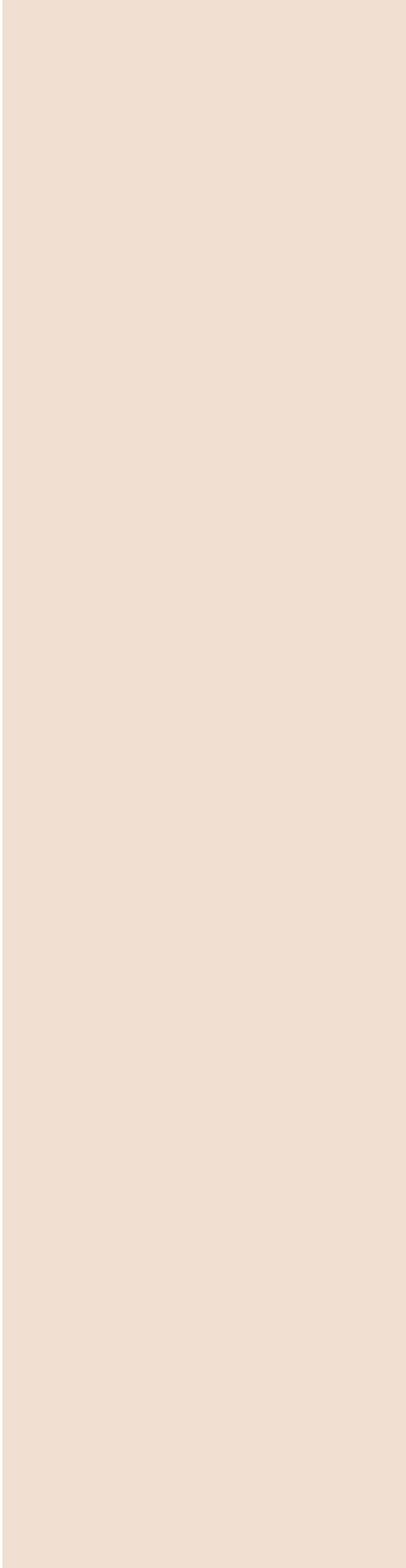
Order No.	303563	303572	303582
A	ø9.5	ø9.5	ø10
B	6	11.5	11.5
C	30	40	40
D	37.5	50	50
E	4.5	6.5	6.5
F	15	18	18
G	10	15	15
H	15	20	20
I	ø3.4	ø4.5	ø4.5



Order No.	303561	303570	303580
A	ø9.5	ø9.5	ø10
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.	303565	303574	303584
A	ø9.5	ø9.5	ø10
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



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**Holtest
ABSOLUTE Borematic**

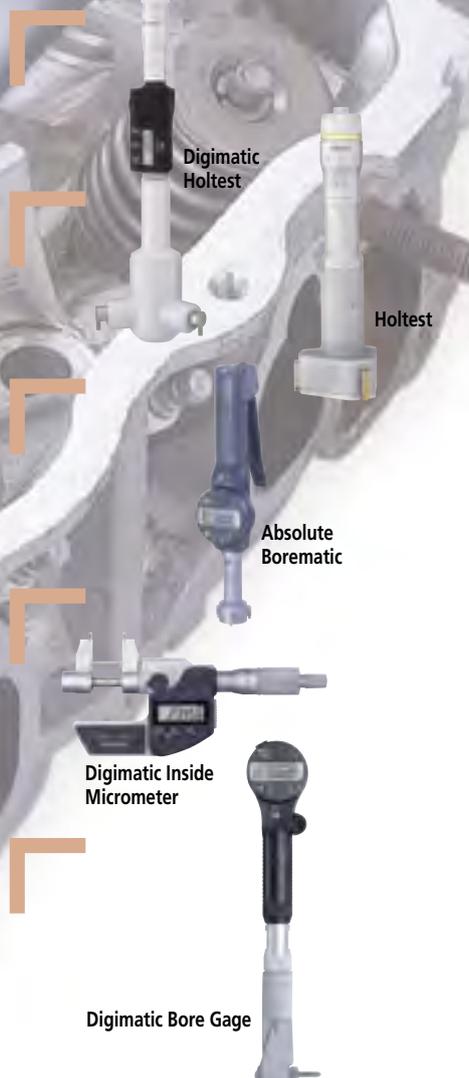


Inside Micrometer



Bore Gages

New Products



Digimatic Holtest

SERIES 468 — Three-Point Internal Micrometers

FEATURES

- Titanium-coated measuring pins (over 12mm range models) provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Large LCD readout.
- Functions available: Presetting, Zero-setting, Data hold, Data out put, Error alarm, Battery replacement alarm.
- 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 AND MASS

Unit: mm

Range	L
6 - 8mm	45
8 - 10mm	45
10 - 12mm	45
12 - 16mm	76
16 - 20mm	76
20 - 25mm	91
25 - 30mm	103
30 - 40mm	103
40 - 50mm	102
50 - 63mm	105
62 - 75mm	105
75 - 88mm	105
87 - 100mm	105
100 - 125mm	151
125 - 150mm	151
150 - 175mm	151
175 - 200mm	151
200 - 225mm	151
225 - 250mm	151
250 - 275mm	151
275 - 300mm	151

Measuring a Blind Hole

The measuring pins held in the jaws permit measuring the diameter of a blind hole right down to the bottom.

Range	a	b	c
2 - 6mm	—	—	2
6 - 12mm	2	—	2.5
12 - 20mm	0.3	5.6	3.5
20 - 30mm	0.3	8.3	5.2
30 - 50mm	0.3	13	10
50 - 100mm	0.3	17	14
100 - 300mm	12.4	21	13.8



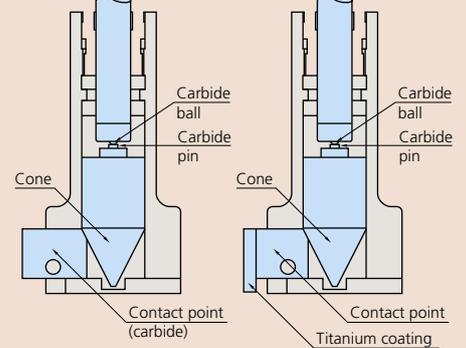
(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
 Resolution: 0.001mm, .00005"/0.001mm (models up to 4")
 or .0001"/0.001mm (models over 5")
 Contact point: Carbide or titanium coating*
*over 12mm/.5" models
 Measuring method: Three-point method
 Display: LCD
 Battery: SR44 (1 pcs.), **938882**
 Battery life: Approx. 8 months under normal use

6 - 12mm / .28 - .5"

Over 12mm / .5"



Function

Zero-setting, Data hold, Automatic power ON/OFF, Data output, Preset, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

- 937387:** SPC cable (1m)
- 965013:** SPC cable (2m)
- 982693:** Mounting plate for stand
- 156-101:** Stand
- : Extension rod (Refer to the list of specifications.)
- : Setting ring (See page 122.)



SPECIFICATIONS

Metric <input type="checkbox"/> Individual		Inch/Metric <input type="checkbox"/> Individual		<input type="checkbox"/> with titanium coated contact points	
Range	Order No.	Range	Order No.	Accuracy*	Extension rod (optional)
6 - 8mm	468-131	.275" - .35"	468-231	±2µm (within 2µm)	100mm (952322)
8 - 10mm	468-132	.35" - .425"	468-232	±2µm (within 2µm)	100mm (952322)
10 - 12mm	468-133	.425" - .5"	468-233	±2µm (within 2µm)	100mm (952322)
12 - 16mm	468-134-10	.5" - .65"	468-234-10	±2µm (within 2µm)	150mm (952621)
16 - 20mm	468-135-10	.65" - .8"	468-235-10	±2µm (within 2µm)	150mm (952621)
20 - 25mm	468-136-10	.8" - 1"	468-236-10	±3µm (within 3µm)	150mm (952622)
25 - 30mm	468-137-10	1" - 1.2"	468-237-10	±3µm (within 3µm)	150mm (952622)
30 - 40mm	468-138-10	1.2" - 1.6"	468-238-10	±3µm (within 3µm)	150mm (952622)
40 - 50mm	468-139-10	1.6" - 2"	468-239-10	±3µm (within 3µm)	150mm (952622)
50 - 63mm	468-140-10	2" - 2.5"	468-240-10	±3µm (within 3µm)	150mm (952623)
62 - 75mm	468-141-10	2.5" - 3"	468-241-10	±3µm (within 3µm)	150mm (952623)
75 - 88mm	468-142-10	3" - 3.5"	468-242-10	±3µm (within 3µm)	150mm (952623)
87 - 100mm	468-143-10	3.5" - 4"	468-243-10	±3µm (within 3µm)	150mm (952623)
100 - 125mm	468-144-10	4" - 5"	468-244-10	±5µm (within 5µm)	150mm (952623)
125 - 150mm	468-145-10	5" - 6"	468-245-10	±5µm (within 5µm)	150mm (952623)
150 - 175mm	468-146-10	6" - 7"	468-246-10	±5µm (within 5µm)	150mm (952623)
175 - 200mm	468-147-10	7" - 8"	468-247-10	±5µm (within 5µm)	150mm (952623)
200 - 225mm	468-148-10	8" - 9"	468-248-10	±5µm (within 5µm)	150mm (952623)
225 - 250mm	468-149-10	9" - 10"	468-249-10	±5µm (within 5µm)	150mm (952623)
250 - 275mm	468-150-10	10" - 11"	468-250-10	±5µm (within 5µm)	150mm (952623)
275 - 300mm	468-151-10	11" - 12"	468-251-10	±5µm (within 5µm)	150mm (952623)

*Instrumental error excluding quantizing error (maximum error)

Complete-Unit Set

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

Metric <input type="checkbox"/> Individual		<input type="checkbox"/> with titanium coated contact points		
Range	Order No.	Individual range	Setting rings included	Remarks
6 - 12mm	468-961	6-8, 8-10, 10-12mm	ø8mm, ø10mm	—
12 - 25mm	468-962-10	12-16, 16-20, 20-25mm	ø16mm, ø20mm	—
25 - 50mm	468-963-10	25-30, 30-40, 40-50mm	ø30mm, ø40mm	—
50 - 75mm	468-964-10	50-63, 62-75mm	ø62mm	—
75 - 100mm	468-965-10	75-88, 87-100mm	ø87mm	—

Inch/Metric <input type="checkbox"/> Individual		<input type="checkbox"/> with titanium coated contact points		
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"	468-967-10	.5-.65", .65-.8", .8-1"	.65" DIA., .8" DIA.	—
1" - 2"	468-968-10	1-1.2", 1.2-1.6", 1.6-2"	1.2" DIA., 1.6" DIA.	—
2" - 3"	468-969-10	2-2.5", 2.5-3"	2.5" DIA.	—
3" - 4"	468-970-10	3-3.5", 3.5-4"	3.5" DIA.	—

Interchangeable-Head Set

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

Metric <input type="checkbox"/> Individual		<input type="checkbox"/> with titanium coated contact points		
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	468-952-10	12-16, 16-20mm	ø16mm.	with extension rod
20 - 50mm	468-953-10	20-25, 25-30, 30-40, 40-50mm	ø25mm, ø40mm	with extension rod
50 - 100mm	468-954-10	50-63, 62-75, 75-88, 87-100mm	ø62mm, ø87mm	with extension rod
100 - 200mm	468-955-10	100-125, 125-150, 150-175, 175-200mm	ø125mm, ø175mm	with extension rod

Inch/Metric <input type="checkbox"/> Individual		<input type="checkbox"/> with titanium coated contact points		
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"	468-957-10	.5-.65", .65-.8"	.65" DIA.	with extension rod
.8" - 2"	468-958-10	.8-1", 1-1.2", 1.2-1.6", 1.6-2"	1" DIA., 1.6" DIA.	with extension rod
2" - 4"	468-959-10	2-2.5", 2.5-3", 3-3.5", 3.5-4"	2.5" DIA., 3.5" DIA.	with extension rod
4" - 8"	468-960-10	4-5", 5-6", 6-7", 7-8"	5" DIA., 7" DIA.	with extension rod



Holtest

SERIES 368 — Three-Point/Two-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

- Titanium-coated measuring pins (over 12mm range models) provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- 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.



368-168

368-174



Two-point contact type

368-001



Titanium coated contact points (excluding models up to 12mm/.5")



(Refer to the page 9 for details.)

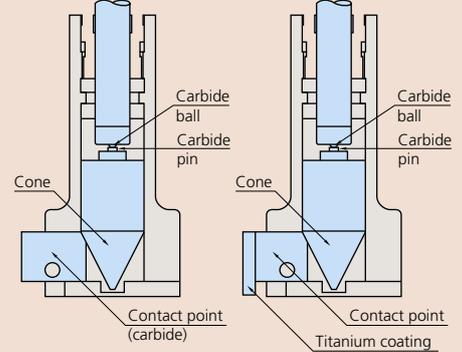
Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.001mm, 0.005mm (models over 12mm),
 .0001" or .0002" (models over .5")

Range	Measuring method	Contact-point material
2 - 3mm .08 - .12"	Two-point method	Hardened steel (HRC60.5 or more)
3 - 6mm .12 - .28"	Two-point method	Hardened steel (HRC60.5 or more)
6 - 12mm .28 - .5"	Three-point method	Carbide
over 12mm over .5"	Three-point method	Titanium coating (1700-2000Hv)

6 - 12mm / .28 - .5"

Over 12mm / .5"



Optional Accessory

- : Extension rod (Refer to the list of specifications.)
- : Setting ring (See page 122.)

DIMENSION

Unit: mm

Measuring a Blind Hole

The measuring pins held in the jaws permit measuring the diameter of a blind hole right down to the bottom.

Range	L	Range	L
2 - 2.5mm	12	40 - 50mm	102
2.5 - 3mm	12	50 - 63mm	105
3 - 4mm	22	62 - 75mm	105
4 - 5mm	22	75 - 88mm	105
5 - 6mm	22	87 - 100mm	105
6 - 8mm	59	100 - 125mm	161
8 - 10mm	59	125 - 150mm	161
10 - 12mm	59	150 - 175mm	161
12 - 16mm	82	175 - 200mm	161
16 - 20mm	82	200 - 225mm	161
20 - 25mm	94	225 - 250mm	161
25 - 30mm	94	250 - 275mm	161
30 - 40mm	102	275 - 300mm	161

Range	a	b	c
2 - 6mm	—	—	2
6 - 12mm	2	—	2.5
12 - 20mm	0.3	5.6	3.5
20 - 30mm	0.3	8.3	5.2
30 - 50mm	0.3	13	10
50 - 100mm	0.3	17	14
100 - 300mm	12.4	21	13.8



Using the optional extension rod



SPECIFICATIONS

Metric		Inch		with titanium coated contact points	
Range	Order No.	Range	Order No.	Accuracy*	Extension Rod (optional)
2 - 2.5mm	368-001	.08" - .1"	368-021	±2µm (within 2µm)	—
2.5 - 3mm	368-002	.1" - .12"	368-022	±2µm (within 2µm)	—
3 - 4mm	368-003	.12" - .16"	368-023	±2µm (within 2µm)	—
4 - 5mm	368-004	.16" - .2"	368-024	±2µm (within 2µm)	—
5 - 6mm	368-005	.2" - .24"	368-025	±2µm (within 2µm)	—
—	—	.24" - .28"	368-026	±2µm (within 2µm)	—
6 - 8mm	368-101-10	.275" - .35"	368-201-10	±2µm (within 2µm)	100mm (952322)
8 - 10mm	368-102-10	.35" - .425"	368-202-10	±2µm (within 2µm)	100mm (952322)
10 - 12mm	368-103-10	.425" - .5"	368-203-10	±2µm (within 2µm)	100mm (952322)
12 - 16mm	368-164	.5" - .65"	368-264	±2µm (within 2µm)	150mm (952621)
16 - 20mm	368-165	.65" - .8"	368-265	±2µm (within 2µm)	150mm (952621)
20 - 25mm	368-166	.8" - 1"	368-266	±3µm (within 3µm)	150mm (952622)
25 - 30mm	368-167	1" - 1.2"	368-267	±3µm (within 3µm)	150mm (952622)
30 - 40mm	368-168	1.2" - 1.6"	368-268	±3µm (within 3µm)	150mm (952622)
40 - 50mm	368-169	1.6" - 2"	368-269	±3µm (within 3µm)	150mm (952622)
50 - 63mm	368-170	2" - 2.5"	368-270	±3µm (within 3µm)	150mm (952623)
62 - 75mm	368-171	2.5" - 3"	368-271	±3µm (within 3µm)	150mm (952623)
75 - 88mm	368-172	3" - 3.5"	368-272	±3µm (within 3µm)	150mm (952623)
87 - 100mm	368-173	3.5" - 4"	368-273	±3µm (within 3µm)	150mm (952623)
100 - 125mm	368-174	4" - 5"	368-274	±5µm (within 5µm)	150mm (952623)
125 - 150mm	368-175	5" - 6"	368-275	±5µm (within 5µm)	150mm (952623)
150 - 175mm	368-176	6" - 7"	368-276	±5µm (within 5µm)	150mm (952623)
175 - 200mm	368-177	7" - 8"	368-277	±5µm (within 5µm)	150mm (952623)
200 - 225mm	368-178	8" - 9"	368-278	±5µm (within 5µm)	150mm (952623)
225 - 250mm	368-179	9" - 10"	368-279	±5µm (within 5µm)	150mm (952623)
250 - 275mm	368-180	10" - 11"	368-280	±5µm (within 5µm)	150mm (952623)
275 - 300mm	368-181	11" - 12"	368-281	±5µm (within 5µm)	150mm (952623)

*Instrumental error (maximum error)

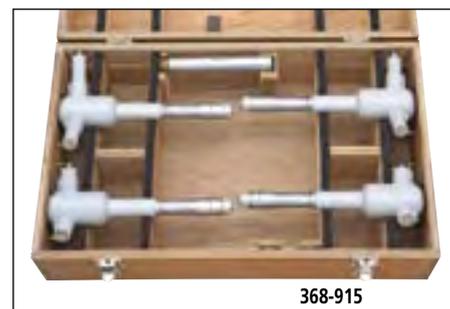
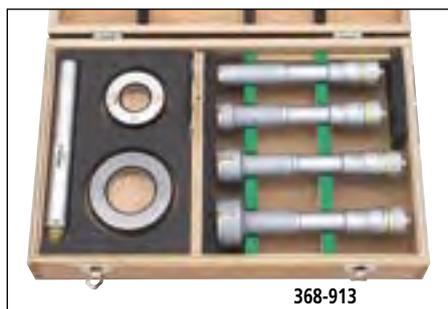
Complete-Unit Set

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

Metric		with titanium coated contact points		
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	368-901-10	6-8, 8-10, 10-12mm	ø8mm, ø10mm	with extension rod
12 - 20mm	368-912	12-16, 16-20mm	ø16mm	with extension rod
20 - 50mm	368-913	20-25, 25-30, 30-40, 40-50mm	ø25mm, ø40mm	with extension rod
50 - 100mm	368-914	50-63, 62-75, 75-88, 87-100mm	ø62mm, ø87mm	with extension rod
100 - 200mm	368-915	100-125, 125-150, 150-175, 175-200mm	ø125mm, ø175mm	with extension rod

Inch		with titanium coated contact points		
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"	368-921-10	.275-.35", .35-.425", .425-.5"	.35" DIA., .5" DIA.	with extension rod
.5" - .8"	368-917	.5-.65", .65-.8"	.65" DIA.	with extension rod
.8" - 2"	368-918	.8-1", 1-1.2", 1.2-1.6", 1.6-2"	1" DIA., 1.6" DIA.	with extension rod
2" - 4"	368-919	2-2.5", 2.5-3", 3-3.5", 3.5-4"	2.5" DIA., 3.5" DIA.	with extension rod
4" - 8"	368-920	4-5", 5-6", 6-7", 7-8"	5" DIA., 7" DIA.	with extension rod

*.0001" graduation



Holtest (Type II)

SERIES 368 — Three-Point Internal Micrometers

FEATURES

- The Holtests (type II) have three contact points made of alloyed steel.
- Economy price.
- 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.



(Refer to the page 9 for details.)

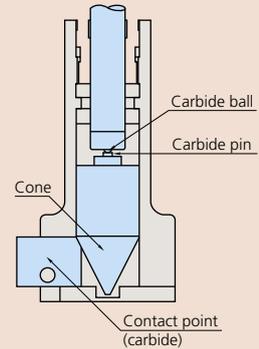
Technical Data

Accuracy: Refer to the list of specifications.

Graduation: 0.001mm or .0002"

Measuring method: Three-point method

Contact point: Carbide-tipped



Optional Accessory

- : Extension rod (Refer to the list of specifications.)
- : Setting ring (See page 122.)

DIMENSION AND MASS

Unit: mm

Range	L
12 - 16mm	82
16 - 20mm	82
20 - 25mm	94
25 - 30mm	94
30 - 40mm	102
40 - 50mm	102
50 - 63mm	105
62 - 75mm	105
75 - 88mm	105
87 - 100mm	105
100 - 125mm	161
125 - 150mm	161
150 - 175mm	161
175 - 200mm	161
200 - 225mm	161
225 - 250mm	161
250 - 275mm	161
275 - 300mm	161

Measuring a Blind Hole

The measuring pins held in the jaws permit measuring the diameter of a blind hole right down to the bottom.

Range	a	b
12 - 20mm	2.6	3.5
20 - 30mm	3.4	5.2
30 - 50mm	3.4	10
50 - 100mm	3.4	14
100 - 300mm	19.6	13.8

SPECIFICATIONS

Metric		Inch		Accuracy	Extension Rod (optional)
Range	Order No.	Range	Order No.		
12 - 16mm	368-764	.5" - .65"	368-864	±2µm (within 2µm)	150mm (952621)
16 - 20mm	368-765	.65" - .8"	368-865	±2µm (within 2µm)	150mm (952621)
20 - 25mm	368-766	.8" - 1"	368-866	±3µm (within 3µm)	150mm (952622)
25 - 30mm	368-767	1" - 1.2"	368-867	±3µm (within 3µm)	150mm (952622)
30 - 40mm	368-768	1.2" - 1.6"	368-868	±3µm (within 3µm)	150mm (952622)
40 - 50mm	368-769	1.6" - 2"	368-869	±3µm (within 3µm)	150mm (952622)
50 - 63mm	368-770	2" - 2.5"	368-870	±3µm (within 3µm)	150mm (952623)
62 - 75mm	368-771	2.5" - 3"	368-871	±3µm (within 3µm)	150mm (952623)
75 - 88mm	368-772	3" - 3.5"	368-872	±3µm (within 3µm)	150mm (952623)
87 - 100mm	368-773	3.5" - 4"	368-873	±3µm (within 3µm)	150mm (952623)
100 - 125mm	368-774	4" - 5"	368-874	±5µm (within 5µm)	150mm (952623)
125 - 150mm	368-775	5" - 6"	368-875	±5µm (within 5µm)	150mm (952623)
150 - 175mm	368-776	6" - 7"	368-876	±5µm (within 5µm)	150mm (952623)
175 - 200mm	368-777	7" - 8"	368-877	±5µm (within 5µm)	150mm (952623)
200 - 225mm	368-778	8" - 9"	368-878	±5µm (within 5µm)	150mm (952623)
225 - 250mm	368-779	9" - 10"	368-879	±5µm (within 5µm)	150mm (952623)
250 - 275mm	368-780	10" - 11"	368-880	±5µm (within 5µm)	150mm (952623)
275 - 300mm	368-781	11" - 12"	368-881	±5µm (within 5µm)	150mm (952623)

Complete-Unit Set

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

Metric				
Range	Order No.	Individual range	Setting rings included	Remarks
12 - 20mm	368-991	12-16, 16-20mm	ø16mm	with extension rod
20 - 50mm	368-992	20-25, 25-30, 30-40, 40-50mm	ø25mm, ø40mm	with extension rod
50 - 100mm	368-993	50-63, 62-75, 75-88, 87-100mm	ø62mm, ø87mm	with extension rod
100 - 200mm	368-994	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"	368-995	.5-.65", .65-.8"	.65" DIA.	with extension rod
.8" - 2"	368-996	.8-1", 1-1.2", 1.2-1.6", 1.6-2"	1" DIA., 1.6" DIA.	with extension rod
2" - 4"	368-997	2-2.5", 2.5-3", 3-3.5", 3.5-4"	2.5" DIA., 3.5" DIA.	with extension rod
4" - 8"	368-998	4-5", 5-6", 6-7", 7-8"	5" DIA., 7" DIA.	with extension rod



Borematic

SERIES 568 — ABSOLUTE Digimatic Snap-Open Bore Gages

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.

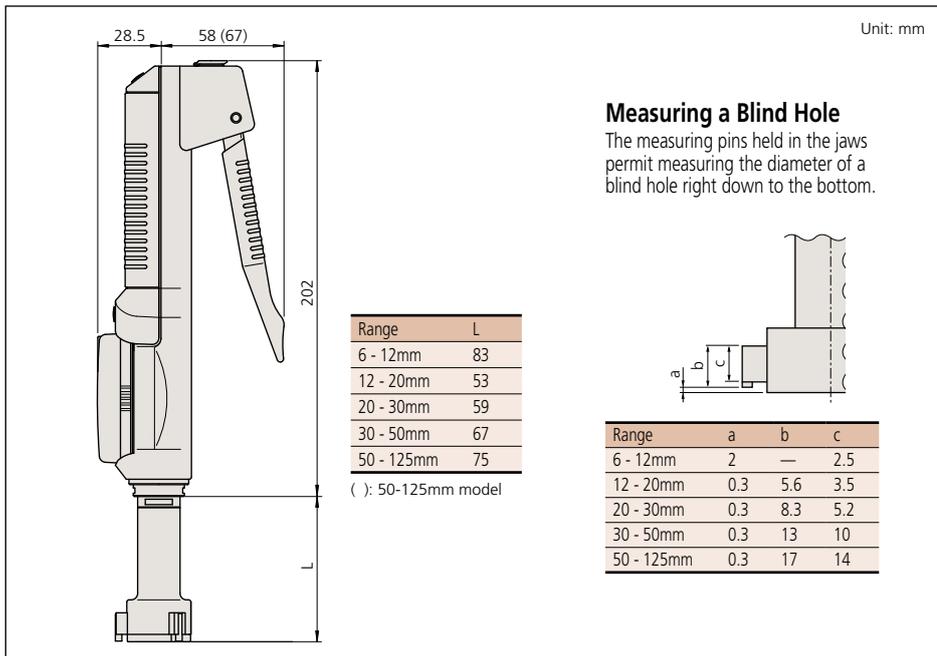
FEATURES

- Titanium-coated measuring pins (models over 12mm range) provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Large LCD digits of 8.5mm height for error-free reading.
- 330-degree rotatable display unit for easy reading at any angle.
- GO/NO-GO judgment function.
- The ABSOLUTE linear encoder 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.



Titanium coated contact points (*-10" suffix models only)

DIMENSION



(Refer to the page 9 for details.)



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
Resolution: 0.001mm or .00005"/0.001mm
Contact point: Carbide or titanium coating*
(*over 12mm/.5" models)
Measuring method: Three-point method
Display: LCD
Battery: SR44 (1 pc.) (938882)
Battery life: Approx. 1 year

Functions

Zero-setting, Preset, GO/NO-GO judgment, Data hold, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)

Optional Accessory

- 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
- : Setting ring (See page 122.)



Interchangeable-Contact Head Set



568-971

Complete-Unit Set



568-983-10

SPECIFICATION

Metric Individual

Range	Order No.	Accuracy*
6 - 8mm	568-331	±5µm (within 5µm)
8 - 10mm	568-332	±5µm (within 5µm)
10 - 12mm	568-333	±5µm (within 5µm)
12 - 16mm	568-334-10	±5µm (within 5µm)
16 - 20mm	568-335-10	±5µm (within 5µm)
20 - 25mm	568-336-10	±6µm (within 6µm)
25 - 30mm	568-337-10	±6µm (within 6µm)
30 - 40mm	568-338-10	±6µm (within 6µm)
40 - 50mm	568-339-10	±6µm (within 6µm)
50 - 63mm	568-340-10	±6µm (within 6µm)
62 - 75mm	568-341-10	±6µm (within 6µm)
75 - 88mm	568-342-10	±6µm (within 6µm)
87 - 100mm	568-343-10	±6µm (within 6µm)
100 - 113mm	568-344-10	±6µm (within 6µm)
112 - 125mm	568-345-10	±6µm (within 6µm)
50 - 75mm	568-346-10	±6µm (within 6µm)
75 - 100mm	568-347-10	±6µm (within 6µm)
100 - 125mm	568-348-10	±6µm (within 6µm)

*Instrumental error excluding quantizing error (maximum error)

with titanium coated contact points

Inch/Metric Individual

Range	Order No.	Accuracy
.275" - .350"	568-431	±.00025" (within .00025")
.350" - .425"	568-432	±.00025" (within .00025")
.425" - .500"	568-433	±.00025" (within .00025")
.50" - .65"	568-434-10	±.00025" (within .00025")
.65" - .80"	568-435-10	±.00025" (within .00025")
.8" - 1.0"	568-436-10	±.0003" (within .0003")
1.0" - 1.2"	568-437-10	±.0003" (within .0003")
1.2" - 1.6"	568-438-10	±.0003" (within .0003")
1.6" - 2.0"	568-439-10	±.0003" (within .0003")
2.0" - 2.5"	568-440-10	±.0003" (within .0003")
2.5" - 3.0"	568-441-10	±.0003" (within .0003")
3.0" - 3.5"	568-442-10	±.0003" (within .0003")
3.5" - 4.0"	568-443-10	±.0003" (within .0003")
4.0" - 4.5"	568-444-10	±.0003" (within .0003")
4.5" - 5.0"	568-445-10	±.0003" (within .0003")
2.0" - 3.0"	568-446-10	±.0003" (within .0003")
3.0" - 4.0"	568-447-10	±.0003" (within .0003")
4.0" - 5.0"	568-448-10	±.0003" (within .0003")

Complete-Unit Set

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

Metric

with titanium coated contact points

Range	Order No.	Individual range	Setting rings included	Remarks
6 - 12mm	568-981	6-8, 8-10, 10-12mm	ø8mm, ø10mm	with extension rod
12 - 25mm	568-982-10	12-16, 16-20, 20-25mm	ø16mm, ø20mm	with extension rod
25 - 50mm	568-983-10	25-30, 30-40, 40-50mm	ø25mm, ø40mm	with extension rod
50 - 75mm	568-984-10	50-63, 62-75mm	ø62mm	with extension rod
75 - 100mm	568-985-10	75-88, 87-100mm	ø87mm	with extension rod
50 - 100mm	568-986-10	50-75*, 75-100mm*	ø62mm, ø82mm	with extension rod

*interchangeable contact points (4 sets)

Inch

with titanium coated contact points

Range	Order No.	Individual range	Setting rings included	Remarks
.275" - .5"	568-987	.275-.35", .35-.425", .425-.5"	ø.35" DIA, ø.425" DIA	with extension rod
.5" - 1"	568-988-10	.5-.65", .65-.8", .8-1"	ø.65" DIA, ø.8" DIA	with extension rod
1" - 2"	568-989-10	1-1.2", 1.2-1.6", 1.6-2"	ø1.2" DIA, ø1.6" DIA	with extension rod
2" - 3"	568-990-10	2-2.5", 2.5-3"	ø2.5" DIA	with extension rod
3" - 4"	568-991-10	3-3.5", 3.5-4"	ø3.5" DIA	with extension rod
2" - 4"	568-992-10	2-3"*, 3-4"*	ø2.5" DIA, ø3.5" DIA	with extension rod

*interchangeable contact points (4 sets)

Interchangeable-Head Set

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

Metric

with titanium coated contact points

Range	Order No.	Individual range	Setting rings included	Remarks
6 - 12mm	568-971	6-8, 8-10, 10-12mm	ø8mm, ø10mm	with extension rod
12 - 25mm	568-972-10	12-16, 16-20, 20-25mm	ø16mm, ø20mm	with extension rod
25 - 50mm	568-973-10	25-30, 30-40, 40-50mm	ø25mm, ø40mm	with extension rod
50 - 100mm	568-975-10	50-63, 62-75, 75-88, 87-100mm	ø62mm, ø87mm	with extension rod
50 - 100mm	568-976-10	50-75*, 75-100mm*	ø62mm, ø82mm	with extension rod

*interchangeable contact points (4 sets)

Inch

with titanium coated contact points

Range	Order No.	Individual range	Setting rings included	Remarks
.275" - .5"	568-987	.275-.35", .35-.425", .425-.5"	ø.35" DIA, ø.425" DIA	with extension rod
.5" - 1"	568-988-10	.5-.65", .65-.8", .8-1"	ø.65" DIA, ø.8" DIA	with extension rod
1" - 2"	568-989-10	1-1.2", 1.2-1.6", 1.6-2"	ø1.2" DIA, ø1.6" DIA	with extension rod
3" - 4"	568-991-10	2-2.5", 2.5-3", 3-3.5", 3.5-4"	ø2.5" DIA, ø3.5" DIA	with extension rod
2" - 4"	568-992-10	2-3"*, 3-4"*	ø2.5" DIA, ø3.5" DIA	with extension rod

*interchangeable contact points (4 sets)

Tubular Inside Micrometers

SERIES 133 — Single Rod Type

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.



Technical Data

Accuracy: Refer to the list of specifications.
Graduation: 0.01mm or .001"

Optional Accessory

— : Setting ring (See page 122.)

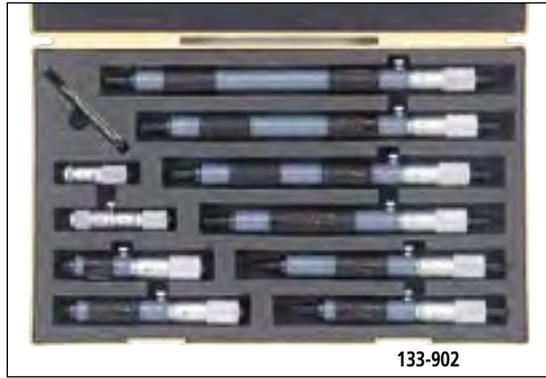


SPECIFICATIONS

Metric		Individual
Range	Order No.	Accuracy
50 - 75mm	133-143	±3µm
75 - 100mm	133-144	±4µm
100 - 125mm	133-145	±5µm
125 - 150mm	133-146	±5µm
150 - 175mm	133-147	±5µm
175 - 200mm	133-148	±5µm
200 - 225mm	133-149	±5µm
225 - 250mm	133-150	±6µm
250 - 275mm	133-151	±6µm
275 - 300mm	133-152	±6µm
300 - 325mm	133-153	±7µm
325 - 350mm	133-154	±7µm
350 - 375mm	133-155	±7µm
375 - 400mm	133-156	±8µm
400 - 425mm	133-157	±8µm
425 - 450mm	133-158	±8µm
450 - 475mm	133-159	±9µm
475 - 500mm	133-160	±9µm
500 - 525mm	133-161	±9µm
525 - 550mm	133-162	±10µm
550 - 575mm	133-163	±10µm
575 - 600mm	133-164	±10µm
600 - 625mm	133-165	±11µm
625 - 650mm	133-166	±11µm
650 - 675mm	133-167	±11µm
675 - 700mm	133-168	±12µm

Metric		Individual
Range	Order No.	Accuracy
700 - 725mm	133-169	±12µm
725 - 750mm	133-170	±12µm
750 - 775mm	133-171	±13µm
775 - 800mm	133-172	±13µm
800 - 825mm	133-173	±13µm
825 - 850mm	133-174	±14µm
850 - 875mm	133-175	±14µm
875 - 900mm	133-176	±14µm
900 - 925mm	133-177	±15µm
925 - 950mm	133-178	±15µm
950 - 975mm	133-179	±15µm
975 - 1000mm	133-180	±16µm

Inch		Individual
Range	Order No.	Accuracy
2" - 3"	133-223	±.00015"
3" - 4"	133-224	±.0002"
4" - 5"	133-225	±.00025"
5" - 6"	133-226	±.00025"
6" - 7"	133-227	±.00025"
7" - 8"	133-228	±.00025"
8" - 9"	133-229	±.00025"
9" - 10"	133-230	±.0003"
10" - 11"	133-231	±.0003"
11" - 12"	133-232	±.0003"



133-902

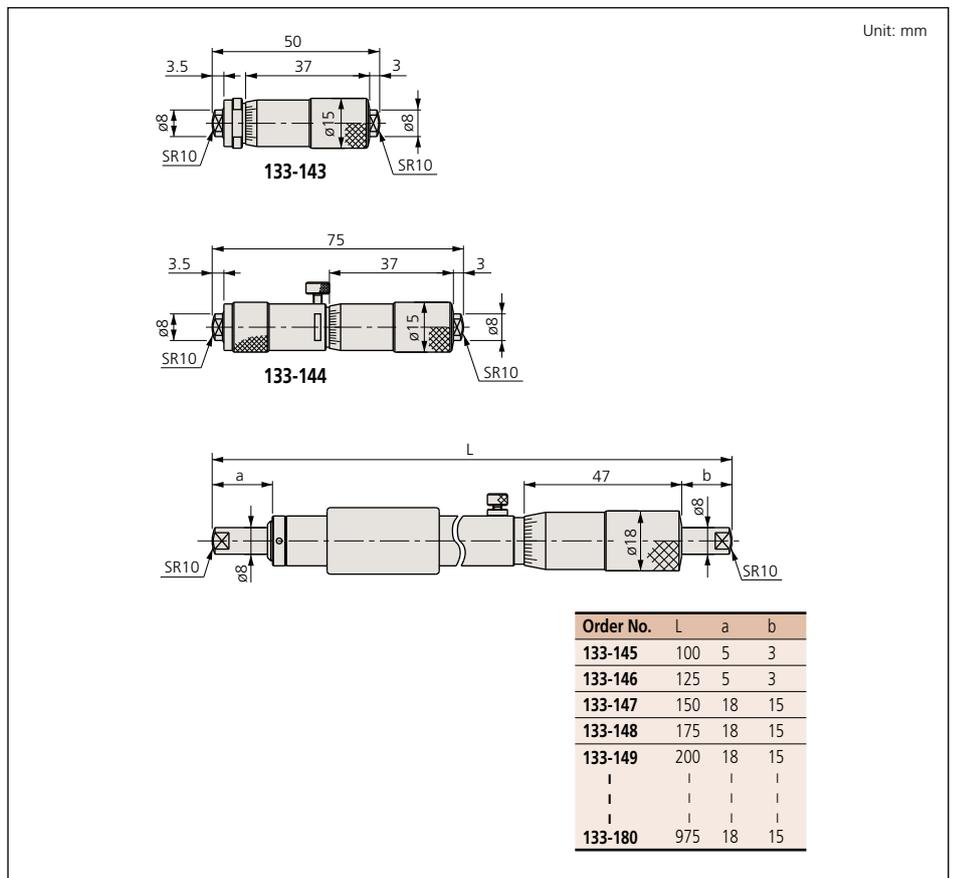
Metric Micrometer set

Range	Order No.	Assortment of micrometers
50 - 150mm (4 mikes/set)	133-901	• 133-143, 133-144, 133-145, 133-146 • with fitted case
50 - 300mm (10 mikes/set)	133-902	• 133-143, 133-144, 133-145, 133-146, 133-147, 133-148, 133-149, 133-150, 133-151, 133-152 • with fitted case

Inch Micrometer set

Range	Order No.	Assortment of micrometers
2" - 6" (4 mikes/set)	133-903	• 133-223, 133-224, 133-225, 133-226 • with fitted case
2" - 12" (10 mikes/set)	133-904	• 133-223, 133-224, 133-225, 133-226, 133-227, 133-228, 133-229, 133-230, 133-231, 133-232 • with fitted case

DIMENSION



Inside Micrometers

SERIES 141 — Interchangeable Rod Type

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.



141-101



When using the extension rod



Technical Data

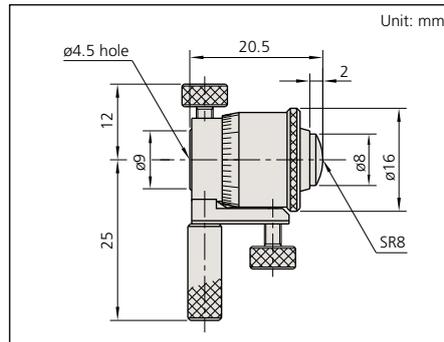
Accuracy: $\pm(6+L/50)\mu\text{m}^*$
 $^*L = \text{Maximum measuring length (mm)}$
 Fraction rounded up
 Graduation: 0.01mm or .001"

Optional Accessory

——— : Setting ring (See page 122.)



DIMENSION



SPECIFICATIONS

Metric

Range	Order No.	Travel of micrometer head	Remarks
25 - 32mm	141-001 / 141-003*	7mm	—
25 - 50mm	141-101 / 141-103*	7mm	with 2 rods
50 - 63mm	141-025 / 141-027*	13mm	—
50 - 200mm	141-205 / 141-211*	13mm	with 3 rods
50 - 300mm	141-206 / 141-212*	13mm	with 5 rods
200 - 225mm	141-009 / 141-011*	25mm	—
200 - 500mm	141-117	25mm	with 3 rods
200 - 1000mm	141-118	25mm	with 8 rods

*with carbide tipped face

Inch

Range	Order No.	Travel of micrometer head	Remarks
1" - 1.25"	141-002 / 141-004*	.25"	—
1" - 2"	141-102 / 141-104*	.25"	with 2 rods
2" - 2.5"	141-026 / 141-028*	.5"	—
2" - 8"	141-208 / 141-214*	.5"	with 3 rods
2" - 12"	141-233 / 141-215*	.5"	with 5 rods
8" - 9"	141-010 / 141-012*	1"	—
4" - 20"	141-121	1"	with 3 rods
4" - 40"	141-122	1"	with 8 rods

*with carbide tipped face

Digimatic Tubular Inside Micrometers

SERIES 337 — Extension Rod Type / SERIES 339 — Extension Pipe Type



Technical Data

Accuracy: $\pm(3+n+L/50)\mu\text{m}^*$
 Excluding quantizing error
 *n = Number of rod, L = Maximum measuring length (mm), Fraction rounded up

Resolution: 0.001mm or .0001"/0.001mm
 Display: LCD
 Battery: SR44 (1 pcs.), **938882**
 Battery life: Approx. 8 months under normal use

Function

Zero-setting, Preset, Data hold, Automatic power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

937387: SPC cable (1m)
965013: SPC cable (2m)
 ———: Setting ring (See page 122.)



FEATURES

- Wide range of ID measurements by combining extension rods (pipes) and anvils with the micrometer head.
- The 339 series uses highly-durable extension pipes.
- Carbide-tipped measuring faces.



337-201



339-291

Metric — Extension rod type

Range	Order No.	Travel of micrometer head	Extension rods
200 - 1000mm	337-201	25mm	25mm, 50mm, 100mm (2 pcs.), 200mm, 300mm
200 - 1500mm	337-202	25mm	25mm, 50mm, 100mm, 200mm, 300mm (3 pcs.)

Inch/Metric — Extension rod type

Range	Order No.	Travel of micrometer head	Extension rods
8" - 40"	337-203	1"	1", 2", 4" (2 pcs.), 8", 12"
8" - 60"	337-204	1"	1", 2", 4", 8", 12" (3 pcs.)

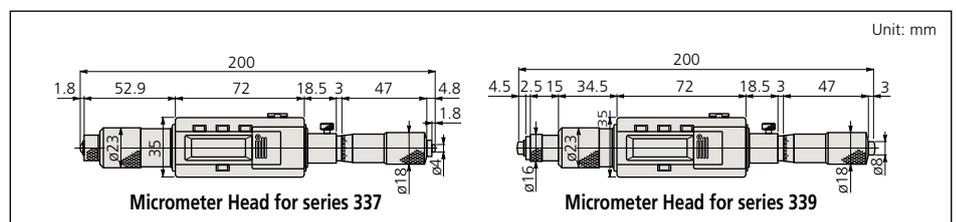
Metric — Extension pipe type

Range	Order No.	Travel of micrometer head	Extension pipes
200 - 1000mm	339-291	25mm	25mm, 50mm, 100mm, 200mm, 400mm
200 - 2000mm	339-292	25mm	25mm, 50mm, 100mm, 200mm (2 pcs.), 400mm (3 pcs.)

Inch/Metric — Extension pipe type

Range	Order No.	Travel of micrometer head	Extension pipes
8" - 40"	339-293	1"	1", 2", 4", 8", 16"
8" - 80"	339-294	1"	1", 2", 4", 8" (2 pcs.), 16" (3 pcs.)

DIMENSION



Tubular Inside Micrometers

SERIES 137 — Extension Rod Type, SERIES 139 — Extension Pipe Type, SERIES 140 — Extension Pipe Type

FEATURES

- Wide range of ID measurements by combining extension rods (pipes) and anvils with the micrometer head.
- Carbide-tipped measuring faces are available. (series 137)
- The 139 and 140 series use highly-durable/ large-diameter extension pipes.



137-205



139-177

SPECIFICATIONS

Metric — Extension rod type

Range	Order No.	Travel of micrometer head	Extension rods
50 - 63mm	137-011 / 137-013*	13mm	—
50 - 150mm	137-201 / 137-206*	13mm	13mm, 25mm, 50mm
50 - 300mm	137-202 / 137-207*	13mm	13mm, 25mm, 50mm (2 pcs.), 100mm
50 - 500mm	137-203 / 137-208*	13mm	13mm, 25mm, 50mm (2 pcs.), 100mm, 200mm
50 - 1000mm	137-204 / 137-209*	13mm	13mm, 25mm, 50mm (2 pcs.), 100mm, 200mm (2 pcs.), 300mm
50 - 1500mm	137-205 / 137-210*	13mm	13mm, 25mm, 50mm (2 pcs.), 100mm, 200mm (3 pcs.), 300mm (2 pcs.)

*with carbide tipped face

Inch — Extension rod type

Range	Order No.	Travel of micrometer head	Extension rods
2" - 2.5"	137-012 / 137-014*	.5"	—
2" - 6"	137-211 / 137-216*	.5"	.5", 1", 2"
2" - 12"	137-212 / 137-217*	.5"	.5", 1", 2" (2 pcs.), 4"
2" - 20"	137-213 / 137-218*	.5"	.5", 1", 2" (2 pcs.), 4", 8"
2" - 40"	137-214 / 137-219*	.5"	.5", 1", 2" (2 pcs.), 4", 8" (2 pcs.), 12"
2" - 60"	137-215 / 137-220*	.5"	.5", 1", 2" (2 pcs.), 4", 8" (3 pcs.), 12" (2 pcs.)

*with carbide tipped face

Technical Data

Accuracy:

- Series 137, 139: $\pm(3+n+L/50)\mu\text{m}^*$
 - Series 140: $\pm(7+n+L/50)\mu\text{m}^*$
- *n = Number of rod, L = Maximum measuring length (mm), Fraction rounded up

Graduation: 0.01mm or .001"

Optional Accessory

— : Setting ring (See page 122.)

Metric Extension pipe type

Range	Order No.	Travel of micrometer head	Extension pipes
100 - 125mm	139-001	25mm	—
100 - 500mm	139-173	25mm	25mm, 50mm, 100mm, 200mm
100 - 900mm	139-174	25mm	25mm, 50mm, 100mm, 200mm, 400mm
100 - 1300mm	139-175	25mm	25mm, 50mm, 100mm, 200mm, 400mm (2 pcs.)
100 - 1700mm	139-176	25mm	25mm, 50mm, 100mm, 200mm, 400mm (3 pcs.)
100 - 2100mm	139-177	25mm	25mm, 50mm, 100mm, 200mm, 400mm (4 pcs.)
1000 - 2000mm	140-157	50mm	50mm, 100mm (2 pcs.), 200mm, 500mm
1000 - 3000mm	140-158	50mm	50mm, 100mm (2 pcs.), 200mm, 500mm, 1000mm
1000 - 4000mm	140-159	50mm	50mm, 100mm (2 pcs.), 200mm, 500mm, 1000mm (2 pcs.)
1000 - 5000mm	140-160	50mm	50mm, 100mm (2 pcs.), 200mm, 500mm, 1000mm (3 pcs.)

Inch Extension pipe type

Range	Order No.	Travel of micrometer head	Extension pipes
4" - 5"	139-002	1"	—
4" - 20"	139-178	1"	1", 2", 4", 8"
4" - 36"	139-179	1"	1", 2", 4", 8", 16"
4" - 52"	139-180	1"	1", 2", 4", 8", 16" (2 pcs.)
4" - 68"	139-181	1"	1", 2", 4", 8", 16" (3 pcs.)
4" - 84"	139-182	1"	1", 2", 4", 8", 16" (4 pcs.)
40" - 80"	140-161	2"	2", 4" (2 pcs.), 8", 20"
40" - 120"	140-162	2"	2", 4" (2 pcs.), 8", 20", 40"
40" - 160"	140-163	2"	2", 4" (2 pcs.), 8", 20", 40" (2 pcs.)
40" - 200"	140-164	2"	2", 4" (2 pcs.), 8", 20", 40" (3 pcs.)

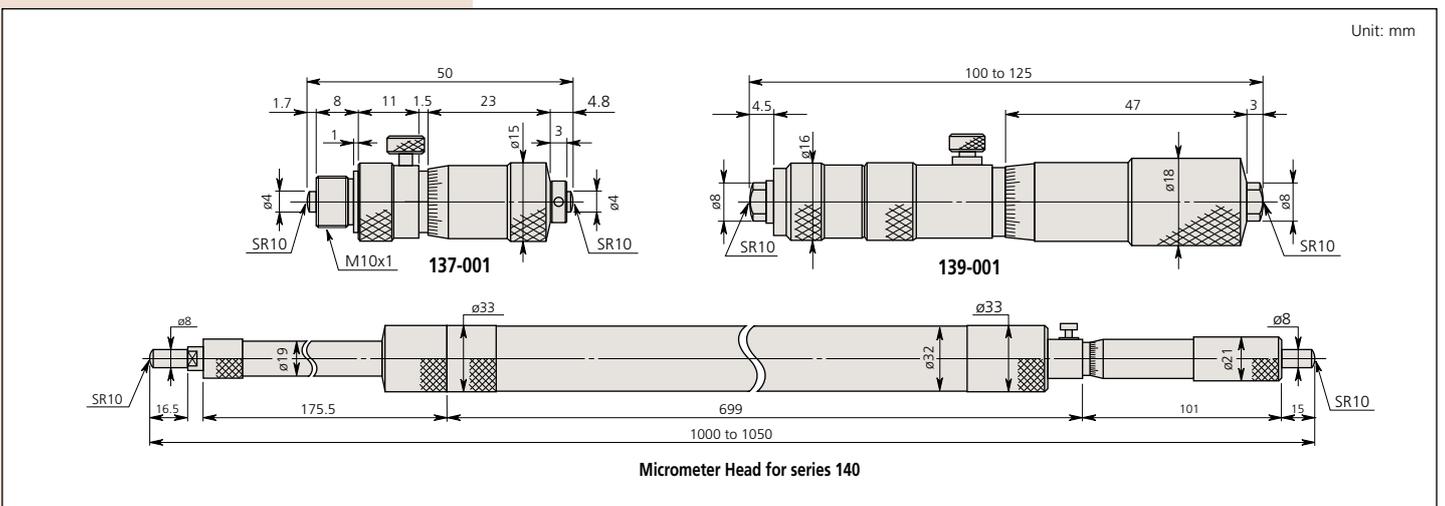


137-011



139-001

DIMENSION



Inside Micrometers

SERIES 345, 145 — Caliper Type

FEATURES

- Caliper type jaws are made of high-grade, tool steel.
- Locking clamp for positive locking of spindle.
- Satin-chrome finished.
- A special holder is available to be used with Mitutoyo Micrometer Stand.



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .00005"/0.001mm
Graduation**: 0.01mm or .001"
Measuring faces: Carbide tipped
Display*: LCD
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 8 months under normal use
*Digital models **Analog models

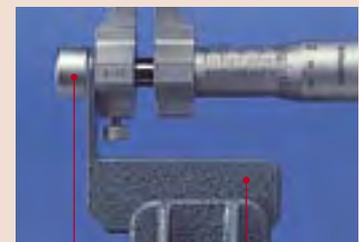
Function of Digital Model

Zero-setting, Preset, Data hold, Automatic power ON/OFF,
Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

05CZA662: SPC cable with data switch (1m)
05CZA663: SPC cable with data switch (2m)
: Setting ring (See page 122.)

For **145-185, 145-186, 145-193, 145-194**



Cap (**300401**)

Holder (**300400**)

SPECIFICATIONS

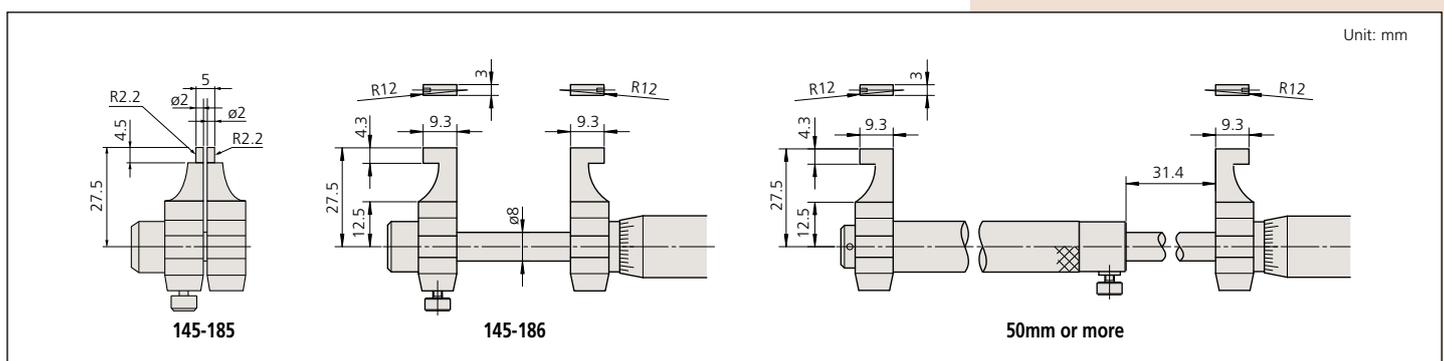
Metric	Order No.	Accuracy
5 - 30mm	345-250	±5μm
25 - 50mm	345-251	±6μm

Inch/Metric	Order No.	Accuracy
.2" - 1.2"	345-350	±.00025"
1" - 2"	345-351	±.0003"

Metric	Order No.	Accuracy
5 - 30mm	145-185	±5μm
25 - 50mm	145-186	±6μm
50 - 75mm	145-187	±7μm
75 - 100mm	145-188	±8μm
100 - 125mm	145-189	±9μm
125 - 150mm	145-190	±9μm
150 - 175mm	145-191	±10μm
175 - 200mm	145-192	±10μm
200 - 225mm	145-217	±11μm
225 - 250mm	145-218	±11μm
250 - 275mm	145-219	±12μm
275 - 300mm	145-220	±12μm

Inch	Order No.	Accuracy
.2" - 1.2"	145-193	±.00025"
1" - 2"	145-194	±.0003"
2" - 3"	145-195	±.00035"
3" - 4"	145-196	±.0004"

DIMENSION





(Refer to the page 9 for details.)

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.



515-585



Standard accessory

Technical Data

Block pitch accuracy: $\pm(0.001+L/150000)\text{mm}^*$
 *L = Length to check (mm)

Optional Accessory

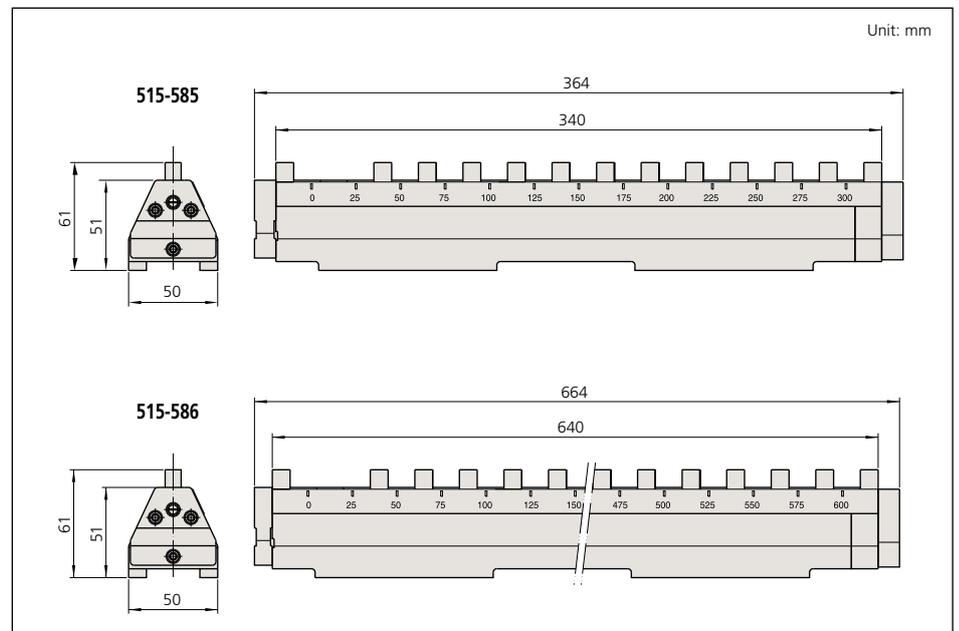
- 602160:** Wooden case for 300mm Inside Micro Checker
602163: Wooden case for 600mm Inside Micro Checker



SPECIFICATIONS

Range	Order No.	Length to check
300mm	515-585	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300mm
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

DIMENSION



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.



526-172



526-127

SPECIFICATIONS

Metric		
Range	Order No.	Probe depth (D)
0.95 - 1.55mm	526-172*	11.5mm
1.5 - 4mm	526-162*	17.5, 22.5mm
3.7 - 7.3mm	526-152*	32mm
7 - 10mm	526-124	56mm
10 - 18mm	526-125	62mm
0.95 - 1.55mm	526-173*	11.5mm
1.5 - 4mm	526-163*	17.5, 22.5mm
3.7 - 7.3mm	526-153*	32mm
7 - 10mm	526-126	56mm
10 - 18mm	526-127	62mm

Inch		
Range	Order No.	Probe depth (D)
.037" - .061"	526-176*	.45"
.06" - .155"	526-166*	.68", .88"
.145" - .29"	526-156*	1.25"
.3" - .4"	526-122	2.2"
.4" - .7"	526-123	2.4"
.3" - .4"	526-119	2.2"
.4" - .7"	526-120	2.4"

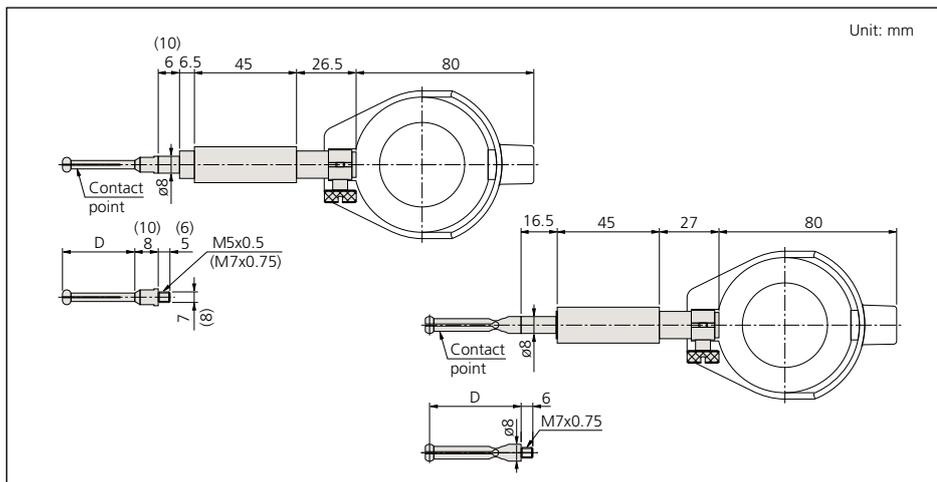
*Provided with setting rings

.0001" graduation (w/ 2923SB-10)
 .0005" graduation (w/ 2922SB)

*Provided with setting rings

0.001mm graduation (w/ 2109SB-10)
 0.01mm graduation (w/ 2046SB)

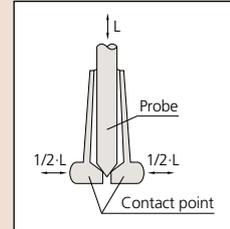
DIMENSION



Technical Data

Accuracy: 4µm
 Indication stability: 2µm
 Graduation: 0.01mm, 0.001mm, .0005 or .00001"

Contact Point



Optional Accessory

215-120M: Bore gage stand



— : Setting ring (See page 122.)

Bore Gages

SERIES 511 — for Small Holes

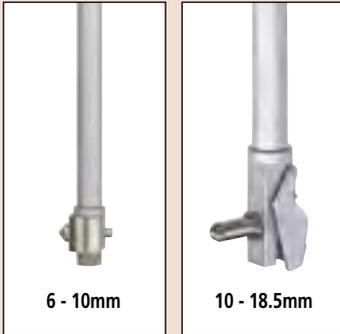
FEATURES

- Its interchangeable anvils are made of alloyed steel.
- The dial indicator is fully protected by a rugged cover.

Technical Data

Accuracy: 5µm
 Indication stability: 2µm
 Graduation: 0.01mm, 0.001mm, .0005 or .0001"

Contact Point



6 - 10mm

10 - 18.5mm

Optional Accessory

— : Setting ring (See page 122.)



511-204

SPECIFICATIONS

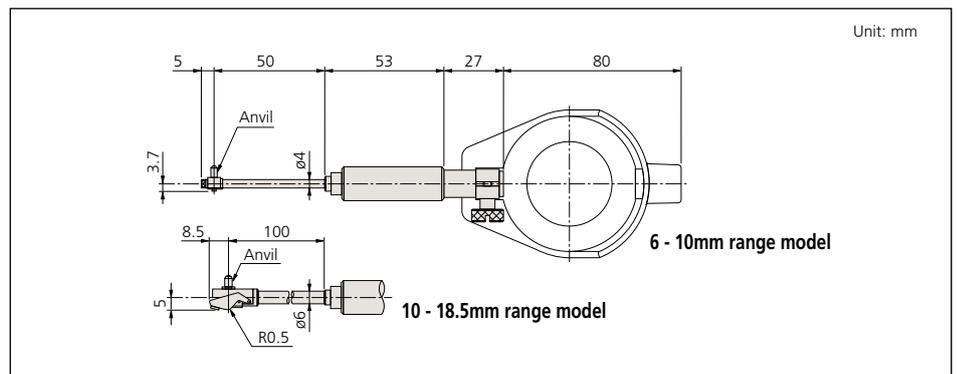
Metric		
Range	Order No.	Probe depth
6 - 10mm	511-210	50mm
10 - 18.5mm	511-203	100mm
6 - 10mm	511-211	50mm
10 - 18.5mm	511-204	100mm

0.001mm graduation (w/ 2109SB-10) 0.01mm graduation (w/ 2046SB)

Inch		
Range	Order No.	Probe depth
.24" - .4"	511-212	2"
.4" - .74"	511-206	4"
.24" - .4"	511-213	2"
.4" - .74"	511-207	4"

.0001" graduation (w/ 2923SB-10) .0005" graduation (w/ 2922SB)

DIMENSION



Unit: mm

6 - 10mm range model

10 - 18.5mm range model

Bore Gages

SERIES 511

Mitutoyo offers a complete selection of Bore Gages, all of them with interchangeable anvils and necessary accessories to perform close tolerance ID measurements.



511-173

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

Metric Individual		
Range	Order No.	Probe depth
18 - 35mm	511-167	100mm
35 - 60mm	511-168	150mm
50 - 100mm	511-169	150mm
50 - 150mm	511-170	150mm
100 - 160mm	511-178	150mm
160 - 250mm	511-179	250mm
250 - 400mm	511-180	250mm
18 - 35mm	511-171	100mm
35 - 60mm	511-172	150mm
50 - 100mm	511-173	150mm
50 - 150mm	511-174	150mm
100 - 160mm	511-175	150mm
160 - 250mm	511-176	250mm
250 - 400mm	511-177	250mm

Inch Individual		
Range	Order No.	Probe depth
.7" - 1.4"	511-163	4"
1.4" - 2.5"	511-164	6"
2" - 4"	511-165	6"
2" - 6"	511-166	6"
4" - 6.5"	511-187	6"
6.5" - 10"	511-188	10"
10" - 16"	511-189	10"
.7" - 1.4"	511-159	4"
1.4" - 2.5"	511-160	6"
2" - 4"	511-161	6"
2" - 6"	511-162	6"
4" - 6.5"	511-184	6"
6.5" - 10"	511-185	10"
10" - 16"	511-186	10"

Metric Bore Gage Sets		
Range	Order No.	Number of probes
18 - 150mm	511-902	3
18 - 150mm	511-901	3

Inch Bore Gage Sets		
Range	Order No.	Number of probes
.7" - 6"	511-912	3
.7" - 6"	511-911	3

0.001mm graduation (w/ 21095B-10) 0.01mm graduation (w/ 20465B)

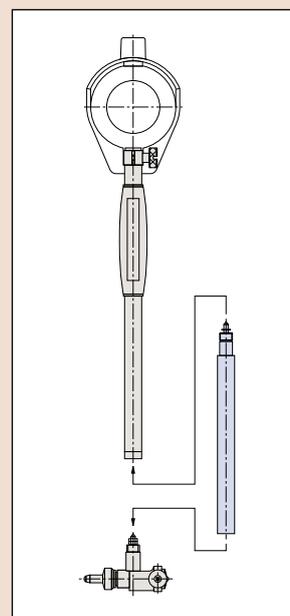
.0001" graduation (w/ 29235B-10) .0005" graduation (w/ 29225B)

Technical Data

Accuracy: 5µm
Indication stability: 2µm
Graduation: 0.01mm, 0.001mm, .0005 or .0001"

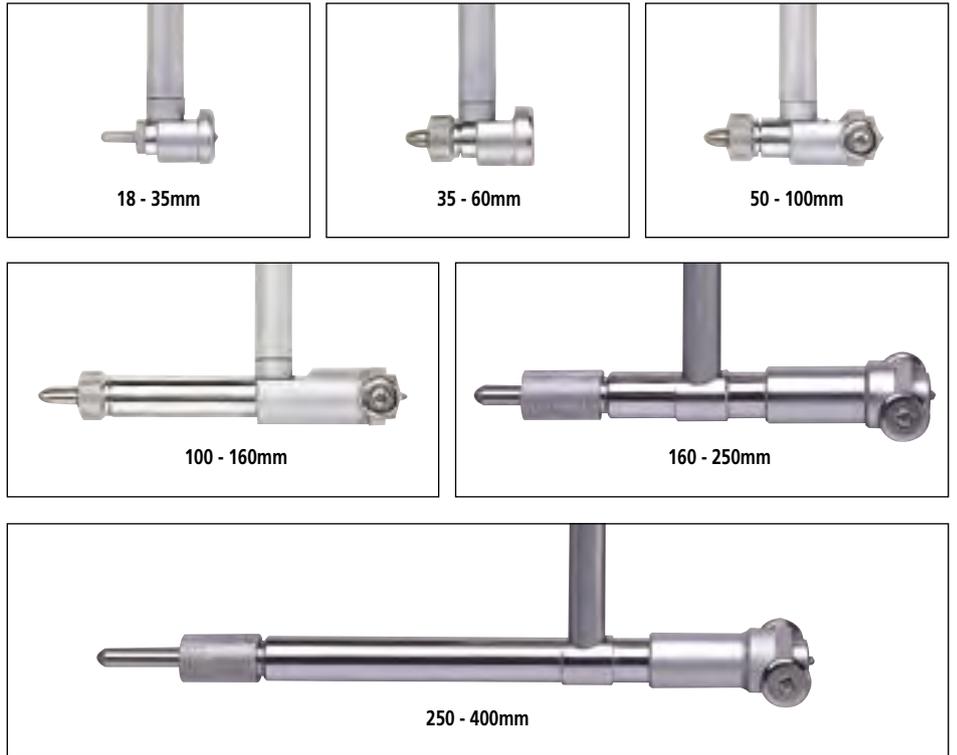
Optional Accessory

- 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

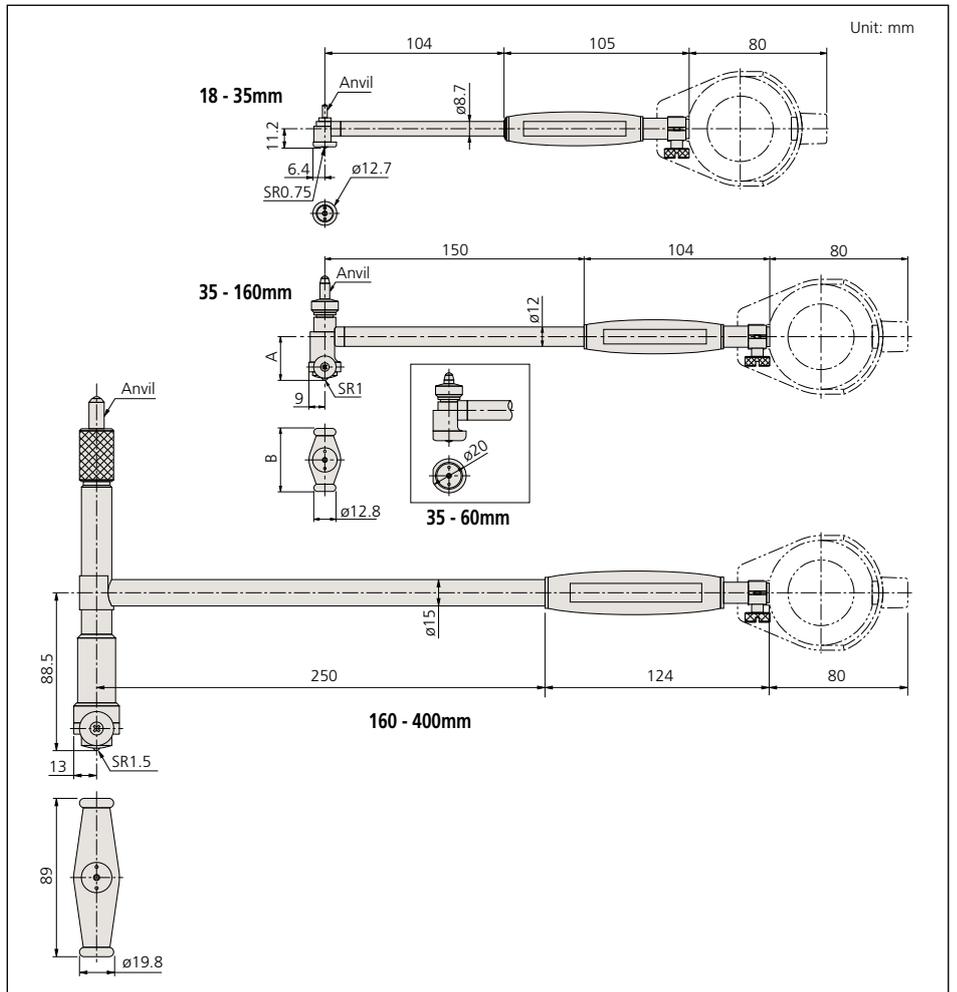


Setting ring (See page 122.)

Contact Point



DIMENSION



Bore Gages

SERIES 511 — Short Leg Type

FEATURES

- Compact and lightweight because of the short length below the grip.
- Carbide-tipped contact point for durability.



SPECIFICATIONS

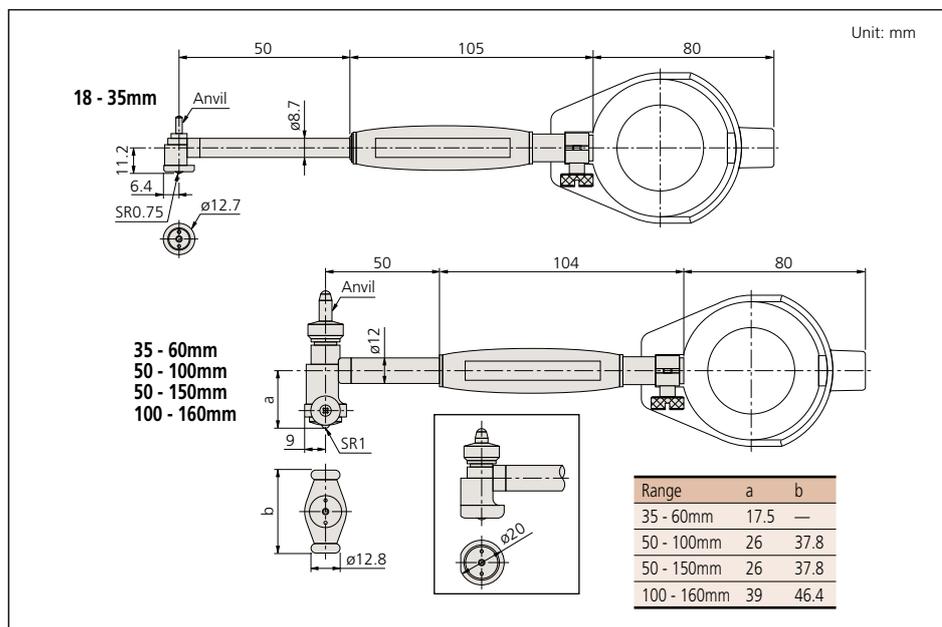
Metric		
Range	Order No.	Probe depth
18 - 35mm	511-471	50mm
35 - 60mm	511-472	50mm
50 - 100mm	511-473	50mm
50 - 150mm	511-474	50mm
100 - 160mm	511-475	50mm
18 - 35mm	511-461	50mm
35 - 60mm	511-462	50mm
50 - 100mm	511-463	50mm
50 - 150mm	511-464	50mm
100 - 160mm	511-465	50mm

Inch		
Range	Order No.	Probe depth
.7" - 1.4"	511-491	2"
1.4" - 2.5"	511-492	2"
2" - 4"	511-493	2"
2" - 6"	511-494	2"
4" - 6.5"	511-495	2"
.7" - 1.4"	511-481	2"
1.4" - 2.5"	511-482	2"
2" - 4"	511-483	2"
2" - 6"	511-484	2"
4" - 6.5"	511-485	2"

0.001mm graduation (w/ 2109SB-10)
 0.01mm graduation (w/ 2046SB)

.0001" graduation (w/ 2923SB-10)
 .0005" graduation (w/ 2922SB)

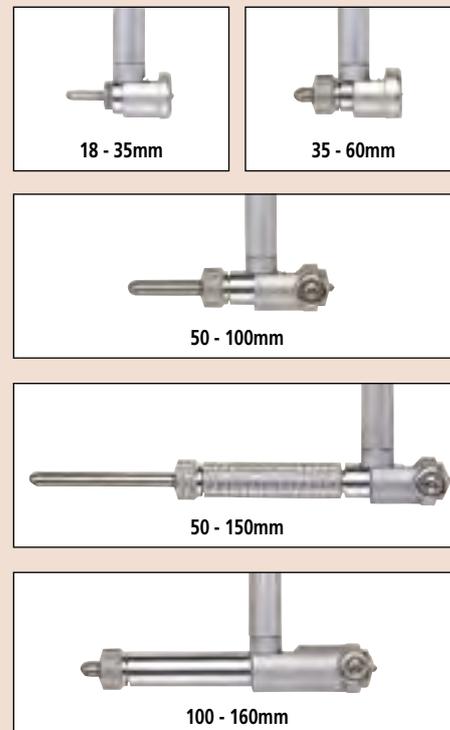
DIMENSION



Technical Data

Accuracy: 5µm
 Indication stability: 2µm
 Graduation: 0.01mm, 0.001mm, .0005 or .0001"

Contact Point



Optional Accessory

— : Setting ring (See page 122.)

Bore Gages

SERIES 511 — for Blind Holes

FEATURES

- Can measure ID at position close to the bottom of blind holes.

Technical Data

Accuracy: 5µm
 Indication stability: 2µm
 Graduation: 0.01mm, 0.001mm, .0005 or .0001"

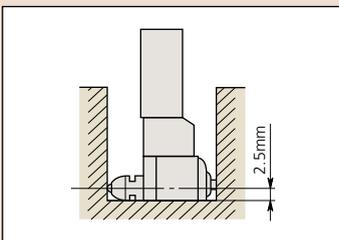
Contact Point



15 - 35mm



50 - 100mm, 50 - 150mm



Optional Accessory

—: Setting ring (See page 122.)



511-412

SPECIFICATIONS

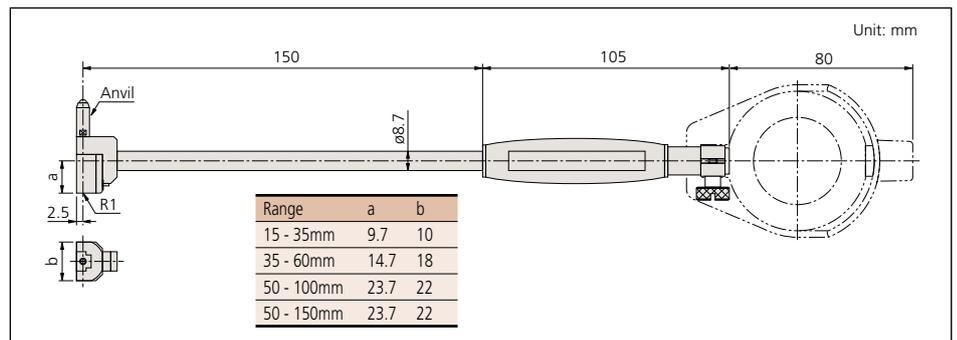
Metric		
Range	Order No.	Probe depth
15 - 35mm	511-421	150mm
35 - 60mm	511-422	150mm
50 - 100mm	511-423	150mm
50 - 150mm	511-424	150mm
15 - 35mm	511-411	150mm
35 - 60mm	511-412	150mm
50 - 100mm	511-413	150mm
50 - 150mm	511-414	150mm

0.001mm graduation (w/ 2109SB-10) 0.01mm graduation (w/ 2046SB)

Inch		
Range	Order No.	Probe depth
.6" - 1.4"	511-441	6"
1.4" - 2.4"	511-442	6"
2" - 4"	511-443	6"
2" - 6"	511-444	6"
.6" - 1.4"	511-431	6"
1.4" - 2.4"	511-432	6"
2" - 4"	511-433	6"
2" - 6"	511-434	6"

.0001" graduation (w/ 2923SB-10) .0005" graduation (w/ 2922SB)

DIMENSION



Bore Gages

SERIES 511 — with Micrometer Head

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.



511-334

SPECIFICATIONS

Metric		
Range	Order No.	Probe depth
35 - 60mm	511-343	150mm
60 - 100mm	511-333	150mm
100 - 160mm	511-311	150mm
150 - 250mm	511-313	250mm
250 - 400mm	511-315	250mm
400 - 600mm	511-317	250mm
600 - 800mm	511-327	250mm
35 - 60mm	511-344	150mm
60 - 100mm	511-334	150mm
100 - 160mm	511-312	150mm
150 - 250mm	511-314	250mm
250 - 400mm	511-316	250mm
400 - 600mm	511-318	250mm
600 - 800mm	511-328	250mm

0.001mm graduation (w/ 2109SB-10) 0.01mm graduation (w/ 2046SB)

Inch		
Range	Order No.	Probe depth
1.4" - 2.5"	511-346	6"
2.4" - 4"	511-336	6"
4" - 6.4"	511-326	6"
6" - 10"	511-320	10"
10" - 16"	511-322	10"
16" - 24"	511-324	10"
24" - 32"	511-330	10"
1.4" - 2.5"	511-345	6"
2.4" - 4"	511-335	6"
4" - 6.4"	511-325	6"
6" - 10"	511-319	10"
10" - 16"	511-321	10"
16" - 24"	511-323	10"
24" - 32"	511-329	10"

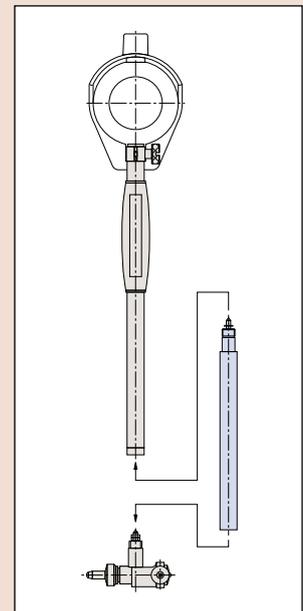
.0001" graduation (w/ 2923SB-10) .0005" graduation (w/ 2922SB)

Technical Data

Accuracy: 5µm
 Indication stability: 2µm
 Graduation: 0.01mm, 0.001mm, .0005 or .0001"

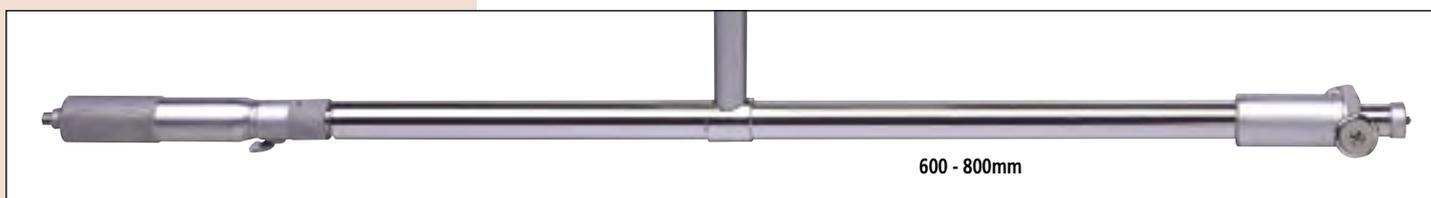
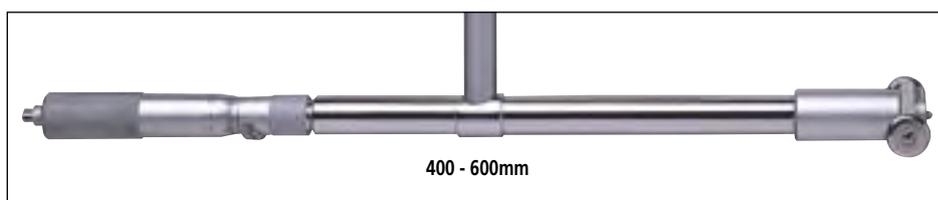
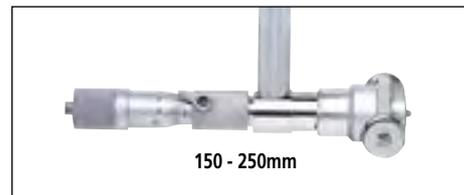
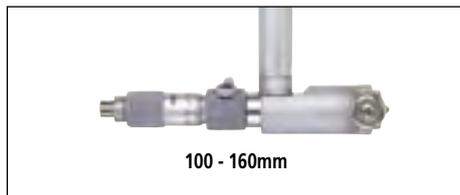
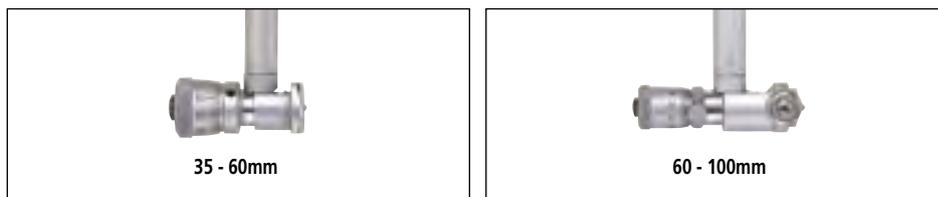
Optional Accessory

- 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
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- 953556:** 1000mm Extension rod for 35-160mm (1.4"-6.5") models
- 953560:** 1000mm Extension rod for 160-400mm (6.5"-16") models

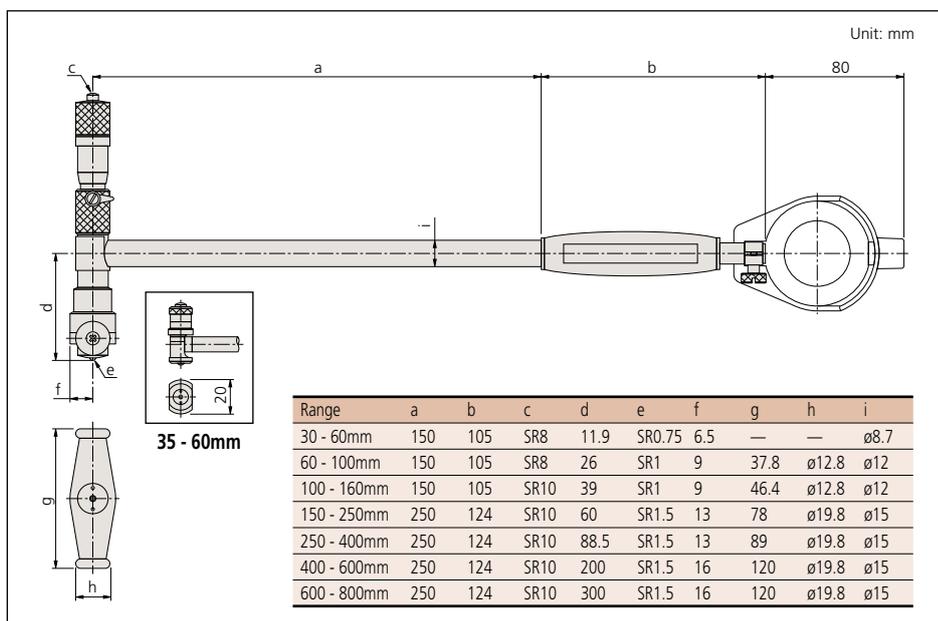


Setting ring (See page 122.)

Contact Point



DIMENSION



Dial Bore Gages

SERIES 545 — Rugged, Production-Line Tools

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.



545-105



545-114

Technical Data

Graduation: 0.01mm, 0.001mm, .0005 or .0001"

Optional Accessory

- 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)



— : Setting ring (See page 122.)

SPECIFICATIONS

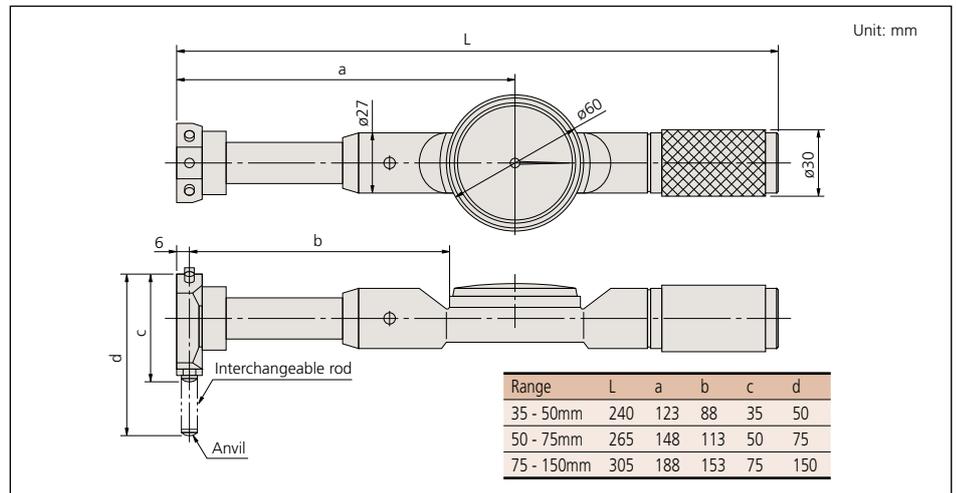
Metric		
Range	Order No.	Probe depth
35 - 50mm	545-114S	85mm
50 - 75mm	545-115S	115mm
75 - 150mm	545-116S	150mm
35 - 50mm	545-104S	85mm
50 - 75mm	545-105S	115mm
75 - 150mm	545-106S	150mm

□ 0.001mm graduation □ 0.01mm graduation

Inch		
Range	Order No.	Probe depth
1.475" - 2.075"	545-134S	3.5"
1.975" - 3.075"	545-135S	4.5"
2.975" - 6.075"	545-136S	6"
1.475" - 2.075"	545-124S	3.5"
1.975" - 3.075"	545-125S	4.5"
2.975" - 6.075"	545-126S	6"

□ .0001" graduation □ .0005" graduation

DIMENSION



Setting Ring

SERIES 177 — Accessories for Inside Micrometers, Holtest and Dial Bore Gages

FEATURES

- Used for quick zero adjustment of dial bore gages, Holtest, and inside micrometers.
- Actual inside diameter is marked on each ring.



SPECIFICATION

Setting Rings

Metric		
Size	Order No.	Accuracy
1mm	177-220	±1.5µm
1.1mm	177-222	±1.5µm
1.2mm	177-225	±1.5µm
1.3mm	177-227	±1.5µm
1.4mm	177-230	±1.5µm
1.75mm	177-236	±1.5µm
2mm	177-239	±1.5µm
2.25mm	177-242	±1.5µm
2.5mm	177-208	±1.5µm
2.75mm	177-246	±1.5µm
3mm	177-248	±1.5µm
3.25mm	177-250	±1.5µm
3.5mm	177-252	±1.5µm
3.75mm	177-255	±1.5µm
4mm	177-204	±1.5µm
4.5mm	177-257	±1.5µm
5mm	177-205	±1.5µm
5.5mm	177-263	±1.5µm
6mm	177-267	±1.5µm
6.5mm	177-271	±1.5µm
7mm	177-275	±1.5µm
8mm	177-125	±1.5µm
10mm	177-126	±1.5µm
12mm	177-284	±1.5µm
14mm	177-132	±1.5µm

Size	Order No.	Accuracy
16mm	177-177	±1.5µm
17mm	177-133	±1.5µm
20mm	177-286	±1.5µm
25mm	177-139	±1.5µm
30mm	177-288	±1.5µm
35mm	177-140	±1.5µm
40mm	177-290	±1.5µm
45mm	177-178	±1.5µm
50mm	177-146	±1.5µm
60mm	177-292	±1.5µm
62mm	177-314	±1.5µm
70mm	177-147	±1.5µm
75mm	177-316	±1.5µm
80mm	177-294	±1.5µm
87mm	177-318	±1.5µm
90mm	177-148	±1.5µm
100mm	177-296	±1.5µm
125mm	177-298	±2.5µm
150mm	177-300	±2.5µm
175mm	177-302	±2.5µm
200mm	177-304	±2.5µm
225mm	177-306	±2.5µm
250mm	177-308	±2.5µm
275mm	177-310	±2.5µm
300mm	177-312	±2.5µm

Inch		
Size	Order No.	Accuracy
.1"	177-209	±.00006"
.16"	177-206	±.00006"
.24"	177-207	±.00006"
.275"	177-281	±.00006"
.35"	177-179	±.00006"
.425"	177-283	±.00006"
.50"	177-180	±.00006"
.60"	177-181	±.00006"
.65"	177-182	±.00006"
.70"	177-183	±.00006"
.80"	177-287	±.00006"
1.0"	177-184	±.00006"
1.2"	177-289	±.00006"
1.4"	177-185	±.00006"
1.6"	177-291	±.00006"
1.8"	177-186	±.00006"
2.0"	177-187	±.00006"
2.4"	177-293	±.00006"
2.5"	177-315	±.00006"
2.8"	177-188	±.00006"
3.0"	177-317	±.00006"
3.2"	177-295	±.00006"
3.5"	177-319	±.00006"
3.6"	177-189	±.00006"
4.0"	177-297	±.00006"
5.0"	177-299	±.00010"
6.0"	177-301	±.00010"
7.0"	177-303	±.00010"
8.0"	177-305	±.00010"
9.0"	177-307	±.00010"
10.0"	177-309	±.00010"
11.0"	177-311	±.00010"
12.0"	177-313	±.00010"

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 Ring

SERIES 177 — Accessories for Inside Micrometers, Holtest and Dial Bore Gages

FEATURES

- 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:
 $\pm 0.01\text{mm}$ for $\varnothing 1 - 45\text{mm}$ setting rings
 $\pm 0.0004''$ for $.1'' - 1.8''$ DIA. setting rings

Cylindricity: $1.0\mu\text{m}$ for $\varnothing 1 - 45\text{mm}$ setting rings
 $.00004''$ for $.1'' - 1.8''$ DIA. setting rings

Ceramic Setting Rings

Metric			Inch		
Size	Order No.	Accuracy	Size	Order No.	Accuracy
4mm	177-418	$\pm 1.5\mu\text{m}$	.16"	177-518	$\pm 0.00006''$
6mm	177-420	$\pm 1.5\mu\text{m}$	.24"	177-520	$\pm 0.00006''$
8mm	177-423	$\pm 1.5\mu\text{m}$	.275"	177-522	$\pm 0.00006''$
10mm	177-424	$\pm 1.5\mu\text{m}$	.35"	177-523	$\pm 0.00006''$
12mm	177-425	$\pm 1.5\mu\text{m}$	.425"	177-524	$\pm 0.00006''$
16mm	177-427	$\pm 1.5\mu\text{m}$	.5"	177-525	$\pm 0.00006''$
20mm	177-429	$\pm 1.5\mu\text{m}$	.65"	177-527	$\pm 0.00006''$
25mm	177-430	$\pm 1.5\mu\text{m}$	.8"	177-529	$\pm 0.00006''$
30mm	177-431	$\pm 1.5\mu\text{m}$	1"	177-530	$\pm 0.00006''$
35mm	177-432	$\pm 1.5\mu\text{m}$	1.2"	177-531	$\pm 0.00006''$
40mm	177-433	$\pm 1.5\mu\text{m}$	1.4"	177-532	$\pm 0.00006''$
45mm	177-434	$\pm 1.5\mu\text{m}$	1.6"	177-533	$\pm 0.00006''$
			1.8"	177-534	$\pm 0.00006''$

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")



RM-120 Ring Master

Ring Gage Measuring Machine

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.



565-201

SPECIFICATIONS

Model No.	RM-120
Range	ID: 6mm - 120mm
Resolution	0.0001mm (0.1 μ m)
Accuracy (20°C)	$\pm(0.03+5D/1000)\mu$ m D = Measuring internal diameter (mm)
Repeatability ($\pm 2\sigma$)	$\pm 0.2\mu$ m
Measuring unit	Laser Holoscale
Measuring force	Approx. 0.2N
Workpiece size	OD: 20mm to 200mm Thickness: Up to 40mm
Ambient temperature	20°C $\pm 0.5^\circ$ C
Air requirement	400KPa
Air consumption	Approx. 30 liters per minute
Dimensions (W x D x H)	720 x 500 x 880mm

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Digimatic Caliper



Digimatic Height Gages



Linear Height



Depth Gages



New Products



SuperCaliper



ABSOLUTE Coolant Proof Caliper



ABSOLUTE Digimatic Caliper



ABSOLUTE Digimatic Offset Caliper



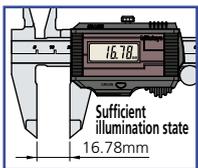
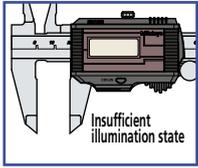
ABSOLUTE Digital Height Gage

SuperCaliper

SERIES 500 — No battery or origin reset needed for IP67 digital caliper

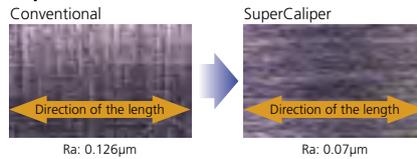
FEATURES

- With no annoying origin restoration necessary, a measurement can be started any time and there is no restriction on operating speed.



- World's unique* solar-powered SuperCaliper that is eco-friendly with no battery
*According to Mitutoyo investigation in January, 2005
- The impact resistance of the display unit has been increased for improved usability in workshop conditions.
- IP67 protection assures waterproof reliability.
- This SuperCaliper uses components that do not contain harmful substances and is compatible with RoHS Directives.

Improvement in surface finish of beam



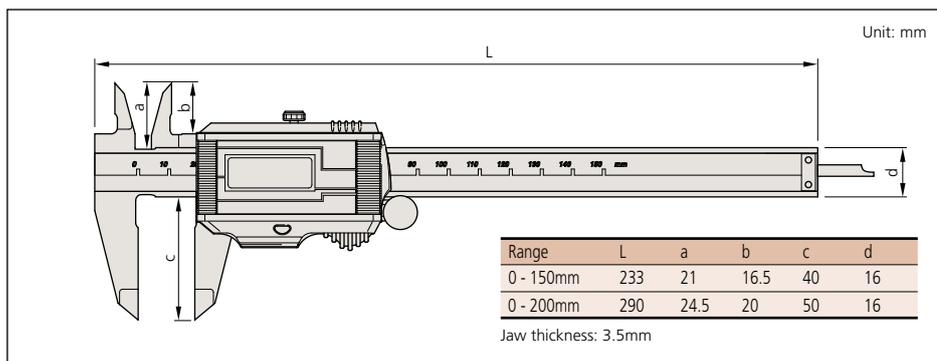
500-774

SPECIFICATIONS

Metric		
Range	Order No.	Remarks
0 - 150mm	500-776	with data output
0 - 150mm	500-774	w/o data output
0 - 200mm	500-777	with data output
0 - 200mm	500-775	w/o data output

Inch/Metric		
Range	Order No.	Remarks
0 - 6"	500-786	with data output
0 - 6"	500-784	w/o data output
0 - 8"	500-787	with data output
0 - 8"	500-785	w/o data output

DIMENSION



(Refer to the page 9 for details.)



(Refer to the page 9 for details.)

Technical Data

Accuracy: $\pm 0.02\text{mm}$ (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Repeatability: 0.01mm
 Display: LCD
 Length standard: ABSOLUTE electromagnetic induction linear encoder
 Max. response speed: Unlimited
 Battery: Solar battery*
 Dust/Water protection level: IP67
 *Can be used continuously above 60lux ambient illumination.

Function

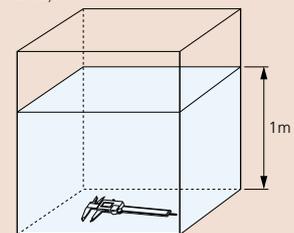
Origin-set, inch/mm conversion (inch/mm models)
 Alarm: Counting value composition error

Optional Accessory

05CZA624: SPC cable with data switch (1m)
05CZA625: SPC cable with data switch (2m)

IP67 protection level

Level 6: Dust-tight
 No ingress of dust.
 Level 7: Protected against the effects of temporary immersion in water.
 Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed 1 meter in water under standardized conditions of pressure and time (30 min.).



About the charge function (SuperCaliper)

The minimum illumination required in the uncharged state is 60lux. As shown in the table 'JIS Z 9110 Artificial Illumination Intensity Standard', this SuperCaliper can be used without problems in a normal work environment.

The charge function allows the operator to use this SuperCaliper without interrupting work even if the ambient illumination is temporarily insufficient.

- In the fully charged state this SuperCaliper can operate for approximately an hour in an environment of 50lux illumination (less than the minimum necessary illumination intensity).
- The time necessary for full charge differs, depending on the charging conditions. If this SuperCaliper is left unused in an illumination of 500 lux (usual for manufacturing environments), it takes approximately one hour to reach full charge.



(Refer to the page 9 for details.)

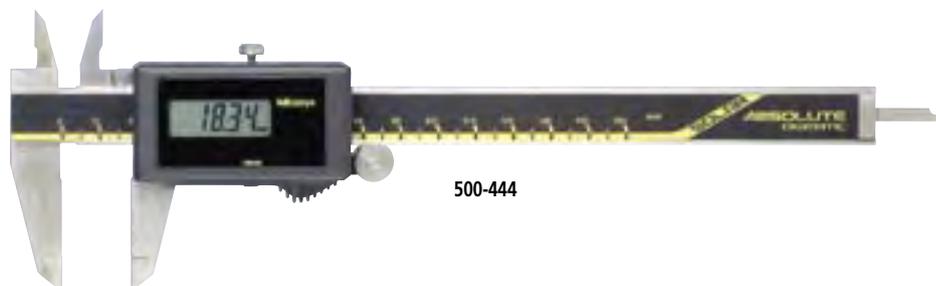
ABSOLUTE Solar Caliper

SERIES 500 — No battery or origin reset needed

Mitutoyo's Absolute Solar Digimatic Caliper retains its origin point even the display turns off for the entire life of the caliper. At 60 Lux and up the ABSOLUTE solar caliper 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.



500-444

Technical Data

Accuracy: $\pm 0.02\text{mm}$ (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Repeatability: 0.01mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Battery: Solar battery*
 *Can be used continuously above 60lux ambient illumination.

Function

Origin-set, Data hold, Data output, inch/mm conversion (inch/mm models)
 Alarm: Counting value composition error

Optional Accessory

- 959143: Data hold unit
- 959149: SPC cable with data switch (1m)
- 959150: SPC cable with data switch (2m)

SPECIFICATIONS

Metric			
Range	Order No.	Remarks (depth measuring bar / thumb roller)	
0 - 100mm	500-443	$\phi 1.9\text{mm}$ rod	with thumb roller
0 - 100mm	500-453*	$\phi 1.9\text{mm}$ rod	with thumb roller
0 - 150mm	500-444	Blade	with thumb roller
0 - 150mm	500-454*	Blade	with thumb roller
0 - 200mm	500-445	Blade	with thumb roller
0 - 200mm	500-455*	Blade	with thumb roller

*without SPC data output

Inch/Metric			
Range	Order No.	Remarks (depth measuring bar / thumb roller)	
0 - 4"	500-463	$\phi 3/40"$ rod	with thumb roller
0 - 4"	500-473*	$\phi 3/40"$ rod	with thumb roller
0 - 6"	500-464	Blade	with thumb roller
0 - 6"	500-474*	Blade	with thumb roller
0 - 8"	500-465	Blade	with thumb roller
0 - 8"	500-475*	Blade	with thumb roller

*without SPC data output

DIMENSION

Unit: mm

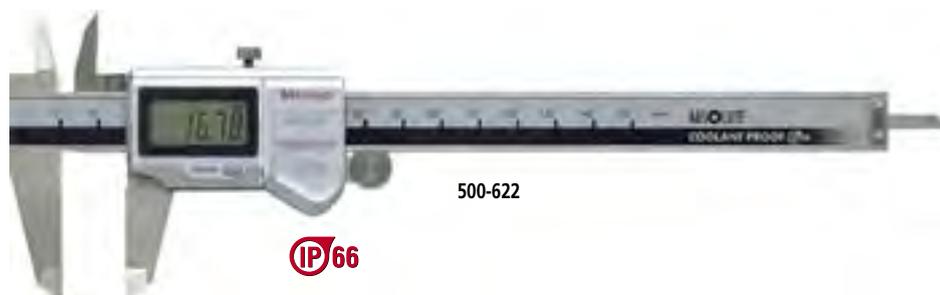
Range	L	a	b	c
0 - 100mm	182	40	21	16.5
0 - 150mm	233	40	21	16.5
0 - 200mm	290	50	24.5	20

ABSOLUTE Coolant Proof Caliper

SERIES 500 — with Dust/Water Protection Conforming to IP66/67 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.



Certificate of inspection



ABSOLUTE[®]
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)



IP67

(Refer to the page 9 for details.)



IP66

(Refer to the page 9 for details.)



(Refer to the page 9 for details.)

Technical Data

Accuracy: $\pm 0.02\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.03\text{mm}$ ($> 200\text{mm}$)
(excluding quantizing error)

Resolution: 0.01mm or .0005"/0.01mm

Repeatability: 0.01mm

Display: LCD

Length standard: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

Battery: SR44 (1 pc. / 2 pcs*), 938882

Battery life: Approx. 3 years under normal use
(1 year: over 300mm models)

Dust/Water protection level: IP66 or IP67

*0 - 300mm model

Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)

Alarm: Low voltage, Counting value composition error

Optional Accessory

05CZA624: SPC cable with data switch (1m)

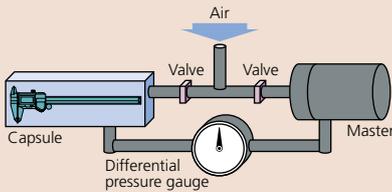
05CZA625: SPC cable with data switch (2m)



Measurement data output function is available with a water-resistant SPC cable.

Air leakage detection system used for water-proof testing

Generally, air leakage tests are performed to evaluate water resistance. Testing begins by placing a measuring tool into the capsule. Next, air with equivalent pressure is supplied to the capsule and the master, then the valves are closed. If none of the air in the capsule seeps into the measuring tool, it will create an air pressure difference in the amount indicated by the differential pressure gauge. Thus, detection of air pressure differences is used as a criterion for judging leakage. Every single unit of the ABS Coolant Proof calipers and Coolant Proof micrometer is tested this way for air leakage to help ensure product quality.



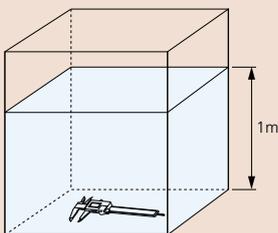
IP66 protection level

- Level 6: Dust-tight
No ingress of dust.
- Level 6: Protected against powerful water jet.
Water projected in powerful jets* against the enclosure from any direction shall have no harmful effects.
*Size of direct jets: uses 12.5 mm (inner diameter) nozzle emitting a 100 kPa jet of water at 100 liters per minute for at least 3 minutes from a distance of approx. 3 meters.

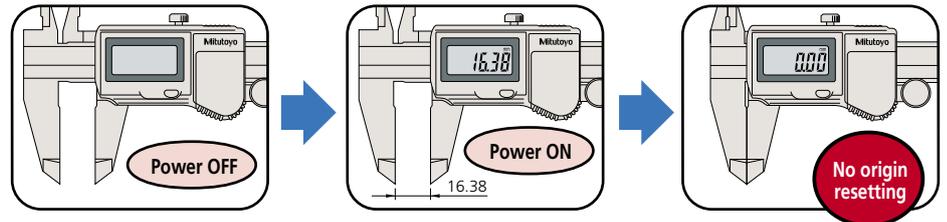


IP67 protection level

- Level 6: Dust-tight
No ingress of dust.
- Level 7: Protected against the effects of temporary immersion in water.
Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed 1 meter in water under standardized conditions of pressure and time (30 min.).



Built-in ABS (absolute) scale means that these calipers are ready to use immediately after power-on without origin resetting. It's as easy as vernier caliper measurements.



SPECIFICATIONS

Metric		IP66 model
Range	Order No.	Remarks
0 - 150mm	500-632	with thumb roller
0 - 150mm	500-637	—
0 - 150mm	500-622*	with thumb roller
0 - 150mm	500-626*	—
0 - 200mm	500-633	with thumb roller
0 - 200mm	500-638	—
0 - 200mm	500-623*	with thumb roller
0 - 200mm	500-627*	—
0 - 300mm	500-634	with thumb roller
0 - 300mm	500-639	—
0 - 300mm	500-624*	with thumb roller
0 - 300mm	500-628*	—

*without SPC data output

Inch/Metric		IP66 model
Range	Order No.	Remarks
0 - 6"	500-682	with thumb roller
0 - 6"	500-672*	with thumb roller
0 - 8"	500-683	with thumb roller
0 - 8"	500-673*	with thumb roller
0 - 12"	500-684	with thumb roller
0 - 12"	500-674*	with thumb roller

*without SPC data output

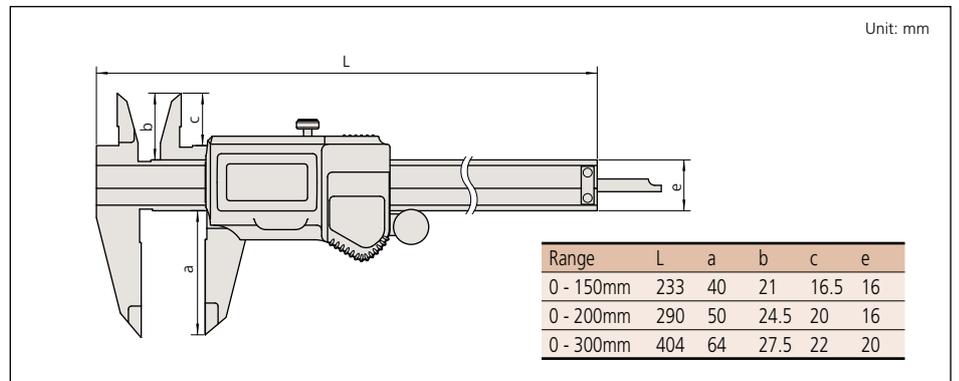
Metric		IP67 model
Range	Order No.	Remarks
0 - 150mm	500-712	with thumb roller
0 - 150mm	500-716	—
0 - 150mm	500-702*	with thumb roller
0 - 150mm	500-706*	—
0 - 200mm	500-713	with thumb roller
0 - 200mm	500-717	—
0 - 200mm	500-703*	with thumb roller
0 - 200mm	500-707*	—

*without SPC data output

Inch/Metric		IP67 model
Range	Order No.	Remarks
0 - 6"	500-762	with thumb roller
0 - 6"	500-752*	with thumb roller
0 - 8"	500-763	with thumb roller
0 - 8"	500-753*	with thumb roller

*without SPC data output

DIMENSION

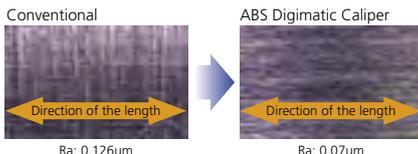


ABSOLUTE Digimatic Caliper

SERIES 500 — with Exclusive ABSOLUTE Encoder Technology

Mitutoyo's absolute Digimatic Caliper 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 absolute encoder technology as well as no more care for overspeed errors.

High quality guide surface finish for smooth slider movement

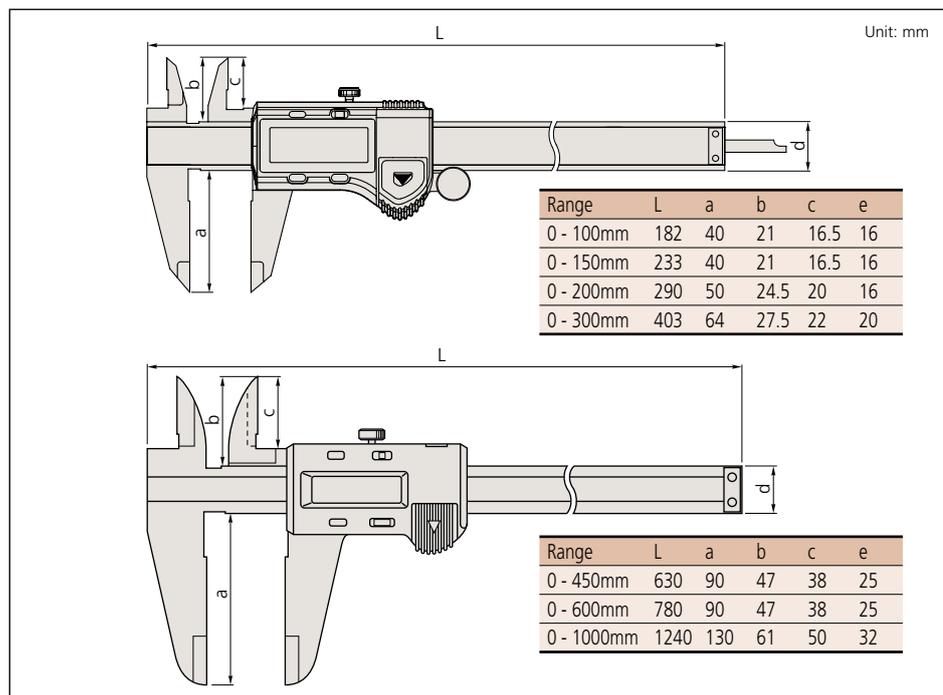


FEATURES

- 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.



DIMENSION



(Refer to the page 9 for details.)



(Refer to the page 9 for details.)

Technical Data

Accuracy: $\pm 0.02\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.03\text{mm}$ ($\leq 300\text{mm}$)
 $\pm 0.05\text{mm}$ ($\leq 600\text{mm}$), $\pm 0.07\text{mm}$ ($\leq 1000\text{mm}$)
 (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Repeatability: 0.01mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 3.5 years under normal use

Function

Origin-set, Zero-setting, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

- 959143:** Data hold unit
- 959149:** SPC cable with data switch (1m)
- 959150:** SPC cable with data switch (2m)



SPECIFICATIONS

Metric

Range	Order No.	Remarks (depth measuring bar / thumb roller / others)		
0 - 100mm	500-150-20	ø1.9mm rod	with thumb roller	—
0 - 100mm	500-180-20*	ø1.9mm rod	—	—
0 - 150mm	500-151-20	Blade	with thumb roller	—
0 - 150mm	500-154-20	Blade	with thumb roller	Carbide-tipped jaws for OD measurement
0 - 150mm	500-155-20	Blade	with thumb roller	Carbide-tipped jaws for OD & ID measurement
0 - 150mm	500-158-20	ø1.9mm rod	with thumb roller	—
0 - 150mm	500-181-20*	Blade	—	—
0 - 200mm	500-152-20	Blade	with thumb roller	—
0 - 200mm	500-156-20	Blade	with thumb roller	Carbide-tipped jaws for OD measurement
0 - 200mm	500-157-20	Blade	with thumb roller	Carbide-tipped jaws for OD & ID measurement
0 - 200mm	500-182-20*	Blade	—	—
0 - 300mm	500-153	Blade	with thumb roller	—
0 - 450mm	500-500-10	—	—	—
0 - 600mm	500-501-10	—	—	—
0 - 1000mm	500-502-10	—	—	—

*without SPC data output

Inch/Metric

Range	Order No.	Remarks (depth measuring bar / thumb roller / others)		
0 - 4"	500-170-20	ø3/40" rod	with thumb roller	—
0 - 4"	500-195-20*	ø3/40" rod	with thumb roller	—
0 - 6"	500-171-20	Blade	with thumb roller	—
0 - 6"	500-174-20	Blade	with thumb roller	Carbide-tipped jaws for OD measurement
0 - 6"	500-175-20	Blade	with thumb roller	Carbide-tipped jaws for OD & ID measurement
0 - 6"	500-178-20	ø3/40" rod	with thumb roller	—
0 - 6"	500-196-20*	Blade	with thumb roller	—
0 - 6"	500-159-20*	Blade	with thumb roller	Carbide-tipped jaws for OD measurement
0 - 6"	500-160-20*	Blade	with thumb roller	Carbide-tipped jaws for OD & ID measurement
0 - 8"	500-172-20	Blade	with thumb roller	—
0 - 8"	500-176-20	Blade	with thumb roller	Carbide-tipped jaws for OD measurement
0 - 8"	500-177-20	Blade	with thumb roller	Carbide-tipped jaws for OD & ID measurement
0 - 8"	500-197-20*	Blade	with thumb roller	—
0 - 8"	500-163-20*	Blade	with thumb roller	Carbide-tipped jaws for OD measurement
0 - 8"	500-164-20*	Blade	with thumb roller	Carbide-tipped jaws for OD & ID measurement
0 - 12"	500-173	Blade	with thumb roller	—
0 - 12"	500-167	Blade	with thumb roller	Carbide-tipped jaws for OD measurement
0 - 12"	500-168	Blade	with thumb roller	Carbide-tipped jaws for OD & ID measurement
0 - 12"	500-193*	Blade	with thumb roller	—
0 - 12"	500-165*	Blade	—	Carbide-tipped jaws for OD measurement
0 - 12"	500-166*	Blade	—	Carbide-tipped jaws for OD & ID measurement
0 - 18"	500-505-10	—	with thumb roller	—
0 - 24"	500-506-10	—	with thumb roller	—
0 - 40"	500-507-10	—	with thumb roller	—

*without SPC data output

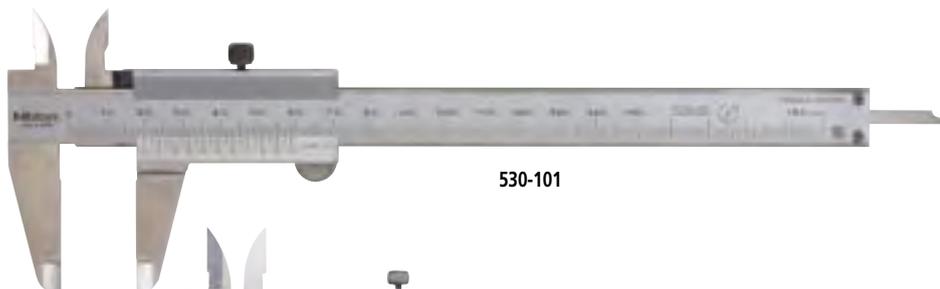
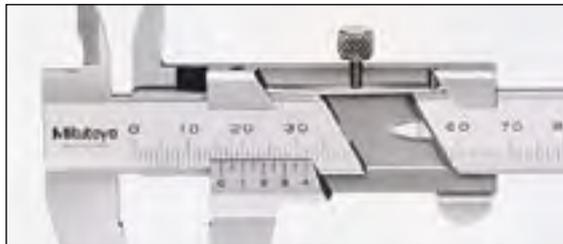
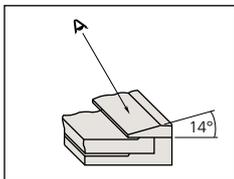


Vernier Caliper

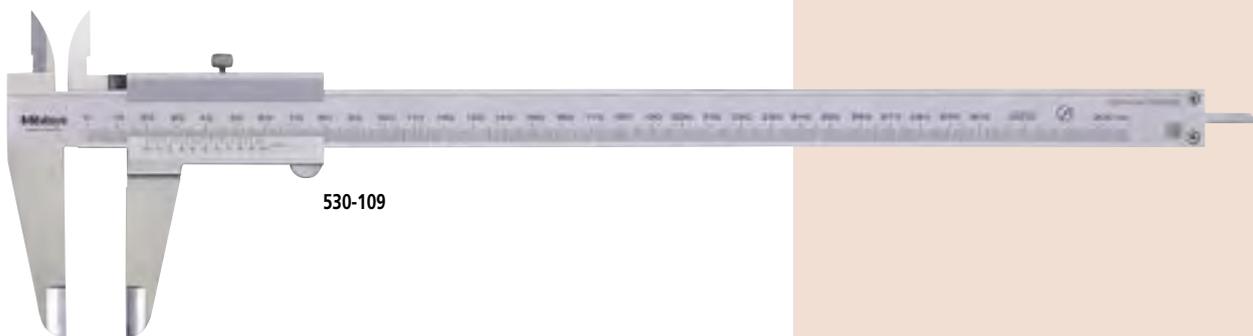
SERIES 530 — Standard model

FEATURES

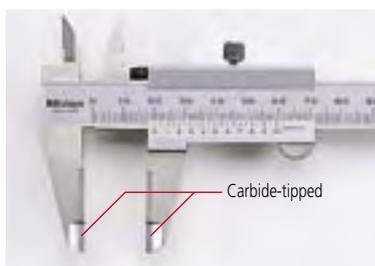
- Plain and basic design.
- Can measure OD (outside diameter), ID (inside diameter), depth, and steps.
- The small vernier face angle (14°) provides easy reading.
- Different reading scales on vernier. (metric/inch and inch models only)
- Clamping screw atop the slider.
- Carbide-tipped jaw type calipers are also available.



530-101



530-109



Carbide-tipped

Carbide-tipped jaw type

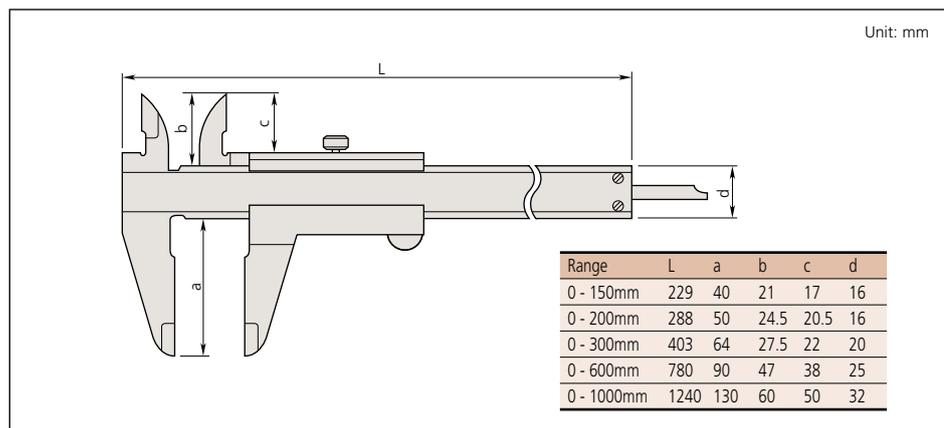


Round depth bar type

Technical Data

Accuracy: $\pm 0.05\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.08\text{mm}$ ($\leq 300\text{mm}$)
 $\pm 0.10\text{mm}$ ($\leq 600\text{mm}$), $\pm 0.15\text{mm}$ ($\leq 1000\text{mm}$)
 High accuracy type:
 $\pm 0.03\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.04\text{mm}$ ($\leq 300\text{mm}$)
 Graduation: 0.05mm, 0.05mm (1/128") or .001" (1/128")
 High accuracy type:
 0.02mm or 0.02mm (.001")

DIMENSION



Measurement Applications



OD measurement



ID measurement



Step measurement



Depth measurement

SPECIFICATIONS

Metric

Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 150mm	530-102	ø1.9mm rod	—	—
0 - 150mm	530-101	Blade	—	—
0 - 150mm	530-320	Blade	—	Carbide-tipped jaws for OD measurement
0 - 150mm	530-335	Blade	—	Carbide-tipped jaws for OD & ID measurement
0 - 150mm	530-319	Blade	—	Clamping screw below the slider
0 - 150mm	530-122*	Blade	—	High accuracy model: ±0.03mm
0 - 200mm	530-108	Blade	—	—
0 - 200mm	530-321	Blade	—	Carbide-tipped jaws for OD measurement
0 - 200mm	530-123*	Blade	—	High accuracy model: ±0.03mm
0 - 300mm	530-109	Blade	—	—
0 - 300mm	530-322	Blade	—	Carbide-tipped jaws for OD measurement
0 - 300mm	530-124*	Blade	—	High accuracy model: ±0.04mm
0 - 600mm	530-501	—	—	—
0 - 1000mm	530-502	—	—	—

*Graduation: 0.02mm

Metric/Inch with metric/inch double scale

Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 150mm	530-104	Blade	1/128"	—
0 - 150mm	530-316	Blade	1/128"	Clamping screw below the slider
0 - 150mm	530-125	Blade	1/128"	—
0 - 150mm	530-312*	Blade	.001"	High accuracy model: ±0.03mm
0 - 200mm	530-114	Blade	1/128"	—
0 - 200mm	530-118*	Blade	.001"	High accuracy model: ±0.03mm
0 - 300mm	530-115	Blade	1/128"	—
0 - 300mm	530-119*	Blade	.001"	High accuracy model: ±0.04mm

*Graduation: 0.02mm

Inch with inch/inch double scale

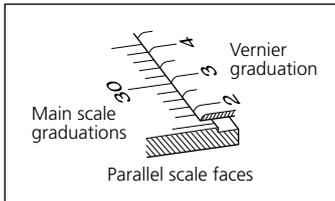
Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 6"	530-105	Blade	1/128"	—
0 - 6"	530-314	Blade	1/128"	Carbide-tipped jaws for OD measurement
0 - 8"	530-116	Blade	1/128"	—

Vernier Caliper

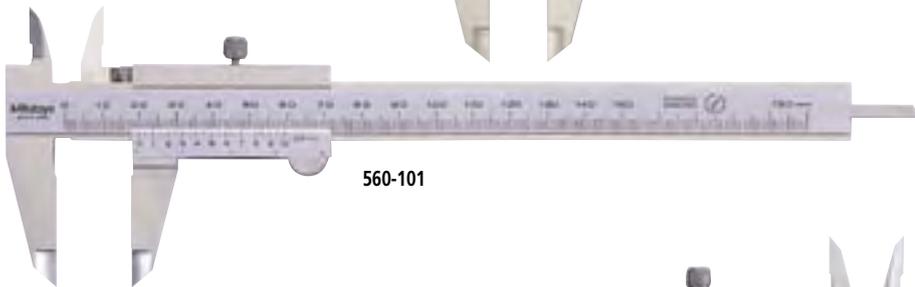
SERIES 560, 536 — Parallax-Free Type

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.



560-110



560-101



536-310

Technical Data

Accuracy: $\pm 0.05\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.08\text{mm}$ ($\leq 300\text{mm}$)
 High accuracy type:
 $\pm 0.02\text{mm}$ ($\leq 150\text{mm}$), $\pm 0.03\text{mm}$ ($\leq 200\text{mm}$)
 Graduation: 0.05mm or 0.05mm (1/128")
 High accuracy type:
 0.02mm or 0.02mm (.001")



SPECIFICATIONS

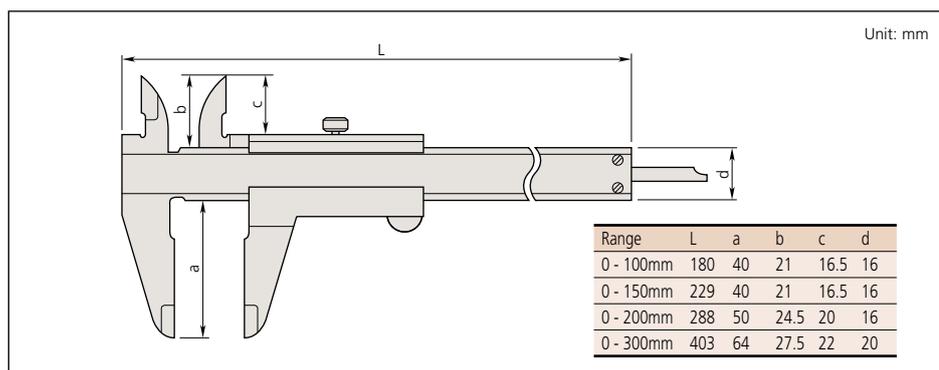
Metric				
Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 100mm	560-110	$\phi 1.9\text{mm}$ rod	—	—
0 - 150mm	560-101	Blade	—	—
0 - 150mm	536-310	Blade	—	Left-handed type
0 - 150mm	560-122*	Blade	—	High accuracy model: $\pm 0.03\text{mm}$
0 - 200mm	560-108	Blade	—	—
0 - 300mm	560-109	Blade	—	—

*Graduation: 0.02mm

Metric/Inch with metric/inch double scale				
Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 100mm	560-104	Blade	1/128"	—
0 - 200mm	560-118*	Blade	.001"	High accuracy model: $\pm 0.03\text{mm}$

*Graduation: 0.02mm

DIMENSION

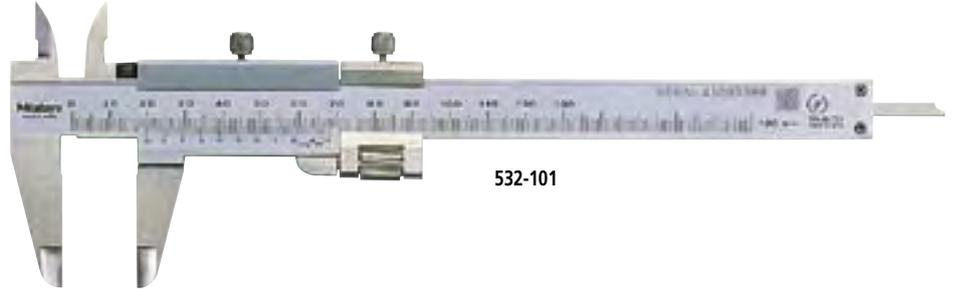


Vernier Caliper

SERIES 532 — with Fine Adjustment

FEATURES

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



532-101

Technical Data

Accuracy: $\pm 0.03\text{mm}$ ($\leq 180\text{mm}$), $\pm 0.04\text{mm}$ ($\leq 280\text{mm}$)
 Graduation: 0.02mm, 0.02mm (.001") or .001" (1/128")

SPECIFICATIONS

Metric

Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 130mm	532-101	Blade	—	with fine adjustment carriage
0 - 180mm	532-102	Blade	—	with fine adjustment carriage
0 - 280mm	532-103	Blade	—	with fine adjustment carriage

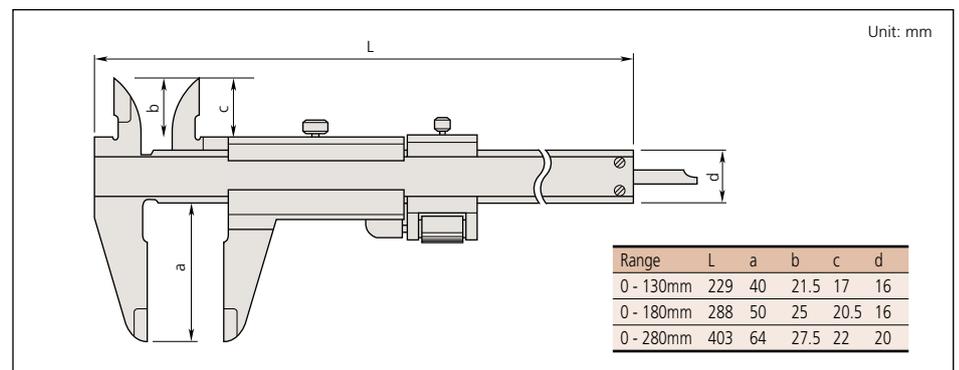
Metric/Inch with metric/inch double scale

Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 130mm	532-119	Blade	.001"	with fine adjustment carriage
0 - 180mm	532-120	Blade	.001"	with fine adjustment carriage
0 - 280mm	532-121	Blade	.001"	with fine adjustment carriage

Inch with inch/inch double scale

Range	Order No.	Remarks (depth measuring bar / second scale graduation / others)		
0 - 5"	532-104	Blade	1/128"	with fine adjustment carriage
0 - 7"	532-105	Blade	1/128"	with fine adjustment carriage
0 - 11"	532-106	Blade	1/128"	with fine adjustment carriage

DIMENSION

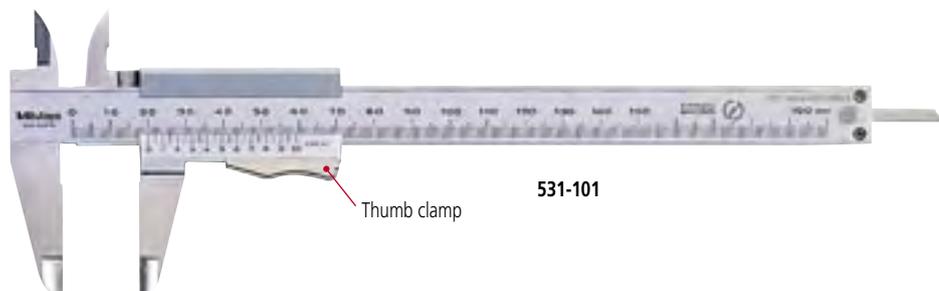


Vernier Caliper

SERIES 531 — with Thumb Clamp

FEATURES

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



531-101

Thumb clamp

Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.05mm, 0.05mm (1/128") or .001" (1/128")
 High accuracy type:
 0.02mm or 0.02mm (.001")

SPECIFICATIONS

Metric

Range	Order No.	Accuracy	Remarks (depth measuring bar / Second scale graduation / Others)		
0 - 150mm	531-101	±0.05mm	Blade	—	—
0 - 150mm	531-140*	±0.03mm	Blade	—	High accuracy model
0 - 200mm	531-102	±0.05mm	Blade	—	—
0 - 200mm	531-141*	±0.03mm	Blade	—	High accuracy model
0 - 300mm	531-103	±0.08mm	Blade	—	—
0 - 300mm	531-142*	±0.04mm	Blade	—	High accuracy model

*Graduation: 0.02mm

Metric/Inch with metric/inch double scale

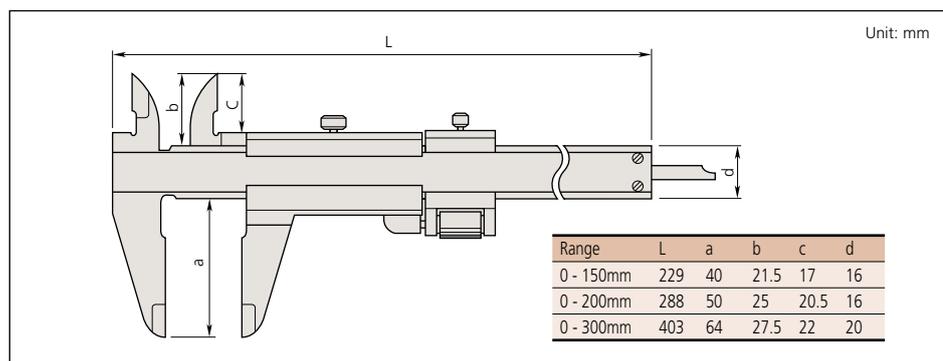
Range	Order No.	Accuracy	Remarks (depth measuring bar / Second scale graduation / Others)		
0 - 150mm	531-107	±0.05mm	Blade	1/128"	—
0 - 150mm	531-122	±0.05mm	Blade	1/128"	with inch/mm conversion label
0 - 150mm	531-128*	±0.03mm	Blade	.001"	High accuracy model
0 - 200mm	531-108	±0.05mm	Blade	1/128"	—
0 - 200mm	531-129*	±0.03mm	Blade	.001"	High accuracy model
0 - 300mm	531-109	±0.08mm	Blade	1/128"	—
0 - 300mm	531-112*	±0.04mm	Blade	.001"	High accuracy model

*Graduation: 0.02mm

inch with inch/inch double scale

Range	Order No.	Accuracy	Remarks (depth measuring bar / Second scale graduation / Others)		
0 - 6"	531-113	±.0015"	Blade	1/128"	—
0 - 8"	531-114	±.0015"	Blade	1/128"	—

DIMENSION

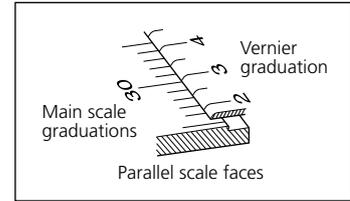


Vernier Caliper

SERIES 522 — Parallax-Free Type

FEATURES

- The main and vernier scales are flush-fitted to eliminate parallax errors because of the diamond-shape (octagonal) cross section of the main scale.
- Can measure OD, ID, depth, and steps.
- With clamping screw below the slider.



522-600

Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.05mm or 0.05mm (1/128")
 High accuracy type:
 0.02mm or 0.02mm (.001")



SPECIFICATIONS

Metric

Range	Order No.	Accuracy	Remarks (depth measuring bar / Second scale graduation / Others)		
0 - 150mm	522-600	±0.05mm	Blade	—	—
0 - 150mm	522-606*	±0.03mm	Blade	—	High accuracy model

*Graduation: 0.02mm

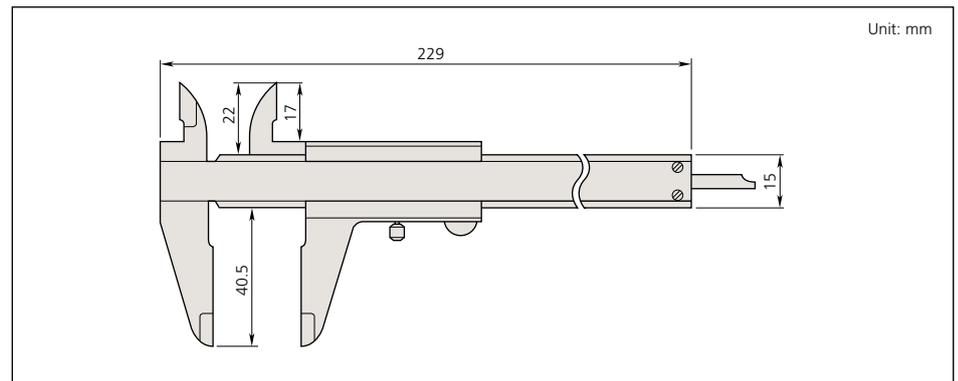
Metric/Inch

with metric/inch double scale

Range	Order No.	Accuracy	Remarks (depth measuring bar / Second scale graduation / Others)		
0 - 150mm	522-601	±0.05mm	Blade	1/128"	—
0 - 150mm	522-602*	±0.03mm	Blade	.001"	High accuracy model

*Graduation: 0.02mm

DIMENSION

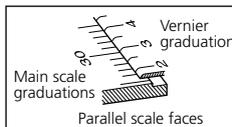


ABSOLUTE Digimatic & Vernier Caliper

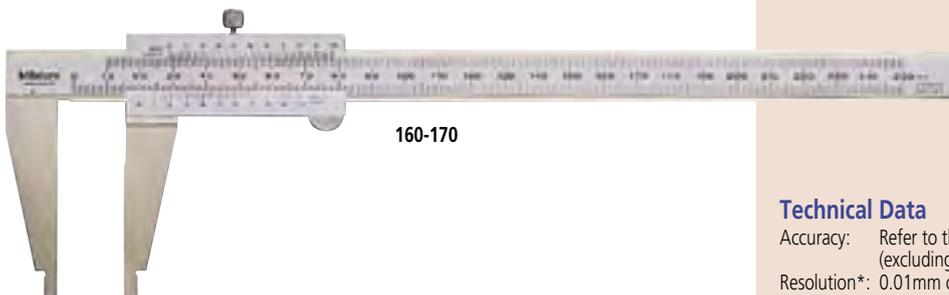
SERIES 550, 160 — with Nib Style Jaws

FEATURES

- The rounded faces of the jaws are ideal for accurate ID (inside diameter) measurement.
- Inside and outside measurements can be directly read from the upper and lower slider graduations (series 160).
- With fine-adjustment carriage type is available (series 160).
- Parallax-free vernier scale type is available for easy and positive measurement (series 160).
- With SPC output (series 550).



550-201-20



160-170

SPECIFICATIONS

Metric Digital model			
Range*	Order No.	Accuracy	Remarks
0 (10) - 200mm	550-201-20	±0.03mm	—
0 (10) - 300mm	550-231-10	±0.03mm	with offset/preset function for easy ID measurement
0 (20) - 450mm	550-203-10	±0.05mm	—
0 (20) - 600mm	550-205-10	±0.05mm	—
0 (20) - 1000mm	550-207-10	±0.07mm	—

*(): Minimum dimension in ID measurement

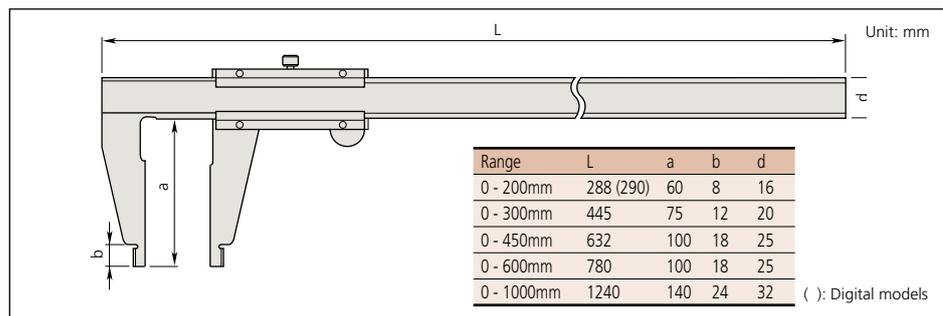
Inch/Metric Digital model			
Range*	Order No.	Accuracy	Remarks
0 (.4") - 8"	550-201-20	±.001"	—
0 (.4") - 12"	550-231-10	±.0015"	with offset/preset function for easy ID measurement
0 (.5") - 18"	550-203-10	±.002"	—
0 (.5") - 24"	550-205-10	±.002"	—
0 (1") - 40"	550-207-10	±.003"	—

*(): Minimum dimension in ID measurement

Metric with metric/metric double scale			
Range*	Order No.	Accuracy	Remarks
0 (10) - 200mm	160-170	±0.03mm	High accuracy model with parallax-free vernier scale (0.02mm graduation)
0 (10) - 300mm	160-180	±0.04mm	High accuracy model with parallax-free vernier scale (0.02mm graduation)
0 (20) - 450mm	160-130	±0.10mm	—
0 (20) - 600mm	160-131	±0.10mm	—
0 (20) - 1000mm	160-132	±0.15mm	—

*(): Minimum dimension in ID measurement

DIMENSION



(Refer to the page 9 for details.)

Technical Data

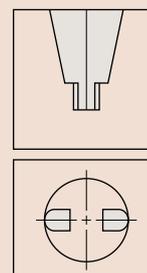
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.02mm
Display*: LCD
Length standard*: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

959143: Data hold unit
959149: SPC cable with data switch (1m)
959150: SPC cable with data switch (2m)



Round surface of jaws for accurate CD measurement

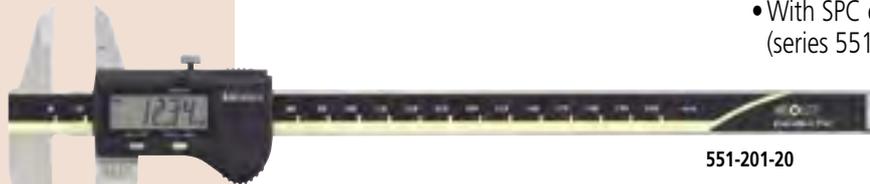
ABSOLUTE Digimatic & Vernier Caliper

SERIES 551, 533 — with Nib Style and Standard Jaws



ABSOLUTE
Absolute System Patented by MITUTOYO

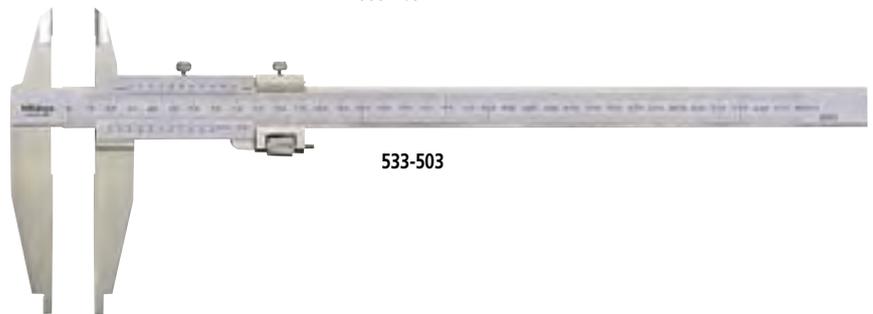
(Refer to the page 9 for details.)



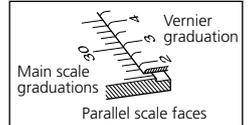
551-201-20



533-403



533-503



FEATURES

- The rounded faces of the jaws are ideal for accurate ID (inside diameter) measurement.
- Inside and outside measurements can be directly read from the upper and lower slider graduations (series 533).
- With fine-adjustment carriage type is available (series 533).
- Parallax-free vernier scale type is available for easy and positive measurement (series 533).
- With SPC output (series 551).

Technical Data

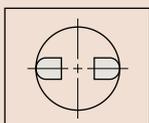
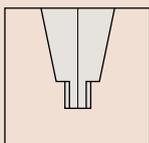
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation***: 0.02mm or 0.05mm
Display*: LCD
Length standard*: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

959143: Data hold unit
959149: SPC cable with data switch (1m)
959150: SPC cable with data switch (2m)



Round surface of jaws for accurate CD measurement

SPECIFICATIONS

Metric Digital model

Range*	Order No.	Accuracy	Remarks
0 (10) - 200mm	551-201-20	±0.03mm	—
0 (10) - 300mm	551-231-10	±0.04mm	with offset/preset function for easy ID measurement
0 (20) - 450mm	551-204-10	±0.06mm	—
0 (20) - 600mm	551-206-10	±0.06mm	—
0 (20) - 1000mm	551-207-10	±0.07mm	—

* (): Minimum dimension in ID measurement

Inch/Metric Digital model

Range*	Order No.	Accuracy	Remarks
0 (.4") - 8"	551-221-20	±.001"	—
0 (.4") - 12"	551-241-10	±.002"	with offset/preset function for easy ID measurement
0 (.5") - 18"	551-224-10	±.0025"	—
0 (.5") - 24"	551-226-10	±.0025"	—
0 (1") - 40"	551-227-10	±.003"	—

* (): Minimum dimension in ID measurement

Metric with metric/metric double scale

Range*	Order No.	Accuracy	Remarks
0 (10) - 200mm	533-401	±0.05mm	with parallax-free vernier scale
0 (10) - 300mm	533-403	±0.08mm	with parallax-free vernier scale
0 (20) - 450mm	533-404	±0.10mm	—
0 (20) - 600mm	533-405	±0.12mm	—
0 (20) - 1000mm	533-406	±0.15mm	—

* (): Minimum dimension in ID measurement

Metric with metric/metric double scale and fine adjustment

Range*	Order No.	Accuracy	Remarks
0 (10) - 280mm	533-503*	±0.04mm	High accuracy model with parallax-free vernier scale (0.02mm graduation)
0 (20) - 500mm	533-504*	±0.05mm	High accuracy model with 0.02mm graduation
0 (20) - 750mm	533-505*	±0.06mm	High accuracy model with 0.02mm graduation
0 (20) - 1000mm	533-506*	±0.07mm	High accuracy model with 0.02mm graduation

* (): Minimum dimension in ID measurement

Dial Caliper

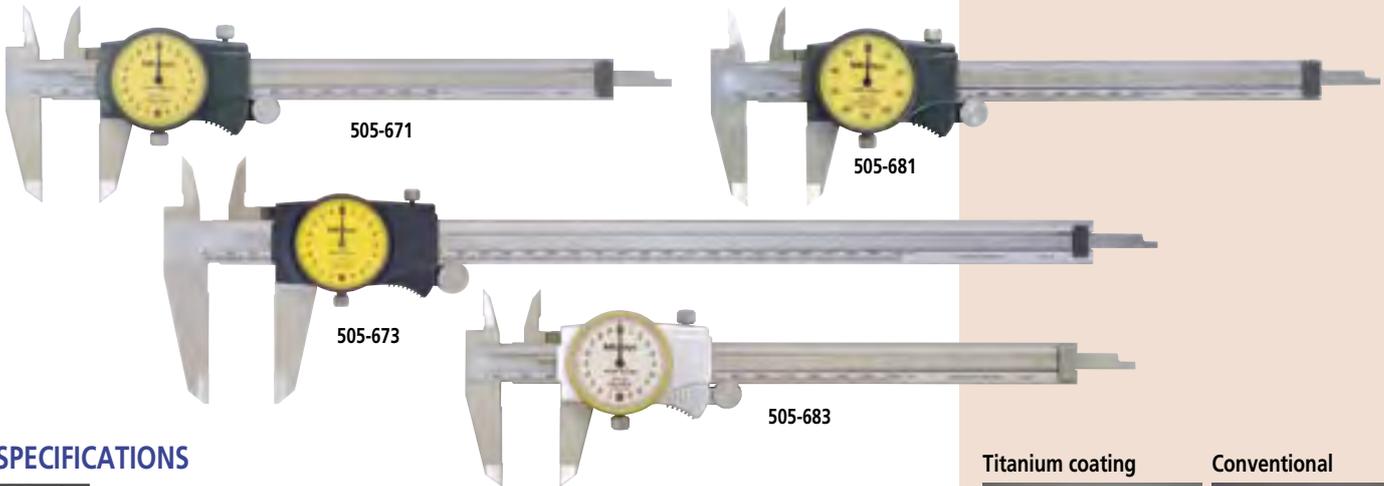
SERIES 505

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 (except for 0 - 300mm and 0 - 12" model). 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.



(Refer to the page 9 for details.)



SPECIFICATIONS

Metric			
Range	Order No.	Accuracy	Remarks (dial reading / others)
0 - 100mm	505-680	±0.015mm	0.01mm, 1mm/rev
0 - 150mm	505-671 / 505-683*	±0.03mm	0.02mm, 2mm/rev
0 - 150mm	505-707	±0.03mm	0.02mm, 2mm/rev
0 - 150mm	505-711	±0.03mm	0.02mm, 2mm/rev
0 - 150mm	505-681 / 505-685*	±0.02mm	0.01mm, 1mm/rev
0 - 200mm	505-672 / 505-684*	±0.03mm	0.02mm, 2mm/rev
0 - 200mm	505-682 / 505-686*	±0.03mm	0.01mm, 1mm/rev
0 - 300mm	505-673	±0.04mm	0.02mm, 2mm/rev

*Silver cover type

Inch			
Range	Order No.	Accuracy	Remarks (dial reading / others)
0 - 4"	505-674	±.001"	.001", .1"/rev
0 - 6"	505-675 / 505-689*	±.001"	.001", .1"/rev
0 - 6"	505-708	±.001"	.001", .1"/rev
0 - 6"	505-712	±.001"	.001", .1"/rev
0 - 8"	505-676 / 505-690*	±.002"	.001", .1"/rev
0 - 8"	505-709	±.002"	.001", .1"/rev
0 - 8"	505-713	±.002"	.001", .1"/rev
0 - 12"	505-720	±.002"	.001", .2"/rev
0 - 12"	505-677*	±.002"	.001", .1"/rev
0 - 12"	505-721	±.002"	.001", .2"/rev
0 - 12"	505-710*	±.002"	.001", .1"/rev
0 - 12"	505-714*	±.002"	.001", .1"/rev

*Silver cover type

Titanium coating



Wear: 0µm

Conventional

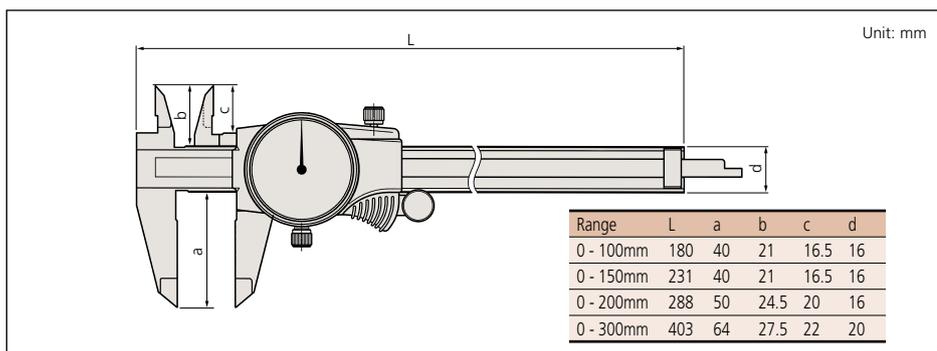


Wear: 4µm

Technical Data

Accuracy: Refer to the list of specifications.
Dial reading: Refer to the list of specifications.

DIMENSION



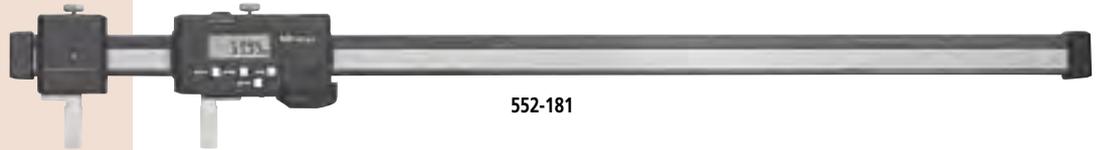


Digimatic Carbon Fiber Caliper

SERIES 552 — with Interchangeable Jaws

FEATURES

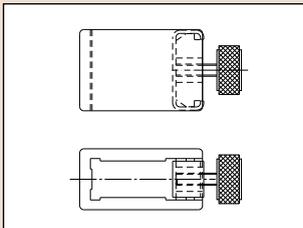
- The range of applications can be expanded by using the interchangeable jaws (optional).
- Quick and easy exchanging of jaws due to the unique clamping mechanism. (A pair of clamping wheels are standard accessories.)
- Provided with preset function for setting a desired starting point, which allows direct readout of offset measurements.
- With SPC data output.



552-181

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Display: LCD
 Length standard: Electrostatic capacitance type linear encoder
 Max. response speed: 1600mm/s
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 3,000 hours in continuous use
 Standard accessory: Attachment clamps (2 pcs.), **05GZA033**



Function

Origin-set, Zero-setting, Presetting, Offsetting, Data hold, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

- 905338:** SPC cable (straight, 1m)
- 905409:** SPC cable (straight, 2m)
- 905689:** SPC cable (L-type, 1m)
- 905690:** SPC cable (L-type, 2m)

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 450mm	552-181	±0.04mm
0 - 600mm	552-182	±0.04mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 18"	552-191	±.002"
0 - 24"	552-192	±.002"

Interchangeable Jaws (Optional)

Unit: mm

Standard Type

Order No.	Components	a	b
07CZA056	Right (07CAA044), Left (07CAA045)	28mm (1.1")	36mm (1.4")

Centerline Type

Metric			
Order No.	Components	a	b
07CZA057	07CZA039 x 2pcs.	30mm	30mm

Inch			
Order No.	Components	a	b
07CZA060	07CZA047 x 2pcs.	1.2"	1.2"

Inside Point Type

Metric			
Order No.	Components	a	b
07CZA058	07CZA041 x 2pcs.	25mm	50mm

Inch			
Order No.	Components	a	b
07CZA059	07CZA048 x 2pcs.	1"	2"

Surface Plate Type

Order No.	a	b
07CZA044	90mm (3.5")	28mm (1.1")

Scriber Type

Metric			
Order No.	Components	a	b
07CZA055	Right (07CZA042), Left (07CZA043)	8mm	30mm

inch			
Order No.	Components	a	b
07CZA061	Right (07CZA042), Left (07CZA049)	0.31"	1.2"

Digimatic Carbon Fiber Caliper

SERIES 552 — with Interchangeable Jaws

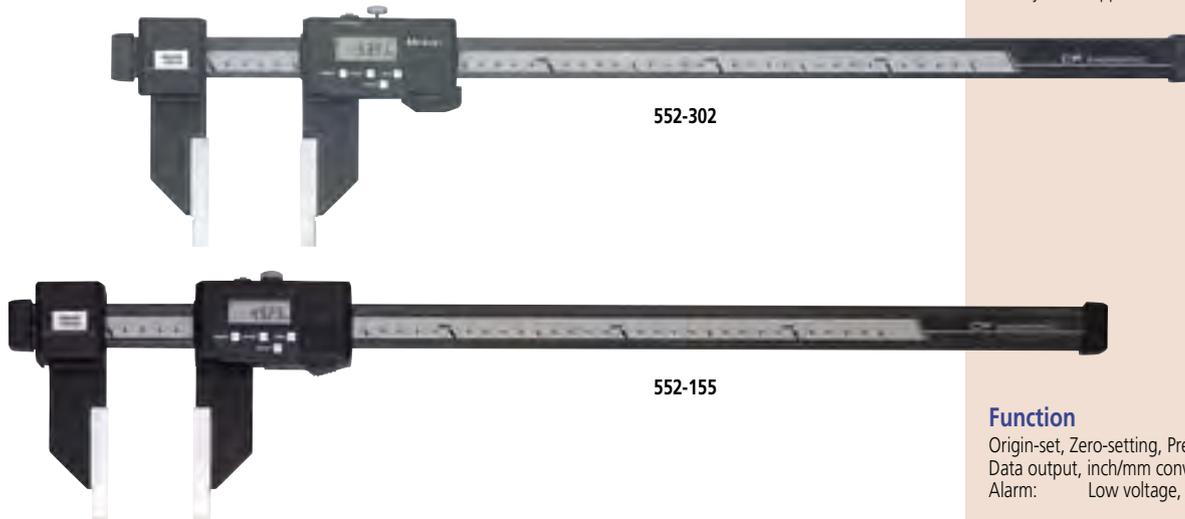
FEATURES

- 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.
- With SPC data output.
- Special model available with ceramic jaws which are suitable to measure magnetic products.



Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Display: LCD
 Length standard: Electrostatic capacitance type linear encoder
 Max. response speed: 1600mm/s
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 3.000 hours in continuous use



SPECIFICATIONS

Metric			
Range*	Order No.	Accuracy	Remarks
0 (20) - 300mm	552-301	±0.04mm	—
0 (20) - 450mm	552-302 / 552-155	±0.05mm	552-155: with ceramic jaws
0 (20) - 600mm	552-303 / 552-156	±0.05mm	552-156: with ceramic jaws
0 (20) - 1000mm	552-304	±0.07mm	—
0 (20) - 1500mm	552-305	±0.09mm	—

*(): Minimum dimension in ID measurement

Inch/Metric			
Range*	Order No.	Accuracy	Remarks
0 (.5") - 12"	552-311	±.0015"	—
0 (.5") - 18"	552-312 / 552-165	±.002"	552-165: with ceramic jaws
0 (.5") - 24"	552-313 / 552-166	±.002"	552-166: with ceramic jaws
0 (1") - 40"	552-314	±.003"	—
0 (1") - 60"	552-315	±.0035"	—

*(): Minimum dimension in ID measurement

Metric Long jaw type			
Range*	Order No.	Accuracy	Remarks
0 (20) - 450mm	552-150	±0.07mm	—
0 (20) - 600mm	552-151	±0.07mm	—

*(): Minimum dimension in ID measurement

Inch/Metric Long jaw type			
Range*	Order No.	Accuracy	Remarks
0 (.5") - 12"	552-160	±.003"	—
0 (.5") - 24"	552-161	±.003"	—

*(): Minimum dimension in ID measurement

Function

Origin-set, Zero-setting, Presetting, Offsetting, Data hold, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

- 905338:** SPC cable (straight, 1m)
- 905409:** SPC cable (straight, 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 (for models up to 600mm/24" range)
- 914054:** Attachment clamps (for models over 600mm/24" range)

* Attachment clamps are required and not available for long jaw type.



Centerline Attachments

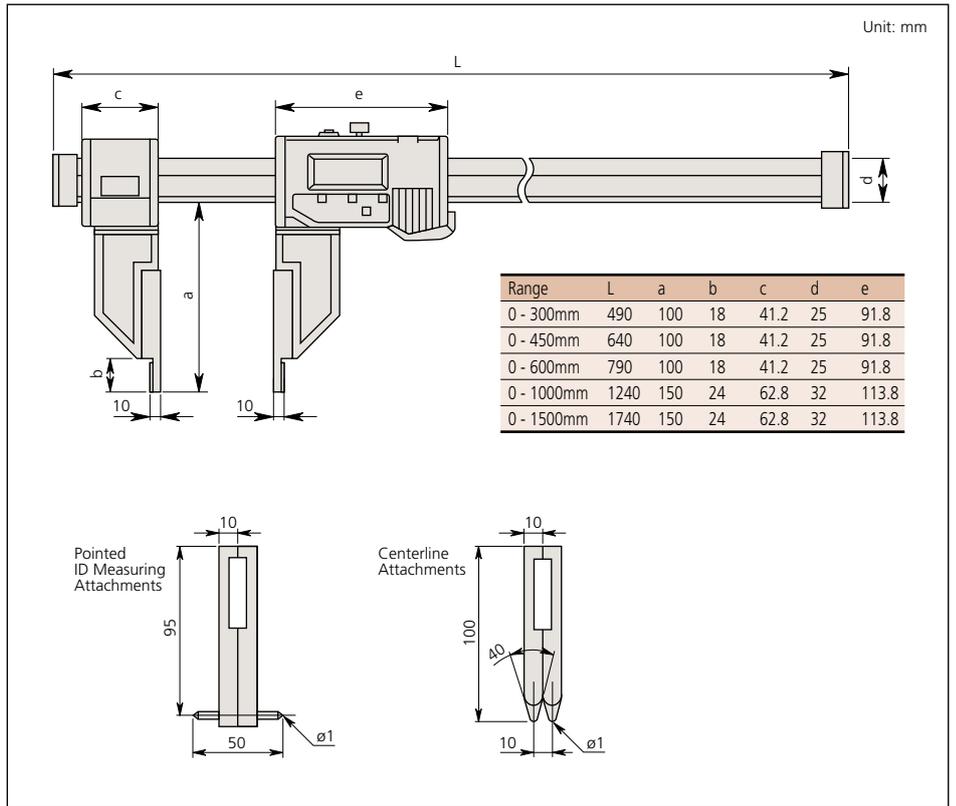
Pointed ID Measuring Attachments



Attachment Clamps



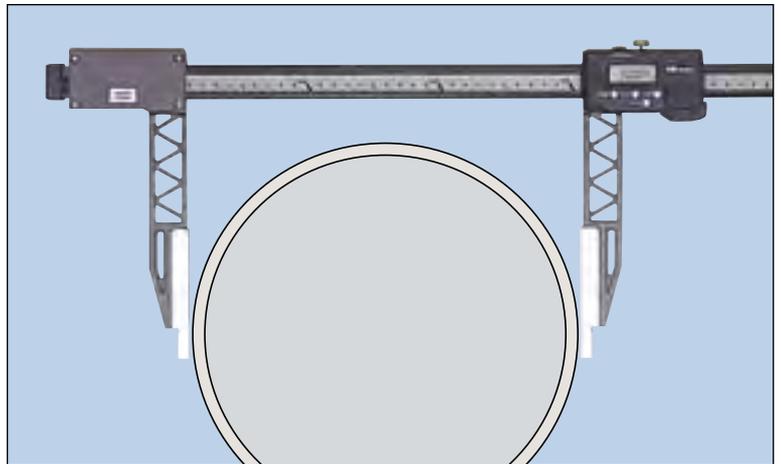
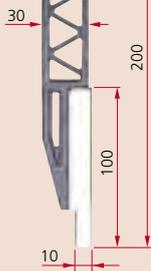
DIMENSION



Unit: mm



552-151



Vernier Caliper

SERIES 160 — with Nib Style Jaws and Fine Adjustment

FEATURES

- The jaws have round measuring faces for accurate ID measurement.
- With fine adjustment carriage to feed the slider finely. (without 160-130~134)
- Inside and outside measurements can be directly read from the upper and lower slider graduations, respectively.



SPECIFICATIONS

Metric with metric/metric double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (20) - 450mm	160-130	±0.10mm	0.05mm	0.05mm	without fine adjustment
0 (20) - 600mm	160-131	±0.10mm	0.05mm	0.05mm	without fine adjustment
0 (20) - 1000mm	160-132	±0.15mm	0.05mm	0.05mm	without fine adjustment
0 (20) - 1500mm	160-133	±0.22mm	0.05mm	0.05mm	without fine adjustment
0 (20) - 2000mm	160-134	±0.28mm	0.05mm	0.05mm	without fine adjustment

*(): Minimum dimension in ID measurement

Metric with metric/metric double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (10) - 300mm	160-127	±0.04mm	0.02mm	0.02mm	—
0 (20) - 450mm	160-128	±0.05mm	0.02mm	0.02mm	—
0 (20) - 600mm	160-101	±0.05mm	0.02mm	0.02mm	—
0 (20) - 1000mm	160-104	±0.07mm	0.02mm	0.02mm	—
0 (20) - 1500mm	160-110	±0.09mm	0.02mm	0.02mm	—
0 (20) - 2000mm	160-113	±0.12mm	0.02mm	0.02mm	—

*(): Minimum dimension in ID measurement

Metric/Inch with metric/inch double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (10) - 300mm	160-150	±0.04mm	0.02mm	.001"	+10mm/.394" to reading in ID measurement
0 (20) - 450mm	160-151	±0.05mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement
0 (20) - 600mm	160-153	±0.05mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement
0 (20) - 1000mm	160-155	±0.07mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement
0 (20) - 1500mm	160-157	±0.09mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement
0 (20) - 2000mm	160-159	±0.12mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement

*(): Minimum dimension in ID measurement

Inch with inch/inch double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (.3") - 12"	160-124	±.0015"	.001"	.001"	—
0 (.5") - 18"	160-116	±.002"	.001"	.001"	—
0 (.5") - 24"	160-102	±.002"	.001"	.001"	—
0 (1") - 40"	160-105	±.003"	.001"	.001"	—
0 (1") - 60"	160-111	±.004"	.001"	.001"	—
0 (1") - 80"	160-114	±.005"	.001"	.001"	—

*(): Minimum dimension in ID measurement

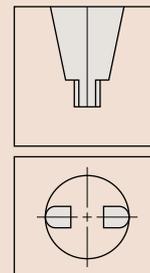
Inch/Metric with inch/metric double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (.3") - 12"	160-125	±.0015"	.001"	0.02mm	+3"/7.62mm to reading in ID measurement
0 (.5") - 18"	160-118	±.002"	.001"	0.02mm	+5"/12.7mm to reading in ID measurement
0 (.5") - 24"	160-103	±.002"	.001"	0.02mm	+5"/12.7mm to reading in ID measurement
0 (1") - 40"	160-106	±.003"	.001"	0.02mm	+1"/25.4mm to reading in ID measurement
0 (1") - 60"	160-112	±.004"	.001"	0.02mm	+1"/25.4mm to reading in ID measurement
0 (1") - 80"	160-115	±.005"	.001"	0.02mm	+1"/25.4mm to reading in ID measurement

*(): Minimum dimension in ID measurement

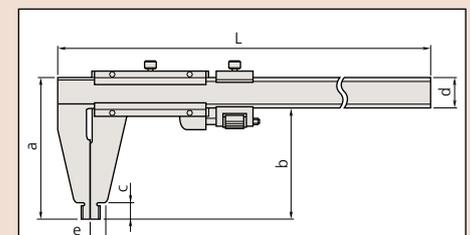
Technical Data

Accuracy: Refer to the list of specifications.
Graduation: Refer to the list of specifications.



Round surface of jaws for accurate CD measurement

DIMENSION



Unit: mm

Range	L	a	b	c	d	e
0 - 300mm	445	95	25	12	20	10
0 - 450mm	630	125	100	18	25	14.8
0 - 600mm	780	125	100	18	25	14.8
0 - 1000mm	1240	172	140	24	32	17
0 - 1500mm	1800	212	180	30	32	19
0 - 2000mm	2300	220	180	30	40	23

Long Jaw Vernier Caliper

SERIES 534

FEATURES

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



534-110



534-114

SPECIFICATIONS

Metric with metric/metric double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (10) - 300mm	534-109	±0.07mm	0.05mm	0.05mm	without fine adjustment
0 (20) - 500mm	534-110	±0.13mm	0.05mm	0.05mm	without fine adjustment

*(): Minimum dimension in ID measurement

Metric with metric/metric double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (10) - 300mm	534-113	±0.04mm	0.02mm	0.02mm	—
0 (20) - 500mm	534-114	±0.06mm	0.02mm	0.02mm	—
0 (20) - 750mm	534-115	±0.08mm	0.02mm	0.02mm	—
0 (20) - 1000mm	534-116	±0.10mm	0.02mm	0.02mm	—

*(): Minimum dimension in ID measurement

Metric/Inch with metric/inch double scale

Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (10) - 300mm	534-101	±0.07mm	0.05mm	1/128"	+10mm/.394" to reading in ID measurement
0 (10) - 300mm	534-105	±0.04mm	0.02mm	.001"	+10mm/.394" to reading in ID measurement
0 (20) - 500mm	534-102	±0.13mm	0.05mm	1/128"	+20mm/.787" to reading in ID measurement
0 (20) - 500mm	534-106	±0.06mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement
0 (20) - 700mm	534-103	±0.16mm	0.05mm	1/128"	+20mm/.787" to reading in ID measurement
0 (20) - 700mm	534-107	±0.08mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement
0 (20) - 1000mm	534-104	±0.20mm	0.05mm	1/128"	+20mm/.787" to reading in ID measurement
0 (20) - 1000mm	534-108	±0.10mm	0.02mm	.001"	+20mm/.787" to reading in ID measurement

*(): Minimum dimension in ID measurement

Inch with inch/inch double scale

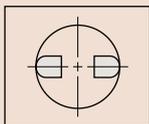
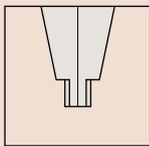
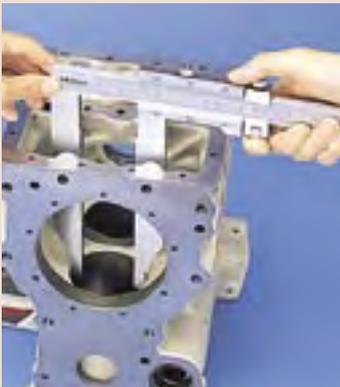
Range*	Order No.	Accuracy	Remarks (lower scale graduation / upper scale graduation / Others)		
0 (.3") - 12"	534-117	±.002"	.001"	.001"	—
0 (.8") - 20"	534-118	±.003"	.001"	.001"	—
0 (.8") - 30"	534-119	±.004"	.001"	.001"	—
0 (.8") - 40"	534-120	±.004"	.001"	.001"	—

*(): Minimum dimension in ID measurement

Technical Data

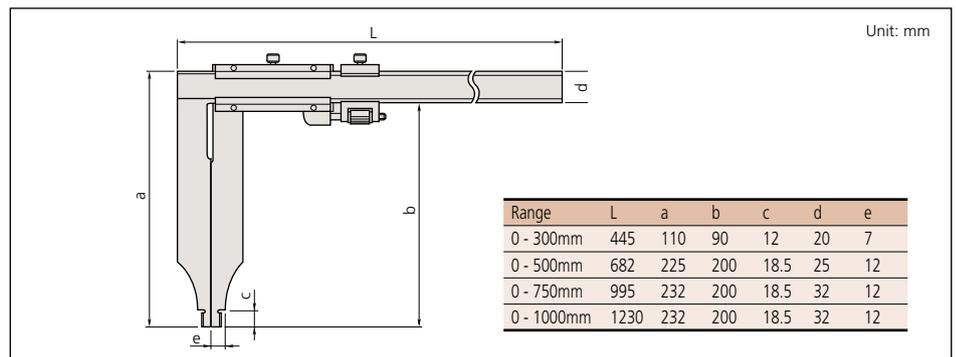
Accuracy: Refer to the list of specifications.

Graduation: Refer to the list of specifications.



Round surface of jaws for accurate CD measurement

DIMENSION



Offset Caliper

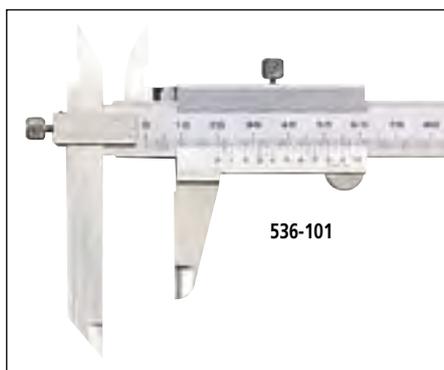
SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

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 depth bar.
- With SPC data output. (series 573)



573-101



536-101

SPECIFICATIONS

Metric Digital model		
Range	Order No.	Accuracy
0 - 150mm	573-101-20	±0.02mm
0 - 200mm	573-102-20	±0.02mm
0 - 300mm	573-103-10	±0.03mm

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

Inch/Metric Digital model		
Range	Order No.	Accuracy
0 - 6"	573-201-20	±.001"
0 - 8"	573-202-20	±.001"
0 - 12"	573-203-10	±.0015"

DIMENSION

Unit: mm

Range	a	b	c	d
0 - 150mm	95	10	40	30.4 (30)
0 - 200mm	95	10	50	40.4 (38.5)
0 - 300mm	135	15	64	51



(Refer to the page 9 for details.)

Technical Data

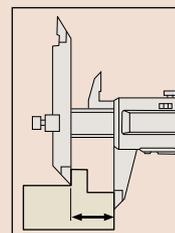
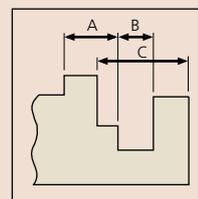
Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)
 Resolution*: 0.01mm or .0005"/0.01mm
 Graduation**: 0.05mm
 Display*: LCD
 Length standard*: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed*: Unlimited
 Battery*: SR44 (1 pc.), **938882**
 Battery life*: Approx. 3.5 years under normal use
 *Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 959143: Data hold unit
- 959149: SPC cable with data switch (1m)
- 959150: SPC cable with data switch (2m)





(Refer to the page 9 for details.)

Technical Data

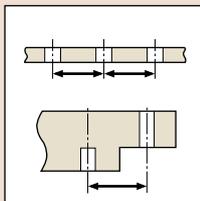
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation***: 0.05mm
Display*: LCD
Length standard*: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

959143: Data hold unit
959149: SPC cable with data switch (1m)
959150: SPC cable with data switch (2m)



Offset Centerline Caliper

SERIES 534, 536 — ABSOLUTE Digimatic and vernier type

FEATURES

- Specially designed for center to center distance measurements on the same and offset planes.
- Can also measure from edge to center.
- Hole diameter should be in the range of 1.5mm - 10mm (.06" - .4").
- With SPC data output. (series 573)



573-105-20



536-105

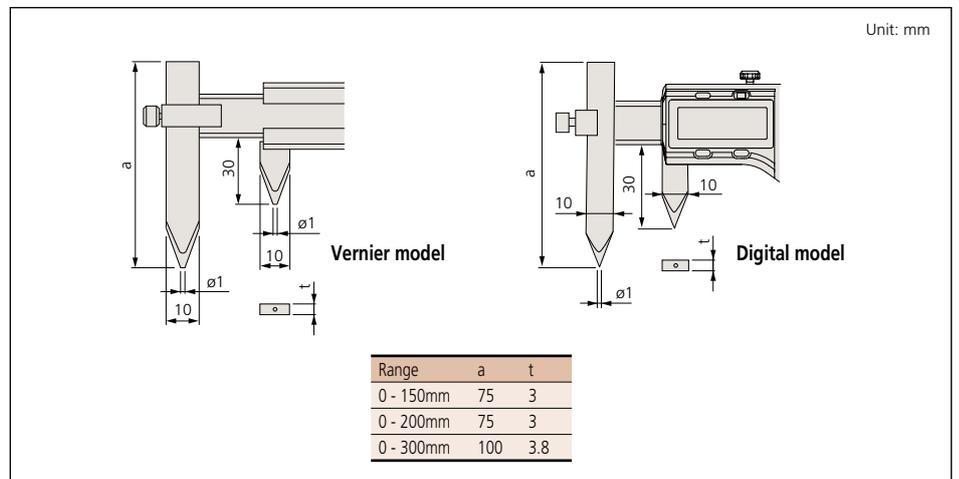
SPECIFICATIONS

Metric Digital model		
Range	Order No.	Accuracy
10 - 150mm	573-105-20	±0.03mm
10 - 200mm	573-106-20	±0.03mm

Inch/Metric Digital model		
Range	Order No.	Accuracy
.4 - 6"	573-205-20	±.0015"
.4 - 8"	573-206-20	±.0015"

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

DIMENSION

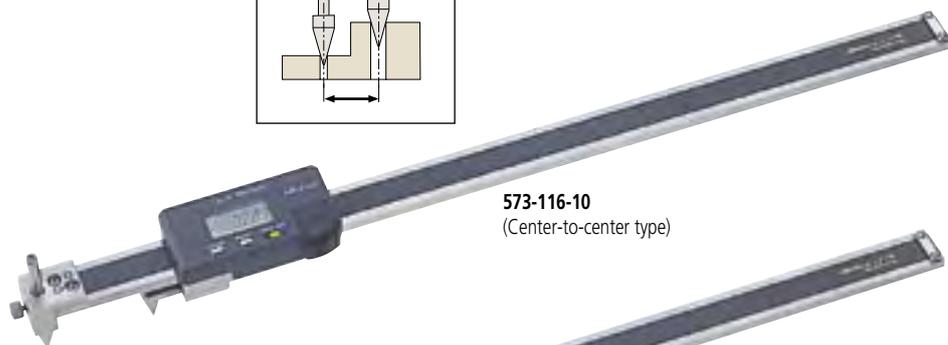
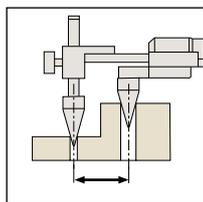


ABSOLUTE Back-Jaw Centerline Caliper

SERIES 537 — Center-to-center & edge-to-center Types

FEATURES

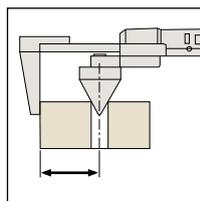
- Specially designed to measure the distance between tow centers or the distance from an edge to center.
- Provided with jaws on the back of the slider, measurements can be read easily by looking down.
- Direct reading of pitch measurements is available due to the offset value setting function.
- With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



573-116-10
(Center-to-center type)



573-118-10
(Edge-to-center type)

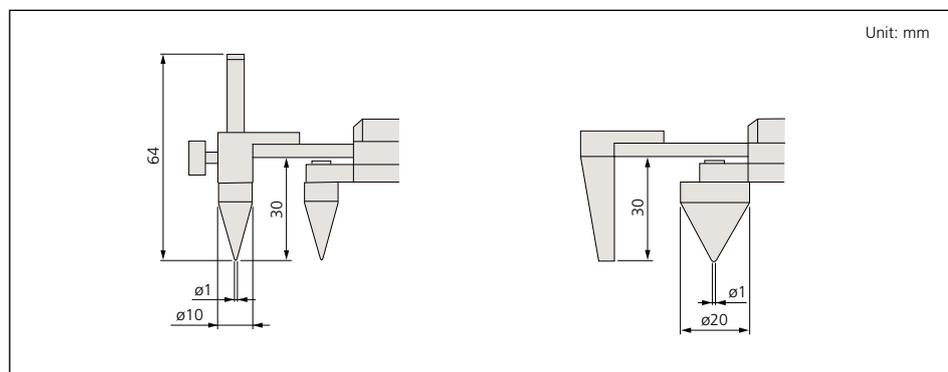


SPECIFICATIONS

Metric — Center-to-center distance type		
Range	Order No.	Accuracy
10 - 200mm	573-116-10	±0.10mm
10 - 300mm	573-117-10	±0.15mm

Metric — Edge-to-center distance type		
Range	Order No.	Accuracy
10 - 200mm	573-118-10	±0.10mm
10 - 300mm	573-119-10	±0.15mm

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Length standard*: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 3.5 years under normal use

Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

959143: Data hold unit
959149: SPC cable with data switch (1m)
959150: SPC cable with data switch (2m)



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Length standard*: ABSOLUTE electrostatic capacitance type
linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

959143: Data hold unit
959149: SPC cable with data switch (1m)
959150: SPC cable with data switch (2m)

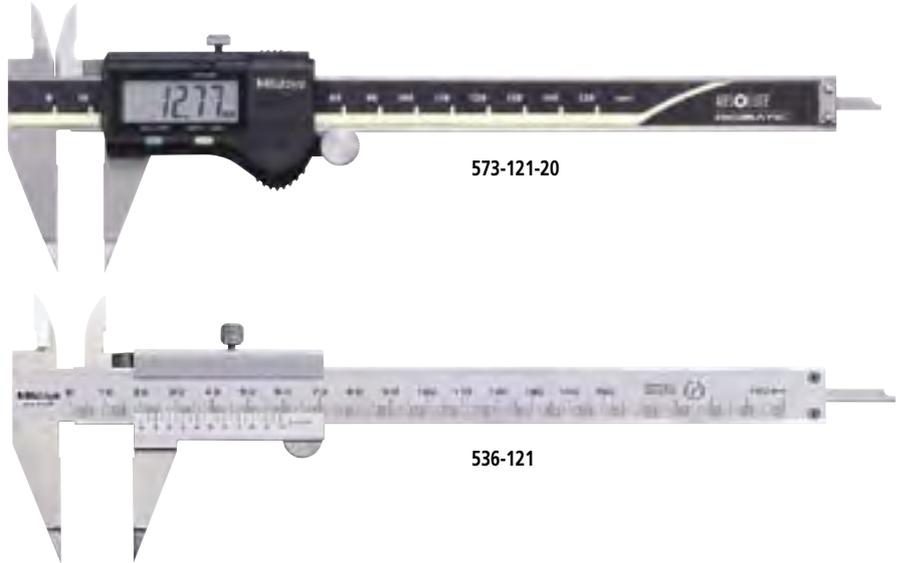


Point Caliper

SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

FEATURES

- Narrow tip jaws fit into very small grooves and tracks, making many previously difficult outside measurements far easier to obtain.
- With depth bar.
- With SPC data output. (series 573)



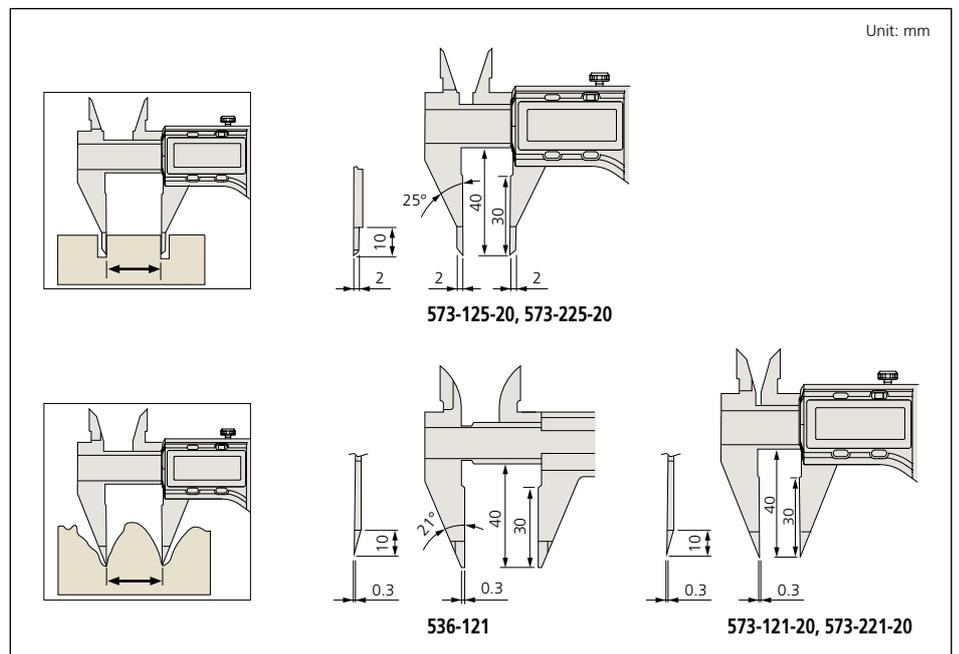
SPECIFICATIONS

Metric Digital model		
Range	Order No.	Accuracy
0 - 150mm	573-121-20	±0.02mm
0 - 200mm	573-125-20	±0.02mm

Inch/Metric Digital model		
Range	Order No.	Accuracy
0 - 6"	573-221-20	±.001"
0 - 8"	573-225-20	±.001"

Metric		
Range	Order No.	Accuracy
0 - 150mm	536-121	±0.05mm

DIMENSION



Blade Type Caliper

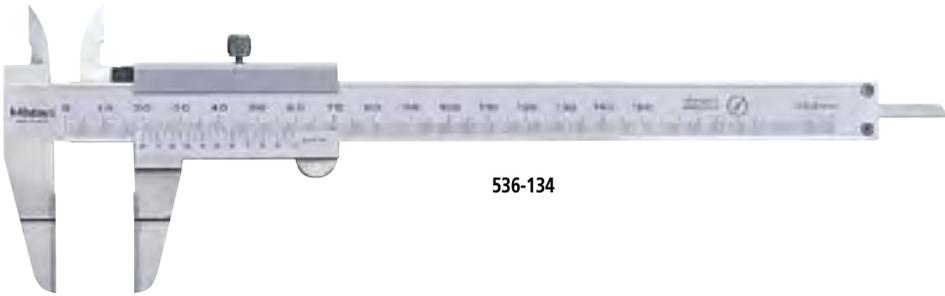
SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

FEATURES

- The thin blade type jaws fit into very small grooves and making previously difficult outside measurements far easier to obtain.
- The OD measuring faces are carbide-tipped.
- With depth bar.
- With SPC data output. (series 573)



573-134-20



536-134

SPECIFICATIONS

Metric Digital model		
Range	Order No.	Accuracy
0 - 150mm	573-134-20	±0.02mm

Inch/Metric Digital model		
Range	Order No.	Accuracy
0 - 6"	573-234-20	±.001"

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

DIMENSION

Unit: mm

Range	a	b	c	t
0 - 150mm	40	20	0.75	3
0 - 200mm	50	25	0.75	3
0 - 300mm	64	30	1	3.8



(Refer to the page 9 for details.)

Technical Data

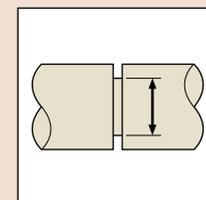
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Length standard*: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 959143:** Data hold unit
- 959149:** SPC cable with data switch (1m)
- 959150:** SPC cable with data switch (2m)





(Refer to the page 9 for details.)

Technical Data

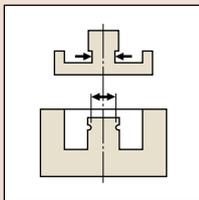
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Length standard*: ABSOLUTE electrostatic capacitance type
linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

959143: Data hold unit
959149: SPC cable with data switch (1m)
959150: SPC cable with data switch (2m)



Neck Caliper

SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

FEATURES

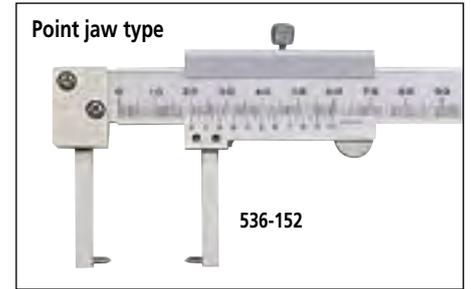
- Can measure wall thickness inside bores and recesses.
- With SPC data output. (series 573)



573-151-20



536-151



Point jaw type

536-152

SPECIFICATIONS

Metric Digital model		
Range	Order No.	Accuracy
0 - 150mm	573-151-20	±0.03mm
0 - 150mm	573-152-20*	±0.03mm

*Point type

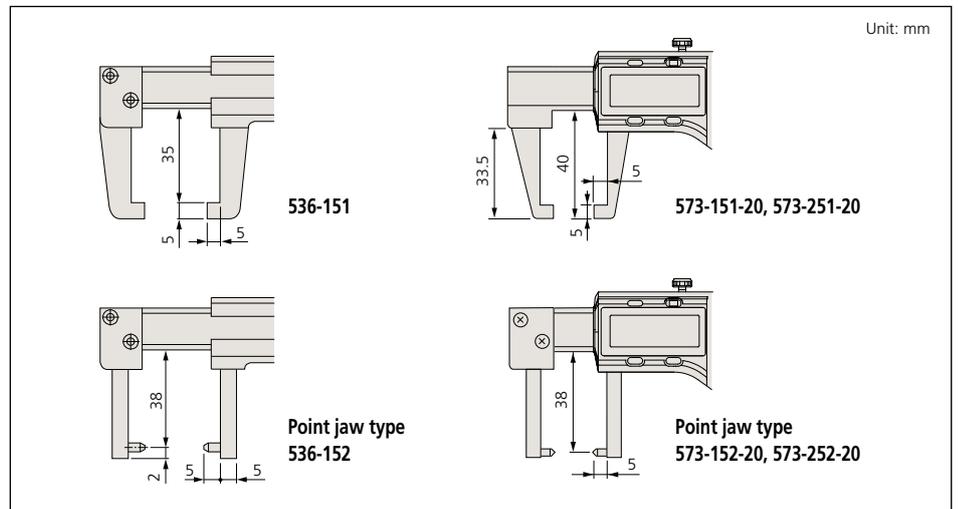
Inch/Metric Digital model		
Range	Order No.	Accuracy
0 - 6"	573-251-20	±.0015"
0 - 6"	573-252-20*	±.0015"

*Point type

Metric		
Range	Order No.	Accuracy
0 - 150mm	536-151	±0.05mm
0 - 300mm	536-152*	±0.05mm

*Point type

DIMENSION



ABSOLUTE Inside Caliper

SERIES 573, 536 — Knife-edge/Inside Groove/Point Jaw Type

FEATURES

- Specially designed for inside measurements in hard-to-reach places.
- With SPC data output. (series 573)

Knife-edge type



573-142-20

536-142

Inside groove type



573-145-20

536-145

Point jaw type



573-146-20

536-146

SPECIFICATIONS

Metric Digital model

Range	Order No.	Accuracy	Remarks
10 - 200mm	573-142-20	±0.05mm	Knife-edge type, Measurable min. hole diameter: ø10mm
10 - 150mm	573-145-20	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10mm
20 - 150mm	573-146-20	±0.03mm	Point jaw type, Measurable min. hole diameter: ø20mm

Inch/Metric Digital model

Range	Order No.	Accuracy	Remarks
.4" - 8"	573-242-20	±.002"	Knife-edge type, Measurable min. hole diameter: ø.4"
.4" - 6"	573-245-20	±.002"	Inside groove type, Measurable min. hole diameter: ø.4"
.8" - 6"	573-246-20	±.0015"	Point jaw type, Measurable min. hole diameter: ø.8"

Metric

Range	Order No.	Accuracy	Remarks
10 - 200mm	536-142	±0.12mm	Knife-edge type, Measurable min. hole diameter: ø10mm
10 - 150mm	536-145	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10mm
20 - 150mm	536-146	±0.05mm	Point jaw type, Measurable min. hole diameter: ø20mm
30 - 300mm	536-147	±0.08mm	Point jaw type, Measurable min. hole diameter: ø30mm
70 - 450mm	536-148	±0.10mm	Point jaw type, Measurable min. hole diameter: ø70mm
70 - 600mm	536-149	±0.12mm	Point jaw type, Measurable min. hole diameter: ø70mm



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Length standard*: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), 938882
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

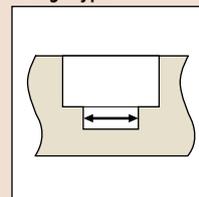
Function of Digital Model

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

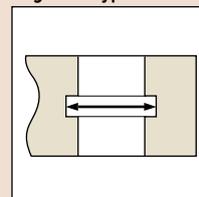
Optional Accessory for Digital Model

- 959143: Data hold unit
- 959149: SPC cable with data switch (1m)
- 959150: SPC cable with data switch (2m)

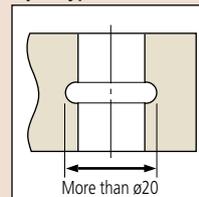
Knife-edge type



Inside groove type



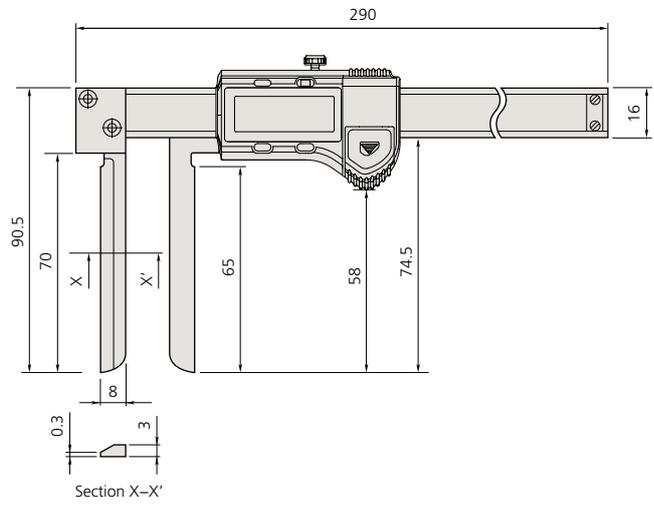
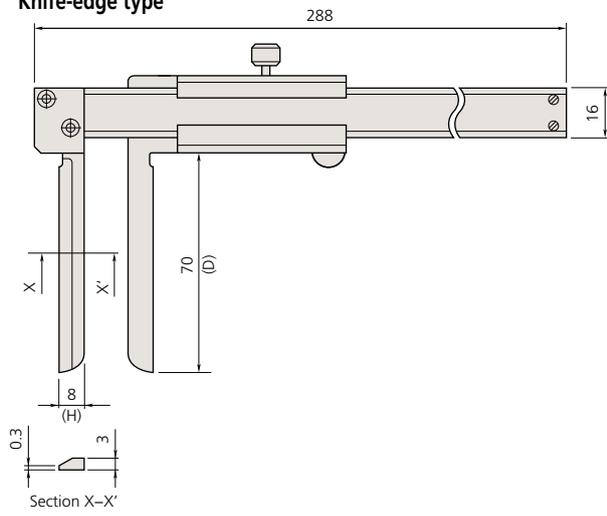
Point jaw type



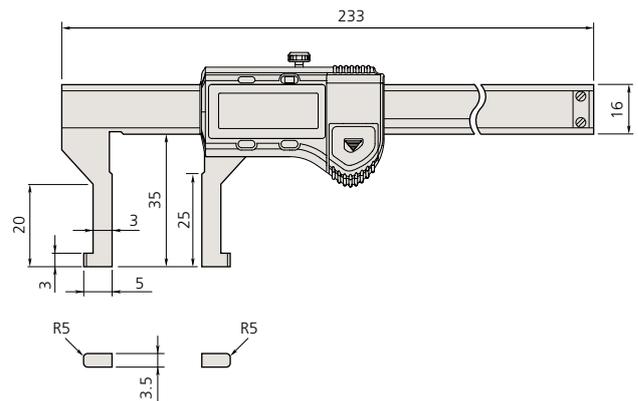
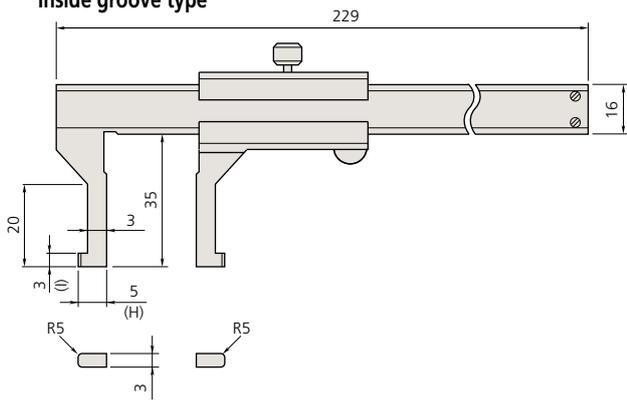
DIMENSION

Unit: mm

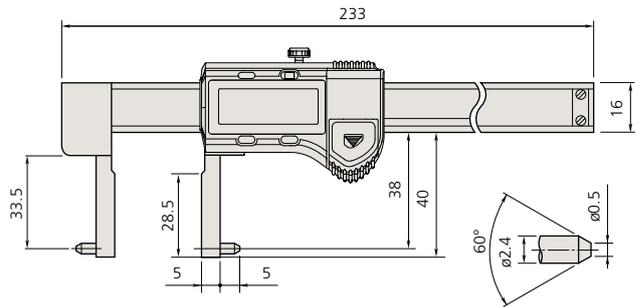
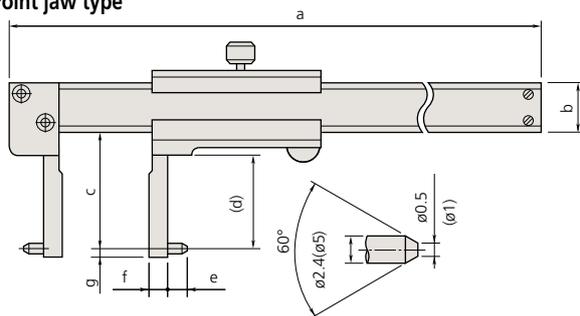
Knife-edge type



Inside groove type



Point jaw type



Range	a	b	c	d	e	f	g
150mm	229	16	38	31	5	5	2
300mm	403	20	98	89	5	10	2
450mm	610	25	145	136	10	25	5
600mm	750	25	145	136	10	25	5

Tube Thickness Caliper

SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

FEATURES

- The main scale jaw is a round bar that facilitates measurements of tube wall thickness.
- With SPC data output. (series 573)



573-161-20



536-161

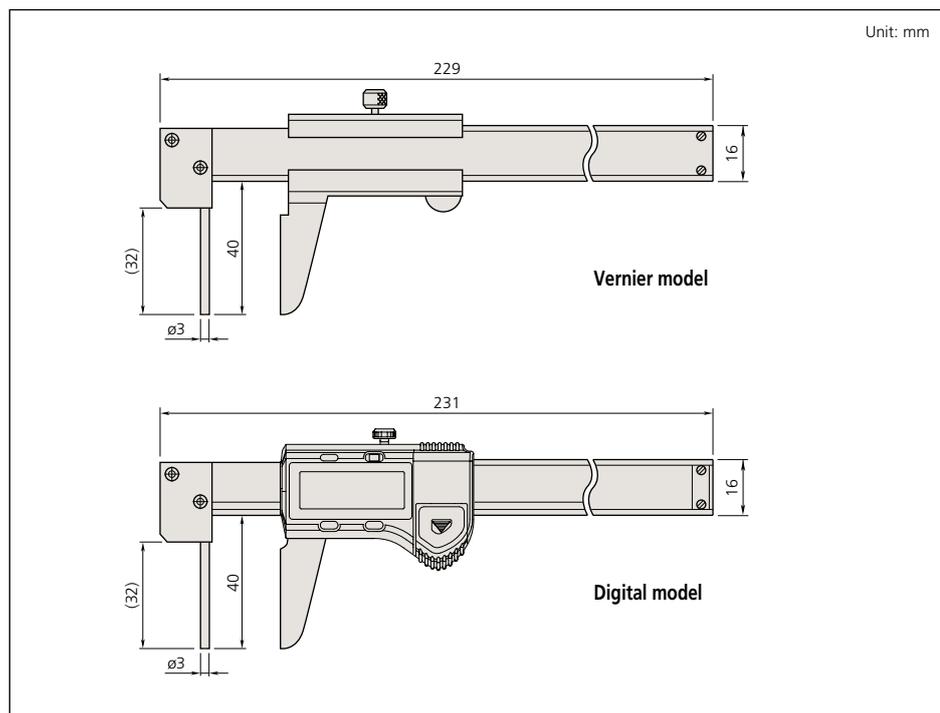
SPECIFICATIONS

Metric Digital model		
Range	Order No.	Accuracy
0 - 150mm	573-161-20	±0.05mm

Inch/Metric Digital model		
Range	Order No.	Accuracy
0 - 6"	573-261-20	±.002"

Metric		
Range	Order No.	Accuracy
0 - 150mm	536-161	±0.05mm

DIMENSION



(Refer to the page 9 for details.)

Technical Data

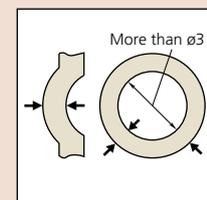
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Length standard: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed*: Unlimited
Battery*: SR44 (1 pc.), **938882**
Battery life*: Approx. 3.5 years under normal use
*Digital models **Analog models

Function of Digital Model

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 959143: Data hold unit
- 959149: SPC cable with data switch (1m)
- 959150: SPC cable with data switch (2m)

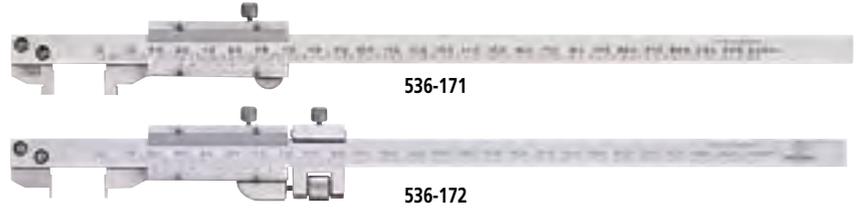


Hook Type Vernier Caliper

SERIES 536

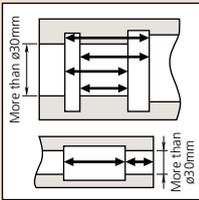
FEATURES

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



Technical Data

Accuracy: $\pm 0.03\text{mm}$
Graduation: 0.02mm



SPECIFICATIONS

Metric

Range*	Order No.	Accuracy	Remarks
0 (10) - 200mm	536-171	$\pm 0.03\text{mm}$	—
0 (2) - 200mm	536-171	$\pm 0.03\text{mm}$	with fine adjustment

*(): Minimum dimension in ID measurement

DIMENSION

Range	L	a	b	c	d	e	f	g
536-171	320	28	—	—	12	4	5	3.5
536-172	320	28	28.5	20	12	4	1	3.5

Unit: mm

Swivel Vernier Caliper

SERIES 536 — With moving jaw type

FEATURES

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



Technical Data

Accuracy: $\pm 0.05\text{mm}$
Graduation: 0.05mm



SPECIFICATIONS

Metric

Range	Order No.	Accuracy
0 - 200mm	536-212	$\pm 0.05\text{mm}$

DIMENSION

Dimension	Value (mm)
Total Length	288
Depth Bar Length	16
Swivel Jaw Width	14.5
Swivel Jaw Height	50
Swivel Jaw Thickness	42
Swivel Jaw Tip Width	91

Unit: mm

ABSOLUTE Low Force Caliper

SERIES 573

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.
- With SPC data output.



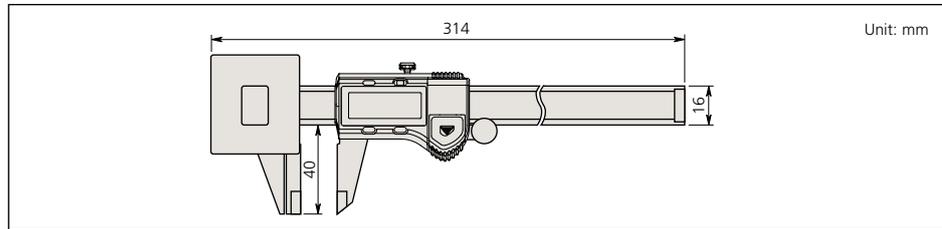
573-191-20

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 180mm	573-191-20	±0.05mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 7"	573-291-20	±.002"

DIMENSION

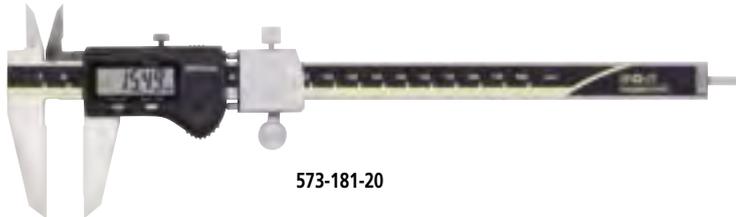


ABSOLUTE Snap Caliper

SERIES 573

FEATURES

- The ABSOLUTE Digimatic snap caliper features a spring-loaded mechanism to allow quick and efficient GO/NO-GO inspection for mass production parts..
- With SPC data output.



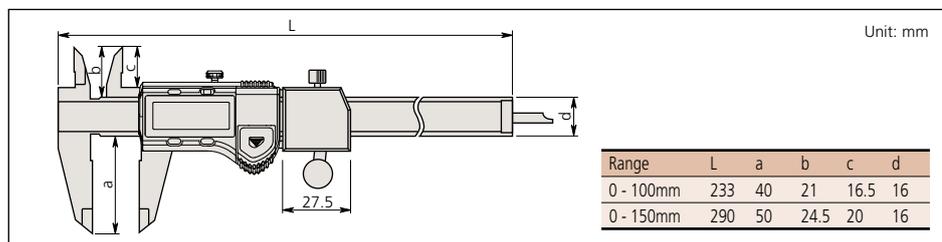
573-181-20

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 100mm	573-181-20	±0.02mm
0 - 150mm	573-182-20	±0.02mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 4"	573-281-20	±.001"
0 - 6"	573-282-20	±.001"

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Length standard: ABSOLUTE electrostatic capacitance type linear encoder
Measuring force: 0.49N to 0.98N (50gf to 100gf)
Jaw retraction: 0.3mm
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 3.5 years under normal use

Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

- 959143: Data hold unit
- 959149: SPC cable with data switch (1m)
- 959150: SPC cable with data switch (2m)



Measurement procedures



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



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Repeatability: 0.01mm
Display: LCD
Length standard: ABSOLUTE electrostatic capacitance type linear encoder
Measuring force: 7N to 14N (700gf to 1400gf)
Jaw retraction: 2mm
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 3.5 years under normal use

Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

- 959143: Data hold unit
- 959149: SPC cable with data switch (1m)
- 959150: SPC cable with data switch (2m)



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Length standard: ABSOLUTE electrostatic capacitance type
linear encoder
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 3.5 years under normal use

Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

959143: Data hold unit
959149: SPC cable with data switch (1m)
959150: SPC cable with data switch (2m)

Scribing Caliper

SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

FEATURES

- The carbide-tipped jaws facilitate fine scribing on workpiece.
- With depth bar.
- With SPC data output. (series 573)



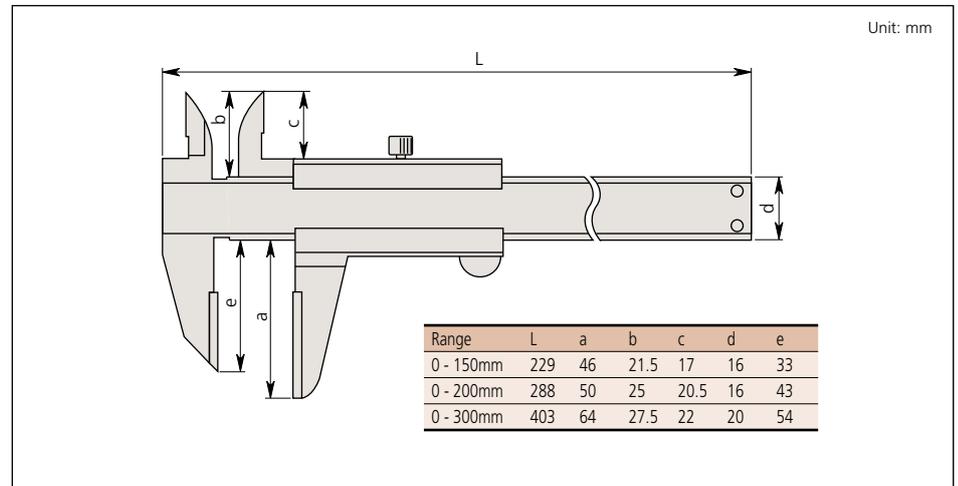
573-171-20

SPECIFICATIONS

Metric		Digital model
Range	Order No.	Accuracy
0 - 150mm	573-171-20	±0.02mm
0 - 200mm	573-172-20	±0.02mm
0 - 300mm	573-173-10	±0.03mm

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

DIMENSION

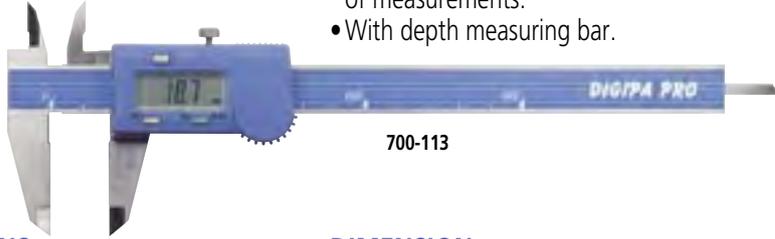


MyCAL-Lite

SERIES 700 — Digital Caliper for DIY

FEATURES

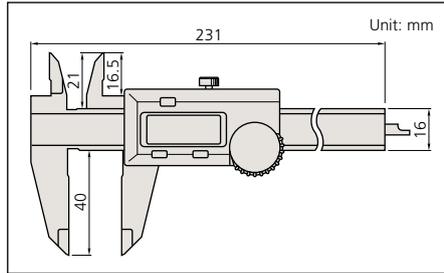
- The " MyCAL-Lite" is an ideal measuring tool for DIY.
- The LCD screen allows error-free readout of measurements.
- With depth measuring bar.



SPECIFICATIONS

Inch/Metric		
Range	Order No.	Accuracy
0 - 6"	700-113	±.005"

DIMENSION



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.1mm
Display: LCD
Length standard: Electrostatic capacitance type linear encoder
Max. response speed: 1800mm/s
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 2 years under normal use

Function

Zero-setting, Power on/off
Alarm: Low voltage, Counting value composition error

Plastic Caliper

SERIES 700 — Digital Caliper for DIY

FEATURES

- Plastic construction for durable and lightweight use.
- Also ideal for use in Lab, wood-shop, nursery, doctor's, office, etc.



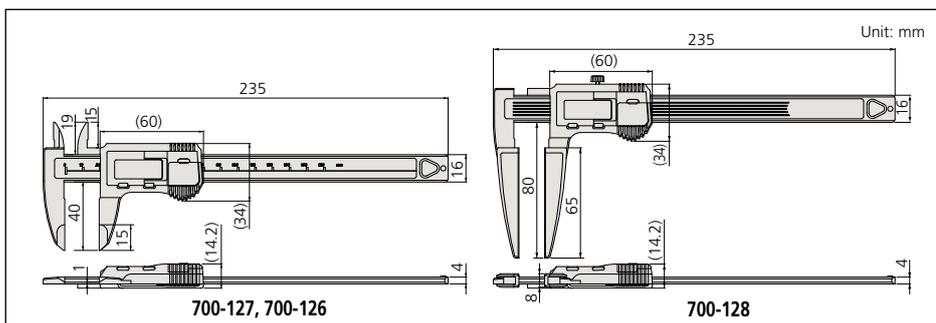
SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 150mm	700-127	±0.2mm
0 - 150mm	700-128*	±0.5mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 6"	700-126	±.008"

*Deep throat type without inside measuring jaws.

DIMENSION



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.1mm or .001"/0.1mm
Display: LCD
Length standard: Electrostatic capacitance type linear encoder
Max. response speed: 1800mm/s
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 2 years under normal use

Function

Zero-setting, Power on/off
Alarm: Low voltage, Counting value composition error





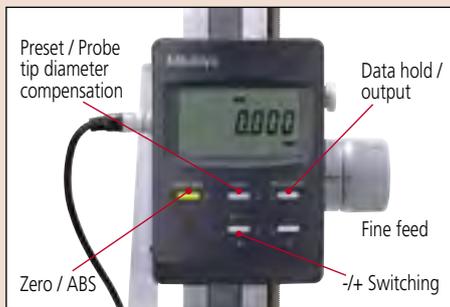
(Refer to the page 9 for details.)

Technical Data

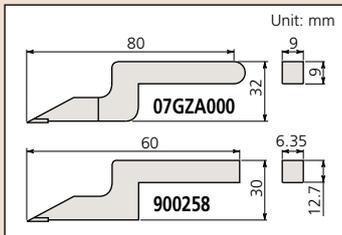
Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Repeatability: 0.001mm
Resolution: 0.001mm or .0001"/0.001mm
Display: LCD, 6-digit
Power supply: Via AC adapter

Function

Zero-setting, Presetting, Probe tip diameter compensation, +/- switching, Data hold, Data output, inch/mm conversion (inch/mm models)
Alarm: Counting value composition error



Dimensions of Optional Scribers



Optional Accessory

- 936937: SPC cable (1m)
- 965014: SPC cable (2m)
- 900321: Swivel clamp for dial test indicator (metric)
- 900322: Swivel clamp for dial test indicator (inch)
- 953638: Holding bar for swivel clamp (metric)
- 953639: Holding bar for swivel clamp (inch)
- 07GZA000: Carbide-tipped scriber (metric)
- 900258: Carbide-tipped scriber (inch)
- 145250: ø1mm contact point for touch-signal probe
- 145251: ø2mm contact point for touch-signal probe

Touch-Signal Probe (Standard accessory)



Order No.: 574-006

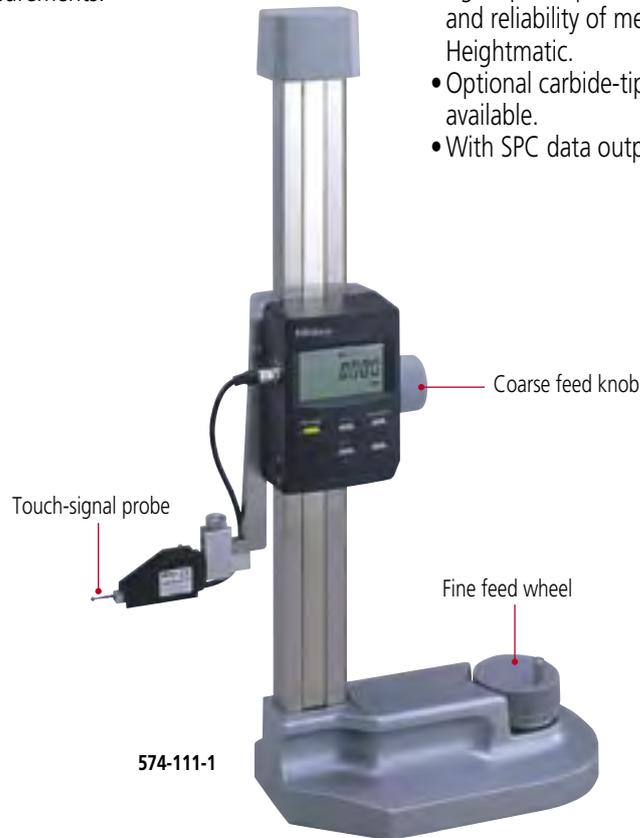
- Two-directional type
- Over travel: Less than 3mm
- Contact point: ø3mm ball
- Repeatability: 0.0015mm
- Measuring force: 0.4N

Heightmatic

SERIES 574 — High Precision Height Gage

FEATURES

- Provides resolution of 0.001mm on the large LCD readout for accurate measurements.
- Excellent functionality and easy operation.
- The standard two-directional touch-signal probe provides improved efficiency and reliability of measurement for the Heightmatic.
- Optional carbide-tipped scribers are available.
- With SPC data output.



574-111-1

SPECIFICATIONS

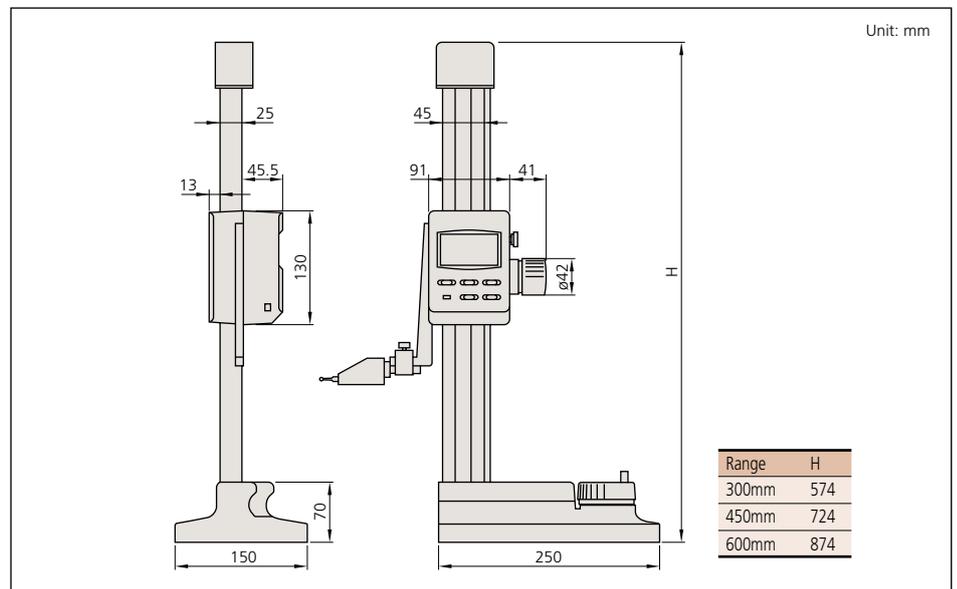
Metric		
Range	Order No.*	Accuracy
0 - 300mm	547-112-1	±0.004mm
0 - 450mm	547-111-1	±0.004mm
0 - 600mm	547-110-1	±0.005mm

* To denote your AC line voltage add the following suffixes to the order No. **A** for 120V **D** for 220V **E** for 240/220V **K** for Korea **DC** for China
No suffix is required for 100V

Inch/Metric		
Range	Order No.*	Accuracy
0 - 12"	547-212-1	±.0002"
0 - 18"	547-211-1	±.0002"
0 - 24"	547-210-1	±.0002"

* To denote your AC line voltage add the following suffixes to the order No. **A** for 120V **D** for 220V **E** for 240/220V **K** for Korea **DC** for China
No suffix is required for 100V

DIMENSION



Digimatic Height Gage

SERIES 192 — Multi-function Type with SPC Data Output

FEATURES

- Highly versatile multi-function type.
- 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.

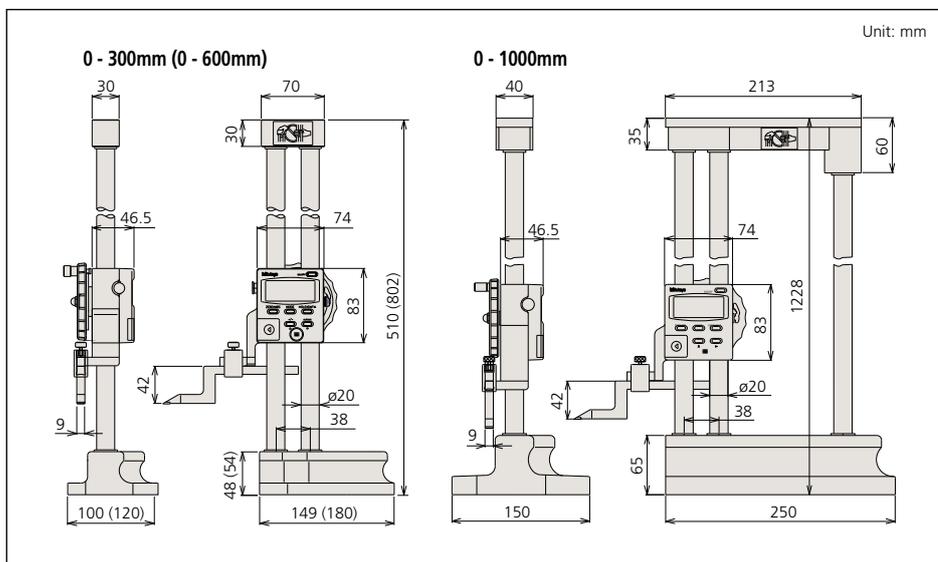


SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 300mm	192-663	±0.02mm
0 - 600mm	192-664	±0.04mm
0 - 1000mm	192-665	±0.06mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 12"	192-670	±.001"
0 - 18"	192-671	±.0015"
0 - 24"	192-672	±.0015"
0 - 40"	192-673	±.0025"

DIMENSION



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD, 6-digit
Max. response speed: 500mm/s
Battery: CR2032 lithium (1 pc.), **055AA217**
Battery life: Approx. 2000 hours under normal use

Function

Zero-setting, ABS/INC switching, Presetting, Probe tip diameter compensation, +/- switching, Power ON/OFF, Data hold, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Standard Scriber Provided

Metric models: Carbide-tipped scriber (**905200**) and scriber clamp (**05GZA033**)
Inch/Metric models: Carbide-tipped scriber (**905201**) and scriber clamp (**901385**)

Optional Accessory

905338: SPC cable (1m)
905409: SPC cable (2m)
905691: SPC cable (L-shape, 1m)
905692: SPC cable (L-shape, 2m)
192-007: Two-directional touch-signal probe (metric)
192-008: Two-directional touch-signal probe (inch)
953638: Holding bar for test indicator (length: 50mm)
900209: Holding bar for test indicator (length: 100mm)
953639: Holding bar for test indicator (length: 2")
900306: Holding bar for test indicator (length: 4")
900321: Swivel clamp used with holding bar (metric)
900322: Swivel clamp used with holding bar (inch)



Digimatic Height Gage

SERIES 192 — Standard Type

FEATURES

- Easy-to-use standard type.
- Carbide-tipped scriber is provided.
- Double-column structure ensures high measuring accuracy.
- Coarse/fine feed switching.

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD, 6-digit
Max. response speed: 500mm/s
Battery: CR2032 lithium (1 pc.), **055AA217**
Battery life: Approx. 2000 hours under normal use

Function

Zero-setting, ABS/INC switching, Presetting, Probe tip diameter compensation, +/- switching, Power ON/OFF, Data hold, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Standard Scriber Provided

Metric models: Carbide-tipped scriber (**07GZA000**) and scriber clamp (**05GZA033**)
Inch/Metric models: Carbide-tipped scriber (**900258**) and scriber clamp (**901385**)

Optional Accessory

905338: SPC cable (1m)
905409: SPC cable (2m)
905691: SPC cable (L-shape, 1m)
905692: SPC cable (L-shape, 2m)
953638: Holding bar for test indicator (length: 50mm)
900209: Holding bar for test indicator (length: 100mm)
953639: Holding bar for test indicator (length: 2")
900306: Holding bar for test indicator (length: 4")
900321: Swivel clamp used with holding bar (metric)
900322: Swivel clamp used with holding bar (inch)



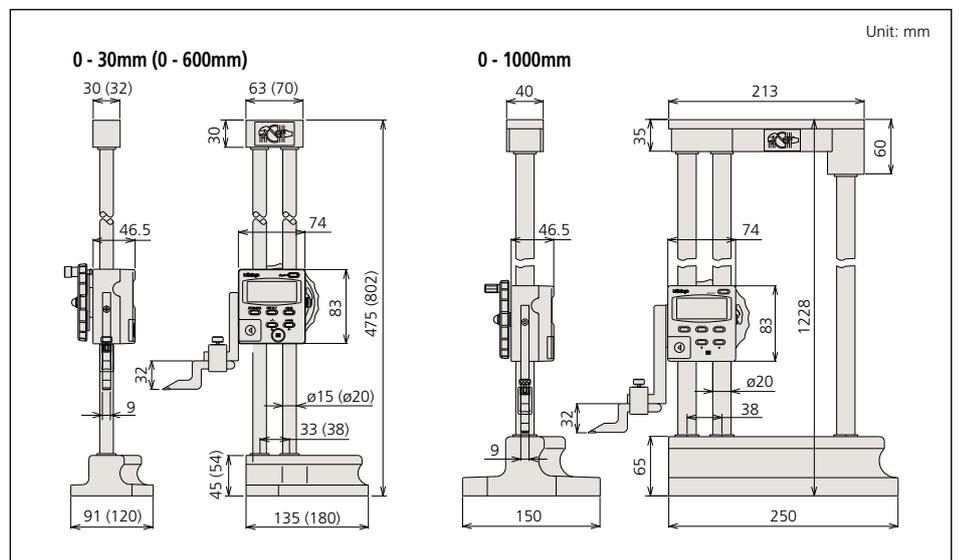
192-613

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 300mm	192-613	±0.02mm
0 - 600mm	192-614	±0.05mm
0 - 1000mm	192-615	±0.07mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 12"	192-630	±.001"
0 - 18"	192-631	±.002"
0 - 24"	192-632	±.002"
0 - 40"	192-633	±.003"

DIMENSION



ABSOLUTE Digimatic Height Gage

SERIES 570 — with ABSOLUTE Linear Encoder

FEATURES

- Built-in ABSOLUTE linear encoder
This encoder eliminates the necessity of setting the reference point at every power-on. It has improved reliability because no over-speed error will occur.
- Fine-adjustment carriage to feed the slider finely.
- Carbide-tipped scriber is provided.
- With SPC data output.

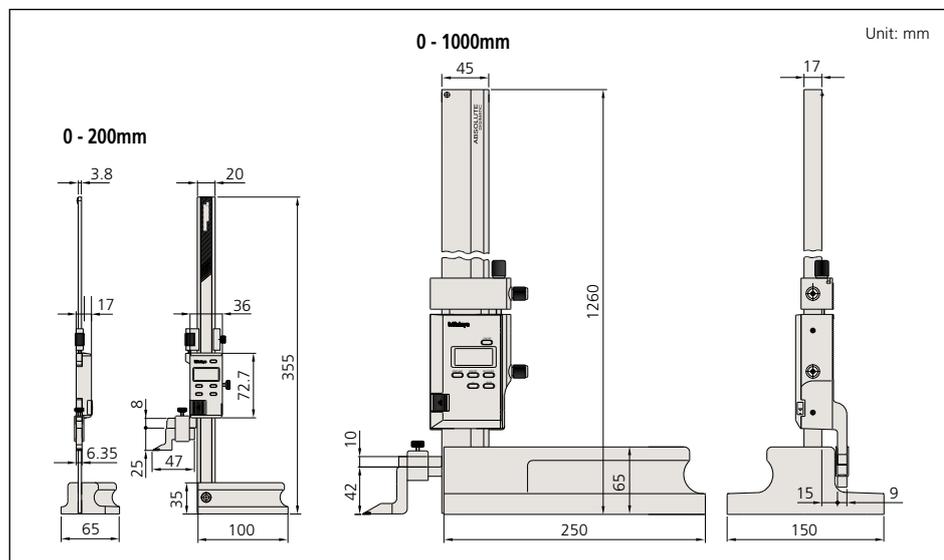


SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 200mm	570-227	±0.03mm
0 - 1000mm	570-230	±0.07mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 8"	570-244	±.001"
0 - 40"	570-248	±.003"

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD, 6-digit
Length standard: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 5000 hours under normal use

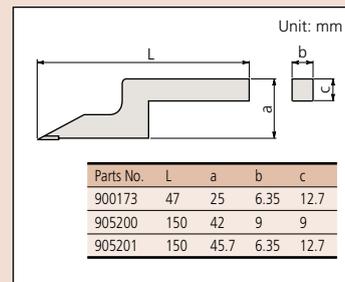
Function

Origin setting, ABS/INC switching, Presetting, +/- switching, Data hold, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Standard Scriber Provided

Metric models: Carbide-tipped scriber
(900173/905200*) and scriber clamp
(901338 / 05GZA033*)
*0 - 1000mm model
Inch/Metric models: Carbide-tipped scriber
(900173/905201*) and scriber clamp
(901338/901385*)
*0 - 40" model

Dimension of scriber



Optional Accessory

- 905338:** SPC cable (1m)
- 905409:** SPC cable (2m)
- 953638:** Holding bar for test indicator (length: 50mm)
- 953639:** Holding bar for test indicator (length: 2")
- 902053:** Swivel clamp used with holding bar (metric)
- 900322:** Swivel clamp used with holding bar (inch)



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD, 6-digit
Length standard: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 20000 hours under normal use

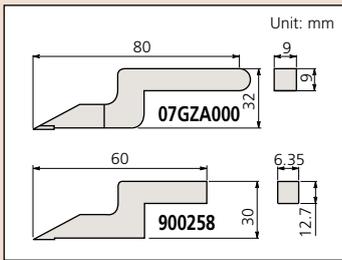
Function

Origin setting, ABS/INC switching, Power ON/OFF, Data hold, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Standard Scriber Provided

Metric models: Carbide-tipped scriber (**07GZA000**), scriber clamp (**05GZA033**)
Inch/Metric models: Carbide-tipped scriber (**900258**), scriber clamp (**901385**)

Dimension of scriber



Optional Accessory

905338: SPC cable (1m)
905409: SPC cable (2m)
953638: Holding bar for test indicator (length: 50mm)
953639: Holding bar for test indicator (length: 2")
902053: Swivel clamp used with holding bar (metric)
900322: Swivel clamp used with holding bar (inch)



Large smooth slider feed wheel



Large clamp lever



Fitted in your hand

ABSOLUTE Digimatic Height Gage

SERIES 570 — with ABSOLUTE Linear Encoder

FEATURES

- Built-in ABSOLUTE linear encoder
This encoder eliminates the necessity of setting the reference point at every power-on. It has improved reliability because no over-speed error will occur.
- Rigid column structure ensures high measuring accuracy.
- With large smooth slider feed wheel.
- Carbide-tipped scriber is provided.
- With SPC data output.

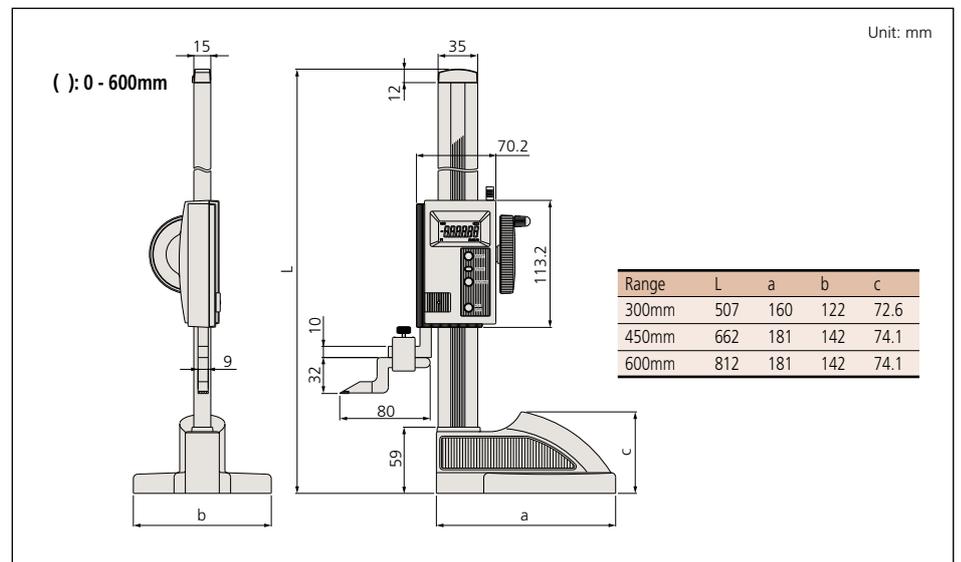


SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 300mm	570-302	±0.03mm
0 - 600mm	570-304	±0.05mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 12"	570-312	±.0015"
0 - 18"	570-313	±.002"
0 - 24"	570-314	±.002"

DIMENSION



Dial Height Gage

SERIES 192 — with Digital Counter

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 is provided.



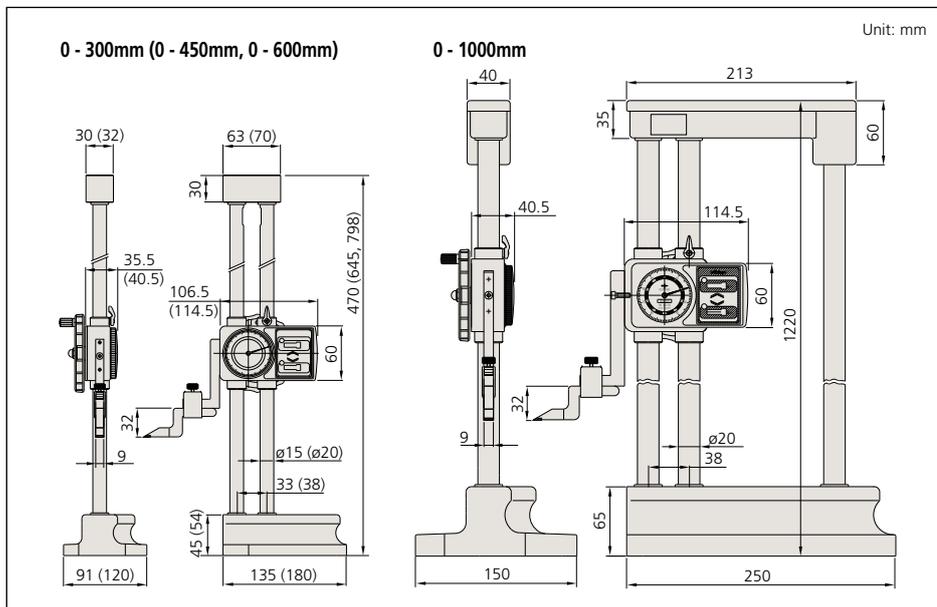
192-130

SPECIFICATIONS

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

Inch/Metric		
Range	Order No.	Accuracy
0 - 12"	192-140	±.0015"
0 - 18"	192-141	±.002"
0 - 24"	192-142	±.002"
0 - 40"	192-143	±.003"

DIMENSION



Technical Data

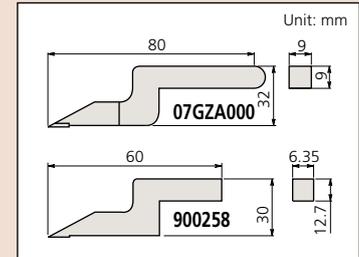
Accuracy: Refer to the list of specifications.
Dial reading: 0.01mm or .001"

Standard Scriber Provided

Metric models: Carbide-tipped scriber (07GZA000) and scriber clamp (05GZA033)

Inch/Metric models: Carbide-tipped scriber (900258) and scriber clamp (901385)

Dimension of scriber



Optional Accessory

- 953638: Holding bar for test indicator (length: 50mm)
- 900209: Holding bar for test indicator (length: 100mm)
- 953639: Holding bar for test indicator (length: 2")
- 900306: Holding bar for test indicator (length: 4")
- 900321: Swivel clamp used with holding bar (metric)
- 900322: Swivel clamp used with holding bar (inch)



Fitted in your arm



Easy and secure clamping



Easy and error free reading

Dial Height Gage

SERIES 509

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 is provided.

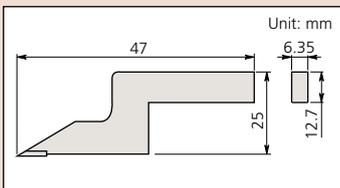
Technical Data

Accuracy: Refer to the list of specifications.
Dial reading: 0.02mm or .001"

Standard Scriber Provided

Carbide-tipped scriber (900173) and scriber clamp (901338)

Dimension of scriber



Optional Accessory

- 953639: Holding bar for test indicator (length: 50mm)
900322: Swivel clamp used with holding bar



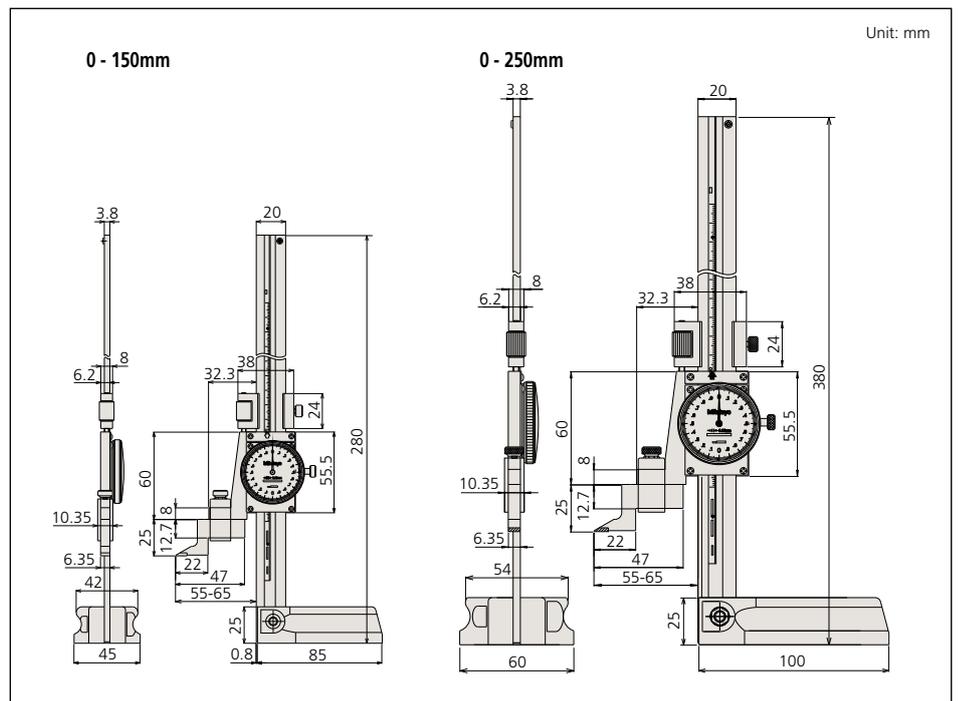
509-301

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 150mm	509-301	±0.03mm
0 - 250mm	509-302	±0.04mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 6"	509-313	±.001"
0 - 10"	509-314	±.0015"

DIMENSION



Vernier Height Gage

SERIES 514 — Standard Height Gage with adjustable Main Scale

FEATURES

- Zero reference point can be adjusted.
- Stain chrome finished scales for glare-free reading.
- Extra-large base for rigidity.
- Final vernier readings can be assisted by an optional magnifier.
- Carbide-tipped scriber is provided.



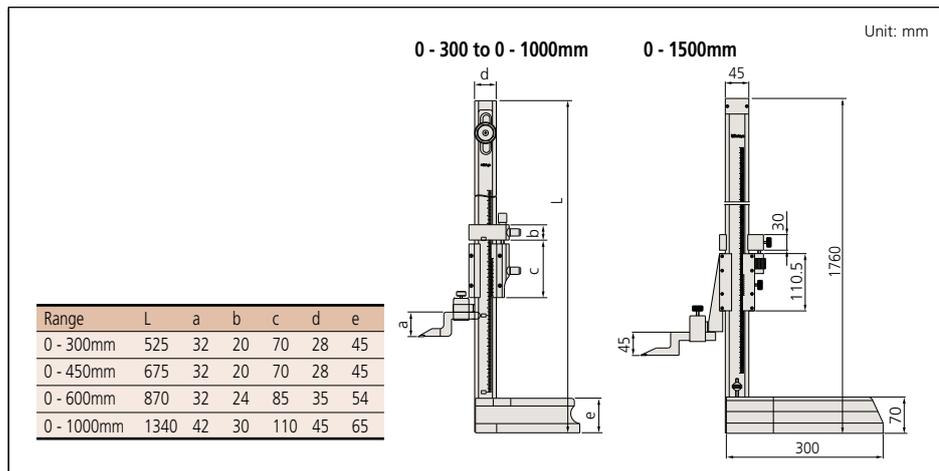
514-102

SPECIFICATIONS

Metric							
Range	Order No.	Accuracy	Remarks (R / L scale graduations / scale adjustment / slider fine feed / others)				
0 - 300mm	514-102	±0.04mm	0.02mm	—	15mm	4mm	—
0 - 450mm	514-104	±0.05mm	0.02mm	—	15mm	4mm	—
0 - 600mm	514-106	±0.05mm	0.02mm	—	15mm	7mm	—
0 - 1000mm	514-108	±0.07mm	0.02mm	—	25mm	6mm	—
0 - 1500mm	514-170	±0.18mm	0.02mm	—	25mm	20mm	Provided with magnifier

Inch/Metric							
Inch model with inch/metric double scale							
Range	Order No.	Accuracy	Remarks (R / L scale graduations / scale adjustment / slider fine feed / others)				
0 - 12"	514-103	±.002"	.001"	0.02mm	.6"	.16"	—
0 - 18"	514-105	±.002"	.001"	0.02mm	.6"	.16"	—
0 - 24"	514-107	±.002"	.001"	0.02mm	.6"	.27"	—
0 - 40"	514-109	±.003"	.001"	0.02mm	1"	.24"	—

DIMENSION



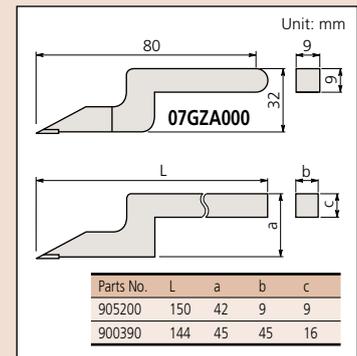
Technical Data

Accuracy: ±0.04mm (≤300mm), ±0.05mm (≤600mm), ±0.07mm (≤1000mm), ±0.18mm (≤1500mm)
 Graduation: 0.02mm or .001" (0.02mm)
 Main scale adjustment: 15mm or 25mm
 Slider fine feed: 4mm, 6mm, 7mm or 20mm

Standard Scriber Provided

Up to 600mm: Carbide-tipped scriber (07GZA000) and scriber clamp (05GZA033)
 0 - 1000mm: Carbide-tipped scriber (905200) and scriber clamp (05GZA033)
 0 - 1500mm: Carbide-tipped scriber (900390) and scriber clamp (905008)

Dimension of scriber



Optional Accessory

07GZA003: Magnifier for 300, 450mm, 600mm models
 07GZA015: Magnifier for 1000mm models
 953638: Holding bar for test indicator (length: 50mm)
 902053: Swivel clamp used with holding bar



Vernier Height Gage

SERIES 506 — Light Weight Height Gage

FEATURES

- Light weight type can measure easily the height of small parts.
- Stain chrome finished scales for glare-free reading.
- Beam and slider are made of stainless steel.
- Carbide-tipped scriber is provided.

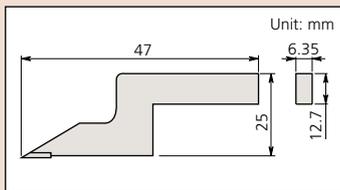
Technical Data

Accuracy: $\pm 0.03\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.04\text{mm}$ ($\leq 250\text{mm}$),
 Graduation: 0.02mm or .001" (0.02mm)

Standard Scriber Provided

Carbide-tipped scriber (900173) and scriber clamp (901338)

Dimension of scriber



Optional Accessory

- 953639: Holding bar for test indicator (length: 50mm)
 900322: Swivel clamp used with holding bar



SPECIFICATIONS

Metric

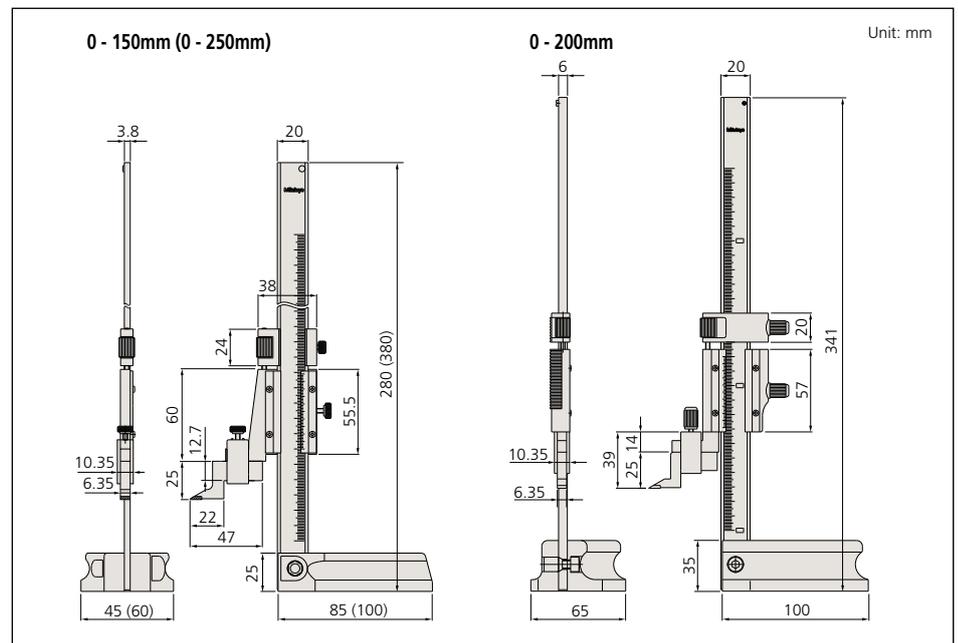
Range	Order No.	Accuracy	Remarks (R / L scale graduations)
0 - 150mm	506-201	$\pm 0.03\text{mm}$	0.02mm —
0 - 200mm	506-207	$\pm 0.03\text{mm}$	0.02mm —
0 - 250mm	506-204	$\pm 0.04\text{mm}$	0.02mm —

Inch/Metric

Inch model with inch/metric double scale

Range	Order No.	Accuracy	Remarks (R / L scale graduations)
0 - 6"	506-202	$\pm .001"$	.001" 0.02mm
0 - 8"	506-208	$\pm .001"$	.001" 0.02mm
0 - 10"	506-205	$\pm .0015"$	.001" 0.02mm

DIMENSION



CERA Caliper Checker

SERIES 515

FEATURES

- The CERA Caliper Checker is designed to inspect vernier, dial and Digimatic calipers of various types. It is comprised of permanently wrung, high-grade CERA gauge blocks in a protective casting.
- The CERA Caliper Checker also stands perpendicular to a surface for height gage inspection.
- Each measuring block (CERA block) is made of zirconia-based ceramic and it free from deterioration and dimensional change over time.



SPECIFICATIONS

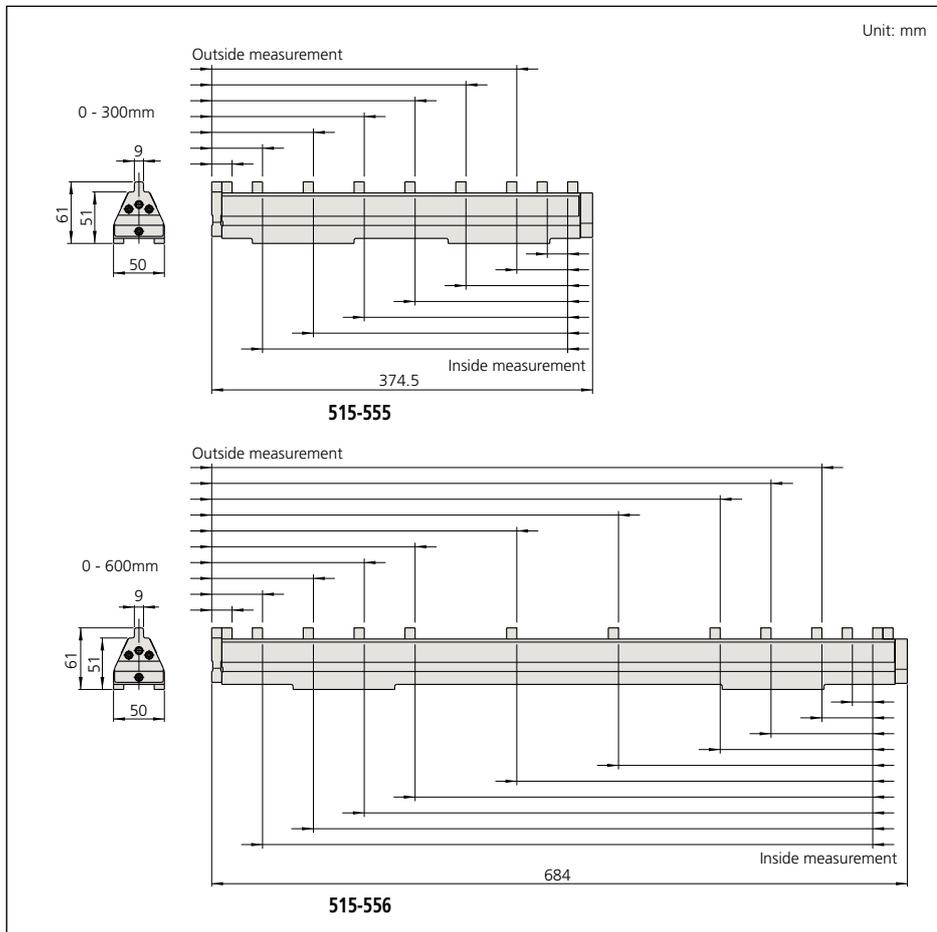
Metric

Range	Order No.	Remarks (length to check)
0 - 300mm	515-555	Outside measurement: 20, 50, 100, 150, 200, 250, 300mm Inside measurement: 20, 50, 100, 150, 200, 250, 300mm
0 - 600mm	515-556	Outside measurement: 20, 50, 100, 150, 200, 300, 400, 500, 550, 600mm Inside measurement: 20, 50, 100, 150, 250, 350, 450, 500, 550, 600mm

Inch

Range	Order No.	Remarks (length to check)
0 - 12"	515-565	Outside measurement: 1", 2", 4", 6", 8", 10", 12" Inside measurement: 1", 2", 4", 6", 8", 10", 12"

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Block pitch accuracy: $\pm 0.005\text{mm}$ for range up to 300mm
 $\pm 0.007\text{mm}$ for range up to 600mm
 Parallelism of blocks: 0.002mm for range up to 300mm
 0.004mm for range up to 600mm

Optional Accessory

602162: Wooden case for 300mm model
602164: Wooden case for 600mm model



Used for caliper

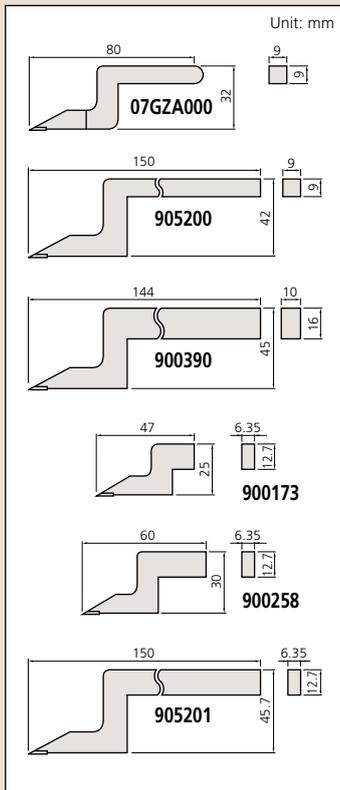


Used for height gage

Carbide-tipped Scriber

Optional Accessory for Height Gage

Dimension of scriber



FEATURES

- Used the appropriate scriber and clamp for each height gage.

SPECIFICATIONS

Metric	
Order No.	Remarks (applicable height gage)
07GZA000	192 series Digimatic height gages (192-613, 192-614, 192-615)
	570 Series Digimatic Height Gages (570-302, 570-304)
	192 Series Dial Height Gages (192-130, 192-131, 192-132, 192-133)
	514 Series Vernier Height Gages (514-102, 514-104, 514-106, 514-103, 514-105, 514-107)
905200	574 Series Heightmatic (574-112-1, 574-111-1, 574-110-1)
	192 Series Digimatic Height Gages (192-663, 192-664, 192-665)
	570 Series Digimatic Height Gages (570-230)
900390	514 Series Vernier Height Gages (514-108, 514-109)
	514 Series Vernier Height Gage (514-170)

Inch	
Order No.	Remarks (applicable height gage)
900173	570 series Digimatic height gages (570-227, 570-244)
	506 Series Vernier Height Gages (506-201, 506-202, 506-204, 506-205, 506-207, 506-208)
	509 Series Vernier Height Gages (509-301, 509-302, 509-313, 509-314)
900258	192 Series Digimatic Height Gages (192-630, 192-631, 192-632, 192-633)
	570 Series Digimatic Height Gages (570-312, 570-313, 570-314)
	574 Series Heightmatic (574-212-1, 574-211-1, 574-210-1)
905201	192 Series Digimatic Height Gages (192-670, 192-671, 192-672, 192-673)
	570 Series Digimatic Height Gages (570-248)

Optional Accessories

Optional Accessory for Height Gage



Contact Sensor

FEATURES

- The contact sensor eliminates errors caused by jacking-up the height gage while taking measurements. When the scriber 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 measurement.
- Battery (2 pcs. PR44 required) is not included.

SPECIFICATIONS

Order No.: 900872



Center Probe

FEATURES

- Allows quick measurement of center-to-center distance between holes.
- Measurable hole diameters: $\varnothing 1 - \varnothing 38\text{mm}$

SPECIFICATIONS

Order No.: 951144 (with metric type holding bar)
900581 (with inch type holding bar)



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 (metric type), 2.95" (inch type)
- Contact points for dial indicator is available.

SPECIFICATIONS

Order No.: 900878 (with metric type holding bar)
900764 (with inch type holding bar)

Linear Height

SERIES 518 — High Performance 2D Measurement System

FEATURES

- Excellent accuracy of $(1.3+0.6L/600)\mu\text{m}$ with $0.1\mu\text{m}/0.5\mu\text{m}$ resolution / repeatability.
- Perpendicularity (frontal) of $6\mu\text{m}$ and straightness of $4\mu\text{m}$ are guaranteed.
- Pneumatic full / semi-floating system allows adjustment of air-cushion height.
- Basic statistical functions are provided and, additionally, RS-232C data output provides the option of evaluating measurement data externally with SPC software on a PC.

- One-key operation for running a semi-automatic measurement.
- Data entry from a Digimatic tool.
- Choice of message language in English, German, French, Spanish, Italian, Dutch, Portuguese, Swedish, Czech, Hungarian, Slovenian, Polish, Traditional Chinese*, Korean** and Japanese for user-friendly operation.

*Optional **518-331K and 518-322K only



518-331-10



518-332-10
(with power grip)



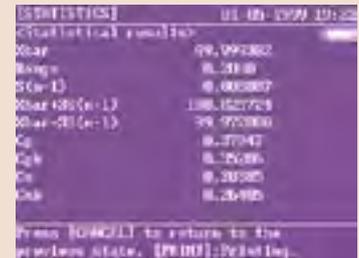
(Refer to the page 9 for details.)

Technical Data

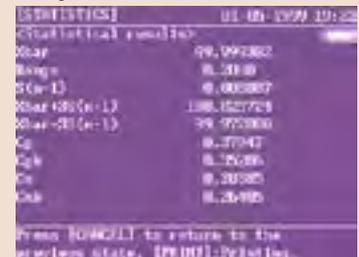
- Measuring range: 0 - 972mm
 Slider stroke: 600mm
 Resolution: 0.0001 / 0.001 / 0.01 / 0.1mm or (switchable) 0.0001" / 0.001" / 0.01" / 0.1mm / .000001" / .00001" / .0001" / .001"
 Accuracy at 20°C: $(1.3+0.6L/600)\mu\text{m}$
 L = Measuring length (mm)
 Repeatability (2 σ): Plane: 0.5 μm , Bore: 1 μm
 Perpendicularity*: 6 μm
 Straightness**: 4 μm
 Drive method: Manual / motor (5 - 40mm/s, 7 steps)
 Measuring force: 1N
 Balancing method: Counter balance
 Floating method: Full / semi-floating with built-in air compressor
 Display: Graphic LCD (320 x 240 dot, with back light)
 Language for display: English / German / French / Spanish / Italian / Dutch / Portuguese / Swedish / Czech / Hungarian / Slovenian / Polish / Traditional Chinese (optional) / Korean (518-331K and 518-322K) / Japanese
 No. of stored programs: 50 programs (max.)
 No. of stored data: 60,000 data (max.)
 Power supply: AC adapter / battery (Ni-MH)
 Battery operation time: Approx. 5 hours (air floating & slider elevation : 25%)

* It is guaranteed when using the standard eccentric $\phi 5$ probe.
 ** It is guaranteed when using a lever head (MLH-321) or Mu-Checker (M-411)

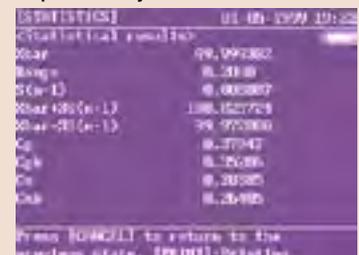
SPC results



Histogram



Perpendicularity / measurement



SPECIFICATIONS

Inch/Metric	
Order No.	Remarks
518-321A-21 / 518-322A-21*	120V w/ English manual
518-321A-22 / 518-322A-22*	120V w/ Spanish manual
518-321D-21 / 518-322D-21*	220V w/ English manual
518-321D-22 / 518-322D-22*	220V w/ Spanish manual
518-321D-23 / 518-322D-23*	220V w/ German manual
518-321D-24 / 518-322D-24*	220V w/ French manual
518-321D-25 / 518-322D-25*	220V w/ Italian manual
518-321E-21 / 518-322E-21*	220V w/ English manual

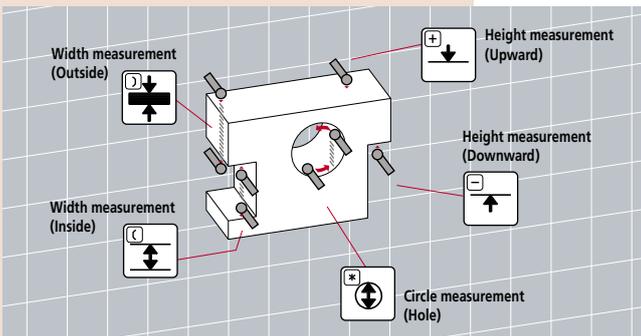
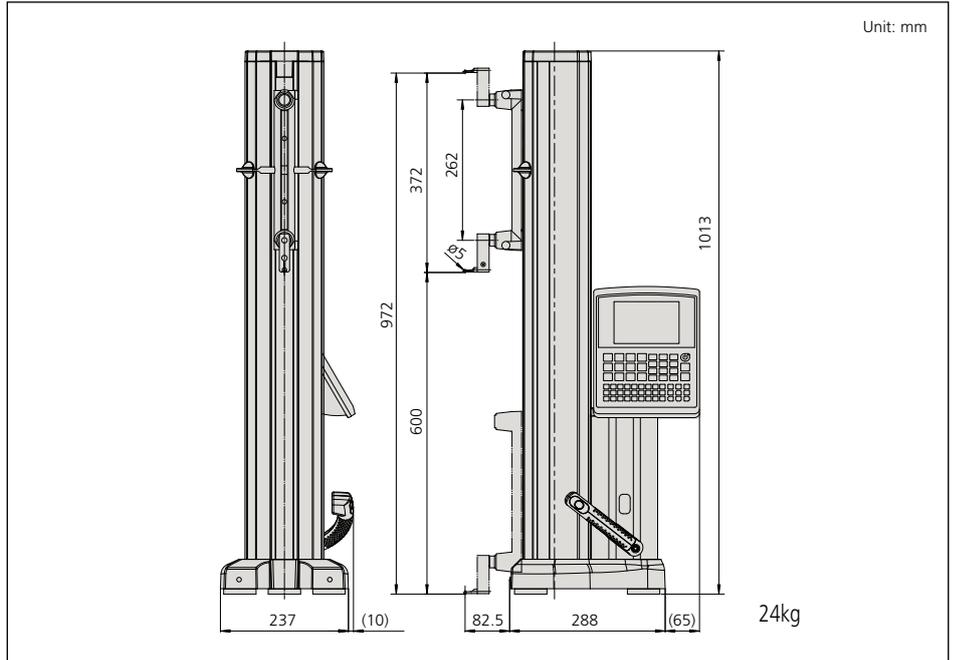
*Power grip preinstalled models

Optional Accessory

- 12AAC072: Depth probe
- 12AAC073: $\varnothing 20\text{mm}$ taper probe
- 12AAA787: Block for calibrating probe diameter (applicable to taper probe)
- 12AAA792: Dial indicator ($\varnothing 8\text{mm}$ stem) holder
- 12AAA837: Dial indicator ($\varnothing 3/8"$ stem) holder
- 12AAA793: Probe extension holder (85mm/3.3")
- 12AAB136: $\varnothing 10\text{mm}$ cylindrical probe
- 932361: Mu-checker lever head holder
- 12AAF666: $\varnothing 1\text{mm}$ ball probe
- 12AAF667: $\varnothing 2\text{mm}$ ruby ball probe
- 957261: $\varnothing 2\text{mm}$ ball probe
- 957262: $\varnothing 3\text{mm}$ ball probe
- 957263: $\varnothing 4\text{mm}$ ball probe
- 12AAB552: $\varnothing 10\text{mm}$ ball probe, L = 55mm
- 12AAF668: $\varnothing 10\text{mm}$ ball probe, L = 82mm
- 12AAF669: $\varnothing 10\text{mm}$ ball probe, L = 120mm
- 12AAF670: $\varnothing 5\text{mm}$ disk probe
- 12AAF671: $\varnothing 10\text{mm}$ disk probe
- 957264: $\varnothing 14\text{mm}$ disk probe
- 957265: $\varnothing 20\text{mm}$ disk probe
- 12AAF672: $\varnothing 1\text{mm}$ ball offset probe
- 12AAA788: $\varnothing 4\text{mm}$ ball offset probe
- 12AAF394: $\varnothing 5\text{mm}$ ball offset probe
- 12AAA789: $\varnothing 6\text{mm}$ ball offset probe
- 226116: Test indicator ($\varnothing 6\text{mm}$ stem) adapter
- 226117: M2 CMM stylus adapter
- 226118: M3 CMM stylus adapter
- : CMM ball and disk hard probes are available.
- 12AAF712: Battery pack
- 12AAF675: Large capacity battery pack
- 12AAA796: Thermal printer (220V)
- 12AAA797: Thermal printer (120V)
- 12AAA802: Thermal printing paper (10 pcs.)
- 12AAA804: Cable for page printer** (2m)
- 12AAA805: Cable for page printer** (4m)
- 12AAA807: RS-232C cable (2m/80")
- 12AAA808: RS-232C cable (4m/160")



DIMENSION AND MASS



QM-Height

SERIES 518 — High Precision ABSOLUTE Digital Height Gage

FEATURES

- Newly developed high accuracy and high resolution ABSOLUTE linear encoder for position detection.
- Easy reference icon keys.
- Possible to measure inside / outside diameter via unique process (detect the circle apex and process by tracing measurement).
- Various types of optional probes are available.
- Large size LCD with back light.

- GO/±NG judgment is performed by setting the upper and lower tolerances. If a judgement 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 (for travel) / wheel (for measurement).
- With SPC and RS-232C output.



(Refer to the page 9 for details.)

Technical Data

Measuring range: 0 - 465mm or 0 - 715mm
 Slider stroke: 350mm or 600mm
 Resolution: 0.001 / 0.005mm or 0.001 / 0.005mm / .00005" / .0001" / .0002"
 Accuracy at 20°C*: $\pm(2.8+5L/1000)\mu\text{m}$
 L = Measuring length (mm)
 Repeatability (2 σ): 1.8 μm
 Perpendicularity**: 6 μm (0 - 350mm), 13 μm (0 - 600mm)
 Guiding method: Roller bearing
 Drive method: Manual
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Measuring force: 1.6 \pm 0.5N
 Display: LCD
 Power supply: AC adapter (optional) / battery (LR6 x 4)
 Battery operation time: Approx. 260 hours***
 (approx. 6 hours when using back light)

* It is guaranteed when using the standard eccentric ϕ 5 probe.
 ** It is guaranteed when using a lever head (MLH-321) or Mu-Checker (M-411)

*** 260 hours (using back light in the power saving mode)
 6 hours (using back light in the full-time turn-on mode)

SPECIFICATIONS

Metric	
Range	Order No.
0 - 350mm	518-220 / 518-224*
0 - 600mm	518-222 / 518-226*

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

Inch/Metric	
Range	Order No.
0 - 14"	518-221 / 518-225*
0 - 24"	518-223 / 518-227*

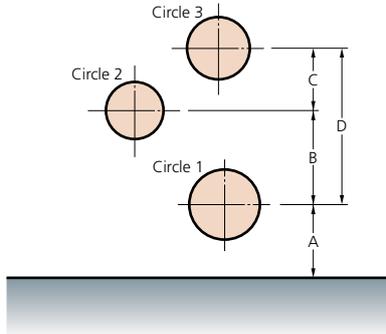
*Model with setting block for ball probe (12AAA715)

Optional Accessory

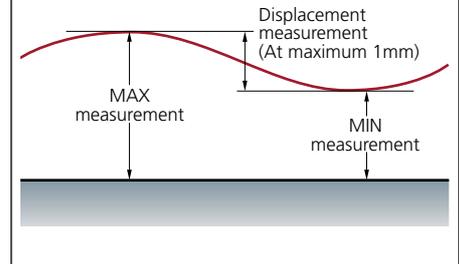
- 12AAC072: Depth probe
- 12AAA792: Dial indicator (ø8mm stem) holder
- 12AAA837: Dial indicator (ø3/8" stem) holder
- 12AAA793: Probe extension holder (85mm/3.3")
- 12AAF667: ø2mm ruby ball probe
- 957261: ø2mm ball probe
- 957262: ø3mm ball probe
- 957263: ø4mm ball probe
- 12AAB552: ø10mm ball probe, L = 55mm
- 12AAF670: ø5mm disk probe
- 12AAF671: ø10mm disk probe
- 957264: ø14mm disk probe
- 957265: ø20mm disk probe
- 12AAA788: ø4mm ball offset probe
- 12AAF394: ø5mm ball offset probe
- 12AAA789: ø6mm ball offset probe
- 226116: Test indicator (ø6mm stem) adapter
- 05HZA173: Scriber
- 264-504: DP-1VR
- 936937: SPC cable (1m)
- 965014: SPC cable (2m)
- 526688: AC adapter (100V)
- 526688A: AC adapter (120V)
- 526688D: AC adapter (220V)
- 526688E: AC adapter (240V/220V)

Circle pitch measurement

The length A, B, C and D can be determined by measuring circles 1 to 3 once each, using the memory of measuring data together with the calculation function. (A maximum of nine circle measurement data can be saved.)



Maximum / minimum and displacement measurement



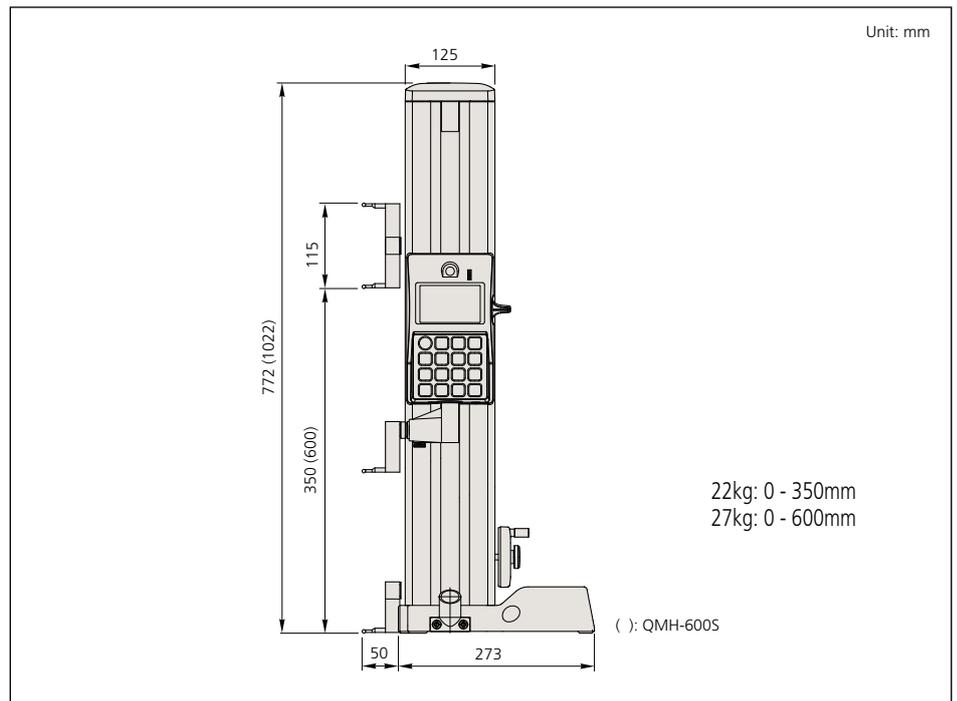
Height measurement



Inside diameter measurement



DIMENSION AND MASS



Depth Micrometer

SERIES 329, 129, 229 — Interchangeable Rod Type

FEATURES

- $\phi 4$ mm interchangeable rods, with lapped measuring end, provide a wide measuring range.
- The rod length can be adjusted in 25mm increments.
- With ratchet stop for constant force.
- With measuring rod clamp.
- With SPC output (series 329).
- With digit counter (series 229).



Technical Data

Accuracy: $\pm 3\mu\text{m}$ for micrometer head feed (excluding quantizing error for digital models)
 $\pm(2+L/75)\mu\text{m}$ for interchangeable rod,
 L = Max. measuring length (mm)
 Fraction rounded up

Resolution*: 0.001mm or .00005"/0.001mm
 (.0001"/0.001mm: **329-351**)

Graduation**: 0.01mm or .001"

Flatness of reference face: 1.3 μm for 63.5mm width base,
 2 μm for 101.6mm width base

Flatness of measuring rod face: 0.3 μm

Parallelism between reference face and measuring rod face:
 (4+L/50) μm , L = Max. measuring length (mm)
 Fraction rounded up

Measuring rod diameter: 4mm

Display*: LCD

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

Battery life*: Approx. 8 months under normal use

*Digital models **Analog models

Function of Digital Model

Preset, Zero-setting, Data hold, Automatic power ON/OFF,
 Data output, Preset inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory for Digital Model

- 05CZA662**: SPC cable with data switch (1m)
- 05CZA663**: SPC cable with data switch (2m)



SPECIFICATIONS

Metric Digital model		
Range	Order No.	Remarks (base / rod)
0 - 150mm	329-250	101.6 x 16mm w/ 6 rods
0 - 300mm	329-251	101.6 x 16mm w/ 12 rods

Inch/Metric Digital model		
Range	Order No.	Remarks (base / rod)
0 - 6"	329-350	4" x .63" w/ 6 rods
0 - 12"	329-351	4" x .63" w/ 12 rods

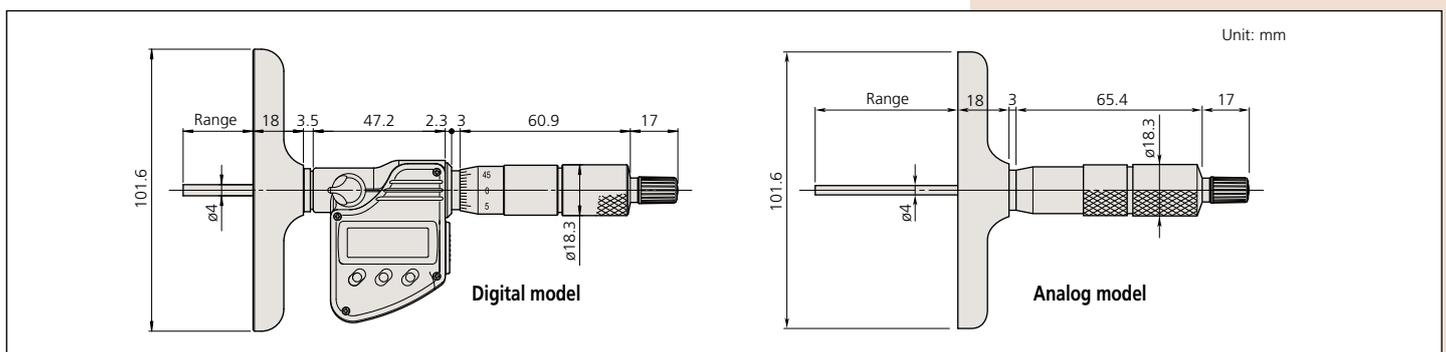
Metric Digit counter model		
Range	Order No.	Remarks (base / rod)
0 - 25mm	229-101	63.5 x 16mm w/ 1 rod
0 - 25mm	229-102	101.6 x 16mm w/ 1 rod
0 - 50mm	229-109	63.5 x 16mm w/ 2 rods
0 - 50mm	229-113	101.6 x 16mm w/ 2 rods

Inch Digit counter model		
Range	Order No.	Remarks (base / rod)
0 - 4"	229-127	2.5" x .63" w/ 4 rods
0 - 4"	229-131	4" x .63" w/ 4 rods
0 - 6"	229-128	2.5" x .63" w/ 6 rods
0 - 6"	229-132	4" x .63" w/ 6 rods

Metric		
Range	Order No.	Remarks (base / rod)
0 - 50mm	129-109	63.5 x 16mm w/ 2 rods
0 - 50mm	129-113	101.6 x 16mm w/ 2 rods
0 - 75mm	129-110	63.5 x 16mm w/ 3 rods
0 - 75mm	129-114	101.6 x 16mm w/ 3 rods
0 - 100mm	129-111	63.5 x 16mm w/ 4 rods
0 - 100mm	129-115	101.6 x 16mm w/ 4 rods
0 - 150mm	129-112	63.5 x 16mm w/ 6 rods
0 - 150mm	129-116	101.6 x 16mm w/ 6 rods

Inch		
Range	Order No.	Remarks (base / rod)
0 - 3"	129-126	2.5" x .63" w/ 3 rods
0 - 3"	129-130	4" x .63" w/ 3 rods
0 - 4"	129-127	2.5" x .63" w/ 4 rods
0 - 4"	129-131	4" x .63" w/ 4 rods
0 - 6"	129-128	2.5" x .63" w/ 6 rods
0 - 6"	129-132	4" x .63" w/ 6 rods
0 - 12"	129-149	2.5" x .63" w/ 12 rods
0 - 12"	129-150	4" x .63" w/ 12 rods

DIMENSION

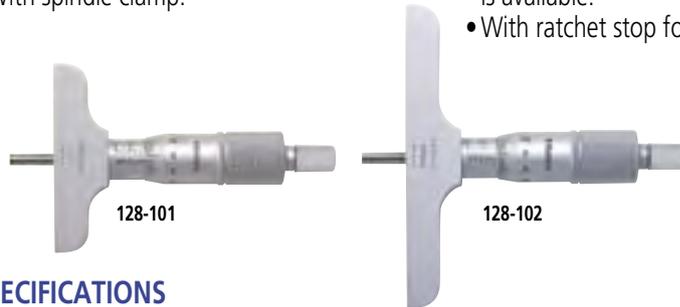


Depth Gage

SERIES 128

FEATURES

- $\phi 4$ mm measuring face.
- With spindle clamp.
- With carbide-tipped measuring face model is available.
- With ratchet stop for constant force.



SPECIFICATIONS

Metric		
Range	Order No.	Remarks (base)
0 - 25mm	128-101	63.5 x 16mm
0 - 25mm	128-103*	63.5 x 16mm
0 - 25mm	128-102	101.6 x 16mm
0 - 25mm	128-104*	101.6 x 16mm

Inch		
Range	Order No.	Remarks (base)
0 - 1"	128-105	2.5" x .63"
0 - 1"	128-106	4" x .63"

*with carbide-tipped measuring rod

Technical Data

Accuracy: $\pm 3\mu\text{m}$ for micrometer head feed
 Graduation: 0.01mm or .001"
 Flatness of reference face: 1.3 μm for 63.5mm width base,
 2 μm for 101.6mm width base
 Flatness of measuring rod face: 0.3 μm



(Refer to the page 9 for details.)

Technical Data

Block pitch accuracy: $\pm(1+L/150)\mu\text{m}$,
 L = Length to check (mm)
 Anvil block accuracy: $\pm 0.5\mu\text{m}$



Depth Micro Checker

SERIES 515

FEATURES

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

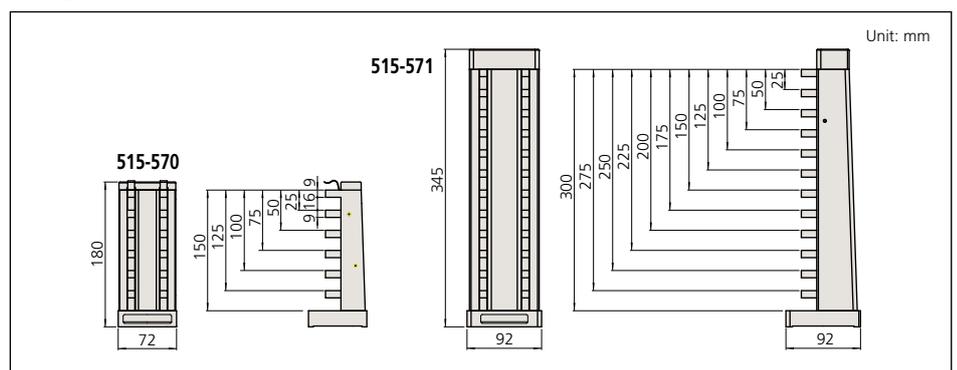


SPECIFICATIONS

Metric		
Range	Order No.	Remarks (length to check)
0 - 150mm	515-570	25, 50, 75, 100, 125, 150mm
0 - 300mm	515-571	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300mm

Inch		
Range	Order No.	Remarks (length to check)
0 - 6"	515-575	1", 2", 3", 4", 5", 6"

DIMENSION



ABSOLUTE Digimatic Depth Gage

SERIES 571

FEATURES

- ABSOLUTE Digimatic Depth Gage can keep track of the origin point once set for the entire life of the battery.
- Base and measuring faces are hardened and micro-lapped.
- Optional wider extension base are available. (up to 450mm range models)
- With SPC data output.



571-251



571-201-20

SPECIFICATIONS

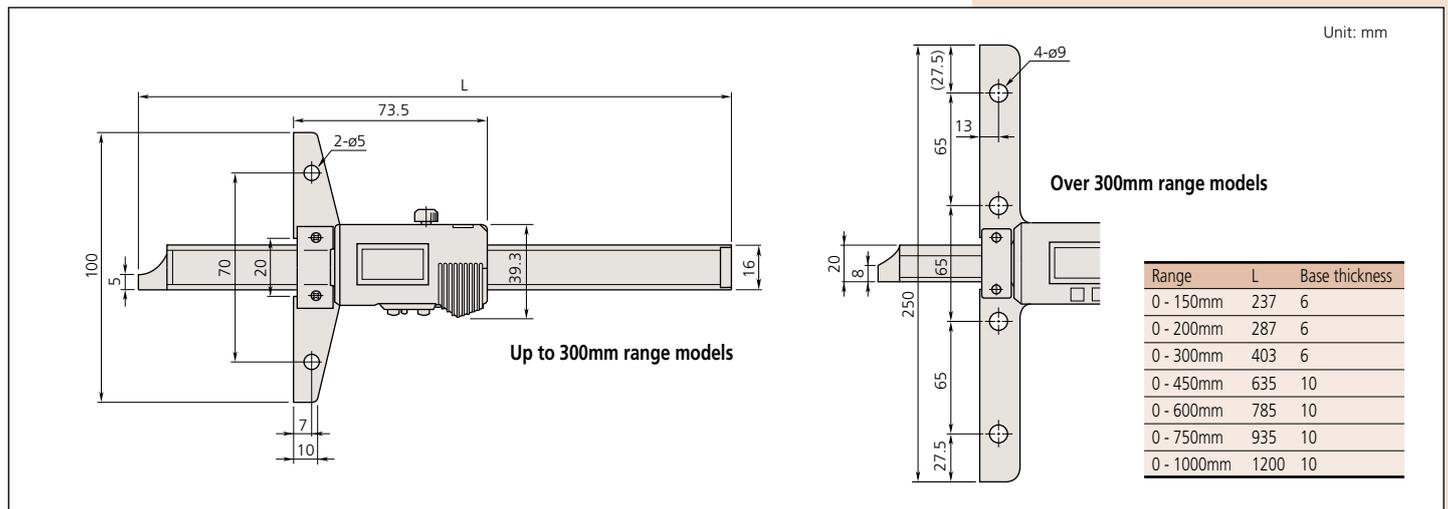
Metric		
Range	Order No.	Base (W x T)
0 - 150mm	571-201-20 / 571-251*	100 x 6mm
0 - 200mm	571-202-20 / 571-252*	100 x 6mm
0 - 300mm	571-203-20	100 x 6mm
0 - 450mm	571-204-10	250 x 10mm
0 - 600mm	571-205-10	250 x 10mm
0 - 750mm	571-206-10	250 x 10mm
0 - 1000mm	571-207-10	250 x 10mm

*IP67 Coolant Proof model

Inch/Metric		
Range	Order No.	Base (W x T)
0 - 6"	571-211-20 / 571-261*	3.93" x .23"
0 - 8"	571-212-20 / 571-262*	3.93" x .23"
0 - 24"	571-213-10	3.93" x .23"
0 - 18"	571-214-10	9.8" x .39"
0 - 24"	571-215-10	9.8" x .39"
0 - 30"	571-216-10	9.8" x .39"
0 - 40"	571-217-10	9.8" x .39"

*IP67 Coolant Proof model

DIMENSION



(Refer to the page 9 for details.)



(Refer to the page 9 for details.)

Technical Data

Accuracy: $\pm 0.02\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.03\text{mm}$ ($\leq 300\text{mm}$), $\pm 0.05\text{mm}$ ($\leq 600\text{mm}$), $\pm 0.06\text{mm}$ ($\leq 750\text{mm}$), $\pm 0.07\text{mm}$ ($\leq 1000\text{mm}$) (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Repeatability: 0.01mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance (electromagnetic induction)* type linear encoder
 Max. response speed: Unlimited
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 20,000 hours (3 years)* under normal use
 Dust/Water protection level: IP67*
 *Coolant Proof models

Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

- 959143:** Data hold unit
- 959149:** SPC cable with data switch (1m)
- 959150:** SPC cable with data switch (2m)
- 05CZA624:** SPC cable with data switch (1m)*
- 05CZA625:** SPC cable with data switch (2m)*
- Extension base (see page 179.)

*For Coolant Proof models



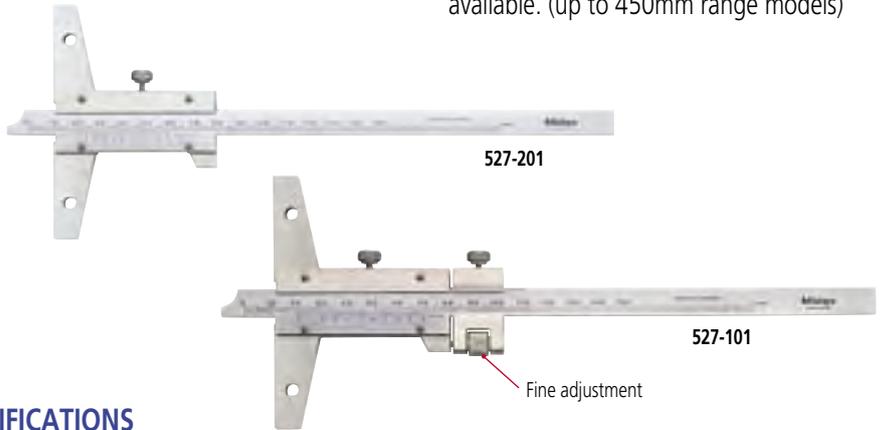
Measurement data output function is available with a water-resistant SPC cable.

Vernier Depth Gage

SERIES 527

FEATURES

- Base and measuring faces are hardened and micro-lapped.
- Made of hardened stainless steel.
- Optional wider extension base are available. (up to 450mm range models)



Technical Data

Accuracy: Refer to the list of specifications.
Graduation: 0.05mm, 0.02mm or .001"

Optional Accessory

—: Extension base (see page 179.)

SPECIFICATIONS

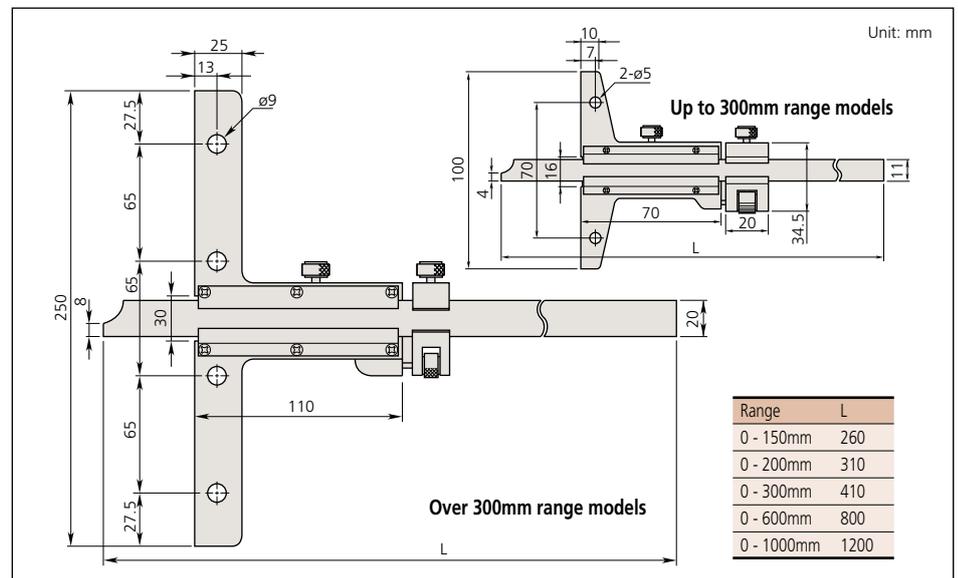
Metric

Range	Order No.	Vernier reading	Accuracy	Remarks [base (W x T) / others]
0 - 150mm	527-201	0.05mm	±0.05mm	100 x 6.5mm —
0 - 150mm	527-121	0.02mm	±0.03mm	100 x 6.5mm —
0 - 150mm	527-101	0.02mm	±0.03mm	100 x 6.5mm with fine adjustment
0 - 200mm	527-202	0.05mm	±0.05mm	100 x 6.5mm —
0 - 200mm	527-122	0.02mm	±0.03mm	100 x 6.5mm —
0 - 200mm	527-102	0.02mm	±0.03mm	100 x 6.5mm with fine adjustment
0 - 300mm	527-203	0.05mm	±0.08mm	100 x 6.5mm —
0 - 300mm	527-123	0.02mm	±0.04mm	100 x 6.5mm —
0 - 300mm	527-103	0.02mm	±0.04mm	100 x 6.5mm with fine adjustment
0 - 600mm	527-204	0.05mm	±0.10mm	250 x 10mm —
0 - 600mm	527-104	0.02mm	±0.05mm	250 x 10mm with fine adjustment
0 - 1000mm	527-205	0.05mm	±0.15mm	250 x 10mm —
0 - 1000mm	527-105	0.02mm	±0.07mm	250 x 10mm with fine adjustment

Inch

Range	Order No.	Vernier reading	Accuracy	Remarks [base (W x T) / others]
0 - 6"	527-111	.001"	±.001"	3.93" x .25" with fine adjustment
0 - 8"	527-112	.001"	±.001"	3.93" x .25" with fine adjustment
0 - 12"	527-113	.001"	±.0015"	9.8" x .39" with fine adjustment
0 - 24"	527-114	.001"	±.002"	9.8" x .39" with fine adjustment
0 - 40"	527-115	.001"	±.003"	9.8" x .39" with fine adjustment

DIMENSION



Vernier Depth Gage

SERIES 527 — Hook End 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 fine adjustment models are available.
- Optional wider extension base are available.



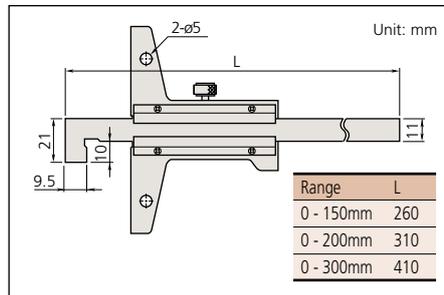
527-401

SPECIFICATIONS

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

Metric with fine adjustment			
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

DIMENSION

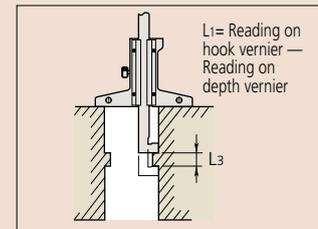
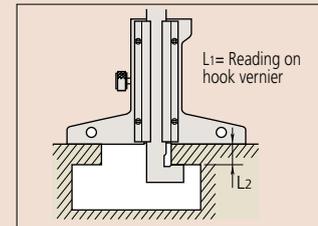
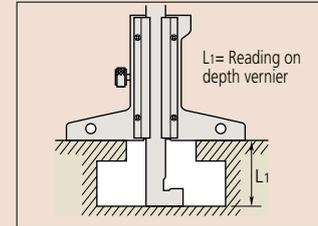


Technical Data

Accuracy: Refer to the list of specifications.
 Graduation: 0.05mm or 0.02mm
 Base size: 100 x 6.5mm (W x T)

Optional Accessory

—: Extension base (see page 179.)

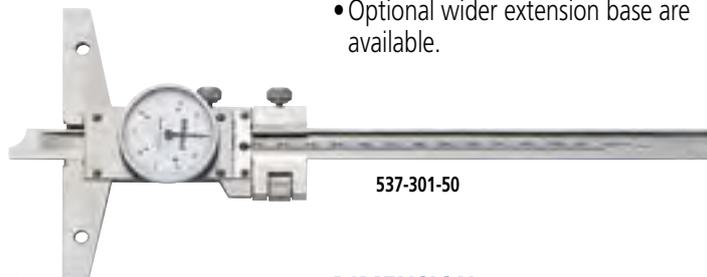


Dial Depth Gage

SERIES 527 — with Fine Adjustment

FEATURES

- Easier and faster reading of dial.
- Made of hardened stainless steel.
- Base and measuring faces are hardened and micro-lapped.
- Optional wider extension base are available.



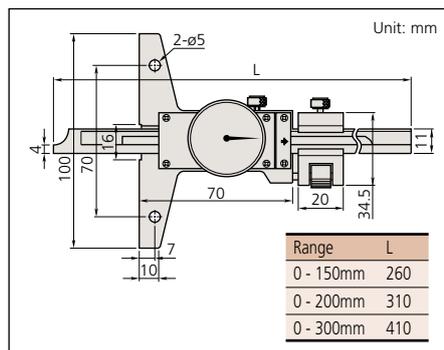
537-301-50

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"

DIMENSION



Technical Data

Accuracy: Refer to the list of specifications.
 Dial reading: 0.05mm or .001"
 Base size: 100 x 6.5mm (W x T)

Optional Accessory

—: Extension base (see page 179.)

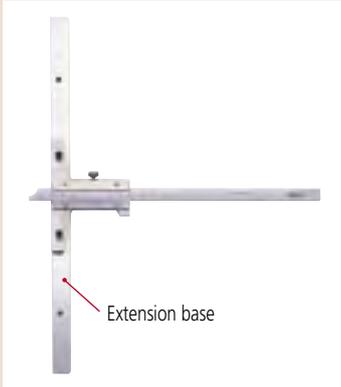


Extension Bases

Optional Accessory for Depth Gage

FEATURES

- Attached to the base (reference face) plate of a depth gage to extend its span.
- These extension base cannot be attached to 0 - 600mm, 0 - 1000mm, 0-24" and 0-40" range models.



Extension base

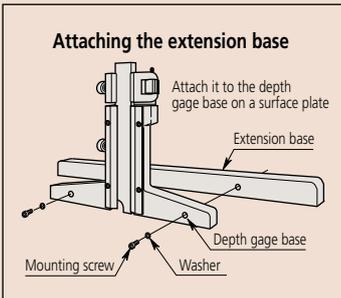
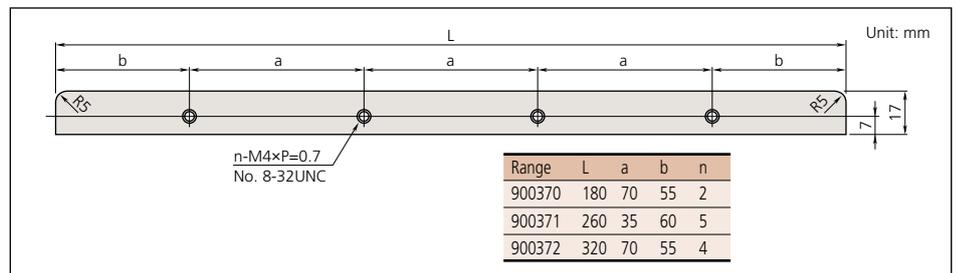
SPECIFICATIONS

Metric			
Size	Order No.	Remarks (dimension A, B / n)	
180mm	900370	70mm, 55mm	2
260mm	900371	35mm, 60mm	5
320mm	900372	70mm, 55mm	4

900372

Inch			
Size	Order No.	Remarks (dimension A, B / n)	
7"	900367	2.76", 2.17"	2
10"	900368	1.38", 2.36"	5
12"	900369	2.76", 2.17"	4

DIMENSION



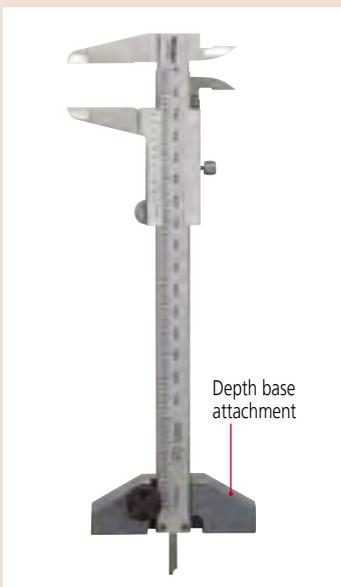
Attaching the extension base

Depth Base Attachment

Optional Accessory for Caliper

FEATURES

- For 100mm, 150mm, 200mm, 300mm, 4", 6", 8" and 12" vernier and dial calipers which have a depth measuring bar.
- Finely grounded base surface and secure locking clamp.



Depth base attachment

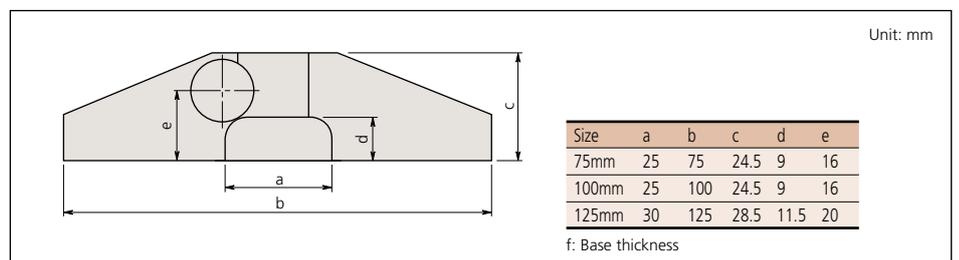


050084

SPECIFICATIONS

Metric		
Size	Order No.	Remarks (applicable measuring range of caliper)
75mm	050083	100mm, 15mm, 200mm, 4", 6" and 8"
100mm	050084	100mm, 15mm, 200mm, 4", 6" and 8"
125mm	050085	300mm and 12"

DIMENSION

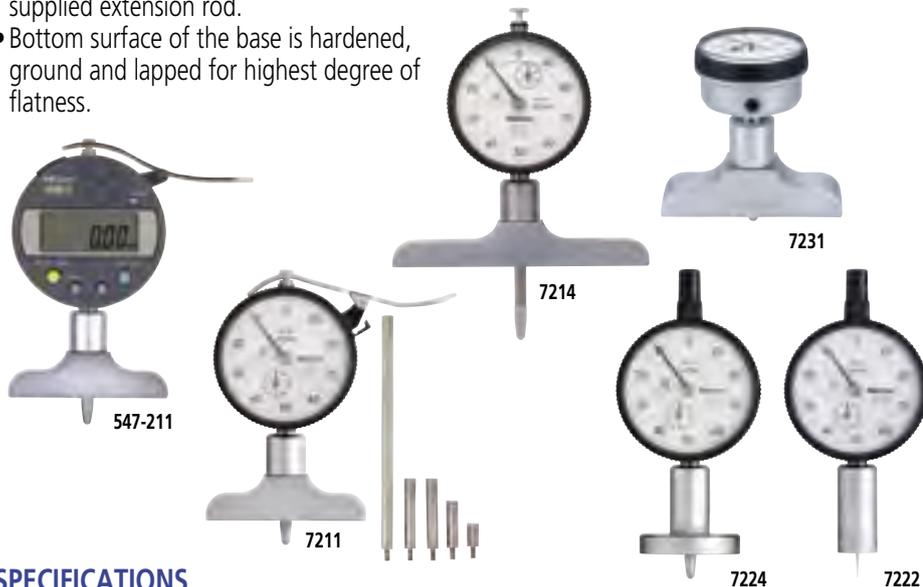


ABSOLUTE Digimatic/Dial Depth Gage

SERIES 547, 7

FEATURES

- ABSOLUTE Digimatic Depth Gage can keep track of the origin point once set for the entire life of the battery. (series 547)
- Wide probing range is available with the supplied extension rod.
- Bottom surface of the base is hardened, ground and lapped for highest degree of flatness.
- Designed with a back plunger type dial indicator for upward facing readings. (**7231, 7237, 7238**)
- With SPC data output. (series 547)



SPECIFICATIONS

Metric Digital Type					
Range	Order No.	Stroke	Accuracy	Extension rod	Base (W x T, flatness)
0 - 200mm	547-211	12mm	±20µm	5 pcs. (10, 20, 30, 30, 100mm)	63.5 x 16mm, 5µm
0 - 200mm	547-212	12mm	±20µm	5 pcs. (10, 20, 30, 30, 100mm)	101.6 x 16mm, 5µm
0 - 200mm	547-251	12mm	±5µm	5 pcs. (10, 20, 30, 30, 100mm)	63.5 x 16mm, 2µm
0 - 200mm	547-252	12mm	±5µm	5 pcs. (10, 20, 30, 30, 100mm)	101.6 x 16mm, 2µm

□ 0.01mm graduation □ 0.001mm graduation

Inch/Metric Digital Type					
Range	Order No.	Stroke	Accuracy	Extension rod	Base (W x T, flatness)
0 - 8"	547-217	.5"	±.001"	4 pcs. (.5", 1", 2", 4")	2.5" x .63", .0002"
0 - 8"	547-218	.5"	±.001"	4 pcs. (.5", 1", 2", 4")	4" x .63", .0002"
0 - 8"	547-257	.5"	±.0003"	4 pcs. (.5", 1", 2", 4")	2.5" x .63", .00008"
0 - 8"	547-258	.5"	±.0003"	4 pcs. (.5", 1", 2", 4")	4" x .63", .00008"

□ .005"/0.01mm graduation □ .00005"/0.001mm graduation

Metric Dial Type					
Range	Order No.	Stroke	Accuracy	Extension rod	Base (W x T, flatness)
0 - 10mm	7210*	10mm	±15µm	—	40 x 16mm, 5µm
0 - 200mm	7211	10mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	63.5 x 16mm, 5µm
0 - 200mm	7212	10mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	101.6 x 16mm, 5µm
0 - 210mm	7213	30mm	±30µm	3 pcs. (30, 60, 90mm)	63.5 x 16mm, 5µm
0 - 210mm	7214	30mm	±30µm	3 pcs. (30, 60, 90mm)	101.6 x 16mm, 5µm
0 - 200mm	7220	10mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	100 x 18mm, 5µm
0 - 200mm	7221	10mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	150 x 18mm, 5µm
0 - 10mm	7222*	10mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	ø16mm, 5µm
0 - 10mm	7223	10mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	ø25mm, 5µm
0 - 10mm	7224	10mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	ø40mm, 5µm
0 - 200mm	7231	5mm	±15µm	5 pcs. (10, 20, 30, 30, 100mm)	63.5 x 16mm, 5µm

*with needle probe

Inch Dial Type					
Range	Order No.	Stroke	Accuracy	Extension rod	Base (W x T, flatness)
0 - .4"	7217S	1"	±.002"	4 pcs. (.5", 1", 2", 4")	2.5" x .63", .0002"
0 - .4"	7218S	1"	±.002"	4 pcs. (.5", 1", 2", 4")	4" x .63", .0002"
0 - 8"	7217	1"	±.002"	3 pcs. (1", 2", 4")	2.5" x .63", .0002"
0 - 8"	7218	1"	±.002"	3 pcs. (1", 2", 4")	4" x .63", .0002"
0 - 8"	7237	.2"	±.002"	4 pcs. (.5", 1", 2", 4")	2.5" x .63", .0002"
0 - 8"	7238	.2"	±.002"	4 pcs. (.5", 1", 2", 4")	4" x .63", .0002"

SPC

ABSOLUTE[®]
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data of Digital Mode

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)

Resolution: 0.001mm, 0.01mm, .00005"/0.001mm or .0005"/0.01mm

Flatness of base face: 5µm or 2µm

Contact point: Carbide-tipped ball point or needle

Measuring force: 1.5N

Display: LCD

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

Battery life: Approx. 5000 hours under normal use

Technical Data of Dial Mode

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)

Dial reading: 0.01mm or .001"

Flatness of base face: 5µm or 2µm

Contact point: Carbide-tipped ball point
(needle point: **7210, 7222**)

Measuring force: 1.4N (2.5N: **7213, 7214, 7217, 7218**)

Function of Digital Model

Origin-set, Zero-setting, Data hold, Data output, inch/mm conversion (inch/mm models)

Alarm: Low voltage, Counting value composition error

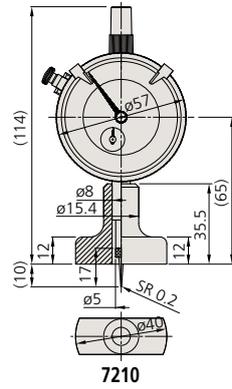
Optional Accessory for Digital Model

905338: SPC cable (1m)

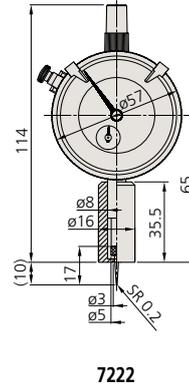
905409: SPC cable (2m)

DIMENSION

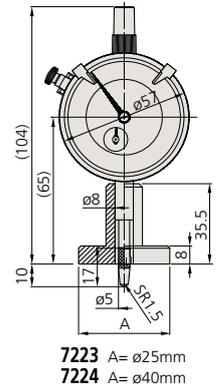
Unit: mm



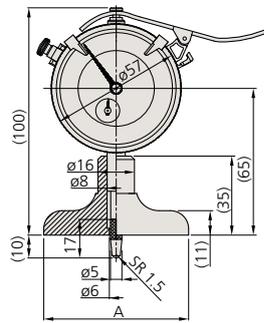
7210



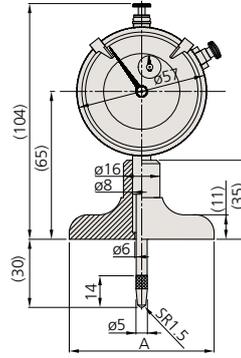
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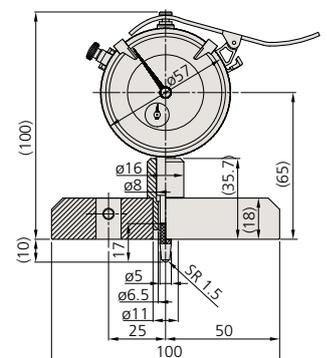
7223 A= 25mm
7224 A= 40mm



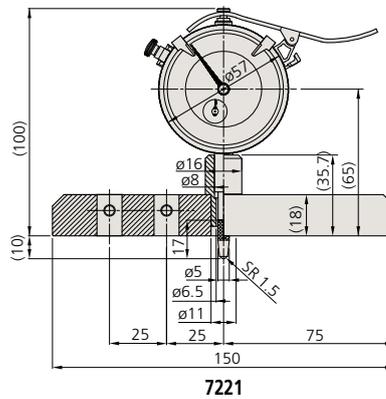
7211 A= 63.5mm
7212 A= 101.6mm



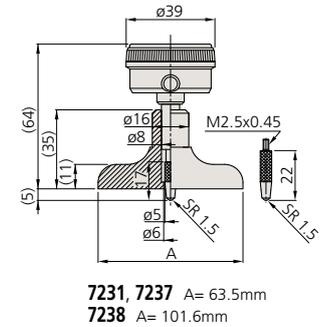
7213, 7217 A= 63.5mm
7214, 7218 A= 101.6mm



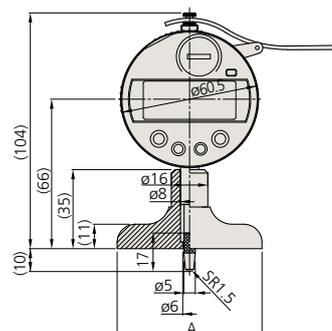
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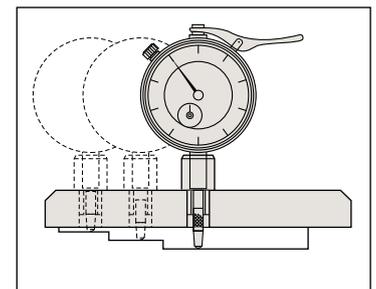
7221



7231, 7237 A= 63.5mm
7238 A= 101.6mm



547-211, 547-251, 547-217, 547-257 A= 63.5mm
547-212, 547-252, 547-218, 547-258 A= 101.6mm



Tire Thread Depth Gage

SERIES 571, 700

FEATURES

- ABSOLUTE Digimatic Thread Depth Gage can keep track of the origin point once set for the entire life of the battery. (series 571)
- Specially designed to measure tire thread depth.
- Plastic construction for light-weight use. (series 700)
- With SPC data output. (series 571)



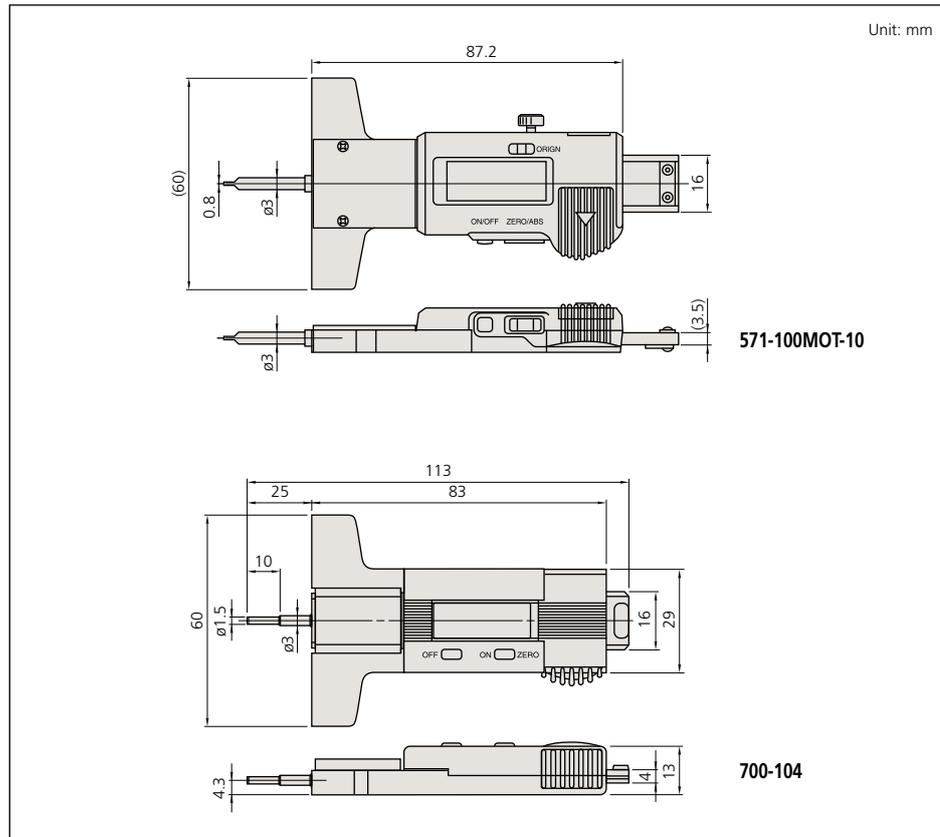
700-104

SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 25mm	571-100MOT-10	±0.02mm
0 - 25mm	700-104	±0.2mm

Inch/Metric		
Range	Order No.	Accuracy
0 - 1"	571-200MOT-10	±.0005"
0 - 1"	700-105	±.008"

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution: 0.01mm or .0005"/0.01mm (571 series)
0.1mm or .001"/0.1mm (700 series)
Display: LCD
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 2 years under normal use
(approx. 2000 hours: series 571)

Function

Origin-set*, Zero-setting, Data output* Power ON/OFF,
inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error
*series 571

Optional Accessory for series 571

- 959143:** Data hold unit
- 959149:** SPC cable with data switch (1m)
- 959150:** SPC cable with data switch (2m)



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Gauge Block



Height Master



Reference Gages



**Granite Surface
Plates & Bench
Comparator**

New Products



**CERA/Steel
Combination
Gauge Block Set**



Step Master



**Straightness
Measuring System**



**Ceramic
Straight Master**

Gauge Block

SERIES 516

FEATURES

Precision gauge blocks are the primary standards vital to dimensional quality control in the manufacture of parts. Mitutoyo offers a complete selection of gauge blocks

available in a choice of rectangular or square, metric or inch and steel or CERA (ceramic) types.

Accuracy

Gauge blocks offered by an all-round precision measuring machine manufacturer, Mitutoyo, guarantee such a high accuracy that users can use them without anxiety. Needless to say, Mitutoyo has established a traceability system for our measurement products, up to the Metrology Management Center of the National Institute of Advanced Industrial Science and Technology (AIST) and we have been certified by the Japanese government as an accredited laboratory.

Wringing

The lapping technique is one of Mitutoyo's specialties. Our advanced lapping technique, developed for more than a half century, enables us to achieve the best flatness and surface roughness needed for gauge blocks and realize a great wringing force.

Abrasion Resistance and Dimensional Stability

High-carbon high-chrome steel is employed to sufficiently satisfy a variety of material characteristics required for gauge blocks. A high degree of hardness, obtained by our heat treatment technology and that reassures users, as well as methodically repeated heat treatment, have successfully reduced deterioration change over time to the minimum.

CERA Blocks

CERA blocks, made of ceramic materials with superior surface quality, that were developed by Mitutoyo's ultra precision machining techniques solve all problems that the steel gauge block had.



1. Corrosion-Resistant

Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.

2. No Burrs Caused by Dents, etc.

Since the CERA Block is very hard, it will not scratch and is highly resistant to burrs. If a burr is formed, it can easily be removed with a ceramic deburring stone (Ceraston).

3. Abrasion Resistant

CERA Blocks have 10 times the abrasion resistance of steel gauge blocks.

4. Dimensional Stability

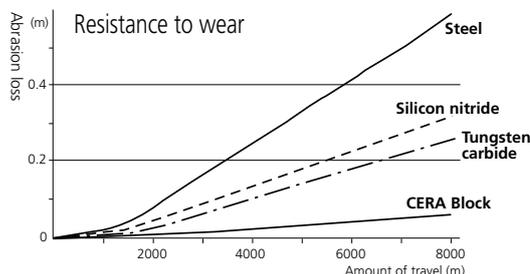
CERA Blocks are free from dimensional change over time.

5. Marking

The black characters, indicating the nominal length, are inscribed by laser and are clearly visible against the white surface of the block.

Selecting Gauge Blocks

- Select gauge blocks in accordance with the combination range required. If a large length is required, add a long block set.
- Select gauge blocks in accordance with the minimum length step required. Add wear block sets if necessary.
- If a set containing a large number of gauge blocks is selected, the number of combination gauge blocks required for a length is reduced and the number of combinations is increased. The accuracy will be retained and damage will be reduced.
- The specific gauge block set for micrometer inspection and caliper inspection is available.
- If using only one length repeatedly, it is a good idea to purchase discrete gauge blocks.
- The 2mm-based gauge blocks, which take the base of the minimum length step as 2mm, are easy to handle and will not warp, as compared to the 1mm-based gauge blocks.



Grade and Application

Refer to the following table to select the gauge block grade according to usage (specified by DIN861, BS4311, and JIS B 7506).

	Applications	Grade
Workshop use	• Mounting tools and cutters	2
	• Manufacturing gages • Calibrating instruments	1 or 2
Inspection use	• Inspecting mechanical parts, tools, etc.	1 or 2
	• Checking the accuracy of gages • Calibrating instruments	0 or 1
Calibration use	• Checking the accuracy of gauge blocks for workshop	K or 0
	• Checking the accuracy of gauge blocks for inspection	
	• Checking the accuracy of instruments	
	• Checking the accuracy of instruments	
Reference use	• Checking the accuracy of gauge blocks for calibration • For academic research	K

Grade 2:

These gauge blocks are intended for shop floor use to set and calibrate fixtures as well as precision instruments.

Grade 1:

This grade is used within an inspection area to verify the accuracy of plug and snap gages as well as for setting electronic measuring devices.

Grade 0:

These higher accuracy gauges are intended for use within a controlled environment by skilled inspection staff. Mainly used as reference standards for setting high precision measuring equipment and for the calibration of lower grade gauge blocks.

Grade K:

Gauge blocks of this accuracy are intended for use within a temperature controlled inspection room or calibration laboratory. They should be used as masters with certificates against other gauge blocks which are calibrated by comparison.

Combination of a Required Length

Multiple combinations of gauge blocks can be used to make a required length. Care should be exercised in the following points.

1. Use as few gauge blocks as possible to obtain the required length. (= Select thick gauge blocks whenever possible.)
2. Select gauge blocks starting with the one that has least significant digit required, and then work up to ones with more significant digits.
3. There are multiple combinations for the integer part of a length. To prevent wear as much as possible, do not always use the same gauge blocks.

Example combination

Required length = 45.6785mm

For the 1mm-based gauge block set (112 pcs.)

$$\begin{array}{r}
 1.0005 \\
 1.008 \\
 1.17 \\
 17.5 \\
 + \quad 25 \\
 \hline
 45.6785\text{mm}
 \end{array}$$

For the 2mm-based gauge block set (112 pcs.)

$$\begin{array}{r}
 2.0005 \\
 2.008 \\
 2.17 \\
 14.5 \\
 + \quad 25 \\
 \hline
 45.6785\text{mm}
 \end{array}$$

6. Anti-magnetic Nature Keeps Away Steel Powders

7. High wringing force

An even, dense tissue can maintain a strong wringing force.

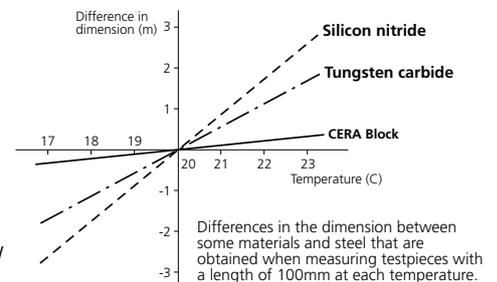


8. Material of CERA block

Property	Material	CERA Block (ZrO ₂)	Steel (Fe)	Carbide (WC-Co)	Silicon nitride (Si ₃ N ₄)
Hardness (HV)		1350	800	1650	1500
Coefficient of thermal expansion (10 ⁻⁶ /K)		9.3±0.5	10.8±0.5	5.5±1.0	2
Flexural strength by 3-point bending (MPa)		1270	1960	1960	580
Fracture toughness K1c (MPa•m ^{1/2})		7	120	12	6.5
Young's modulus x104 (MPa)		20.6	20.6	61.8	28.4
Poisson's ratio		0.3	0.3	0.2	0.3
Specific gravity		6.0	7.8	14.8	3.2
Thermal conductivity (W/m•k)		2.9	54.4	79.5	16.7

9. Closest Expansion Coefficient to Steel

The thermal expansion coefficient of a CERA Block is quite similar to that of a steel gauge block.



10. Highly Resistant Against Drops and Other Shocks

The CERA Block material is one of the toughest ceramics materials. It is extremely difficult to crack under normal use.

Features of Square Gauge Blocks

1. Perfect wringing is possible using the center hole.

After wringing the square gauge blocks, an optional tie rod can be inserted through the center hole to fix the blocks using a screw.



2. A height reference standard can easily be made.

A precision height reference standard can be made easily and inexpensively using accessories such as the plain jaw and block base.



3. A dedicated inspection jig can be easily be made.

A dedicated inspection jig for periodic inspection of instruments can be made easily and inexpensively.



4. A wide measuring surface with cross section dimensions of [24.1 x 24.1mm] is available.

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.



Long and Ultra-Thin Gauge Blocks

Mitutoyo offers extra thin gauge blocks from 0.10 mm to 0.99 mm (increments of 0.01 mm) as well as long gauge blocks up to 1,000 mm as standard products.

Gauge Block

SERIES 516

Accuracies of Mitutoyo Gauge Blocks

All Mitutoyo gauge blocks meet or exceed all known specifications. The flatness, parallelism and surface finish necessary to achieve the required accuracies are the same as or better than government requirements.

ACCURACY SPECIFICATIONS: JIS B 7506-2004 (JAPAN)

(at 20°C)

Nominal length (mm)		Grade K		Grade 0	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
from 0.5	up to 10	±0.20µm	0.05µm	±0.12µm	0.10µm
over 10	up to 25	±0.30µm	0.05µm	±0.14µm	0.10µm
over 25	up to 50	±0.40µm	0.06µm	±0.20µm	0.10µm
over 50	up to 75	±0.50µm	0.06µm	±0.25µm	0.12µm
over 75	up to 100	±0.60µm	0.07µm	±0.30µm	0.12µm
over 100	up to 150	±0.80µm	0.08µm	±0.40µm	0.14µm
over 150	up to 200	±1.00µm	0.09µm	±0.50µm	0.16µm
over 200	up to 250	±1.20µm	0.10µm	±0.60µm	0.16µm
over 250	up to 300	±1.40µm	0.10µm	±0.70µm	0.18µm
over 300	up to 400	±1.80µm	0.12µm	±0.90µm	0.20µm
over 400	up to 500	±2.20µm	0.14µm	±1.10µm	0.25µm
over 500	up to 600	±2.60µm	0.16µm	±1.30µm	0.25µm
over 600	up to 700	±3.00µm	0.18µm	±1.50µm	0.30µm
over 700	up to 800	±3.40µm	0.20µm	±1.70µm	0.30µm
over 800	up to 900	±3.80µm	0.20µm	±1.90µm	0.35µm
over 900	up to 1000	±4.20µm	0.25µm	±2.00µm	0.40µm

Nominal length (mm)		Grade 1		Grade 2	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
from 0.5	up to 10	±0.20µm	0.16µm	±0.45µm	0.30µm
over 10	up to 25	±0.30µm	0.16µm	±0.60µm	0.30µm
over 25	up to 50	±0.40µm	0.18µm	±0.80µm	0.30µm
over 50	up to 75	±0.50µm	0.18µm	±1.00µm	0.35µm
over 75	up to 100	±0.60µm	0.20µm	±1.20µm	0.35µm
over 100	up to 150	±0.80µm	0.20µm	±1.60µm	0.40µm
over 150	up to 200	±1.00µm	0.25µm	±2.00µm	0.40µm
over 200	up to 250	±1.20µm	0.25µm	±2.40µm	0.45µm
over 250	up to 300	±1.40µm	0.25µm	±2.80µm	0.50µm
over 300	up to 400	±1.80µm	0.30µm	±3.60µm	0.50µm
over 400	up to 500	±2.20µm	0.35µm	±4.40µm	0.60µm
over 500	up to 600	±2.60µm	0.40µm	±5.00µm	0.70µm
over 600	up to 700	±3.00µm	0.45µm	±6.00µm	0.70µm
over 700	up to 800	±3.40µm	0.50µm	±6.50µm	0.80µm
over 800	up to 900	±3.80µm	0.50µm	±7.50µm	0.90µm
over 900	up to 1000	±4.20µm	0.60µm	±8.00µm	1.00µm

ACCURACY SPECIFICATIONS: BS 4311: Part 1: 1993 (UK)

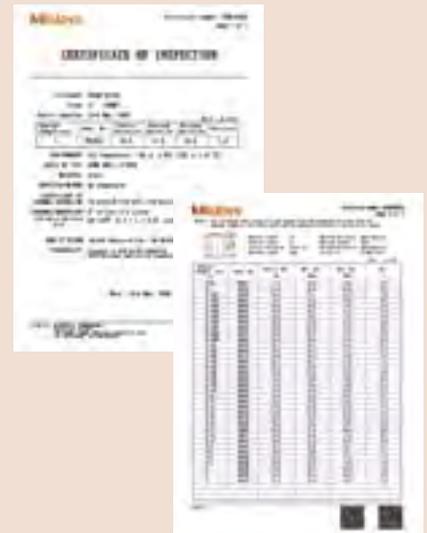
(at 20°C)

Nominal length (inch)		Grade K			Grade 0		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 0.4	±5µin	2µin	2µin	±5µin	4µin	4µin
over 0.4	up to 1	±6µin	2µin	2µin	±6µin	4µin	4µin
over 1	up to 2	±8µin	3µin	2µin	±8µin	4µin	4µin
over 2	up to 3	±10µin	3µin	2µin	±10µin	5µin	4µin
over 3	up to 4	±12µin	3µin	2µin	±12µin	5µin	4µin

Nominal length (inch)		Grade 1			Grade 2		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 0.4	±10µin	6µin	6µin	±20µin	12µin	10µin
over 0.4	up to 1	±12µin	6µin	6µin	±25µin	12µin	10µin
over 1	up to 2	±15µin	7µin	6µin	±30µin	12µin	10µin
over 2	up to 3	±20µin	7µin	6µin	±40µin	14µin	10µin
over 3	up to 4	±25µin	8µin	6µin	±50µin	14µin	10µin

Mitutoyo Gauge Blocks and Inspection Certificates

A Certificate of Inspection is furnished with all Mitutoyo gauge blocks with a serial number on the case and an identification number on each block. The deviation of each block is registered. For this inspection, each gauge block is measured relative to the upper level master using a gauge block comparator. Grade K gauge blocks are manufactured by absolute measurement using an interferometer. The gauge block set and discrete gauge block are supplied with a Certificate of Calibration. The Certificate of Calibration specifies the deviation from the nominal length. (Comparative measurement, however, is performed for all square gauge blocks.)



ISO/DIN/JIS Metric Rectangular Gauge Block Sets with RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration.

- The configuration of each set is identical with that of the standard set introduced on the previous pages, having the identical 6-digit order number, regardless of the suffix.
- The charge for issue of RvA certificate is not included in the prior set price (Grade K gauge block sets).
- The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).
- Grade K BS gauge block sets come with RvA Certificate as standard.



ACCURACY SPECIFICATIONS: BS 4311: Part 1: 1993 (UK)

(at 20°C)

Nominal length (mm)		Grade K			Grade 0		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 10	±0.12µm	0.05µm	0.05µm	±0.12µm	0.10µm	0.10µm
over 10	up to 25	±0.15µm	0.05µm	0.05µm	±0.15µm	0.10µm	0.10µm
over 25	up to 50	±0.20µm	0.06µm	0.05µm	±0.20µm	0.10µm	0.10µm
over 50	up to 75	±0.25µm	0.06µm	0.05µm	±0.25µm	0.12µm	0.10µm
over 75	up to 100	±0.30µm	0.07µm	0.05µm	±0.30µm	0.12µm	0.10µm

Nominal length (mm)		Grade 1			Grade 2		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 10	±0.25µm	0.16µm	0.15µm	±0.50µm	0.30µm	0.25µm
over 10	up to 25	±0.30µm	0.16µm	0.15µm	±0.60µm	0.30µm	0.25µm
over 25	up to 50	±0.40µm	0.18µm	0.15µm	±0.80µm	0.30µm	0.25µm
over 50	up to 75	±0.50µm	0.18µm	0.15µm	±1.00µm	0.35µm	0.25µm
over 75	up to 100	±0.60µm	0.20µm	0.15µm	±1.20µm	0.35µm	0.25µm

ACCURACY SPECIFICATIONS: ASME B89.1.9-2002 (USA)

(at 20°C)

Nominal length (inch)		Grade K		Grade 00		Grade 0		Grade 1		Grade 2	
		Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length
	up to .05	±12µin	2µin	±4µin	2µin	±6µin	4µin	±12µin	6µin	±24µin	12µin
over .05	up to .4	±10µin	2µin	±3µin	2µin	±5µin	4µin	±8µin	6µin	±18µin	12µin
over .45	up to 1	±12µin	2µin	±3µin	2µin	±6µin	4µin	±12µin	6µin	±24µin	12µin
over 1	up to 2	±16µin	2µin	±4µin	2µin	±8µin	4µin	±16µin	6µin	±32µin	12µin
over 2	up to 3	±20µin	2µin	±5µin	3µin	±10µin	4µin	±20µin	6µin	±40µin	14µin
over 3	up to 4	±24µin	3µin	±6µin	3µin	±12µin	5µin	±24µin	8µin	±48µin	14µin
over 4	up to 5	±32µin	3µin	±8µin	3µin	±16µin	5µin	±32µin	8µin	±64µin	16µin
over 5	up to 6	±32µin	3µin	±8µin	3µin	±16µin	5µin	±32µin	8µin	±64µin	16µin
over 6	up to 7	±40µin	4µin	±10µin	4µin	±20µin	6µin	±40µin	10µin	±80µin	16µin
over 7	up to 8	±40µin	4µin	±10µin	4µin	±20µin	6µin	±40µin	10µin	±80µin	16µin
over 8	up to 10	±48µin	4µin	±12µin	4µin	±24µin	6µin	±48µin	10µin	±104µin	18µin
over 10	up to 12	±56µin	4µin	±14µin	4µin	±28µin	7µin	±56µin	10µin	±112µin	20µin
over 12	up to 16	±72µin	5µin	±18µin	5µin	±36µin	8µin	±72µin	12µin	±144µin	20µin
over 16	up to 20	±88µin	6µin	±20µin	6µin	±44µin	10µin	±88µin	14µin	±176µin	24µin
over 20	up to 24	±104µin	6µin	±25µin	6µin	±52µin	10µin	±104µin	16µin	±200µin	28µin
over 24	up to 28	±120µin	7µin	±30µin	7µin	±60µin	12µin	±120µin	18µin	±240µin	28µin
over 28	up to 32	±136µin	8µin	±34µin	8µin	±68µin	12µin	±136µin	20µin	±260µin	32µin
over 32	up to 36	±152µin	8µin	±38µin	8µin	±76µin	14µin	±152µin	20µin	±300µin	36µin
over 36	up to 40	±160µin	10µin	±40µin	10µin	±80µin	16µin	±168µin	24µin	±320µin	40µin

ACCURACY SPECIFICATIONS: ASME B89.1.9-2002 (USA)

Nominal length (mm)		Grade K		Grade 00		Grade 0		Grade 1		Grade 2	
		Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length
	up to 0.5	±0.30µm	0.05µm	±0.10µm	0.05µm	±0.14µm	0.10µm	±0.30µm	0.16µm	±0.60µm	0.30µm
over 0.5	up to 10	±0.20µm	0.05µm	±0.07µm	0.05µm	±0.12µm	0.10µm	±0.20µm	0.16µm	±0.45µm	0.30µm
over 10	up to 25	±0.30µm	0.05µm	±0.07µm	0.05µm	±0.14µm	0.10µm	±0.30µm	0.16µm	±0.60µm	0.30µm
over 25	up to 50	±0.40µm	0.06µm	±0.10µm	0.06µm	±0.20µm	0.10µm	±0.40µm	0.18µm	±0.80µm	0.30µm
over 50	up to 75	±0.50µm	0.06µm	±0.12µm	0.06µm	±0.25µm	0.12µm	±0.50µm	0.18µm	±1.00µm	0.35µm
over 75	up to 100	±0.60µm	0.07µm	±0.15µm	0.07µm	±0.30µm	0.12µm	±0.60µm	0.20µm	±1.20µm	0.35µm
over 100	up to 150	±0.80µm	0.08µm	±0.20µm	0.08µm	±0.40µm	0.14µm	±0.80µm	0.20µm	±1.60µm	0.40µm
over 150	up to 200	±1.00µm	0.09µm	±0.25µm	0.09µm	±0.50µm	0.16µm	±1.00µm	0.25µm	±2.00µm	0.40µm
over 200	up to 250	±1.20µm	0.10µm	±0.30µm	0.10µm	±0.60µm	0.16µm	±1.20µm	0.25µm	±2.40µm	0.45µm
over 250	up to 300	±1.40µm	0.10µm	±0.35µm	0.10µm	±0.70µm	0.18µm	±1.40µm	0.25µm	±2.80µm	0.50µm
over 300	up to 400	±1.80µm	0.12µm	±0.45µm	0.12µm	±0.90µm	0.20µm	±1.80µm	0.30µm	±3.60µm	0.50µm
over 400	up to 500	±2.20µm	0.14µm	±0.50µm	0.14µm	±1.10µm	0.25µm	±2.20µm	0.35µm	±4.40µm	0.60µm
over 500	up to 600	±2.60µm	0.16µm	±0.65µm	0.16µm	±1.30µm	0.25µm	±2.60µm	0.40µm	±5.00µm	0.70µm
over 600	up to 700	±3.00µm	0.18µm	±0.75µm	0.18µm	±1.50µm	0.30µm	±3.00µm	0.45µm	±6.00µm	0.70µm
over 700	up to 800	±3.40µm	0.20µm	±0.85µm	0.20µm	±1.70µm	0.30µm	±3.40µm	0.50µm	±6.50µm	0.80µm
over 800	up to 900	±3.80µm	0.20µm	±0.95µm	0.20µm	±1.90µm	0.35µm	±3.80µm	0.50µm	±7.50µm	0.90µm
over 900	up to 1000	±4.20µm	0.25µm	±1.00µm	0.25µm	±2.00µm	0.40µm	±4.20µm	0.60µm	±8.00µm	1.00µm

Metric Rectangular Gauge Block Set

SERIES 516 — 1mm Base Block Set



Steel 112-block set



Steel 103-block set



Steel 47-block set



CERA 112-block set



CERA 56-block set



CERA 32-block set

SPECIFICATIONS

1mm Base Block Set

Blocks per set	Order No.*			Standard / grade available			Blocks included in set		
	Steel	CERA	Steel/CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
122	—	—	—	—	—	—	1.0005	—	1
	516-596	—	—	Grade K	—	—	1.001 - 1.009	0.001	9
	516-597	—	—	Grade 0	—	—	1.01 - 1.49	0.01	49
	516-598	—	—	Grade 1	—	—	1.6 - 1.9	0.1	4
	516-599	—	—	Grade 2	—	—	0.5 - 24.5	0.5	49
112	516-531	516-541	—	—	Grade K	—	1.0005	—	1
	516-937	516-337	—	Grade K	Grade 00	Grade K	1.001 - 1.009	0.001	9
	516-938	516-338	—	Grade 0	Grade 0	Grade 0	1.01 - 1.49	0.01	49
	516-939	516-339	—	Grade 1	Grade 1	Grade 1	0.5 - 24.5	0.5	49
	516-940	516-340	—	Grade 2	Grade 2	Grade 2	25 - 100	25	4
103	516-533	516-542	—	—	Grade K	—	1.0005	—	1
	516-941	516-341	—	Grade K	Grade 00	Grade K	1.01 - 1.49	0.01	49
	516-942	516-342	—	Grade 0	Grade 0	Grade 0	0.5 - 24.5	0.5	49
	516-943	516-343	—	Grade 1	Grade 1	Grade 1	25 - 100	25	4
	516-944	516-344	—	Grade 2	Grade 2	Grade 2	—	—	—
88	—	—	—	—	—	—	1.0005	—	1
	516-969	516-369	—	—	—	Grade K	1.001 - 1.009	0.001	9
	516-970	516-370	—	Grade 0	—	Grade 0	1.01 - 1.49	0.01	49
	516-971	516-371	—	Grade 1	—	Grade 1	0.5 - 9.5	0.5	19
	516-972	516-372	—	Grade 2	—	Grade 2	20 - 100	10	9
87	516-535	515-543	—	—	Grade K	—	1.001 - 1.009	0.001	9
	516-945	516-345	—	Grade K	Grade 00	Grade K	1.01 - 1.49	0.01	49
	516-946	516-346	—	Grade 0	Grade 0	Grade 0	0.5 - 9.5	0.5	19
	516-947	516-347	—	Grade 1	Grade 1	Grade 1	10 - 100	10	10
	516-948	516-348	—	Grade 2	Grade 2	Grade 2	—	—	—
76	—	—	—	—	—	—	1.005	—	1
	516-949	516-349	—	Grade K	—	—	1.01 - 1.49	0.01	49
	516-950	516-350	—	Grade 0	—	—	0.5 - 9.5	0.5	19
	516-951	516-351	—	Grade 1	—	—	10 - 40	10	4
	516-952	516-352	—	Grade 2	—	—	50 - 100	25	3
56	516-536	516-544	—	—	Grade K	—	0.5	—	1
	516-953	516-353	—	Grade K	Grade 00	—	1.001 - 1.009	0.001	9
	516-954	516-354	—	Grade 0	Grade 0	—	1.01 - 1.09	0.01	9
	516-955	516-355	—	Grade 1	Grade 1	—	1.1 - 1.9	0.1	9
	516-956	516-356	—	Grade 2	Grade 2	—	1 - 24	1	24
47	516-537	516-545	—	—	Grade K	—	1.005	—	1
	516-957	516-357	—	Grade K	Grade 00	—	1.01 - 1.09	0.01	9
	516-958	516-358	516-958N**	Grade 0	Grade 0	—	1.1 - 1.9	0.1	9
	516-959	516-359	516-959N**	Grade 1	Grade 1	—	1 - 24	1	24
	516-960	516-360	516-960N**	Grade 2	Grade 2	—	25 - 100	25	4
47	—	—	—	—	—	—	1.005	—	1
	516-961	516-361	—	Grade K	—	Grade K	1.01 - 1.19	0.01	19
	516-962	516-362	516-962N**	Grade 0	—	Grade 0	1.2 - 1.9	0.1	8
	516-963	516-363	516-963N**	Grade 1	—	Grade 1	1 - 9	1	9
	516-964	516-364	516-964N**	Grade 2	—	Grade 2	10 - 100	10	10

**CERA blocks are adopted for frequently-used blocks. 47-block set: 1mm, 1.5mm, 2mm, 3mm, 4mm, 5mm, 10mm and 20mm

*Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS	Steel, CERA	Steel/CERA
Grade K	-60 or -70	—
Grade 0	-10, -60 or -70	-13, -63 or -73
Grade 1	-10, -60 or -70	-13, -63 or -73
Grade 2	-10, -60 or -70	-13, -63 or -73

-10, -13: provided with Inspection Certificate
 -60, -63: provided with JCSS Calibration Certificate and Inspection Certificate
 -70, -73: provided with RvA Calibration Certificate and Inspection Certificate

ASME	Steel, CERA	Steel/CERA
Grade K	-66	—
Grade 00	-16	—
Grade 0	-16	-17
Grade 1	-16	-17
Grade 2	-16	—

-16, -17: provided with Inspection Certificate
 -66: provided with JCSS Calibration Certificate and Inspection Certificate

BS	Steel, CERA	Steel/CERA
Grade K	-71	—
Grade 0	-11 or -71	-15
Grade 1	-11 or -71	-15
Grade 2	-11 or -71	-15

-11, -15: provided with Inspection Certificate
 -71: provided with RvA Calibration Certificate and Inspection Certificate



Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration.

*The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).



***Suffix Number for Selecting Standard and Certificate Provided**

ISO/DIN/JIS

	Steel, CERA	Steel/CERA
Grade K	-60 or -70	—
Grade 0	-10, -60 or -70	-13, -63 or -73
Grade 1	-10, -60 or -70	-13, -63 or -73
Grade 2	-10, -60 or -70	-13, -63 or -73

-10, -13: provided with Inspection Certificate
 -60, -63: provided with JCSS Calibration Certificate and Inspection Certificate
 -70, -73: provided with RvA Calibration Certificate and Inspection Certificate

ASME

	Steel, CERA	Steel/CERA
Grade K	-66	—
Grade 00	-16	—
Grade 0	-16	-17
Grade 1	-16	-17
Grade 2	-16	—

-16, -17: provided with Inspection Certificate
 -66: provided with JCSS Calibration Certificate and Inspection Certificate

BS

	Steel, CERA	Steel/CERA
Grade K	-71	—
Grade 0	-11 or -71	-15
Grade 1	-11 or -71	-15
Grade 2	-11 or -71	-15

-11, -15: provided with Inspection Certificate
 -71: provided with RvA Calibration Certificate and Inspection Certificate



Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration.

*The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).



CERA/Steel combination
47-block set



CERA/Steel combination
32-block set



CERA/Steel combination
32-block set



CERA/Steel combination
24-block set



CERA/Steel combination
19-block set



CERA/Steel combination
10-block set

SPECIFICATIONS

1mm Base Block Set

Blocks per set	Order No.*			Standard / grade available			Blocks included in set		
	Steel	CERA	Steel/CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
46	—	—	—	—	—	—	1.001 - 1.009	0.001	9
	516-994	516-394	—	Grade K	—	—	1.01 - 1.09	0.01	9
	516-995	516-395	—	Grade 0	—	—	1.1 - 1.9	0.1	9
	516-996	516-396	—	Grade 1	—	—	1 - 9	1	9
	516-997	516-397	—	Grade 2	—	—	10 - 100	10	10
34	—	—	—	—	—	—	1.0005	—	1
	516-128	516-178	—	Grade K	—	Grade K	1.001 - 1.009	0.001	9
	516-129	516-179	—	Grade 0	—	Grade 0	1.01 - 1.09	0.01	9
	516-130	516-180	—	Grade 1	—	Grade 1	1.1 - 1.9	0.1	9
	516-131	516-181	—	Grade 2	—	Grade 2	1 - 5	1	5
32	—	—	—	—	—	—	1.005	—	1
	516-956	516-365	—	Grade K	—	Grade K	1.01 - 1.09	0.01	9
	516-966	516-366	516-966N**	Grade 0	—	Grade 0	1.1 - 1.9	0.1	9
	516-967	516-367	516-967N**	Grade 1	—	Grade 1	1 - 9	1	9
	516-968	516-368	516-968N**	Grade 2	—	Grade 2	10 - 30	10	3
24	—	—	—	—	—	—	1.01 - 1.09	0.01	9
	—	—	—	—	—	—	1.1 - 1.9	0.1	9
	—	—	516-488**	Grade 0	Grade 0	Grade 0	1 - 5	1	5
	—	—	516-489**	Grade 1	Grade 1	Grade 1	10	1	1
	—	—	516-490**	Grade 2	—	Grade 2	—	—	—
19	—	—	—	—	—	—	1.1 - 1.9	0.1	9
	—	—	—	—	—	—	1 - 5	1	5
	—	—	516-484**	Grade 0	Grade 0	Grade 0	10 - 20	10	2
	—	—	516-485**	Grade 1	Grade 1	Grade 1	25, 50, 100	—	3
10	—	—	—	—	—	—	1 - 5	1	5
	—	—	—	—	—	—	10 - 20	10	2
	—	—	516-480**	Grade 0	Grade 0	Grade 0	25, 50, 100	—	3
	—	—	516-481**	Grade 1	Grade 1	Grade 1	—	—	—
—	—	516-482**	Grade 2	—	Grade 2	—	—	—	

**CERA blocks are adopted for frequently-used blocks.
 32-block set: 1mm, 1.5mm, 2mm, 3mm, 4mm, 5mm, 10mm and 20mm
 24-block set: 1mm, 1.5mm, 2mm, 3mm, 5mm and 10mm
 19-block set: 1mm, 2mm, 3mm, 5mm and 10mm
 10-block set: 1mm, 2mm and 10mm



Metric Rectangular Gauge Block Set

SERIES 516 — 2mm Base Block Set, 0.001mm Step Block Set



Steel 112-block set



Steel 88-block set



Steel 33-block set

SPECIFICATIONS

2mm Base Block Set

Blocks per set	Order No.*		Standard / grade available			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
112	516-532	—	—	Grade K	—	2.0005	—	1
	516-513	—	Grade K	Grade 00	Grade K	2.001 - 2.009	0.001	9
	516-514	—	Grade 0	Grade 0	Grade 0	2.01 - 2.49	0.01	49
	516-515	—	Grade 1	Grade 1	Grade 1	0.5 - 24.5	0.5	49
	516-516	—	Grade 2	Grade 2	Grade 2	25 - 100	25	4
88	—	—	—	—	—	1.0005	—	1
	516-501	—	Grade K	—	Grade K	2.001 - 2.009	0.001	9
	516-502	—	Grade 0	—	Grade 0	2.01 - 2.49	0.01	49
	516-503	—	Grade 1	—	Grade 1	0.5 - 9.5	0.5	19
	516-504	—	Grade 2	—	Grade 2	10 - 100	10	10
88	516-534	—	—	Grade K	—	2.0005	—	1
	516-517	—	Grade K	Grade 00	—	2.001 - 2.009	0.001	9
	516-518	—	Grade 0	Grade 0	—	2.01 - 2.49	0.01	49
	516-519	—	Grade 1	Grade 1	—	0.5 - 9.5	0.5	19
	516-520	—	Grade 2	Grade 2	—	10 - 100	10	10
47	516-538	—	—	Grade K	—	2.0005	—	1
	516-521	—	Grade K	Grade 00	—	2.001 - 2.009	0.001	9
	516-522	—	Grade 0	Grade 0	—	2.01 - 2.09	0.01	9
	516-523	—	Grade 1	Grade 1	—	2.1 - 2.9	0.1	9
	516-524	—	Grade 2	Grade 2	—	1 - 9	1	9
46	—	—	—	—	—	10 - 100	10	10
	516-505	—	Grade K	—	Grade K	2.001 - 2.009	0.001	9
	516-506	—	Grade 0	—	Grade 0	2.01 - 2.09	0.01	9
	516-507	—	Grade 1	—	Grade 1	2.1 - 2.9	0.1	9
	516-508	—	Grade 2	—	Grade 2	1 - 9	1	9
33	516-539	—	—	Grade K	—	2.005	—	1
	516-509	—	Grade K	Grade 00	Grade K	2.01 - 2.09	0.01	9
	516-510	—	Grade 0	Grade 0	Grade 0	2.1 - 2.9	0.1	9
	516-511	—	Grade 1	Grade 1	Grade 1	1 - 9	1	9
	516-512	—	Grade 2	Grade 2	Grade 2	10 - 30	10	3
						60, 100		2

*Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS

	Steel, CERA
Grade K	-60 or -70
Grade 0	-10, -60 or -70
Grade 1	-10, -60 or -70
Grade 2	-10, -60 or -70

- 10: provided with Inspection Certificate
- 60: provided with JCSS Calibration Certificate and Inspection Certificate
- 70: provided with RvA Calibration Certificate and Inspection Certificate

ASME

	Steel, CERA
Grade K	-66
Grade 00	-16
Grade 0	-16
Grade 1	-16
Grade 2	-16

- 16: provided with Inspection Certificate
- 66: provided with JCSS Calibration Certificate and Inspection Certificate

BS

	Steel, CERA
Grade K	-71
Grade 0	-11 or -71
Grade 1	-11 or -71
Grade 2	-11 or -71

- 11: provided with Inspection Certificate
- 71: provided with RvA Calibration Certificate and Inspection Certificate



Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration.

*The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).



Metric Rectangular Gauge Block Set

SERIES 516 — Thin Block Set, 0.001mm Step Block Set

*Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS

	Steel, CERA
Grade K	-60 or -70
Grade 0	-10, -60 or -70
Grade 1	-10, -60 or -70
Grade 2	-10, -60 or -70

-10: provided with Inspection Certificate
 -60: provided with JCSS Calibration Certificate and Inspection Certificate
 -70: provided with RvA Calibration Certificate and Inspection Certificate

BS

	Steel, CERA
Grade K	-71
Grade 0	-11 or -71
Grade 1	-11 or -71
Grade 2	-11 or -71

-11: provided with Inspection Certificate
 -71: provided with RvA Calibration Certificate and Inspection Certificate



Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration.
 *The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).

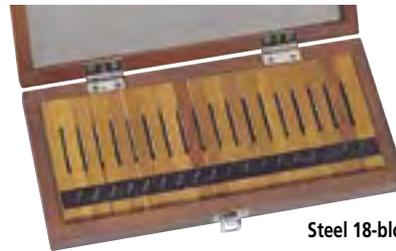


Steel 9-block set

SPECIFICATIONS

Thin Block Set

Blocks per set	Order No.*		Standard / grade available			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
9	516-990	—	Grade 0	—	—	0.10 - 0.50	0.05	9
	516-991	—	Grade 1	—	—			
	516-992	—	Grade 2	—	—			



Steel 18-block set



CERA 18-block set



Steel 9-block set



CERA 9-block

SPECIFICATIONS

0.001mm Step Block Set

Blocks per set	Order No.*		Standard / grade available			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
18	516-973	516-373	Grade K	—	—	0.991 - 0.999	0.001	9
	516-974	516-374	Grade 0	—	—			
	516-975	516-375	Grade 1	—	—	1.001 - 1.009	0.001	9
	516-976	516-376	Grade 2	—	—			
9	516-981	516-381	Grade K	—	Grade K	1.001 - 1.009	0.001	9
	516-982	516-382	Grade 0	—	Grade 0			
	516-983	516-383	Grade 1	—	Grade 1			
	516-984	516-384	Grade 2	—	Grade 2			
9	516-985	516-385	Grade K	—	—	0.991 - 0.999	0.001	9
	516-986	516-386	Grade 0	—	—			
	516-987	516-387	Grade 1	—	—			
	516-988	516-388	Grade 2	—	—			

Metric Rectangular Gauge Block Set

SERIES 516 — Long Block Set, Wear Block Set



CERA 8-block set



Steel 8-block set

SPECIFICATIONS

Long Block Set

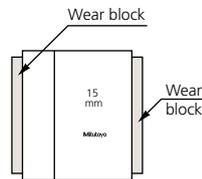
Blocks per set	Order No.*		Standard / grade available			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
8	516-540	516-546	—	Grade K	—	125 - 175	25	3
	516-701	516-731	Grade K	Grade 00	—	200 - 250	50	2
	516-702	516-732	Grade 0	Grade 0	—	300 - 500	100	3
	516-703	516-733	Grade 1	Grade 1	—			
	516-704	516-734	Grade 2	Grade 2	—			



CERA 2-block set



Steel 2-block



SPECIFICATIONS

Wear Block Set

Blocks per set	Order No.*		Standard / grade available			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
2	516-807	516-832	Grade 0	Grade 0	—	1		2
	516-806	516-833	Grade 1	Grade 1	—			
2	516-803	516-830	Grade 0	Grade 0	—	2		2
	516-802	516-831	Grade 1	Grade 1	—			

*Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS	
	Steel, CERA
Grade K	-60 or -70
Grade 0	-10, -60 or -70
Grade 1	-10, -60 or -70
Grade 2	-10, -60 or -70

- 10: provided with Inspection Certificate
- 60: provided with JCSS Calibration Certificate and Inspection Certificate
- 70: provided with RvA Calibration Certificate and Inspection Certificate

ASME	
	Steel, CERA
Grade K	-66
Grade 00	-16
Grade 0	-16
Grade 1	-16
Grade 2	-16

- 16: provided with Inspection Certificate
- 66: provided with JCSS Calibration Certificate and Inspection Certificate

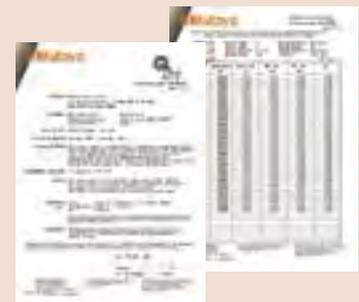


Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration.

*The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).



Inch Rectangular Gauge Block Set

SERIES 516 — Inch Block Set, Thin Block Set, Long Block Set, Wear Block Set

*Suffix Number for Selecting Standard and Certificate Provided

ASME		
	Steel, CERA	Steel/CERA
Grade K	-66	—
Grade 00	-16	—
Grade 0	-16	-17
Grade 1	-16	-17
Grade 2	-16	—

-16, -17: provided with Inspection Certificate
 -66: provided with JCSS Calibration Certificate and Inspection Certificate

BS		
	Steel, CERA	Steel/CERA
Grade K	—	—
Grade 0	-11	-15
Grade 1	-11	-15
Grade 2	-11	-15

-11, -15: provided with Inspection Certificate



Inspection Certificate

SPECIFICATIONS

Inch Block Set

Blocks per set	Order No.*			Standard / grade available		Blocks included in set		
	Steel	CERA	Steel/CERA	ASME	BS	Size	Step	Qty.
82	516-548	516-556	—	Grade K	—	.10005	—	1
	516-905	516-305	—	Grade 00	—	.1001 – .1009	.0001	9
	516-906	516-306	—	Grade 0	Grade 0	.101 – .149	.001	49
	516-907	516-307	—	Grade 1	Grade 1	.05 – .95	.05	19
	516-908	516-308	—	Grade 2	Grade 2	1 - 4	1	4
81	516-549	516-557	—	Grade K	—	.1001 – .1009	.0001	9
	516-901	516-301	—	Grade 00	—	.101 – .149	.001	49
	516-902	516-302	—	Grade 0	Grade 0	.05 – .95	.05	19
	516-903	516-303	—	Grade 1	Grade 1	1 - 4	1	4
	516-904	516-304	—	Grade 2	Grade 2	—	—	—
49	—	—	—	—	—	.1001 – .1009	.0001	9
	—	—	—	—	—	.101 – .109	.001	9
	516-910	—	516-910N**	—	Grade 0	.01 – .19	.01	19
	516-911	—	516-911N**	—	Grade 1	.2 - .9	.1	8
	516-912	—	516-912N**	—	Grade 2	1 - 4	1	4
35	516-550	516-558	—	Grade K	—	.10005	—	1
	516-913	516-313	—	Grade 00	—	.1001 – .1009	.0001	9
	516-914	516-314	516-914N**	Grade 0	Grade 0	.101 – .109	.001	9
	516-915	516-315	516-915N**	Grade 1	Grade 1	.11 – .19	.01	9
	516-916	516-316	516-916N**	Grade 2	Grade 2	.1 - .3	.1	3
						.5, 1, 2, 4		4

**CERA blocks are adopted for frequently-used blocks.

49-block set: .05, .1, .15, .2, .3, .5, 1, 2"

35-block set: .1, .15, .2, .3, .5, 1, 2"

SPECIFICATIONS

Thin Block Set

Blocks per set	Order No.*			Standard / grade available		Blocks included in set		
	Steel	CERA	Steel/CERA	ASME	BS	Size	Step	Qty.
28	516-551	—	—	Grade K	—	.02005	—	1
	516-917	—	—	Grade 00	—	.0201 – .0209	.0001	9
	516-918	—	—	Grade 0	—	.021 – .029	.001	9
	516-919	—	—	Grade 1	—	.01 – .09	.01	9
	516-920	—	—	Grade 2	—	—	—	—
10	516-926	—	—	Grade 0	Grade 0	.005 - .050	.005	10
	516-927	—	—	Grade 1	Grade 1	—	—	—
	516-928	—	—	—	Grade 2	—	—	—

SPECIFICATIONS

Long Block Set

Blocks per set	Order No.*			Standard / grade available		Blocks included in set		
	Steel	CERA	Steel/CERA	ASME	BS	Size	Step	Qty.
8	—	516-564	—	Grade K	—	5 - 7	1	3
	—	516-741	—	Grade 00	—	8, 10, 12	2	3
	516-712	516-742	—	Grade 0	—	16, 20	4	2
	516-713	516-743	—	Grade 1	—	—	—	—

SPECIFICATIONS

Wear Block Set

Blocks per set	Order No.*			Standard / grade available		Blocks included in set		
	Carbide	CERA	Steel/CERA	ASME	BS	Size	Step	Qty.
2	516-809	516-836	—	Grade 0	—	.05	—	2
	516-808	516-837	—	Grade 1	—	—	—	—
2	516-805	516-834	—	Grade 0	—	.1	—	2
	516-804	516-835	—	Grade 1	—	—	—	—

Micrometer Inspection Gauge Block Sets

SERIES 516



Steel 10-block set



Steel 16-block set



Steel 8-block set



CERA 10-block set



CERA 16-block set



CERA 8-block set

SPECIFICATIONS

Metric Micro Checker (holder only)	
Order No.	516-607
Applicable gauge block set	516-106, 516-107, 516-108, 516-156, 516-157, 516-158
Applicable gauge block size (mm)	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25
Inch/Metric Micro Checker (holder only)	
Order No.	516-608
Applicable gauge block set	516-921, 516-922, 516-923, 516-321, 516-322, 516-323
Applicable gauge block size (inch)	.105, .210, .315, .420, .5, .605, .815, .920

Micro Checker



- Can be fixed a series of gauge blocks to be used for micrometer inspection.
- Can be measured in both vertical and horizontal posture.
- Parallelism is measured by attaching the optical parallel (optional accessory) to the GB set.

***Suffix Number for Selecting Standard and Certificate Provided**

ISO/DIN/JIS	
	Steel, CERA
Grade K	-60 or -70
Grade 0	-10, -60 or -70
Grade 1	-10, -60 or -70
Grade 2	-10, -60 or -70

- 10: provided with Inspection Certificate
- 60: provided with JCSS Calibration Certificate and Inspection Certificate
- 70: provided with RvA Calibration Certificate and Inspection Certificate

ASME	
	Steel, CERA
Grade K	-66
Grade 00	-16
Grade 0	-16
Grade 1	-16
Grade 2	-16

- 16: provided with Inspection Certificate
- 66: provided with JCSS Calibration Certificate and Inspection Certificate

BS	
	Steel, CERA
Grade K	—
Grade 0	-11
Grade 1	-11
Grade 2	-11

- 11, -15: provided with Inspection Certificate



Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration. *The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).



***Suffix Number for Selecting Standard and Certificate Provided**

ISO/DIN/JIS	
	Steel, CERA
Grade K	-60 or -70
Grade 0	-10, -60 or -70
Grade 1	-10, -60 or -70
Grade 2	-10, -60 or -70

-10: provided with Inspection Certificate
 -60: provided with JCSS Calibration Certificate and Inspection Certificate
 -70: provided with RvA Calibration Certificate and Inspection Certificate

ASME	
	Steel, CERA
Grade K	-66
Grade 00	-16
Grade 0	-16
Grade 1	-16
Grade 2	-16

-16: provided with Inspection Certificate
 -66: provided with JCSS Calibration Certificate and Inspection Certificate

BS	
	Steel, CERA
Grade K	—
Grade 0	-11
Grade 1	-11
Grade 2	-11

-11, -15: provided with Inspection Certificate



Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration. *The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).



SPECIFICATIONS

Metric Block Set

Blocks per set	Order No.*		Standard / grade available		Blocks included in set
	Steel	CERA	ISO/DIN/JIS	ASME	
16	516-111	516-161	Grade 0	—	1.00, 1.25, 1.5, 2, 3, 5, 10, 15, 20, 25, 25.25, 30, 35, 40, 45, 50mm • Cerastone • Optical parallels (t = 12mm, 25mm)
	516-112	516-162	Grade 1	—	
	516-113	516-163	Grade 2	—	
10	516-977	—	Grade K	—	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25mm • Optical parallel (t = 12mm)
	516-978	516-378	Grade 0	—	
	516-979	516-379	Grade 1	—	
	516-980	516-380	Grade 2	—	
10	516-103	516-152	Grade 0	Grade 0	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25mm
	516-101	516-153	Grade 1	Grade 1	
	—	516-154	Grade 2	—	
10	516-106	516-156	Grade 0	—	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25mm • Optical parallel (t = 12mm)
	516-107	516-157	Grade 1	—	
	516-108	516-158	Grade 2	—	
10	516-132	516-182	Grade 0	—	1.25, 1.50, 1, 2, 3, 5, 10, 15, 20, 25mm • Micro Checker • Optical parallel (t = 12mm)
	516-133	516-183	Grade 1	—	
	516-134	516-184	Grade 2	—	
10	516-135	516-185	Grade 0	—	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25mm • Micro Checker • Optical parallel (t = 12mm)
	516-136	516-186	Grade 1	—	
	516-137	516-187	Grade 2	—	
8	—	516-547	—	Grade K	25, 50, 75, 100, 125, 150, 175, 200
	—	516-164	Grade K	Grade 00	
	516-115	516-165	Grade 0	Grade 0	
	516-116	516-166	Grade 1	Grade 1	
	516-117	516-167	Grade 2	Grade 2	

Inch Block Set

Blocks per set	Order No.*		Standard / grade available		Blocks included in set
	Steel	CERA	ASME	BS	
10	516-552	516-559	Grade K	—	.105, .210, .315, .420, .500, .605, .710, .815, .920, 1" • Optical parallel (t = .5")
	516-921	516-321	Grade 00	Grade 0	
	516-922	516-322	Grade 0	Grade 1	
	516-923	516-323	Grade 1	Grade 2	
10	516-553	516-560	Grade K	—	.105, .210, .315, .420, .500, .605, .710, .815, .920, 1" • Micro checker • Optical parallel (t = .5")
	516-138	516-188	Grade 00	Grade 0	
	516-139	516-189	Grade 0	Grade 1	
	516-140	516-190	Grade 1	Grade 2	
	—	—	—	—	
9	516-554	516-561	Grade K	—	.0625, .100, .125, .200, .250, .300, .500, 1, 2" • Optical parallel (t = .5")
	516-929	516-333	Grade 00	—	
	516-930	516-334	Grade 0	—	
	516-931	516-335	Grade 1	—	
	516-932	516-336	Grade 2	—	
9	516-555	516-562	Grade K	—	.0625, .100, .125, .200, .250, .300, .500, 1, 2" • Micro Checker • Optical parallel (t = .5")
	516-141	516-191	Grade 00	—	
	516-142	516-192	Grade 0	—	
	516-143	516-193	Grade 1	—	
	516-144	516-194	Grade 2	—	
9	—	516-563	Grade K	—	.0625, .100, .125, .200, .250, .300, .500, 1, 2"
	—	516-329	Grade 00	—	
	516-934	516-330	Grade 0	—	
	516-935	516-331	Grade 1	—	
	516-936	516-332	Grade 2	—	
8	516-126	516-176	Grade 0	—	1, 2, 3, 4, 5, 6, 7, 8"
	516-127	516-177	Grade 1	—	

Caliper Inspection Gauge Block Sets

SERIES 516

SPECIFICATIONS

Metric Block Set

Blocks per set	Order No.*		Standard / grade available			Blocks included in set
	Steel	CERA	ISO/DIN/JIS	ASME	BS	
5	—	—	—	—	—	5 pcs.: 10.3, 24.5, 50, 75, 100mm • Ceramic plain jaws • Holder 250mm • Glove
	—	516-174	Grade 2	—	—	
3	516-124	516-150	Grade 1	—	—	3 pcs.: 30, 41.3, 131.4mm • Setting ring (ø4mm, ø25mm) • Glove
	516-125	516-151	Grade 2	—	—	
2	516-122	516-172	Grade 1	—	—	2 pcs.: 41.3, 131.4mm • Setting ring (ø20mm) • Glove
	516-123	516-173	Grade 2	—	—	

Individual Metric Rectangular Gauge Block

FEATURES

- If using only one length repeatedly, it is a good idea to purchase discrete gauge blocks.
- Each gauge block is supplied with a Certificate of Inspection.
- Each Grade K gauge block of ISO/DIN/JIS, BS and ASME standard is specially supplied with a Certificate of Calibration which certifies that the gauge block was manufactured through interferometry.



SPECIFICATIONS

Metric Block

Length (mm)	Order No.*		Length (mm)	Order No.*		Length (mm)	Order No.*	
	Steel	CERA		Steel	CERA		Steel	CERA
0.1	611821	—	0.53	611894	—	0.96	611937	—
0.11	611860	—	0.54	611895	—	0.97	611938	—
0.12	611861	—	0.55	611896	—	0.98	611939	—
0.13	611862	—	0.56	611897	—	0.99	611940	—
0.14	611863	—	0.57	611898	—	0.991	611551	613551
0.15	611822	—	0.58	611899	—	0.992	611552	613552
0.16	611864	—	0.59	611900	—	0.993	611553	613553
0.17	611865	—	0.6	611901	—	0.994	611554	613554
0.18	611866	—	0.61	611902	—	0.995	611555	613555
0.19	611867	—	0.62	611903	—	0.996	611556	613556
0.2	611823	—	0.63	611904	—	0.997	611557	613557
0.21	611868	—	0.64	611905	—	0.998	611558	613558
0.22	611869	—	0.65	611906	—	0.999	611559	613559
0.23	611870	—	0.66	611907	—	1	611611	613611
0.24	611871	—	0.67	611908	—	1.0005	611520	613520
0.25	611824	—	0.68	611909	—	1.001	611521	613521
0.26	611872	—	0.69	611910	—	1.002	611522	613522
0.27	611873	—	0.7	611911	—	1.003	611523	613523
0.28	611874	—	0.71	611912	—	1.004	611524	613524
0.29	611875	—	0.72	611913	—	1.005	611525	613525
0.3	611825	—	0.73	611914	—	1.006	611526	613526
0.31	611876	—	0.74	611915	—	1.007	611527	613527
0.32	611877	—	0.75	611916	—	1.008	611528	613528
0.33	611878	—	0.76	611917	—	1.009	611529	613529
0.34	611879	—	0.77	611918	—	1.01	611561	613561
0.35	611826	—	0.78	611919	—	1.02	611562	613562
0.36	611880	—	0.79	611920	—	1.03	611563	613563
0.37	611881	—	0.8	611921	—	1.04	611564	613564
0.38	611882	—	0.81	611922	—	1.05	611565	613565
0.39	611883	—	0.82	611923	—	1.06	611566	613566
0.4	611827	—	0.83	611924	—	1.07	611567	613567
0.41	611884	—	0.84	611925	—	1.08	611568	613568
0.42	611885	—	0.85	611926	—	1.09	611569	613569
0.43	611886	—	0.86	611927	—	1.1	611570	613570
0.44	611887	—	0.87	611928	—	1.11	611571	613571
0.45	611828	—	0.88	611929	—	1.12	611572	613572
0.46	611888	—	0.89	611930	—	1.13	611573	613573
0.47	611889	—	0.9	611931	—	1.14	611574	613574
0.48	611890	—	0.91	611932	—	1.15	611575	613575
0.49	611891	—	0.92	611933	—	1.16	611576	613576
0.5	611506	613506	0.93	611934	—	1.17	611577	613577
0.51	611892	—	0.94	611935	—	1.18	611578	613578
0.52	611893	—	0.95	611936	—	1.19	611579	613579

* Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS	
	Steel, CERA
Grade K	-016** or -017***
Grade 0	-021*, -026** or -027***
Grade 1	-031*, -036** or -037***
Grade 2	-041*, -046** or -047***

ASME	
	Steel, CERA
Grade K	-516**
Grade 00	-521*
Grade 0	-531*
Grade 1	-541*
Grade 2	-551*

BS	
	Steel, CERA
Grade K	-117***
Grade 0	-121* or -127***
Grade 1	-131* or -137***
Grade 2	-141* or -147***

* provided with Inspection Certificate
 ** provided with Calibration Certificate and Inspection Certificate
 *** provided with RvA Calibration Certificate

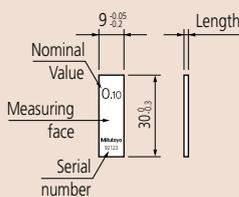


Inspection Certificate

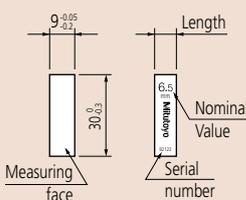
Dimension

Unit: mm

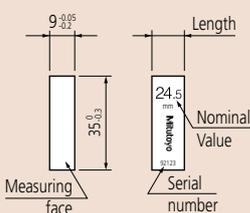
Nominal length:
0.1mm - 5.5mm
(.004" - .25")



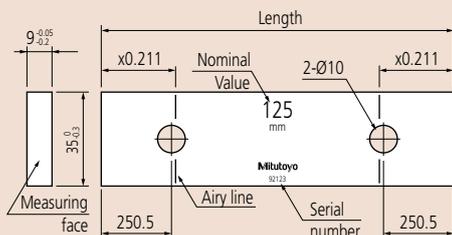
Nominal length:
6mm - 10mm
(.3" - .4")



Nominal length:
10.3mm - 100mm
(.45" - 4")



Nominal length 125mm - 1000mm (5" - 20")



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	—
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
12.5	611652	613652
12.9	611853	613853

Length (mm)	Order No.*	
	Steel	CERA
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
41.3	611857	613857
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
131.4	611858	613858
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	—

Length (mm)	Order No.*	
	Steel	CERA
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
41.3	611857	613857
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
131.4	611858	613858
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	—

Metric Wear Block

Length (mm)	Order No.* Tungsten carbide
1	612611
2	612612

Individual Inch Rectangular Gauge Block

SPECIFICATIONS

Inch Block

Length (inch)	Order No.*		Length (inch)	Order No.*		Length (inch)	Order No.*	
	Steel	CERA		Steel	CERA		Steel	CERA
.004	611304	—	.06	611106	—	.139	611179	613179
.005	611305	—	.0625	611303	613303	.14	611180	613180
.006	611306	—	.07	611107	—	.141	611181	613181
.007	611307	—	.078125 (5/64)	611103	613100	.142	611182	613182
.008	611308	—	.08	611108	—	.143	611183	613183
.009	611309	—	.09	611109	—	.144	611184	613184
.01	611310	—	.09375 (3/32)	611104	613101	.145	611185	613185
.011	611311	—	.1	611191	613191	.146	611186	613186
.012	611312	—	.100025	611111	613110	.147	611187	613187
.013	611313	—	.10005	611135	613135	.148	611188	613188
.014	611314	—	.100075	611112	613111	.149	611189	613189
.015	611315	—	.1001	611121	613121	.15	611115	613115
.016	611316	—	.1002	611122	613122	.16	611116	613116
.017	611317	—	.1003	611123	613123	.17	611117	613117
.018	611318	—	.1004	611124	613124	.18	611118	613118
.019	611319	—	.1005	611125	613125	.19	611119	613119
.02	611320	—	.1006	611126	613126	.2	611192	613192
.02005	611240	—	.1007	611127	613127	.21	611221	613221
.0201	611231	—	.1008	611128	613128	.25	611212	613212
.0202	611232	—	.1009	611129	613129	.3	611193	613193
.0203	611233	—	.101	611141	613141	.315	611209	613209
.0204	611234	—	.102	611142	613142	.35	611213	613213
.0205	611235	—	.103	611143	613143	.375 (3/8)	611113	613112
.0206	611236	—	.104	611144	613144	.4	611194	613194
.0207	611237	—	.105	611145	613145	.420	611210	613210
.0208	611238	—	.106	611146	613146	.45	611214	613214
.0209	611239	—	.107	611147	613147	.5	611195	613195
.021	611321	—	.108	611148	613148	.55	611215	613215
.022	611322	—	.109	611149	613149	.6	611196	613196
.023	611323	—	.109375 (7/64)	611110	613102	.605	611211	613211
.024	611324	—	.11	611150	613150	.65	611216	613216
.025	611325	—	.111	611151	613151	.7	611197	613197
.026	611326	—	.112	611152	613152	.710	611220	613220
.027	611327	—	.113	611153	613153	.75	611217	613217
.028	611328	—	.114	611154	613154	.8	611198	613198
.029	611329	—	.115	611155	613155	.815	611226	613226
.03	611330	—	.116	611156	613156	.85	611218	613218
.031	611331	—	.117	611157	613157	.9	611199	613199
.03125 (1/32)	611101	613103	.118	611158	613158	.920	611227	613227
.032	611332	—	.119	611159	613159	.95	611219	613219
.033	611333	—	.12	611160	613160	1	611201	613201
.034	611334	—	.121	611161	613161	2	611202	613202
.035	611335	—	.122	611162	613162	3	611203	613203
.036	611336	—	.123	611163	613163	4	611204	613204
.037	611337	—	.124	611164	613164	5	611205	613205
.038	611338	—	.125	611165	613165	6	611206	613206
.039	611339	—	.126	611166	613166	7	611207	613207
.04	611340	—	.127	611167	613167	8	611208	613208
.041	611341	—	.128	611168	613168	10	611222	613222
.042	611342	—	.129	611169	613169	12	611223	613223
.043	611343	—	.13	611170	613170	16	611224	613224
.044	611344	—	.131	611171	613171	20	611225	613225
.045	611345	—	.132	611172	613172			
.046	611346	—	.133	611173	613173			
.046875 (3/64)	611102	613104	.134	611174	613174			
.047	611347	—	.135	611175	613175			
.048	611348	—	.136	611176	613176			
.049	611349	—	.137	611177	613177			
.05	611105	613105	.138	611178	613178			

Inch Wear Block

Length (inch)	Order No.*
.05	612105
.1	612191

*Suffix Number for Selecting Standard and Certificate Provided

ASME

	Steel, CERA
Grade K	-516**
Grade 00	-521*
Grade 0	-531*
Grade 1	-541*
Grade 2	-551*

BS

	Steel, CERA
Grade K	—
Grade 0	-121*
Grade 1	-131*
Grade 2	-141*

* provided with Inspection Certificate
** provided with Calibration Certificate and Inspection Certificate

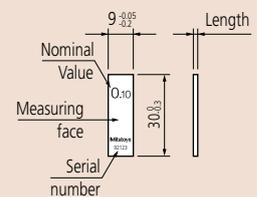


Inspection Certificate

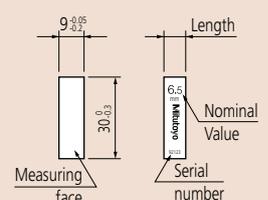
Dimension

Unit: mm

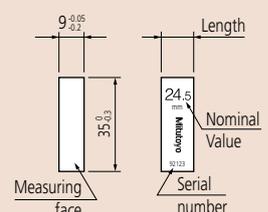
Nominal length:
0.1mm - 5.5mm
(.004" - .25")



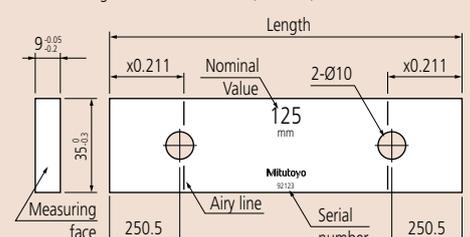
Nominal length:
6mm - 10mm
(.3" - .4")



Nominal length:
10.3mm - 100mm
(.45" - 4")



Nominal length 125mm - 1000mm (5" - 20")



Rectangular Gauge Block with CTE

Gauge Blocks with Thermal Expansion Coefficient Data

*Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS	
	Steel, CERA
Grade K	-01B or -01C

-01B: provided with JCSS Calibration Certificate and Inspection Certificate

-01C: provided with RvA Calibration Certificate and Inspection Certificate (only for 100mm)

ASME	
	Steel, CERA
Grade K	-51B

-51B: provided with JCSS Calibration Certificate and Inspection Certificate

BS	
	Steel, CERA
Grade K	-11C

-01C: provided with RvA Calibration Certificate and Inspection Certificate (only for 100mm)

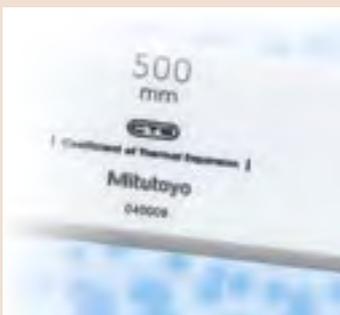


Inspection Certificate

RvA Certificate

ISO/DIN/JIS gauge block sets that come with an RvA Certificate in addition to a regular one are also available. The certificate would be of use for your ISO9000 registration.

*The charge for calibration and the charge for issue of RvA certificate are not included in the prior set price (Grade 0 and grade 1 gauge block sets).



FEATURES

• Mitutoyo offers top-level gauge blocks (steel and ceramic) which are superior to the K class blocks, with their quality supported by Mitutoyo's best technologies.



double-faced interferometer (DFI)

• Comes with a highly accurate thermal expansion coefficient measured with a high accuracy double-faced interferometer (DFI).

• The high accuracy gauge block interferometer (GBI) guarantees a high dimensional accuracy.

• Mitutoyo offers rectangular gauge blocks, having nominal values from 100 to 500mm
Grade: K class in JIS/ASME/ISO
Uncertainty of thermal expansion coefficient:
 $0.035 \times 10^{-6}/K$ ($k = 2$)

Uncertainty of dimension measurement:
30nm ($k = 2$), for 100mm block

SPECIFICATIONS

Metric Block with CTE		
Length (mm)	Order No.* Steel	Order No.*CERA
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

Inch Block with CTE		
Length (inch)	Order No.* Steel	Order No.*CERA
4	611204	613204
5	611205	613205
6	611206	613206
7	611207	613207
8	611208	613208
10	611222	613222
12	611223	613223
16	611224	613224
500	611225	613225



Rectangular Gauge Block Accessory

SERIES 516

To expand the variety of rectangular gauge block (steel and CERA) 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.

SPECIFICATIONS

Order No. 516-601	Order No. 516-602	Included in set
—	1 pc.	Holder 15 - 60mm (619002)
1 pc.	1 pc.	Holder 5 - 100mm (619003)
1 pc.	1 pc.	Holder 15 - 160mm (619004)
1 pc.	1 pc.	Holder 20 - 250mm (619005)
1 pc.	1 pc.	Holder base 35mm (619009)
2 pcs.	2 pcs.	Half round jaw 2mm (619010)
2 pcs.	2 pcs.	Half round jaw 5mm (619011)
2 pcs.	2 pcs.	Half round jaw 8mm (619012)
2 pcs.	—	Half round jaw 12mm (619013)
2 pcs.	—	Half round jaw 20mm (619014)
2 pcs.	—	Plain jaw (619018)
1 pc.	1 pc.	Scriber point (619019)
1 pc.	1 pc.	Center point (619020)
2 pcs.	—	Tram point (619021)
1 pc.	1 pc.	Triangular straight edge 100mm (619022)
1 pc.	—	Triangular straight edge 160mm (619023)

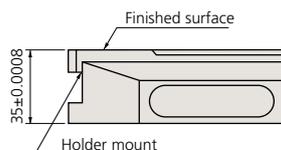


516-601



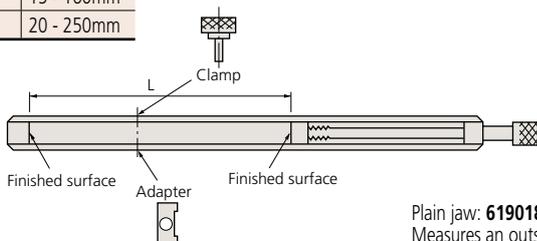
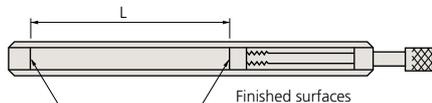
516-602

Holder base 35mm: **619009**
Measures a height on the surface plate and scribes a workpiece if used with the holder.

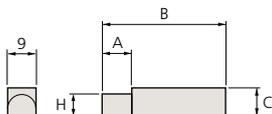
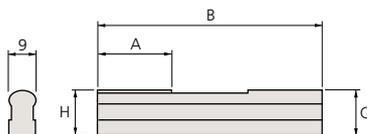


Holder:
Used as a clamp if using plain jaws, scriber point, etc.

Order No.	L
619002	15 - 60mm
619003	5 - 100mm
619004	15 - 160mm
619005	20 - 250mm



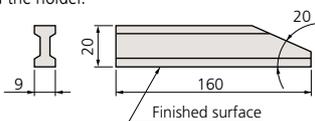
Half round jaw:
Measures an outside or inside diameter if used with a pair of jaws and the holder.



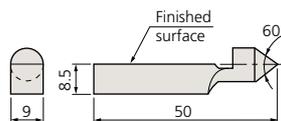
Unit: mm

Size	Order No.	H	A	B	C
2	619010	2±0.0005	5.5	40	7.5
5	619011	5±0.0005	14	45	7.5
8	619012	8±0.0005	20	50	8.5
12	619013	12±0.0005	25	75	13
20	619014	20±0.0005	25	125	20

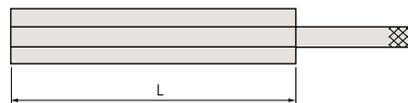
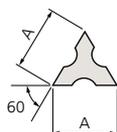
Plain jaw: **619018**
Measures an outside or inside diameter if used with a pair of jaws and the holder.



Center point: **619020**
Scribes a workpiece if used with the holder and holder base.



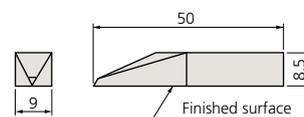
Triangular straight edge: Measures parallelism.



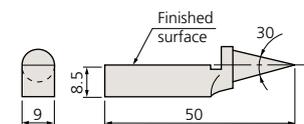
Order No.	L	A
619022	100mm	16mm
619023	160mm	19.5mm



Scriber point: **619019**
Scribes a workpiece if used with the holder and holder base.



Tram point: **619021**
Inspects the scale of the height gage, etc., if used with the holder and holder base.



Specially designed for the long gauge blocks over 100mm which have two holes on the body for coupling.



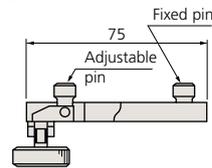
SPECIFICATIONS

Accessories for gauge blocks over 100mm

Order No. 516-605	Included in set
1 pc.	Holder A (619031)
1 pc.	Holder B (619032)
1 pc.	Holder C (619033)
1 pc.	Holder D (619034)
1 pc.	Holder E (619035)
3 pcs.	Adaptor (619036)
1 pc.	Holder base 35mm (619009)
2 pcs.	Half round jaw 12mm (619013)
2 pcs.	Plain jaw (619018)
1 pc.	Scriber point (619019)

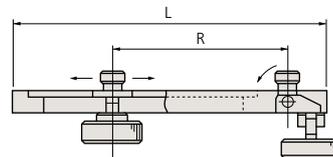
Note: These accessories can be used for inch rectangular gauge blocks.

Holder A: **619031**
Used for coupling two long gauge blocks.

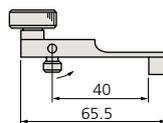


Holder B and C:
Used for coupling two long gauge blocks together with other gauge blocks up to 35mm (Holder B) or 140mm (Holder C). Also used for attaching jaws with two adaptors.

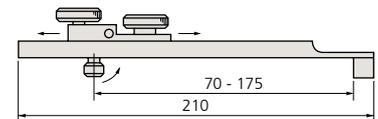
	Order No.	R (max.)	L
Holder B	619032	90mm	126mm
Holder C	619033	200mm	236mm



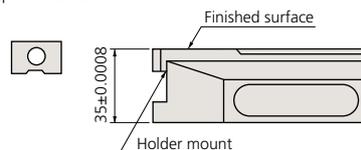
Holder D: **619034**
Used for attaching to the holder base.



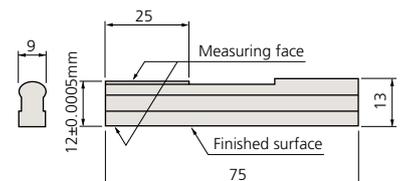
Holder E: **619035**
Used for attaching to the holder base together with other gauge blocks up to 125mm. Used for attaching jaws with one adaptor.



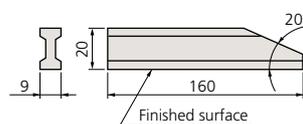
Holder base: **619009**
Adaptor: **619036**



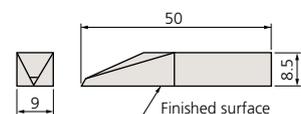
Half round jaw: **619013**



Plain jaw: **619018**



Scriber point: **619019**



Metric Square Gauge Block Set

SERIES 516 — Metric Block Set, Long Block Set, Wear Block Set

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.



Steel 112-block set



Steel 103-block set



Steel 76-block set

SPECIFICATIONS

Metric Block Set

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
112	516-437	—	—	Grade 00	1.005	—	1
	516-438	—	Grade 0	Grade 0	1.001 - 1.009	0.001	9
	516-439	—	Grade 1	Grade 1	1.01 - 1.49	0.01	49
	516-440	—	Grade 2	Grade 2	0.5 - 24.5	0.5	49
	—	—	—	—	25 - 100	25	4
103	516-441	—	—	Grade 00	1.005	—	1
	516-442	—	Grade 0	Grade 0	1.01 - 1.49	0.01	49
	516-443	—	Grade 1	Grade 1	0.5 - 24.5	0.5	49
	516-444	—	Grade 2	Grade 2	25 - 100	25	4
	—	—	—	—	—	—	—
76	516-449	—	—	Grade 00	1.005	—	1
	516-450	—	Grade 0	Grade 0	1.01 - 1.49	0.01	49
	516-451	—	Grade 1	Grade 1	0.5 - 9.5	0.5	19
	516-452	—	Grade 2	Grade 2	10 - 40	10	4
	—	—	—	—	50 - 100	25	3
47	516-457	—	—	Grade 00	1.005	—	1
	516-458	—	Grade 0	Grade 0	1.01 - 1.09	0.01	9
	516-459	—	Grade 1	Grade 1	1.1 - 1.9	0.1	9
	516-460	—	Grade 2	Grade 2	1 - 24	1	24
	—	—	—	—	25 - 100	25	4
32	516-465	—	—	Grade 00	1.005	—	1
	516-466	—	Grade 0	Grade 0	1.01 - 1.09	0.01	9
	516-467	—	Grade 1	Grade 1	1.1 - 1.9	0.1	9
	516-468	—	Grade 2	Grade 2	1 - 9	1	9
	—	—	—	—	10 - 30	10	3
—	—	—	—	60	—	1	

Metric Long Block Set

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
8	—	—	—	—	125, 150, 175	25	3
	516-752	—	Grade 0	Grade 0	200, 250	50	2
	516-753	—	Grade 1	Grade 1	300, 400, 500	100	3
	516-754	—	Grade 2	Grade 2	—	—	—
	—	—	—	—	—	—	—

Metric Wear Block Set

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
2	516-820	—	Grade 0	—	1	—	2
	516-821	—	Grade 1	—	—	—	—
2	516-822	—	Grade 0	—	2	—	2
	516-823	—	Grade 1	—	—	—	—

*Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS	
	Steel, CERA
Grade K	—
Grade 0	-10 or -60
Grade 1	-10 or -60
Grade 2	-10 or -60

-10: provided with Inspection Certificate
-60: provided with JCSS Calibration Certificate and Inspection Certificate

ASME	
	Steel, CERA
Grade K	—
Grade 00	-16
Grade 0	-16
Grade 1	-16
Grade 2	-16

-16: provided with Inspection Certificate

BS	
	Steel, CERA
Grade K	—
Grade 0	-11
Grade 1	-11
Grade 2	-11

-11: provided with Inspection Certificate
-71: provided with RvA Calibration Certificate and Inspection Certificate



Inspection Certificate

Inch Square Gauge Block Set

SERIES 516 — Inch Block Set, Long Block Set, Wear Block Set

*Suffix Number for Selecting Standard and Certificate Provided

ASME

	Steel, CERA	Steel/CERA
Grade K	-66	—
Grade 00	-16	—
Grade 0	-16	-17
Grade 1	-16	-17
Grade 2	-16	—

-16, -17: provided with Inspection Certificate
-66: provided with JCSS Calibration Certificate and Inspection Certificate

BS

	Steel, CERA	Steel/CERA
Grade K	—	—
Grade 0	-11	-15
Grade 1	-11	-15
Grade 2	-11	-15

-11, -15: provided with Inspection Certificate



Inspection Certificate

SPECIFICATIONS

Inch Block Set

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
81	516-401	516-201	—	Grade 00	.1001 - .1009	.0001	9
	516-402	516-202	—	Grade 0	.101 - .149	.001	49
	516-403	516-203	—	Grade 1	.05 - .95	.05	19
	516-404	516-204	—	Grade 2	1 - 4	1	4
	—	—	—	—	—	—	—
36	516-421	516-221	—	Grade 00	.05"	.0001	1
	516-422	516-222	—	Grade 0	.1001 - .1009	.001	10
	516-423	516-223	—	Grade 1	.101 - .109	.001	9
	516-424	516-224	—	Grade 2	.11 - .19	.01	9
	—	—	—	—	.1 - .5	.1	5
28	516-417	—	—	Grade 00	1.005	—	1
	516-418	—	—	Grade 0	1.01 - 1.49	.0001	9
	516-419	—	—	Grade 1	0.5 - 9.5	.001	9
	516-420	—	—	Grade 2	10 - 40	.01	9
	—	—	—	—	50 - 100	—	—

Metric Long Block Set

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
8	516-762	—	—	Grade 0	5 - 7	1	3
	516-763	—	—	Grade 1	8, 10, 12	2	3
	—	—	—	—	16, 20	4	2

Inch Wear Block Set

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
2	516-824	516-846	Grade 0	—	.05	—	2
	516-825	516-847	Grade 1	—	—	—	—
2	516-826	516-844	Grade 0	—	.1	—	2
	516-827	516-845	Grade 1	—	—	—	—



Steel 47-block set



Steel 32-block set



Steel 8-block set



Steel 2-block set

Individual Metric Square Gauge Block



SPECIFICATIONS

Metric Block

Length (mm)	Order No.*		Length (mm)	Order No.*		Length (mm)	Order No.*	
	Steel	CERA		Steel	CERA		Steel	CERA
0.5	614506	—	1.33	614593	—	13	614623	—
1	614611	—	1.34	614594	—	13.5	614653	—
1.0005	614520	—	1.35	614595	—	14	614624	—
1.001	614521	—	1.36	614596	—	14.5	614654	—
1.002	614522	—	1.37	614597	—	15	614625	—
1.003	614523	—	1.38	614598	—	15.5	614655	—
1.004	614524	—	1.39	614599	—	16	614626	—
1.005	614525	—	1.4	614600	—	16.5	614656	—
1.006	614526	—	1.41	614601	—	17	614627	—
1.007	614527	—	1.42	614602	—	17.5	614657	—
1.008	614528	—	1.43	614603	—	18	614628	—
1.009	614529	—	1.44	614604	—	18.5	614658	—
1.01	614561	—	1.45	614605	—	19	614629	—
1.02	614562	—	1.46	614606	—	19.5	614659	—
1.03	614563	—	1.47	614607	—	20	614672	—
1.04	614564	—	1.48	614608	—	20.5	614660	—
1.05	614565	—	1.49	614609	—	21	614631	—
1.06	614566	—	1.5	614641	—	21.5	614661	—
1.07	614567	—	1.6	614516	—	22	614632	—
1.08	614568	—	1.7	614517	—	22.5	614662	—
1.09	614569	—	1.8	614518	—	23	614633	—
1.1	614570	—	1.9	614519	—	23.5	614663	—
1.11	614571	—	2	614612	—	24	614634	—
1.12	614572	—	2.5	614642	—	24.5	614664	—
1.13	614573	—	3	614613	—	25	614635	—
1.14	614574	—	3.5	614643	—	30	614673	—
1.15	614575	—	4	614614	—	40	614674	—
1.16	614576	—	4.5	614644	—	50	614675	—
1.17	614577	—	5	614615	—	60	614676	—
1.18	614578	—	5.5	614645	—	75	614801	—
1.19	614579	—	6	614616	—	100	614681	—
1.2	614580	—	6.5	614646	—	125	614802	—
1.21	614581	—	7	614617	—	150	614803	—
1.22	614582	—	7.5	614647	—	175	614804	—
1.23	614583	—	8	614618	—	200	614682	—
1.24	614584	—	8.5	614648	—	250	614805	—
1.25	614585	—	9	614619	—	300	614683	—
1.26	614586	—	9.5	614649	—	400	614684	—
1.27	614587	—	10	614671	—	500	614685	—
1.28	614588	—	10.5	614650	—			
1.29	614589	—	11	614621	—			
1.3	614590	—	11.5	614651	—			
1.31	614591	—	12	614622	—			
1.32	614592	—	12.5	614652	—			

Metric Wear Block

Length (mm)	Order No. Tungsten carbide
1	615611
2	615612

*Suffix Number for Selecting Standard and Certificate Provided

ISO/DIN/JIS

	Steel, CERA
Grade K	—
Grade 0	-021* or -026**
Grade 1	-031* or -036**
Grade 2	-041* or -046**

ASME

	Steel, CERA
Grade K	—
Grade 00	-521*
Grade 0	-531*
Grade 1	-541*
Grade 2	-551*

BS

	Steel, CERA
Grade K	—
Grade 0	-121*
Grade 1	-131*
Grade 2	-141*

* provided with Inspection Certificate
 ** provided with Calibration Certificate and Inspection Certificate



Inspection Certificate

Individual Inch Square Gauge Block

*Suffix Number for Selecting Standard and Certificate Provided

ASME	
	Steel, CERA
Grade K	—
Grade 00	-521*
Grade 0	-531*
Grade 1	-541*
Grade 2	-551*

BS	
	Steel, CERA
Grade K	—
Grade 0	-121*
Grade 1	-131*
Grade 2	-141*

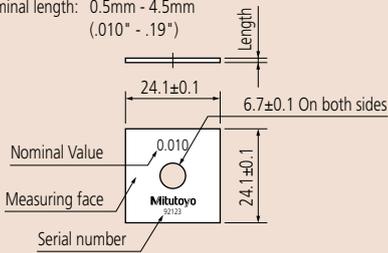
* provided with Inspection Certificate
 ** provided with Calibration Certificate and Inspection Certificate



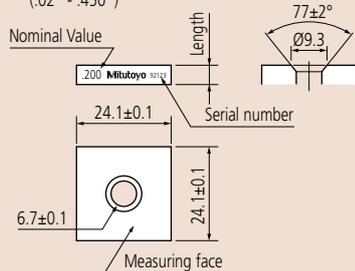
Inspection Certificate

Dimension

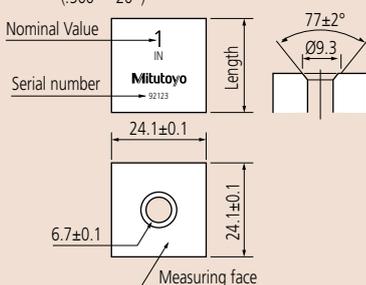
Nominal length: 0.5mm - 4.5mm
 (.010" - .19") Unit: mm



Nominal length: 5mm - 14.5mm
 (.02" - .450")



Nominal length: 15mm - 500mm
 (.500" - 20")



SPECIFICATIONS

Inch Block

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	614303	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	614222	—
12	614223	—
16	614224	—
20	614225	—

Inch Wear Block

Length (inch)	Order No.*
.05	615105
.1	615191

Square Gauge Block Accessory

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.



516-611

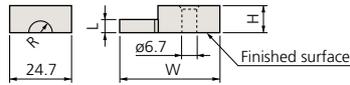
SPECIFICATIONS

Metric	
Order No. 516-611	Included in set
2 pcs.	Half round jaw 2mm (619070)
2 pcs.	Half round jaw 5mm (619071)
2 pcs.	Plain jaw (619072)
1 pc.	Center point (619073)
1 pc.	Scriber point (619054)
1 pc.	Block base (619074)
2 pcs.	Flat head screw 1-1/4" (619057)
2 pcs.	Flat head screw 5/8" (619058)
2 pcs.	Slotted head nut (619059)
2 pcs.	Adjustable tie rod 6" (619060)
2 pcs.	Adjustable tie rod 4-1/2" (619061)
1 pc.	Tie rod 3" (619062)
1 pc.	Tie rod 2-1/4" (619063)
1 pc.	Tie rod 1-1/2" (619064)
1 pc.	Tie rod 3/4" (619065)
2 pcs.	Stud (619056)
2 pcs.	Knurled head screw (619066)

Inch	
Order No. 516-612	Included in set
2 pcs.	Half round jaw .125" (619050)
2 pcs.	Half round jaw .25" (619051)
2 pcs.	Plain jaw (619052)
1 pc.	Center point (619053)
1 pc.	Scriber point (619054)
1 pc.	Block base (619055)
2 pcs.	Flat head screw 1-1/4" (619057)
2 pcs.	Flat head screw 5/8" (619058)
2 pcs.	Slotted head nut (619059)
2 pcs.	Adjustable tie rod 6" (619060)
2 pcs.	Adjustable tie rod 4-1/2" (619061)
1 pc.	Tie rod 3" (619062)
1 pc.	Tie rod 2-1/4" (619063)
1 pc.	Tie rod 1-1/2" (619064)
1 pc.	Tie rod 3/4" (619065)
2 pcs.	Stud (619056)
2 pcs.	Knurled head screw (619066)

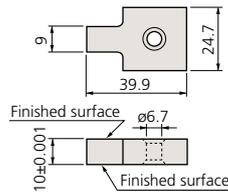


Half round jaw:
Used to measure an inside or outside diameter.

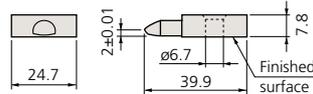


Order No.	R	L	W	H
619070	1.95mm	2mm	33.6mm	5.3mm
619071	4.95mm	5mm	39.9mm	10.3mm
619050	.123"	.125"	33.6mm	5.3mm
619051	.248"	.25"	39.9mm	10.3mm

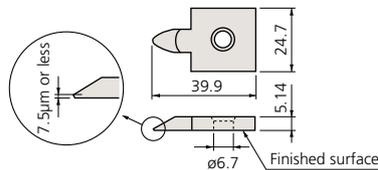
Plain jaw: **619072** (10mm), **619052** (.5")
Used to measure an inside or outside diameter.



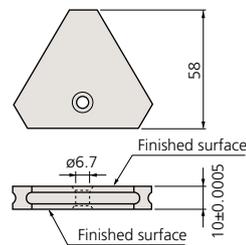
Center point: **619073** (2mm), **619053** (.1")
Used to scribe a workpiece.



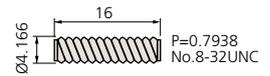
Scriber point: **619054**
Used to scribe a workpiece.



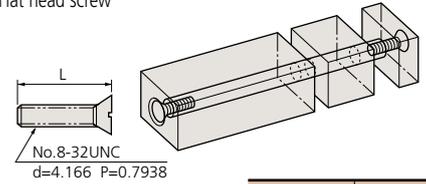
Base: **619074** (10mm), **619054** (.5")
Used as clamps by inserting them into the center hole of a square gauge block.



Stud: **619056**

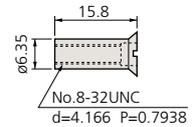


Flat head screw

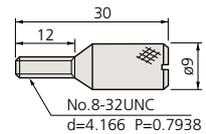


Order No.	L
619057	31.6mm
619058	15.8mm

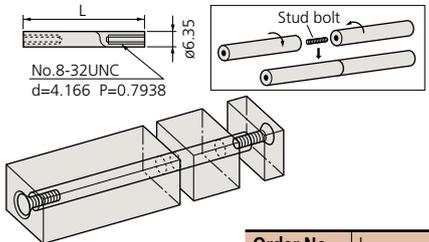
Slotted head nut: **619059**



Knurled head screw: **619066**

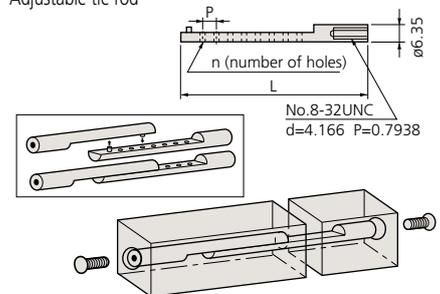


Tie rod



Order No.	L
619065	19mm
619064	38mm
619063	57mm
619062	76mm

Adjustable tie rod



Order No.	L	P	n
619060	124.5mm	6.35mm	14
619061	86.5mm	6.35mm	8

Ceraston

Accessory for Gauge Blocks

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 CERA Blocks.



SPECIFICATIONS

Order No.	Dimensions (W x D x H)	Mass
601645	100 x 25 x 12mm	110g
601644	150 x 50 x 20mm	530g

Maintenance Kit for Gauge Block

SERIES 516

FEATURES

- Includes all necessary maintenance tools for daily care and storage of gauge blocks.
- Supplied in a fitted wooden case for portable use.



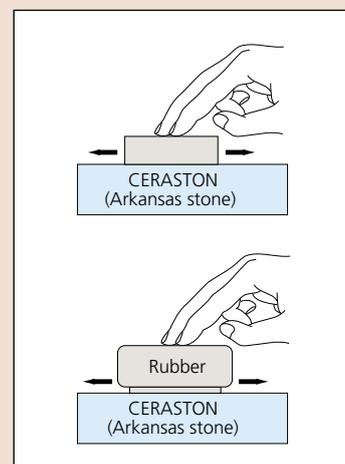
SPECIFICATIONS

Order No.	Assortment of tools and accessories
516-650	Anti-corrosive oil (600001): Used for both steel and tungsten-carbide gauge blocks.
	Ceraston (601645): Used for removing burrs on the measuring surface
	Optical flat (600003): Used for checking whether burrs exist.
	Tweezers (600004): Used for handling thin gauge blocks.
	Blower brush (600005): Used for blowing out dust on the measuring surface.
	Cleaning paper (600006): Used for wiping off rust preventive oil and contamination.
	Artificial leather mat (600007): Used as a gauge block mat.
	Reagent bottle (600008): Bottle of wiping solution (100mL)
	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. Mitutoyo does not handle the Arkansas stone.



Step Master

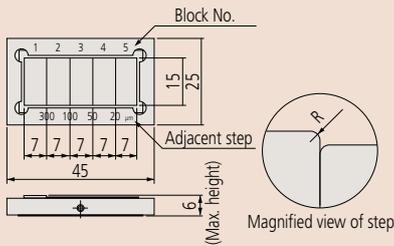
SERIES 516

FEATURES

Step master is a master gage used for the z-axis (vertical direction) calibration of optical instruments.

- Each adjacent step is measured down to $0.01\mu\text{m}$ by using an interferometer within $\pm 0.20\mu\text{m}$ allowance.
- Steel and ceramic types are available.

Dimension



516-498
Ceramic type



516-199
Steel type



SPECIFICATIONS

Metric

Order No.	Step value between adjacent blocks				Remarks
	No. 1 - No. 2	No. 2 - No. 3	No. 3 - No. 4	No. 4 - No. 5	
516-198	10 μm	5 μm	2 μm	1 μm	Steel type
516-199	300 μm	100 μm	50 μm	20 μm	Steel type
516-498	10 μm	5 μm	2 μm	1 μm	Ceramic type
516-499	300 μm	100 μm	50 μm	20 μm	Ceramic type

Available Dimension

Nominal size: 0.1mm to 1000mm (steel)
0.5mm to 500mm (ceramic)

Nominal pitch: 0.0005mm (up to 100mm)
0.001mm (over 100mm)

Minimum section dimension:
Approx. 5 x 5mm

Maximum section dimension:
Approx. 140 x 140mm (steel)
Approx. \varnothing 160mm (steel, cylindrical)
Approx. 100 x 50mm (ceramic)
Approx. \varnothing 60mm (ceramic, cylindrical)

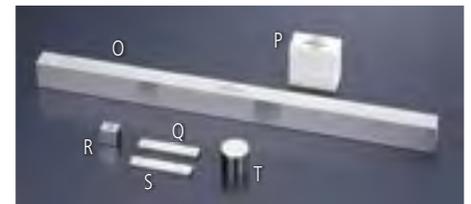
Accuracy: Gauge Block level

Special materials of low expansion glass and low expansion ceramic are available.

Made-to-order Block & Reference

FEATURES

- Mitutoyo can provide Gauge Blocks and reference gages to your size and design.



O: Steel Long rectangular block (15 x 10 x 200mm)
P: Ceramic square block (24.1 x 24.1 x 12.3mm)
Q: Steel thin rectangular block (30 x 6 x 1.9mm)
R: Steel square block (9 x 9 x 6mm)
S: Steel thin rectangular block (30 x 6 x 2.1mm)
T: Steel cylindrical block (\varnothing 13.08 x 12mm)



A: Ceramic rectangular gauge block (21.94mm)
B: Ceramic square gauge block (2.1005mm)
C: Steel square gauge block (10.72mm)
D: Steel square gauge block (2.2065mm)
E: Ceramic rectangular gauge block (20.64mm)
F: Steel rectangular gauge block (31.5mm)
G: Ceramic rectangular gauge block (6.34mm)
H: Steel rectangular gauge block (3.603mm)
I: Steel rectangular gauge block (1.1505mm)
J: Steel rectangular gauge block (0.555mm)
K: Steel rectangular gauge block (6.156mm)
L: Steel rectangular gauge block (9.694mm)
M: Steel rectangular gauge block (10.02mm)



U: Cylindrical reference block for depth micrometer (\varnothing 60 x 150mm)
V: Ceramic reference plate (50 x 50 x 50mm, flatness 0.3 μm)
W: Ceramic stepped block (30 x 18 x 5mm, step: 0.15mm)

Gauge Block Interferometer GBI

Automatic Gauge Block Calibration

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 μ m wavelength system He-Ne laser 543.5 μ m wavelength system He-Ne laser
Measuring range	0.5mm - 250mm
Accuracy (Uncertainty 95%)	$\pm 0.02\mu$ m (when measuring a gauge block of 100mm length), $\pm 0.04\mu$ m (when measuring a gauge block of 200mm length)
Number of gauge blocks to be mounted on the measuring table	12

Gauge Block Comparator GBCD-100A

SERIES 516 — Automatic Type Comparator with Dual Gage Heads

SPECIFICATIONS

Model No.	GBCD-100A
Order No.	100V AC 565-111K
	110V AC 565-111C
	120V AC 565-111A
	240V AC 565-111E
Resolution	0.00001mm (0.01 μ m)
Range	0.5mm - 100mm
Measuring unit	Differential (dual-head) type Mu-Checker
Accuracy in narrow range (20°C)	$\pm(0.03+0.3L/1000)\mu$ m* L = Gauge block length (mm) *Uncertainty of measurement is 95% (not including the calibration error of the standard gauge block).
Measuring force	Upper gage head: 1N (100gf) Lower gage head: 0.6N (60gf)
Air requirement	400kPa (4kgf/cm ²)
Operating condition	Temperature: 20°C \pm 1°C Humidity: 58%RH \pm 15%RH
Power supply	100 - 120V/200 - 240V AC, 50/60Hz
Dimensions (W x D x H)	Main unit: 710 x 366 x 783mm Electronic unit: 160 x 410 x 382mm
Mass	Main unit: 120kg Electronic unit: 14kg



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.

Optional Accessory

- 962723:** Gauge block set for probe calibration
- 962764:** Gauge block holder for probe calibration
- 611615-02:** 5mm gauge block (grade 0) for origin setting
- 243989:** Auxiliary stage (size: 360 x 253mm)
- 218-007:** Work bench

Gauge Block Comparator GBCD-250

SERIES 516 — Manual Type Comparator with Dual Gage Heads

FEATURES

- Gauge 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.

Optional Accessory

- 962723:** Gage head calibration kit
02ASD130: Square gauge block measuring kit
02ASF040: Heat insulation shield
02ASD100: Gauge block set for accuracy inspection



SPECIFICATIONS

Metric	
Model No.	GBCD-250
Order No.	100V AC 565-130
	110V AC 565-130A
	220V AC 565-130D
	240V AC 565-130E
Range	0.1mm - 250mm
Resolution	0.00001mm (0.01μm)
Accuracy in narrow range (20°C)	±(0.03+0.3L/1000)μm* L = Gauge block length (mm)
Measuring units	Laser Hologage (upper), Mu-checker (lower)
Operating condition	Temperature: 20°C ±1°C Humidity: 58%RH ±15%RH
Data output	Via SPC output port
Power supply	100 - 120V/200 - 240V AC, 50/60Hz
Dimensions (W x D x H)	Main unit: 455 x 318 x 691mm
	Display unit: 345 x 397 x 187mm
Mass	Main unit: Approx. 50kg
	Display unit: Approx. 9kg

* Uncertainty of measurement is 95% (not including the calibration error of the standard gauge block).

Gauge Block Comparator GBCS-250

SERIES 516 — Manual Type Comparator with Single Gage Head

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.

Optional Accessory

- 02ASB530:** Heat insulation shield
02ASD130: Square gauge block measuring kit*
02ASD150: 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



**GBCS-250
(with Gauge Block
Positioning Unit)**

SPECIFICATIONS

Model No.	GBCS-250	GBCS-250
Order No.	100V AC 565-120	565-122
	110V AC 565-120A	565-122A
	220V AC 565-120D	565-122D
	240V AC 565-120E	565-122E
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* L = Gauge block length (mm)	
Measuring unit	Laser Hologage	
Measuring force	Approx. 0.4N (40gf)	
Operating condition	Temperature: 20°C ±1°C Humidity: 58%RH ±15%RH	
Data output	Via RS-232C interface unit	
Power supply	100 - 120V/200 - 240V AC, 50/60Hz	
Dimensions (W x D x H)	Main unit: 300 x 300 x 687mm	
	Display unit: 235 x 115 x 118mm	
Mass	Main unit: Approx. 60kg	
	Display unit: Approx. 2kg	

* Uncertainty of measurement is 95% (not including the calibration error of the standard gauge block).

Height Master

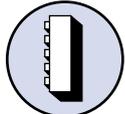
SERIES 515

FEATURES

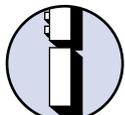
- Models with staggered arrangement of block stack have two measuring faces on the same level, one facing up and the other down (except for 515-311).



Staggered 20mm blocks (movable)



Vertical orientation



Riser block

515-322

- Each Height Master is supplied with a gauge block for zero-setting.
- Fitted wooden case supplied.



SPECIFICATIONS

Metric		
Range (H)	Order No.	Block step
$5 < H \leq 310\text{mm}$	515-322	20mm (staggered)

Inch		
Range (H)	Order No.	Block step
$.2" < H \leq 12.2"$	515-311	.5" (straight)
$.2" < H \leq 12.2"$	515-310	1" (staggered)



(Refer to the page 9 for details.)

Technical Data

Measuring range (H): Refer to the list of specifications.
 Graduation: 0.001mm or .00001"
 Block arrangement: Staggered arrangement (515-311: straight arrangement)
 Block travel stroke: 20mm or 1"
 Block feeding pitch: 0.5mm/rev or .025"/rev
 Block pitch accuracy: $\pm 1.5\mu\text{m}$
 Parallelism of blocks: $1\mu\text{m}$
 Block feeding error: $\pm 1\mu\text{m}$
 Block retracting error: $1\mu\text{m}$
 Mass: 23kg

Optional Accessory

515-112: Auxiliary block kit for bore gage (mm)
 515-119: Auxiliary block kit for bore gage (for 515-310)
 515-121: Auxiliary block kit for bore gage (for 515-311)
 _____: Riser block (see page 213.)

Reading



Height A

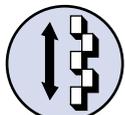
1. Scale 280. mm
 2. Counter 5.67 mm
 3. Thimble 0.000 mm
 285.670 mm

Digital Height Master

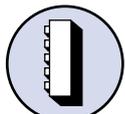
SERIES 515

FEATURES

- Standard model with a digital display, featuring all essential specifications required for versatile height standard.
- With SPC output.
- Each Height Master is supplied with a gauge block for zero setting.



Staggered 20mm blocks (movable)



Vertical orientation



Riser block

515-354



SPECIFICATIONS

Metric		
Range (H)	Order No.	Block step
$10 < H \leq 310\text{mm}$	515-354	20mm (staggered)
$10 < H \leq 460\text{mm}$	515-356	20mm (staggered)
$10 < H \leq 610\text{mm}$	515-358	20mm (staggered)

Inch		
Range (H)	Order No.	Block step
$.5" < H \leq 12"$	515-355	1" (staggered)
$.5" < H \leq 18"$	515-357	1" (staggered)
$.5" < H \leq 24"$	515-359	1" (staggered)



(Refer to the page 9 for details.)



Technical Data

Measuring range (H): Refer to the list of specifications.
 Graduation: 0.001mm or .00001"
 Block arrangement: Staggered arrangement
 Block travel stroke: 20mm or 1"
 Block feeding pitch: 0.5mm/rev or .025"/rev
 Block pitch accuracy: $\pm 1.5\mu\text{m}$ ($0 < H \leq 310\text{mm}$)
 $\pm 2.5\mu\text{m}$ ($310 < H \leq 450\text{mm}$)
 $\pm 3.5\mu\text{m}$ ($450 < H \leq 610\text{mm}$)
 Parallelism of blocks: $2.0\mu\text{m}$ ($0 < H \leq 310\text{mm}$)
 $2.5\mu\text{m}$ ($310 < H \leq 610\text{mm}$)
 Block feeding error: $\pm 2.0\mu\text{m}$ (515-358, 515-359: $\pm 2.5\mu\text{m}$)
 Block retracting error: $2.0\mu\text{m}$ (515-358, 515-359: $2.5\mu\text{m}$)
 Display: LCD
 Battery: SR44 (2 pcs.), 938882
 Battery life: Approx. 1.8 years under normal use
 Mass: 9.5kg (515-354, 515-355)
 13.6kg (515-356, 515-357)
 16kg (515-358, 515-359)

Function

Zero-setting, Presetting, ABS/INC switching, Data hold, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

515-112: Auxiliary block kit for bore gage (mm)
 515-119: Auxiliary block kit for bore gage (inch)
 _____: Riser block (see page 213.)
 937387: SPC cable (1m)
 965013: SPC cable (2m)



SPC

(Refer to the page 9 for details.)

Technical Data

Measuring range (H): Refer to the list of specifications.
 Graduation: 0.0001mm or .000005"
 Block arrangement: Staggered arrangement
 Block travel stroke: 20mm or 1"
 Indication accuracy: ±1µm
 Block pitch accuracy: ±0.5µm
 Parallelism of blocks: 0.5µm
 Block feeding error: ±0.5µm
 Display: LED
 Power supply: Via AC adaptor
 Mass: 18kg

Function

Zero-setting, Presetting, ABS/INC switching, Data hold, Data output, inch/mm conversion (inch/mm models)

Optional Accessory

- : Riser block (see page 213.)
- 936937**: SPC cable (1m)
- 965014**: SPC cable (2m)
- 940269**: RS-232C interface unit



LED display



LED block indication



Fine feeding

Coarse feeding

Bore gage zero-setting



CERA Height Master

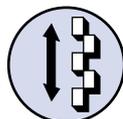
SERIES 515

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.



515-341



Staggered 20mm blocks (movable)



Vertical orientation



Riser block

- 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.
- With SPC output.
- Fitted wooden case supplied.

SPECIFICATIONS

Metric		
Range (H)	Order No.*	Block step
5 < H ≤ 310mm	515-341	20mm (staggered)

Inch		
Range (H)	Order No.*	Block step
.2" < H ≤ 12"	515-352	1" (staggered)

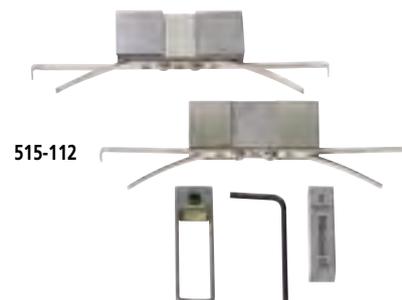
*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **515-341A**):
A for 120V, **D** for 220V, **DC** for 220V (CCC), **K** for 220V (EK),
No suffix is required for 100V

Auxiliary Block Kit

SERIES 515 — for Bore Gage

FEATURES

- Used for efficient zero-setting of dial bore gages and tubular inside micrometers (18 - 150mm) on a Height Master.



515-112

SPECIFICATIONS

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, Height Master (515-311)
515-120	Digimatic Height Master
515-121	Height Master (515-310)

Riser Blocks

SERIES 515

FEATURES

- These riser blocks are specially designed for standard/Digimatic height masters.



515-113 515-114 515-115

SPECIFICATIONS

Metric			
Height	Order No.	Accuracy of height	Mass
150mm	515-113	±0.6µm	5.7kg
300mm	515-114	±1.0µm	11.3kg
600mm	515-115	±2.0µm	31kg

Inch			
Height	Order No.	Accuracy of height	Mass
6"	515-116	±20µin	12.5 lbs.
12"	515-117	±40µin	24.9 lbs.
24"	515-118	±80µin	68.2 lbs.

Universal Height Master

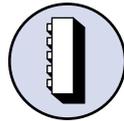
SERIES 515 — Usable in Vertical and Horizontal Orientations

FEATURES

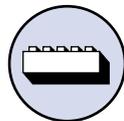
- The Universal Height Master is designed for both vertical and horizontal orientations, providing a wide range of applications such as accuracy checking of machine tool table movements.
- Fitted wooden case supplied.



Single-row 10mm blocks (movable)



Vertical orientation



Horizontal orientation



Riser block

515-520

SPECIFICATIONS

Metric		
Range (R)	Order No.	Block step
$5 < R \leq 610\text{mm}$	515-520	10mm (straight)
$5 < R \leq 1010\text{mm}$	515-523	10mm (straight)

Inch		
Range (R)	Order No.	Block step
$.2" < R \leq 18.2"$	515-512	.5" (straight)
$.2" < R \leq 24.2"$	515-510	.5" (straight)
$.2" < R \leq 40.2"$	515-513	.5" (straight)



(Refer to the page 9 for details.)

Technical Data

Measuring range (R): Refer to the list of specifications.
 Graduation: 0.001mm or .00001"
 Block arrangement: Straight arrangement
 Block travel stroke: 20mm or 1"
 Block feeding pitch: 0.5mm/rev or .025"/rev
 Block pitch accuracy: $\pm 1.5\mu\text{m}$ ($0 < R \leq 310\text{mm}$)
 $\pm 2.5\mu\text{m}$ ($310 < R \leq 610\text{mm}$)
 $\pm 3.5\mu\text{m}$ ($610 < R \leq 1010\text{mm}$)
 Parallelism of blocks: 1.0 μm ($0 < R \leq 310\text{mm}$)
 2.5 μm ($310 < R \leq 1010\text{mm}$)
 Block feeding error: $\pm 1.2\mu\text{m}$ (**515-523**, **515-513**: $\pm 1.5\mu\text{m}$)
 Block retracting error: 1.2 μm (**515-523**, **515-513**: 1.5 μm)
 Mass: 42kg (**515-520**, **515-512**)
 50kg (**515-510**)
 63.5kg (**515-523**, **515-513**)

Optional Accessory

- 900574:** Supporting base for vertical operation
 (*supplied as a standard for **515-523** and **515-513**)
515-112: Auxiliary block kit for bore gage (mm)
515-119: Auxiliary block kit for bore gage (inch)



Using in horizontal orientation



Supporting base

Check Master

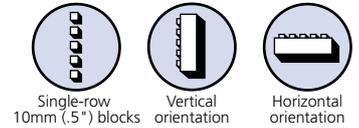
SERIES 515



(Refer to the page 9 for details.)

Technical Data

Measuring range (R): Refer to the list of specifications.
 Block pitch accuracy:
 ±2.5µm (0 < R ≤ 310mm)
 ±3.5µm (310 < R ≤ 610mm)
 ±5.0µm (610 < R ≤ 1010mm)
 ±8.0µm (1010 < R ≤ 1510mm)
 Parallelism of blocks:
 1.2µm (0 < R ≤ 310mm)
 1.5µm (310 < R ≤ 610mm)
 2.0µm (610 < R ≤ 1010mm)
 2.5µm (1010 < R ≤ 1510mm)
 Mass:
 7kg (515-720, 515-710)
 10kg (515-721, 515-711)
 13kg (515-722, 515-712)
 22kg (515-723, 515-713)
 30kg (515-724)



SPECIFICATIONS

Metric		
Range (R)	Order No.	Block step
300mm	515-720	10mm
450mm	515-721	10mm
600mm	515-722	10mm
1000mm	515-723	10mm
1500mm	515-724	10mm

Inch		
Range (H)	Order No.	Block step
12"	515-710	.5"
18"	515-711	.5"
24"	515-712	.5"
40"	515-713	.5"

High Accuracy Check Master

SERIES 515



(Refer to the page 9 for details.)

Technical Data

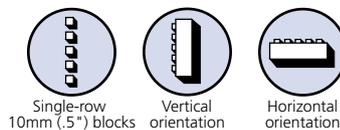
Measuring range (R): Refer to the list of specifications.
 Block pitch accuracy:
 ±1.2µm (0 < R ≤ 310mm)
 ±1.8µm (310 < R ≤ 610mm)
 ±2.5µm (610 < R ≤ 1010mm)
 ±4.0µm (1010 < R ≤ 1510mm)
 Parallelism of blocks:
 1.0µm (0 < R ≤ 450mm)
 1.5µm (450 < R ≤ 1010mm)
 2.0µm (1010 < R ≤ 1510mm)
 Mass:
 3.6kg (515-740, 515-730)
 5.4kg (515-741, 515-731)
 7.2kg (515-742, 515-732)
 12kg (515-743, 515-733)
 18kg (515-744, 515-734)

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 vertical and horizontal orientation.
- Fitted wooden case supplied.

Specifications for Ceramic Check Master:

- Each measuring block is made of zirconia-based ceramic that requires no anti-corrosion treatment for measuring faces.
- Free from deterioration and dimensional changes over time.



SPECIFICATIONS

Metric		
Range (R)	Order No.	Block step
300mm	515-740 / 515-760*	10mm
450mm	515-741 / 515-761*	10mm
600mm	515-742 / 515-762*	10mm
1000mm	515-743 / 515-763*	10mm
1500mm	515-744 / 515-764*	10mm

Inch		
Range (R)	Order No.	Block step
12"	515-730 / 515-750*	.5"
18"	515-731 / 515-751*	.5"
24"	515-732 / 515-752*	.5"
40"	515-733 / 515-753*	.5"
60"	515-734 / 515-754*	.5"

*Ceramic Check Master

*Ceramic Check Master

Optional Accessory

601167: Supporting base for vertical operation
 (*supplied as a standard for 515-523 and 515-513)



Supporting base

Standard Scales

SERIES 182 — Made of Low Expansion Glass

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.



(Refer to the page 9 for details.)

Technical Data

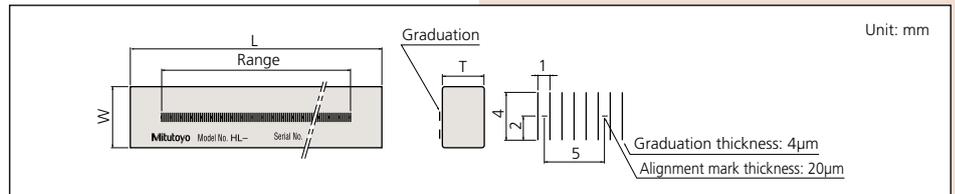
Accuracy (at 20°C): $(0.5+L/1000)\mu\text{m}$,
 L = Measured length (mm)
 Glass material: Low expansion glass
 Thermal expansion coefficient: $8 \times 10^{-8}/\text{K}$
 Graduation: 1mm
 Graduation thickness: 4 μm
 Mass: 0.75kg (250mm), 1.8kg (500mm)

SPECIFICATIONS

Metric				
Range	Order No.	L	W	T
250mm	182-501-50	280mm	20mm	10mm
250mm	182-501-60	280mm	20mm	10mm
500mm	182-502-50	530mm	30mm	20mm
500mm	182-502-60*	530mm	30mm	20mm

*with English JCSS certificate.

DIMENSION



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.



(Refer to the page 9 for details.)

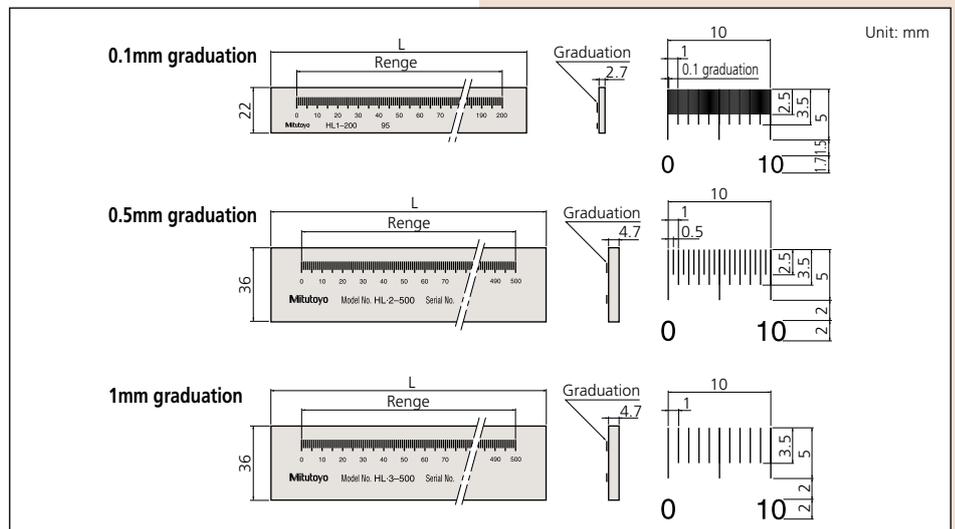
Technical Data

Accuracy (at 20°C): $(1.5+2L/1000)\mu\text{m}$,
 L = Measured length (mm)
 Glass material: Sodium glass
 Thermal expansion coefficient: $8.5 \times 10^{-8}/\text{K}$
 Graduation: 0.1mm (thickness: 20 μm)
 0.5mm (thickness: 50 μm)
 1mm (thickness: 100 μm)
 Mass: Refer to the list of specifications.

SPECIFICATIONS

Metric				
Range	Order No.	Graduation	L	Mass
50mm	182-511-10	0.1mm	75mm	0.23kg
100mm	182-512-10	0.1mm	125mm	0.24kg
150mm	182-513-10	0.1mm	175mm	0.35kg
200mm	182-514-10	0.1mm	225mm	0.36kg
100mm	182-521-10	0.5mm	130mm	0.27kg
200mm	182-522-10	0.5mm	230mm	0.32kg
300mm	182-523-10	0.5mm	330mm	0.57kg
400mm	182-524-10	0.5mm	430mm	0.71kg
500mm	182-525-10	0.5mm	530mm	0.86kg
250mm	182-531-10	1mm	280mm	0.55kg
500mm	182-532-10	1mm	530mm	0.86kg
750mm	182-533-10	1mm	780mm	1.22kg
1000mm	182-534-10	1mm	1030mm	1.54kg

DIMENSION



CERA Straight Master

SERIES 311 — Straightness Measuring Instrument



(Refer to the page 9 for details.)



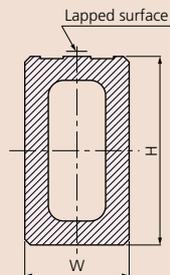
*Suffix Number for Inspection Certificate and Calibration Certificate

Suffix No.	Certificate provided
-20	Provided with Inspection Certificate
-22	Provided with Calibration Certificate

Technical Data

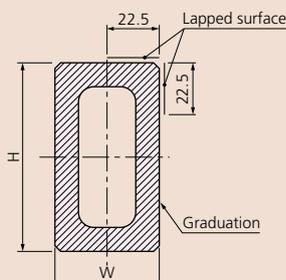
Cross section

(High accuracy and ultra high accuracy types)



Double faced type

(High accuracy and ultra high accuracy types)



FEATURES

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.

- Alminaceramic made
- 50mm/100" pitch gradation scales

- Precision lapped measuring surface
- Double faced type is lapping the double face which can be used for straightness in horizontal and vertical as a reference square.
- Little secular change
- Lightweight



SPECIFICATIONS

Metric		Inch		High accuracy model		
Nominal length	Order No.*	Nominal length	Order No.*	Straightness	Size (L x H x W)	Mass
400mm	311-302	16"	311-322	0.3μm	440 x 35 x 50mm	1.8kg
700mm	311-305	28"	311-325	0.5μm	740 x 35 x 50mm	3kg
1000mm	311-307	40"	311-327	1.0μm	1040 x 45 x 80mm	8kg
1300mm	311-309	52"	311-329	1.5μm	1340 x 45 x 80mm	10kg

Metric		Inch		Ultra high accuracy model		
Nominal length	Order No.*	Nominal length	Order No.*	Straightness	Size (L x H x W)	Mass
400mm	311-332	16"	311-342	0.2μm	440 x 35 x 50mm	1.8kg
700mm	311-335	28"	311-345	0.4μm	740 x 35 x 50mm	3kg
1000mm	311-337	40"	311-347	0.5μm	1040 x 45 x 80mm	8kg
1300mm	311-339	52"	311-349	0.7μm	1340 x 45 x 80mm	10kg

Double faced type



SPECIFICATIONS

Metric		Inch		Double faced model		
Nominal length	Order No.*	Nominal length	Order No.*	Straightness	Size (L x H x W)	Mass
400mm	311-352	16"	311-362	0.3μm	440 x 45 x 80mm	3.2kg
700mm	311-355	28"	311-365	0.5μm	740 x 45 x 80mm	5.5kg
1000mm	311-357	40"	311-367	1.0μm	1040 x 45 x 80mm	8kg
1300mm	311-359	52"	311-369	1.5μm	1340 x 45 x 80mm	10kg

Straightness Measuring System

SERIES 311 — Portable and High Accuracy Straightness Measurement

FEATURES

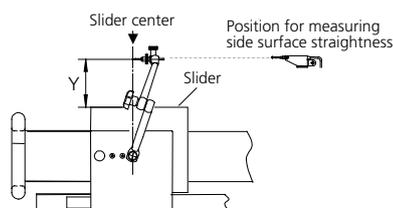
- Straightness can be easily measured by direct placement on a surface plate or a machine tool.
- An air bearing slider helps attain smooth movement and high precision.
- Workpieces can be measured for straightness on vertical and horizontal surfaces.
- Workpieces of 3.5m can be measured for straightness by a connecting measurement function that expands the length that can be measured. (The measurement accuracy is lowered due to the uncertainty of the scanned data.)
- Superior auxiliary functions allow easier parallelism alignments and accurate measurements.



SPECIFICATIONS

Order No.*	311-404 (w/ A4 size User's Manual), 311-405 (w/ letter size User's Manual)	
Measuring range	800mm	
Resolution	0.1μm	
Straightness (20°C)	Upper surface	$\pm(0.5+0.5L/1000)\mu\text{m}$, L = Measured length (mm)
	Side surface	$\pm(0.5+0.5L/1000)\mu\text{m}$, L = Measured length (mm)
Travel	Manual operation	
Length standard	ABSOLUTE linear encoder	
Air source	0.4MPa, 60L/min	
Power supply	100 - 240VAC±10%, 50/60Hz	
Operation temperature	20°C±10°C	
Dimension and mass (W x D x H)	Main unit	1072 x 207 x 245mm, 25kg
	Electronic unit	330 x 305 x 76mm, 3.6kg
	Air unit	270 x 150 x 372mm, 5.8kg

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **311-404A**):
A for 120V, **D** for 220V, **DC** for 220V (CCC), **K** for 220V (EK), **No suffix** is required for 100V



Y=35mm, when measuring upper surface straightness
 Y=100mm, when measuring side surface straightness

Optional Accessory

Attachment

- 02ASM150:** Two-head attachment
Used to attach two probes (lever head).
- 02ASM170:** Large arm
A large arm that expands the range where the probe can access, used by replacing with the standard arm.
- 02ASM140:** Extension rod for large arm
For large arms, used for surface measurements on a mounting table, or the like.
- 519-322:** Probe (lever head)
For electric micrometers (Mu-Checker)

Precision verification tools*

- 311-337:** 1000mm CERA straightness master (ultra-high precision type, straightness: 0.5μm)
For high precision correction of upper surface by users and for verification of precision
- 311-357:** 1000mm CERA straightness master (double-face finishing type, straightness: 1μm)
For correction of upper and side surfaces by users and for verification of precision

* A high precision straightedge rule having an effective length of at least 800mm is required as a precision verification tool.

Software

Measurement mode

- Normal measurement
General straightness measurement
- Reverse method
Measurement and calculation by reverse method
- Connecting measurement
Measurement range is expanded by connecting multiple measurements (up to 5)
- Parallelism measurement
Difference between straightness measurement results of two locations is evaluated for inclination (parallelism).
- Shape comparison measurement
Difference between straightness measurement results of two locations is evaluated for linear shape

Auxiliary functions

- Indication of slider moving speed
Indication of slider moving speed by a graph allows stable measurement
- Parallelism adjustment
A function that measures the part of a measured surface beforehand to aid parallelism adjustment
- User correction measurement
Correction values are created by using the master obtained by user.
- Measurement assistance function
Whether auxiliary messages for measurement operation are displayed is switched.

Calculation conditions

- Straightness calculation methods
Least squares, minimum zone method
- Filtering
Moving-average method (Vibration components and surface irregularity are smoothed for calculation and display.)

Print

Simplified printing function of measurement results

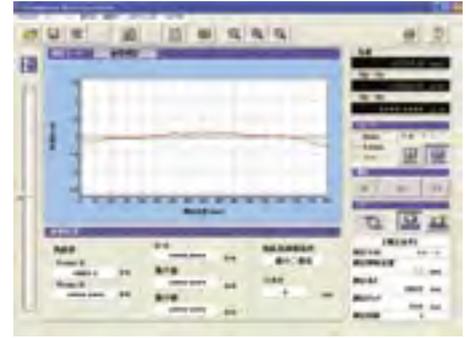
Storing measurement data

Measurement data is stored in a text format.
 The data can be read by using spreadsheet application software and processed to create an inspection certificate in a customized format.

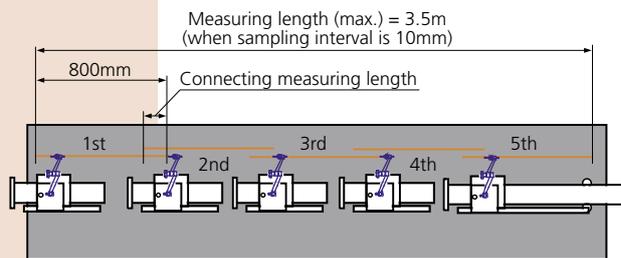
Normal measurement



Display of normal measurement results

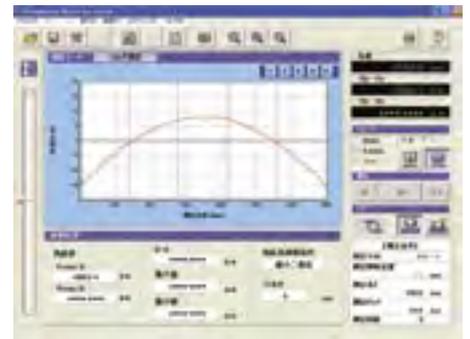


Connecting measurement



Measurement data of up to five times is combined to create one set of straightness measurement data. An optimized fitting processing of connecting processing range allows a connection errors to be minimized.
 (Connecting measuring length) = (Length equal to 10 points of measurement data)

Display of connecting measurement results



Parallelism measurement / shape comparison measurement



Display of parallelism measurement results



Feeding of two rails can be evaluated for parallelism displacement.

Display of shape comparison measurement results



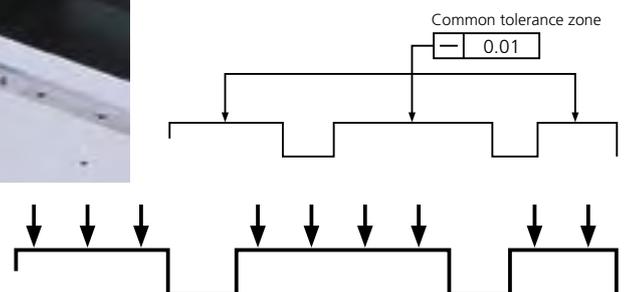
Bending of two rails can be evaluated for difference.

Point measurement



Example of instructions in drawing

Point measurement function
 Workpieces such as those shown above can be evaluated for straightness, by performing point measurement at the points indicated by the downward arrows, above.



Snap Gage Checker

SERIES 515

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.
- With an SPC output.



515-611

SPECIFICATIONS

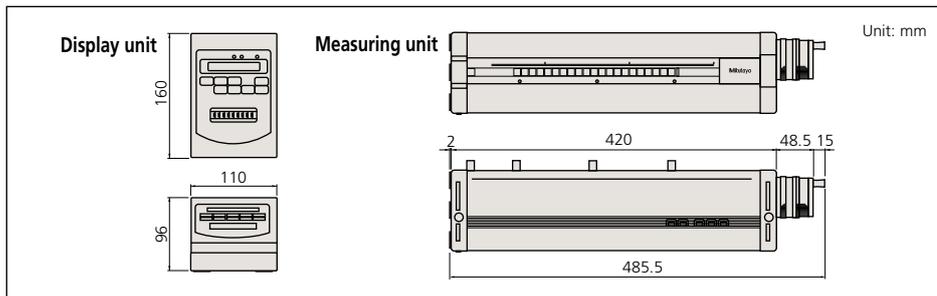
Metric		
Range	Order No.*	Block step
20 - 320mm	515-611	20mm (staggered)

* To denote your AC line voltage add the following suffixes to the order No.: A for 120V, D for 220V, E for 240/220V, K for 100V

Inch		
Range	Order No.*	Block step
.8" - 12.8"	515-612	1" (staggered)

* To denote your AC line voltage add the following suffixes to the order No.: A for 120V, D for 220V, E for 240/220V

DIMENSION



High Precision Square

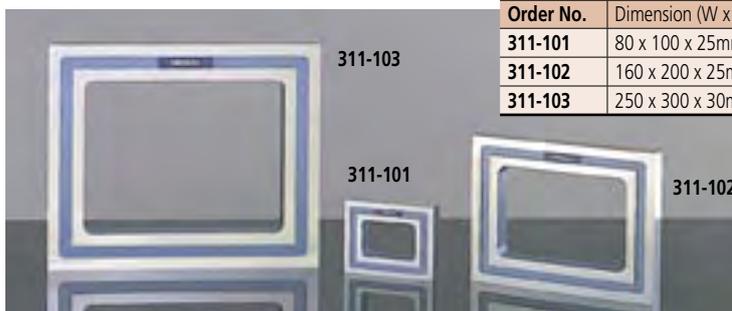
SERIES 311

FEATURES

- High precision square is a master gage used for the straightness and perpendicularity inspection of each axis movement such as a CMM and machine tool.
- Precision lapped 4 measuring surfaces
 - Less than 1 μ m/300mm straightness and perpendicularity.

SPECIFICATIONS

Metric		
Order No.	Dimension (W x L x T)	Mass
311-101	80 x 100 x 25mm	1.1kg
311-102	160 x 200 x 25mm	3.5kg
311-103	250 x 300 x 30mm	8.6kg



SPC



(Refer to the page 9 for details.)

Technical Data

Range:	20 - 320mm
Resolution:	0.0001mm/0.001mm or .00001"/.0001"
Block travel stroke:	100mm
Block pitch accuracy:	\pm 0.001mm
Parallelism of blocks*:	0.001mm (*between the anvil block and the 1st measuring block)
Block feeding error:	\pm 0.002mm
Power supply:	Via AC adaptor
Mass:	12.5kg

Function

Data output

Optional Accessory

- 936937: SPC cable (1m)
- 965014: SPC cable (2m)
- 990554: Workpiece rest

Square Master

SERIES 311 — Squareness / Straightness Measuring Instrument

Technical Data

Squareness:	3 μ m (311-215, 311-216)
	6 μ m (311-225, 311-226)
	9 μ m (311-245, 311-246)
Straightness:	2 μ m (311-215, 311-216)
	2.5 μ m (311-225, 311-226)
	3.5 μ m (311-245, 311-246)
Dial test indicator provided	
Range:	0.2mm or .008"
Graduation:	0.002mm or .0001"
Accuracy:	3 μ m or \pm .0001"
Dial reading:	0-100-0 (metric) or 0-4-0 (inch)
Mass:	13.7kg, 30.14 lbs (311-215, 311-216)
	16.2kg, 35.64 lbs (311-225, 311-226)
	24kg 52.8 lbs (311-245, 311-246)

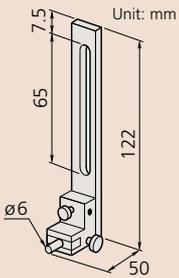
Optional Accessory

—	Riser blocks (see page 213.)*
517-665:	Granite square, 45 (W) x 140 (D) x 280 (H) mm
900571:	Adjustable holder
900551:	Extension holder
900565:	Feeler**

*Not available for 450mm (18") model.
**Adapter (902803) is required for metric model.

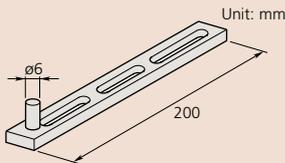
Adjustable holder

No.900571



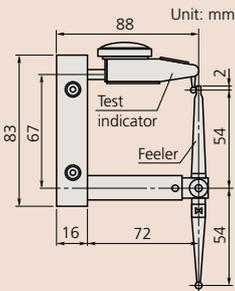
Extension holder

No.900551



Feeler

No.900565



FEATURES

- Squareness (perpendicularity) and straightness measurements can be performed accurately and efficiently by moving a lever.
- With a dial test indicator for reading displacements.
- Its own squareness is adjustable for high accuracy measurement.



311-215



311-225

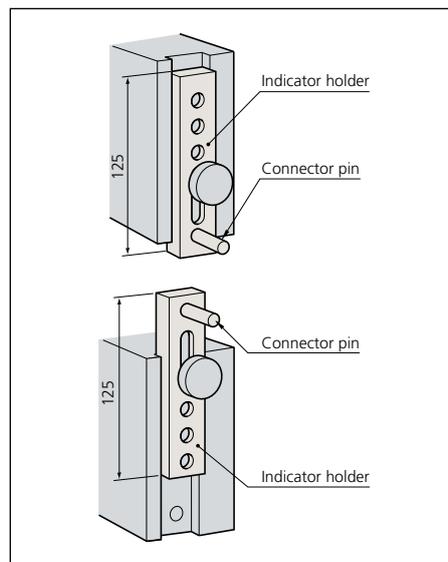


311-245

SPECIFICATIONS

Metric			
Vertical travel	Order No.	Squareness	Straightness
150mm	311-215	3 μ m	2 μ m
250mm	311-225	6 μ m	2.5 μ m
450mm	311-245	9 μ m	3.5 μ m

Inch			
Vertical travel	Order No.	Squareness	Straightness
6"	311-216	.00012"	.00008"
10"	311-226	.00024"	.0001"
18"	311-246	.00036"	.00014"



Precision Square

SERIES 916

FEATURES

- Three types of square are available.
- All edges are hardened and precision ground.



SPECIFICATIONS

Size (H x W)	Order No.	Remarks
50 x 40mm	916-211	Standard type
75 x 50mm	916-212	Standard type
100 x 70mm	916-213	Standard type
150 x 100mm	916-214	Standard type
200 x 130mm	916-215	Standard type
250 x 165mm	916-216	Standard type
300 x 200mm	916-217	Standard type
400 x 250mm	916-218	Standard type
75 x 50mm	916-401	with stand
100 x 70mm	916-402	with stand
150 x 100mm	916-403	with stand
200 x 130mm	916-404	with stand
250 x 165mm	916-405	with stand
300 x 200mm	916-406	with stand
400 x 250mm	916-407	with stand
50 x 40mm	916-100	Standard type
75 x 50mm	916-101	Standard type
100 x 70mm	916-102	Standard type
150 x 100mm	916-103	Standard type
200 x 130mm	916-104	Standard type

Technical Data

Squareness

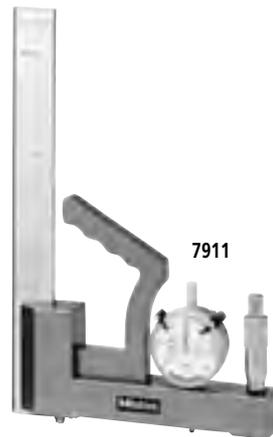
	Outside	Inside
916-211	6µm	12.5µm
916-212	6.5µm	14µm
916-213	7µm	15µm
916-214	8µm	17.5µm
916-215	9µm	20µm
916-216	10µm	22.5µm
916-217	11µm	25µm
916-218	13µm	30µm
916-401	6.5µm	14µm
916-402	7µm	15µm
916-403	8µm	17.5µm
916-404	9µm	20µm
916-405	10µm	22.5µm
916-406	11µm	25µm
916-407	13µm	30µm
916-100	2.5µm	6µm
916-101	3µm	6.5µm
916-102	3µm	7µm
916-103	3.5µm	8µm
916-104	4µm	9µm

Precision Dial Square

SERIES 7

FEATURES

- Regular type and beveled-edge type blades are interchangeable.
- Dial indicator shows squareness directly.



SPECIFICATIONS

Size	Order No.	Range	Squareness
300mm	7911	±0.17mm	±2.5µm/300mm
600mm	7912	±0.24mm	±5µm/600mm

Technical Data

Range:

±0.17mm (7911)

±0.24mm (7912)

Squareness:

±2.5µm/300mm (7911)

±5µm/600mm (7912)

Spring Dividers and Calipers

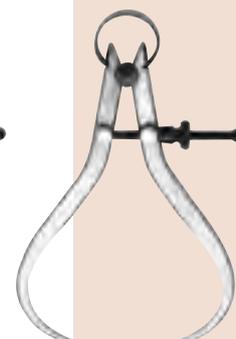
SERIES 950

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 Set

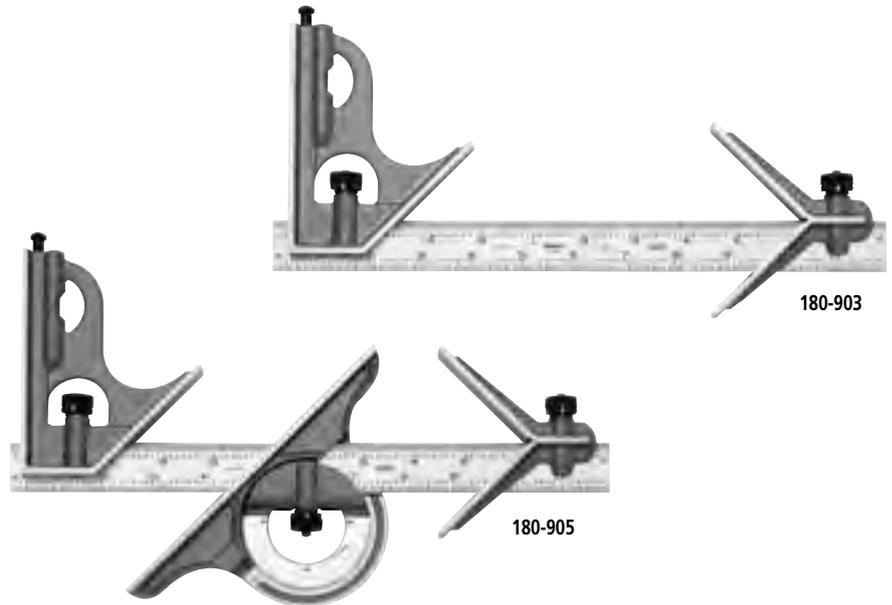
SERIES 180

Technical Data

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.

FEATURES

- Three measuring heads are attached to the stainless steel rule (blade), allowing versatile measurements on various types of workpieces.
- The measuring heads are hardened.
- Economy sets not including a protractor head are also available.



SPECIFICATIONS

Metric — Combination Square Sets

Size	Order No.		Blade provided
	Complete	Semi-complete	
150mm	—	180-919	180-405
300mm	180-910	180-920	180-505

Inch/Metric — Combination Square Sets

Size	Order No.		Blade provided
	Complete	Semi-complete	
6"/150mm	—	180-915	180-403
12"/300mm	180-907	180-909	180-503

Inch — Combination Square Sets

Size	Order No.		Blade provided
	Complete	Semi-complete	
6"	—	180-901	180-401
6"	—	180-902	180-402
12"	180-905	180-903	180-501
12"	180-906	180-904	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)

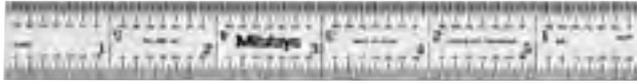
Order No.	Description	Remarks
180-101	Square head	For 150mm (6") blades
180-102	Square head	For 300mm (12"), 450mm (18"), 600mm (24") blades
180-201	Center head	For 150mm (6") blades
180-202	Center head	For 300mm (12"), 450mm (18"), 600mm (24") blades
180-301	Protractor head	For 300mm (12"), 450mm (18"), 600mm (24") blades

Steel Rules

SERIES 182

FEATURES

- Clear graduations on satin-chrome finish.
- Stainless tempered.



182-101



182-102



182-103



182-105



182-201



182-202



182-205



182-302

SPECIFICATIONS

Metric Wide Rigid Rules

Graduations	Range	Order No.	Width
1mm, 0.5mm (on both faces)	150mm	182-111	19mm
	300mm	182-131	25mm
	450mm	182-151	30mm
	600mm	182-171	30mm

Inch/Metric Wide Rigid Rules

Graduations	Range	Order No.	Width
1/32", 1/64", 1mm, 0.5mm	6"/150mm	182-105	.75"
	12"/300mm	182-125	.98"
	18"/450mm	182-145	1.18"
	24"/600mm	182-165	1.18"
1/50", 1/100", 1mm, 0.5mm	6"/150mm	182-106	.75"
	12"/300mm	182-126	.98"
1/10", 1/100", 1mm, 0.5mm	6"/150mm	182-107	.75"
	6"/150mm	182-108	.75"

Inch Wide Rigid Rules

Graduations	Range	Order No.	Width
1/8", 1/16", 1/32", 1/64"	6"	182-101	.75"
	12"	182-121	.98"
	18"	182-241	1.18"
	24"	182-161	1.18"
1/50", 1/100", 1/32", 1/64"	6"	182-102	.75"
	12"	182-122	.98"
	18"	182-142	1.18"
	24"	182-162	1.18"
1/10", 1/100", 1/32", 1/64"	6"	182-103	.75"
	12"	182-123	.98"
	18"	182-143	1.18"
	24"	182-163	1.18"
1/10", 1/50", 1/32", 1/64"	6"	182-104	.75"
	12"	182-124	.98"

Metric Full-Flexible Rules

Graduations	Range	Order No.	Width
1mm, 0.5mm (on both faces)	150mm	182-211	12mm
	300mm	182-231	12mm
	450mm	182-251	18mm
	600mm	182-271	18mm

Inch/Metric Full-Flexible Rules

Graduations	Range	Order No.	Width
1/32", 1/64", 1mm, 0.5mm	6"/150mm	182-205	.47"
	12"/300mm	182-225	.47"
	18"/450mm	182-245	.71"
	24"/600mm	182-265	.71"
1/50", 1/100", 1mm, 0.5mm	6"/150mm	182-206	.47"
	12"/300mm	182-226	.47"
1/10", 1/100", 1mm, 0.5mm	6"/150mm	182-207	.47"
	6"/150mm	182-208	.47"

Inch Full-Flexible Rules

Graduations	Range	Order No.	Width
1/8", 1/16", 1/32", 1/64"	6"	182-201	.47"
	12"	182-221	.47"
	18"	182-241	.71"
	24"	182-261	.71"
1/50", 1/100", 1/32", 1/64"	6"	182-202	.47"
	12"	182-222	.47"
	18"	182-242	.71"
	24"	182-262	.71"
1/10", 1/100", 1/32", 1/64"	6"	182-203	.47"
	12"	182-223	.47"
	18"	182-243	.71"
	24"	182-263	.71"
1/10", 1/50", 1/32", 1/64"	6"	182-204	.47"
	12"	182-224	.47"

Inch/Metric Semi-Flexible Rules

Graduations*	Range	Order No.	Width
1/16", 1/32", 1/64", 1mm, 0.5mm	6"/150mm	182-302	.51"
	8"/200mm	182-303	.51"
	12"/300mm	182-305	.59"
	20"/500mm	182-307	.59"
	40"/1000mm	182-309	.59"

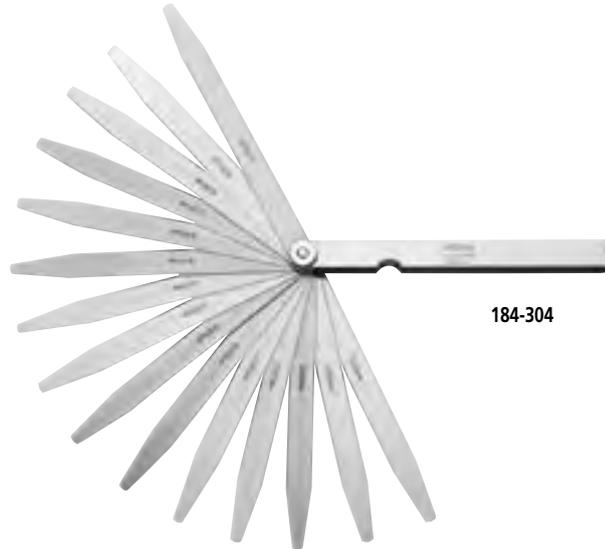
*Engraved on the front side only.

Thickness Gages

SERIES 184

FEATURES

- Metric thickness gages are available with tapered leaves.
- Each leaf is marked with its thickness.
- Each leaf is detachable if necessary.



184-304

SPECIFICATIONS

Metric

Range	Order No.	Composition of leaves	Remarks
0.05 - 1mm	184-313S	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	—
	184-303S	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	Long leaf
0.05 - 1mm	184-304S	20 leaves: 0.05 - 1mm by 0.05mm	Long leaf
0.05 - 1mm	184-305S	13 leaves: 0.05 - 0.3mm by 0.05mm, 0.4 - 1mm by 0.1mm	—
	184-301S	13 leaves: 0.05 - 0.3mm by 0.05mm, 0.4 - 1mm by 0.1mm	Long leaf
0.05 - 0.8mm	184-306S	10 leaves: 0.05 - 0.2mm by 0.05mm, 0.3 - 0.8mm by 0.1mm	—
	184-308S	10 leaves: 0.05 - 0.2mm by 0.05mm, 0.3 - 0.8mm by 0.1mm	Long leaf
0.03 - 0.5mm	184-307S	13 leaves: 0.03 - 0.1mm by 0.01mm, 0.2 - 0.5mm by 0.1mm, 0.15mm	—
	184-302S	13 leaves: 0.03 - 0.1mm by 0.01mm, 0.2 - 0.5mm by 0.1mm, 0.15mm	Long leaf

Precision Levels

SERIES 960

FEATURES

- High precision longitudinal and transverse vials make it possible to check or level surfaces.

SPECIFICATIONS

Order No.	Sensitivity	Dimensions (W x D x H)
960-606	0.02mm/m	200 x 44 x 38.2mm
960-706	0.02mm/m	200 x 44 x 200mm



960-606



960-706

Technical Data

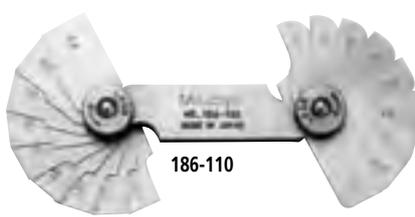
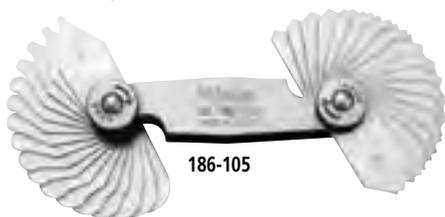
Accuracy of graduations: ± 0.7 (960-606), ± 0.3 (960-706)

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 leaves	Remarks
0.4 - 6mm	186-110	18 pairs: 0.4, 0.8, 1, 1.2, 1.5, 1.6mm, 1.75 - 3mm by 0.25mm, 3.5 - 6mm by 0.5mm	90° arc
0.5 - 13mm	186-902	26 pairs: 0.5 - 13mm by 0.5mm	90° arc
1 - 7mm	186-105	34 pairs: 1 - 3mm by 0.25mm 3.5 - 7mm by 0.5mm	180° arc
7.5 - 15mm	186-106	32 pairs: 7.5 - 15mm by 0.5mm	180° arc
15.5 - 25mm	186-107	30 pairs: 15.5 - 20mm by 0.5mm, 21 - 25mm by 1mm	180° arc

Inch			
Range	Order No.	Composition of leaves	Remarks
1/32" - 17/64"	186-103	16 pairs: 1/32" - 17/64" by 64ths	90° arc
1/32" - 1/4"	186-101	15 pairs: 1/32" - 1/4" by 64ths	180° arc
17/64" - 1/2"	186-102	16 pairs: 17/64" - 1/2" by 64ths	180° arc
9/32" - 33/64"	186-104	16 pairs: 9/32" - 33/64" by 64ths	90° arc
1/64" - 1/2"	186-901*	25 pairs: 1/64" - 17/64" by 64ths, 9/32" - 1/2" by 32nds	—

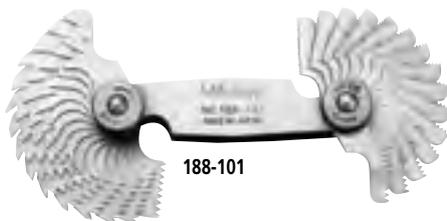
*Each gage has five measuring locations.

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 leaves
0.35 - 6mm	188-130	22 leaves: 0.35, 0.4, 0.45, 0.5, 0.6, 0.7, 0.75, 0.8, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6mm and 60° angle gage
0.4 - 7mm	188-122	21 leaves: 0.4, 0.5, 0.7, 0.75, 0.8, 0.9, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7mm
0.4 - 7mm	188-121	18 leaves: 0.4, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7mm

Unified Screw Pitch Gages

Range	Order No.	Composition of leaves
4 - 42 TPI	188-111	30 leaves: 4, 4 1/2, 5, 5 1/2, 6, 7, 8, 9, 10, 11, 11 1/2, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 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 leaves
4 - 42 TPI	188-101	30 leaves: 4, 4 1/2, 5, 5 1/2, 6, 7, 8, 9, 10, 11, 11 1/2, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42 TPI
4 - 60 TPI	188-102	28 leaves: 4, 4 1/2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 34, 36, 40, 48, 60 TPI

Digital Universal Protractor

SERIES 187

Technical Data

Range: -360° to +360°
 Tolerance: ±2" (±0.03°)
 Repeatability: 1'
 Resolution: 1' (0.01°)
 Battery: Lithium Battery
 Battery life: 2,000 hours

Function

Presetting

FEATURES

- Data output function make it easy to see the statistical data.
- Can be attached to height gages, gage holder (950750, metric)
- Setting preset value.
- Removable blade.

SPECIFICATIONS

Blade length	Order No.	Remarks (standard accessory)
150mm	187-501	Height gage holder (950750)
300mm	187-502	Height gage holder (950750)
6"	187-551	Height gage holder (950749)
12"	187-552	Height gage holder (950749)



187-501

Technical Data

Graduation: 5 min. (0° - 90° - 0°)
 Blade edge angle: 30°* 45° and 60°
 *187-901, 187-902 only

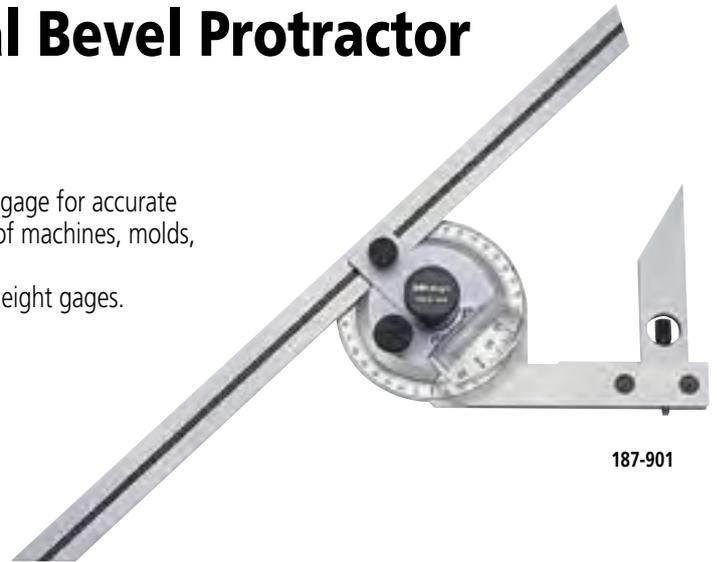


Universal Bevel Protractor

SERIES 187

FEATURES

- High-precision angle gage for accurate angle measurement of machines, molds, and jigs.
- Can be attached to height gages.



187-901

SPECIFICATIONS

Metric		
Blade length	Order No.	Remarks
150, 300mm	187-901	w/60°, 45°, 30° edges
150mm	187-907	w/60°, 45° edges
300mm	187-908	w/60°, 45° edges

Inch		
Blade length	Order No.	Remarks
6", 12"	187-902	w/60°, 45°, 30° edges
6"	187-904	w/60°, 45° edges
12"	187-906	w/60°, 45° edges

Bevel Protractor

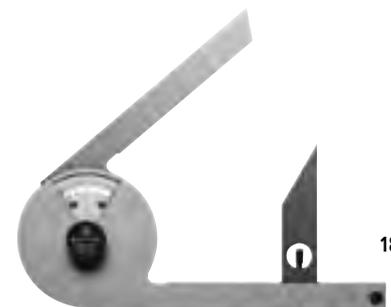
SERIES 187

FEATURES

- Consists of three sheets of stainless steel, the middle one of which is made for angle measurements.

SPECIFICATIONS

Blade length	Order No.	Remarks
135mm	187-201	w/60°, 30° edges



187-201

Technical Data

Graduation: 5 min. (0° - 90° - 0°)
 Blade edge angle: 30° and 60°

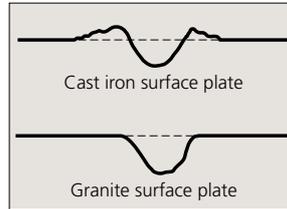
Black Granite Surface Plate

SERIES 517

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.
- Free from warping, 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.



(Refer to the page 9 for details.)

1000 x 750mm



600 x 600mm



DIMENSION

Unit: mm

W	D	H	w	d	Mass
300	300	100	240	240	27kg
450	300	100	390	240	40kg
600	450	100	500	370	80kg
600	600	130	500	500	140kg
750	500	130	630	420	146kg
1000	750	150	700	630	337kg
1000	1000	150	700	700	450kg
1500	1000	200	1100	700	900kg
2000	1000	250	1500	700	1500kg
2000	1500	300	1500	1100	2700kg
2000	2000	300	2000	1500	4200kg
3000	1500	400	1500	1100	5400kg
3000	2000	500	2000	1500	9000kg

*Suffix Number for Calibration Certificate

Suffix No.	Calibration certificate
-4	Not provided
K	Provided



Order to Made Granite Products

Mitutoyo can produce order to made granite products with your design.

SPECIFICATIONS

Grade 00		
Dimensions (W x D x H)	Order No.*	Flatness
300 x 300 x 100mm	517-401	0.002mm
450 x 300 x 100mm	517-411	0.002mm
600 x 450 x 100mm	517-414	0.0025mm
600 x 600 x 130mm	517-403	0.0025mm
750 x 500 x 130mm	517-405	0.003mm
1000 x 750 x 150mm	517-407	0.003mm
1000 x 1000 x 150mm	517-409	0.0035mm
1500 x 1000 x 200mm	517-413	0.004mm
2000 x 1000 x 250mm	517-410	0.0045mm
2000 x 1500 x 300mm	517-416	0.005mm
2000 x 2000 x 300mm	517-417	0.0055mm
3000 x 1500 x 400mm	517-418	0.0065mm
3000 x 2000 x 500mm	517-419	0.007mm

Grade 1		
Dimensions (W x D x H)	Order No.*	Flatness
300 x 300 x 100mm	517-101	0.005mm
450 x 300 x 100mm	517-111	0.006mm
600 x 450 x 100mm	517-114	0.008mm
600 x 600 x 130mm	517-103	0.008mm
750 x 500 x 130mm	517-105	0.009mm
1000 x 750 x 150mm	517-107	0.012mm
1000 x 1000 x 150mm	517-109	0.013mm
1500 x 1000 x 200mm	517-113	0.016mm
2000 x 1000 x 250mm	517-110	0.019mm
2000 x 1500 x 300mm	517-116	0.020mm
2000 x 2000 x 300mm	517-117	0.022mm
3000 x 1500 x 400mm	517-118	0.025mm
3000 x 2000 x 500mm	517-119	0.027mm

Grade 0		
Dimensions (W x D x H)	Order No.*	Flatness
300 x 300 x 100mm	517-301	0.003mm
450 x 300 x 100mm	517-311	0.003mm
600 x 450 x 100mm	517-314	0.004mm
600 x 600 x 130mm	517-303	0.005mm
750 x 500 x 130mm	517-305	0.005mm
1000 x 750 x 150mm	517-307	0.006mm
1000 x 1000 x 150mm	517-309	0.007mm
1500 x 1000 x 200mm	517-313	0.008mm
2000 x 1000 x 250mm	517-310	0.010mm
2000 x 1500 x 300mm	517-316	0.010mm
2000 x 2000 x 300mm	517-317	0.011mm
3000 x 1500 x 400mm	517-318	0.013mm
3000 x 2000 x 500mm	517-319	0.014mm



Stand

SPECIFICATIONS: Stand

Applicable surface plate size (W x D x H)	Order No.*	Adjustable height (h) range	Remarks
300 x 300 x 100mm	—	—	—
450 x 300 x 100mm	—	—	—
600 x 450 x 100mm	517-203-4 / 203R / 203CR	755 - 780mm	With levelling bolt
600 x 600 x 130mm	517-204-4 / 204R / 204CR	785 - 810mm	With levelling bolt
750 x 500 x 130mm	517-205-4 / 205R / 205CR	785 - 810mm	With levelling bolt
1000 x 750 x 150mm	517-206-4 / 206R / 206CR	755 - 780mm	With levelling bolt
1000 x 1000 x 150mm	517-207-4 / 207R / 207CR	735 - 775mm	With levelling bolt
1500 x 1000 x 200mm	517-208-4 / 208R / 208CR	735 - 775mm	With levelling bolt
2000 x 1000 x 250mm	517-209-4 / 209R / 209CR	735 - 775mm	With levelling bolt
2000 x 1500 x 300mm	517-210-4 / 210R / 210CR	735 - 775mm	With levelling bolt
2000 x 2000 x 300mm	O6AAY174	700 - 706mm	—
3000 x 1500 x 400mm	O6AAY175	700 - 706mm	—
3000 x 2000 x 500mm	O6AAY176	700 - 706mm	—

*Suffix "-4": Normal type, Suffix "R": with safety frame, Suffix "CR": with casters

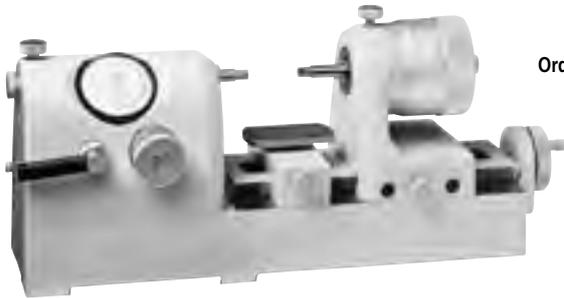
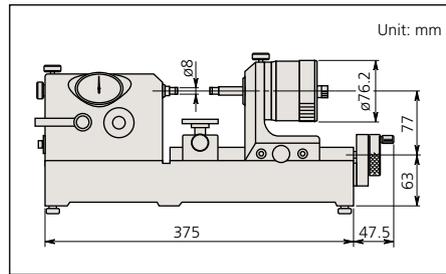
Bench Comparator

SERIES 162

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.
- $\varnothing 8\text{mm}$ (or 3/8") probe of Mitutoyo Mu-Checker can be attached for higher precision measurement if required.

DIMENSION



Order No.: 162-101 (metric)
162-102 (inch)

Technical Data

Micrometer head stroke: 25mm or 1"
Graduation: 0.001mm or .0001"
Dial indicator range: $\pm 0.1\text{mm}$ or $\pm .005"$
Maximum workpiece length: 100mm or 4"
Mass: 15kg

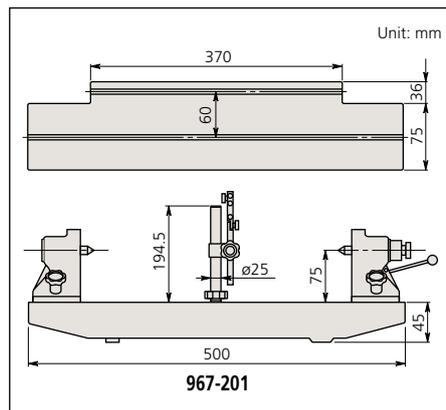
Bench Center

SERIES 967

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)

DIMENSION



Order No.: 967-201

Technical Data

Maximum workpiece dia.: 300mm
Maximum workpiece height: 150mm
Mass: 13kg

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Digimatic Indicator



Dial Indicator



Dial Test Indicator



**Dial Indicator
Application and
Stand**

New Products



ID-H

20465

2109S-10

ID-N / ID-B

Caliper gage

ABSOLUTE Digimatic Indicator ID-S

SERIES 543 — with Economical Design

FEATURES

- As compact as standard Series 2 dial indicators.
- The ID-S 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.
- SPC data output.

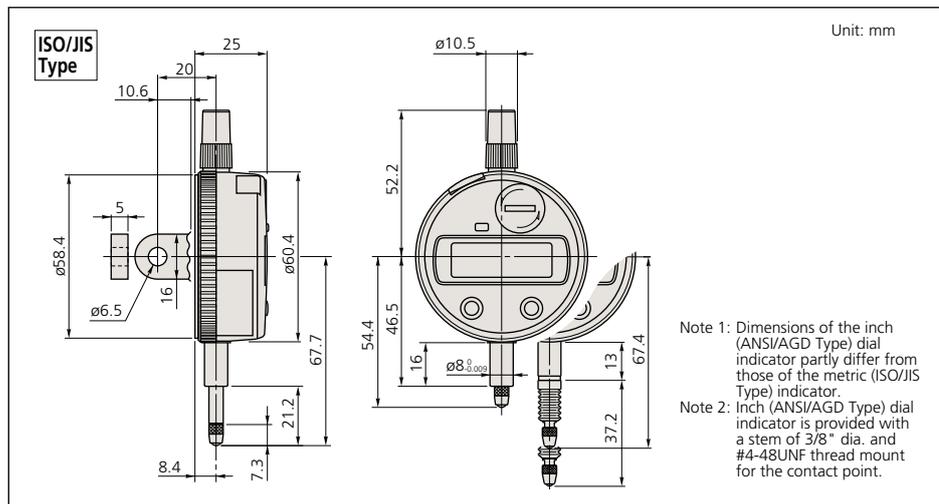


SPECIFICATIONS

Metric		ISO/JIS type	ANSI/AGD type			
Resolution	Order No. (w/ lug, flat-back)	Range	Accuracy	Measuring force	Remarks	
0.001mm	543-690	543-690B	12.7mm	0.003mm	2.0N or less	—
0.001mm	543-694	543-694B	12.7mm	0.003mm	2.5N or less	Dust-proof
0.01mm	543-681	543-681B	12.7mm	0.02mm	2.0N or less	—

Inch/Metric		ISO/JIS type	ANSI/AGD type			
Resolution	Order No. (w/ lug, flat-back)	Range	Accuracy	Measuring force	Remarks	
.00005"/0.001mm	543-691	543-691B	.5"	.00012"	2.0N or less	—
.00005"/0.001mm	543-695	543-695B	.5"	.00012"	2.5N or less	Dust-proof
.00005"/0.001mm	543-692	543-692B	.5"	.00012"	2.0N or less	—
.00005"/0.001mm	543-696	543-696B	.5"	.00012"	2.5N or less	Dust-proof
.0001"/0.001mm	543-693	543-693B	.5"	.00012"	2.0N or less	—
.0005"/0.01mm	543-682	543-682B	.5"	.0008"	2.0N or less	—
.0005"/0.01mm	543-683	543-683B	.5"	.0008"	2.0N or less	—

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)

Resolution: 0.01mm, 0.001mm, .0005"/0.01mm, .0001"/0.001mm or .00005"/0.001mm

Display: LCD

Length standard: ABSOLUTE electrostatic capacitance type linear encoder

Max. response speed: Unlimited

Measuring force: Refer to the list of specifications

Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type) Carbide ball with #4-48UNF (ANSI/AGD type)

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

Battery life: Approx. 20,000 hours under normal use

Dust/Water protection level: IP42 (IP53: **543-694, 543-695, 543-696**)

Function

Origin-set, Zeroset, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)

Alarm: Low voltage, Counting value composition error, Over-flow error

Optional Accessory

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)

02ACB610: Back with post

02ACB630: Adjustable back

02ACB640: Back with offset lug

02ACB650: Magnetic back

02ACB670: Back with screw mount

02ACB680: Back with adjustable bracket

—: Contact points (See page 264.)



Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

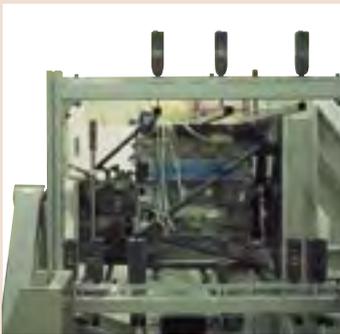
Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm,
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Measuring force: Refer to the list of specifications
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type) Carbide ball with #4-48UNF (ANSI/AGD type)
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 20,000 hours under normal use
 Dust/Water protection level: IP42

Function

Origin-set, Zeraset, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error

Optional Accessory

905338: SPC cable (1m)
905409: SPC cable (2m)
540774: Spindle lifting cable (stroke: 10mm)
 —: Contact points (See page 264.)



Application example

ABSOLUTE Digimatic Indicator ID-U

SERIES 575 — with Slime and Economical Design

FEATURES

- Slim type digital indicator with low price.
- Large LCD and simple key operation.
- The ID-U displays the absolute position of the spindle from the origin point at power-on.
- After the initial origin setting, the ID-U 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.



575-121



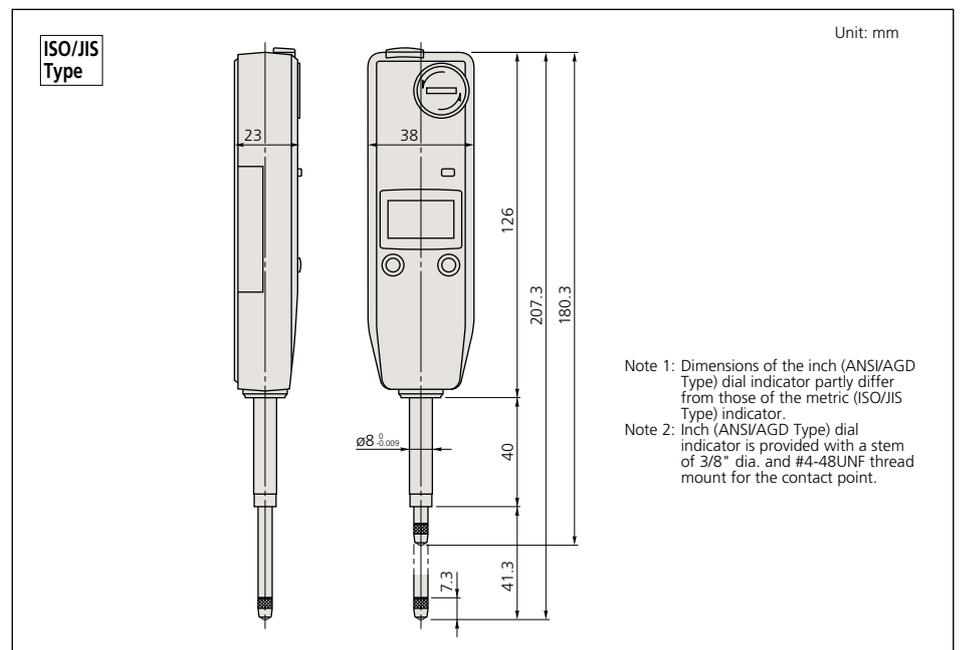
SPECIFICATIONS

Metric		ISO/JIS type	ANSI/AGD type
Resolution	Order No. (w/ lug, flat-back)	Range	Accuracy
0.01mm	—	575-121	25.4mm
			0.02mm
			Measuring force
			1.8N or less
			Remarks
			—

Inch/Metric

Resolution	Order No. (w/ lug, flat-back)	Range	Accuracy	Measuring force	Remarks
.0005"/0.01mm	—	575-122	1"	.0008"	1.8N or less
.0005"/0.01mm	—	575-123	1"	.0008"	1.8N or less

DIMENSION



ABSOLUTE Digimatic Indicator ID-C

SERIES 543 — Standard Type

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 ID-C indicator face can be rotated 330° to an appropriate angle for easy reading.
- With SPC data output.



SPC

ABSOLUTE[®]
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01mm, 0.001mm, .0005"/0.01mm, .0001"/0.001mm or .00005"/0.001mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Measuring force: Refer to the list of specifications
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with #4-48UNF (ANSI/AGD type)
 Carbide ball with #4-48UNF (ANSI/AGD type)
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 5,000 hours under normal use
 Dust/Water protection level: IP42 or IP53 (dust-proof type)

Function

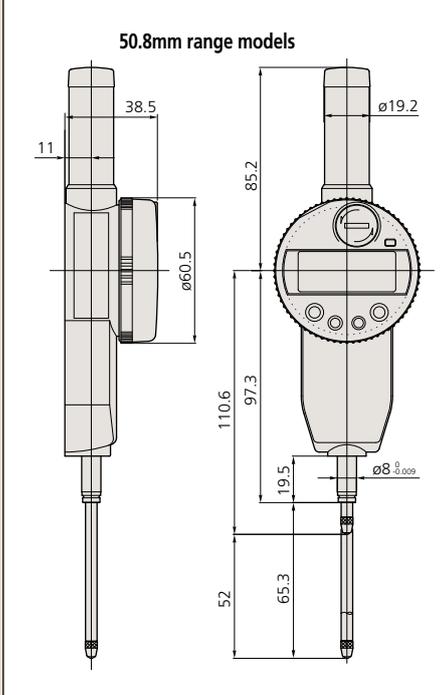
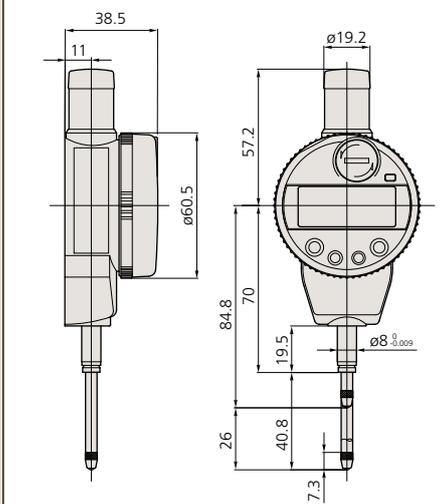
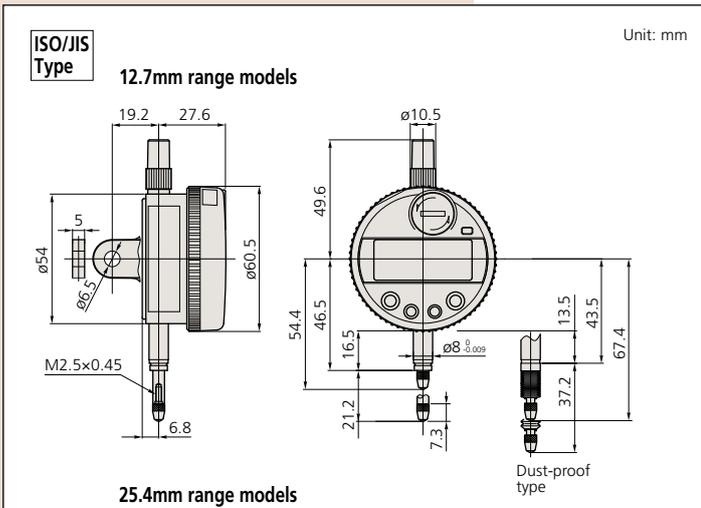
Origin-set/Preset, Zeroset, GO/±NG judgment, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

905338: SPC cable (1m)
905409: SPC cable (2m)
902011: Spindle lifting lever (ISO/JIS type)*
902794: Spindle lifting lever (ANSI/AGD type)*
137693: Spindle lifting hook**
540774: Spindle lifting cable
125317: Spare rubber boot (for dust-proof type)
02ACA571: Auxiliary spindle spring for 25mm/1" models***
02ACA773: Auxiliary spindle spring for 50mm/2" models***
 _____: Backs (See page 266.)
 _____: Contact points (See page 264.)

*Can be used on 12mm/.5" models only.
 **Can be used on 25mm/1" or 50mm/2" models.
 ***Required when orienting the indicator upside down.

DIMENSION



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 type	ANSI/AGD type		
Resolution	Order No. (w/ lug, flat-back)	Range	Accuracy	Measuring force	Remarks
0.001mm	543-250 543-250B	12.7mm	0.003mm	1.5N or less	—
0.001mm	543-257 543-257B	12.7mm	0.003mm	2.0N or less	Dust-proof
0.001mm	543-254 543-254B	12.7mm	0.003mm	0.4N - 0.7N	Low measuring force
0.001mm	— 543-450B	25.4mm	0.003mm	1.8N or less	—
0.001mm	— 543-460B	50.8mm	0.006mm	2.3N or less	—
0.01mm	543-290 543-290B	12.7mm	0.005mm	1.5N or less	—
0.01mm	543-270 543-270B	12.7mm	0.02mm	0.9N or less	—
0.01mm	543-277 543-277B	12.7mm	0.002mm	2.0N or less	Dust-proof
0.01mm	543-274 543-274B	12.7mm	0.002mm	0.2N - 0.5N	Low measuring force
0.01mm	— 543-457B	25.4mm	0.005mm	1.8N or less	—
0.01mm	— 543-454B	25.4mm	0.03mm	1.8N or less	—

Inch/Metric		ISO/JIS type	ANSI/AGD type		
Resolution	Order No. (w/ lug, flat-back)	Range	Accuracy	Measuring force	Remarks
.00005"/0.001mm	543-251 543-251B	.5"	.00012"	1.5N or less	—
.00005"/0.001mm	543-252 543-252B	.5"	.00012"	1.5N or less	—
.00005"/0.001mm	543-258 543-258B	.5"	.00012"	2.0N or less	Dust-proof
.00005"/0.001mm	543-259 543-259B	.5"	.00012"	2.0N or less	Dust-proof
.00005"/0.001mm	543-255 543-255B	.5"	.00012"	0.4N - 0.7N	Low measuring force
.00005"/0.001mm	543-256 543-256B	.5"	.00012"	0.4N - 0.7N	Low measuring force
.00005"/0.001mm	— 543-451B	1"	.00012"	1.8N or less	—
.00005"/0.001mm	— 543-452B	1"	.00012"	1.8N or less	—
.00005"/0.001mm	— 543-461B	2"	.00025"	2.3N or less	—
.00005"/0.001mm	— 543-462B	2"	.00025"	2.3N or less	—
.0001"/0.001mm	543-253 543-253B	.5"	.00012"	1.5N or less	—
.0001"/0.001mm	— 543-453B	1"	.00012"	1.8N or less	—
.0001"/0.001mm	— 543-463B	2"	.00025"	2.3N or less	—
.0005"/0.01mm	543-291 543-291B	.5"	.0002"	1.5N or less	—
.0005"/0.01mm	543-292 543-292B	.5"	.0002"	1.5N or less	—
.0005"/0.01mm	543-271 543-271B	.5"	.0008"	0.9N or less	—
.0005"/0.01mm	543-272 543-272B	.5"	.0008"	0.9N or less	—
.0005"/0.01mm	543-278 543-278B	.5"	.0008"	2.0N or less	Dust-proof
.0005"/0.01mm	543-279 543-279B	.5"	.0008"	2.0N or less	Dust-proof
.0005"/0.01mm	543-275 543-275B	.5"	.0008"	0.2N - 0.5N	Low measuring force
.0005"/0.01mm	543-276 543-276B	.5"	.0008"	0.2N - 0.5N	Low measuring force
.0005"/0.01mm	— 543-458B	1"	.0002"	1.8N or less	—
.0005"/0.01mm	— 543-459B	1"	.0002"	1.8N or less	—
.0005"/0.01mm	— 543-455B	1"	.0012"	1.8N or less	—
.0005"/0.01mm	— 543-456B	1"	.0012"	1.8N or less	—
.0005"/0.01mm	— 543-465B	2"	.0016"	2.3N or less	—
.0005"/0.01mm	— 543-466B	2"	.0016"	2.3N or less	—

ABSOLUTE Digimatic Indicator ID-C

SERIES 543 — Calculation Type

FEATURES

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.

- 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.



543-285B

SPECIFICATIONS

Metric			
Resolution	Order No.*	Range	Accuracy
0.0002 - 1mm (switchable)	543-285B	12.7mm	0.003mm
	543-480B	25.4mm	0.003mm
	543-485B	50.8mm	0.006mm

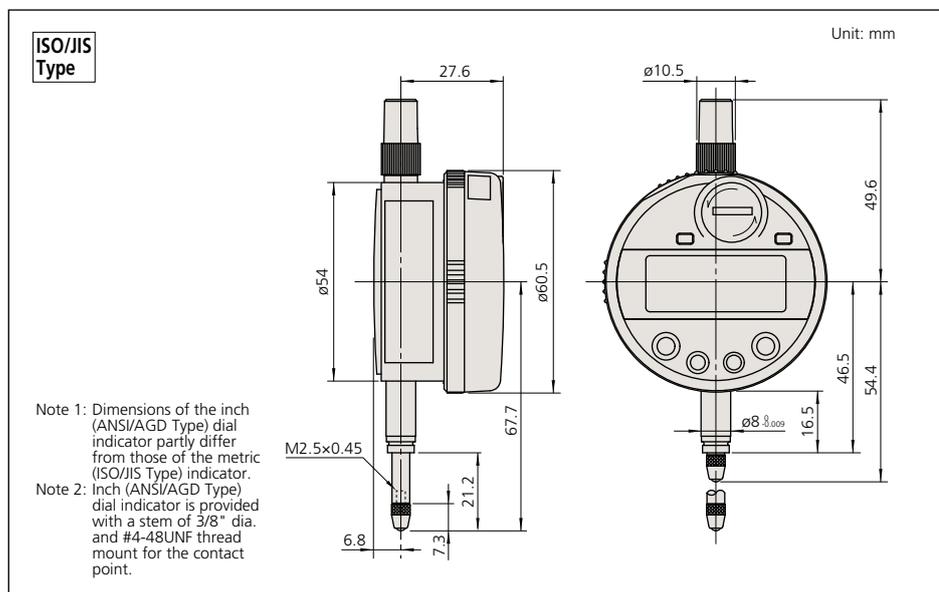
*Flat back

ISO/JIS type ANSI/AGD type

Inch/Metric			
Resolution	Order No.*	Range	Accuracy
.00001" - .05"/ 0.0002 - 1mm (switchable)	543-286B	.5"	.00012"
	543-287B	.5"	.00012"
	543-481B	1"	.00012"
	543-482B	1"	.00012"
	543-486B	2"	.00025"
	543-487B	2"	.00025"

*Flat back

DIMENSION



(Refer to the page 9 for details.)

Technical Data

- Accuracy: Refer to the list of specifications (excluding quantizing error)
- Resolution: 0.0002mm - 1mm or .00001" - .05"/0.0002mm - 1mm
- Display: LCD
- Length standard: ABSOLUTE electrostatic capacitance type linear encoder
- Max. response speed: Unlimited
- Measuring force: 1.5N or less
- Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
- Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type) Carbide ball with #4-48UNF (ANSI/AGD type)
- Battery: SR44 (1 pc.), 938882
- Battery life: Approx. 12 months under normal use

Function

- Origin-set/Pre-set, Zero-set, GO/±NG judgment, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
- Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

- 905338: SPC cable (1m)
- 905409: SPC cable (2m)
- 902011: Spindle lifting lever (ISO/JIS type)
- 540774: Spindle lifting cable
- : Backs (See page 266.)
- : Contact points (See page 264.)

APPLICATIONS



- Various fixtures suited for individual workpieces can be prepared.
- Measuring accuracy is subject to fixture accuracy



(Refer to the page 9 for details.)

ABSOLUTE[®]

Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.001mm, .00005"/0.001mm or .0001"/0.001mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Measuring force: 2.0N or less
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type) Carbide ball with #4-48UNF (ANSI/AGD type)
 Power supply: DC 12 - 24V±10%
 Dust/Water protection level: IP54

Function

Data output (-NG/OK/NG signal, NPN open collector), Remote control (hold-preset, preset-recall, zero-set), Origin-set/Preset, Zero-set, GO/±NG judgment, Max/Min/Runout value holding, Counting direction switching, Power ON/OFF, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

902011: Spindle lifting lever* (ISO/JIS type)
 902794: Spindle lifting lever* (ANSI/AGD type)
 540774: Spindle lifting cable*
 125317: Rubber boot
 —: Backs (See page 266.)
 —: Contact points (See page 264.)

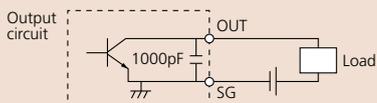
*When using the spindle lifting lever/cable, IP54 is not guaranteed.

Output pattern

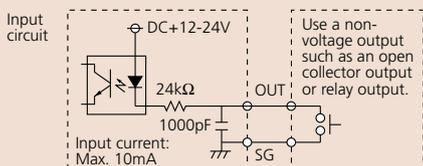
Wire	- NG	OK	+ NG	Composition error
Orange (- NG)	Low	High	High	High
Green (OK)	High	Low	High	High
Brown (+ NG)	High	High	Low	High
LED	Red	Green	Red	Red (blinking)
LCD	<	O	>	" x.xxE" indication

I/O Specifications

Wire	Signal	I/O	Description
Black	- V (GND)	—	Connected to minus (-) terminal
Red	+ V (GND)	I	Power supply (12 - 24VDC)
Orange	- NG	O	Tolerance judgment result output: Only the terminal corresponding to a judgment result is set to the below level.
Green	OK	O	
Brown	+ NG	O	
Yellow	PRESET_RECALL ZERO	I	External input terminal: If the relevant terminal is set to the low level, its signal becomes true.
Blue	HOLD_RESET	I	
Shield	FG	—	Connected to GND



Output voltage: Max. 24V
 Output current: Max. 30mA
 Output saturated voltage: Max. 0.3V



Use a non-voltage output such as an open collector output or relay output.
 Input current: Max. 10mA

ABSOLUTE Digimatic Indicator ID-C

SERIES 543 — with Green/Red LED and GO/NG Signal Output Function

FEATURES

- With the max./min. value holding function, the signal ID-C 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.
- 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.
- Employing the ABSOLUTE linear encoder, the Signal ID-C always displays the spindle "Absolute Position" from the origin at power-on. Also unlimited response speed eliminates over-speed errors.
- The Signal ID-C achieves the IP54 protection level to resist dust and contaminants for safe operation in harsh machine shop environments.



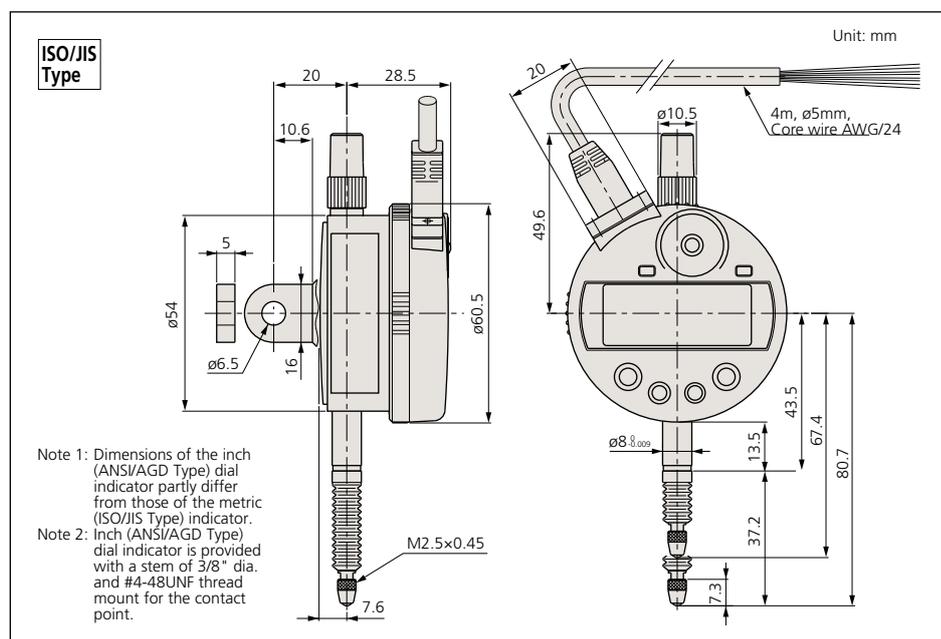
543-280

SPECIFICATIONS

Metric	Resolution		Range	Accuracy	Measuring force	Remarks
	ISO/JIS type	ANSI/AGD type				
Resolution	0.001mm	0.001mm	12.7mm	0.003mm	2.0N or less	—
Order No. (w/ lug, flat-back)	543-280	543-280B				

Inch/Metric	Resolution		Range	Accuracy	Measuring force	Remarks
	ISO/JIS type	ANSI/AGD type				
Resolution	.00005"/0.001mm	.00005"/0.001mm	.5"	.00012"	2.0N or less	—
Order No. (w/ lug, flat-back)	543-281	543-281B				
Resolution	.00005"/0.001mm	.00005"/0.001mm	.5"	.00012"	2.0N or less	—
Order No. (w/ lug, flat-back)	543-282	543-282B				
Resolution	.0005"/0.01mm	.0005"/0.01mm	.5"	.00012"	2.0N or less	—
Order No. (w/ lug, flat-back)	543-283	543-283B				

DIMENSION



ABSOLUTE Digimatic Indicator ID-C

SERIES 543 — with Max./Min. Value Holding Function

With max./min. value holding function model of the ID-C Series Digimatic Indicators.

FEATURES

- The maximum, minimum, or runout value can be displayed during measurement.
- 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.



543-262

SPECIFICATIONS

Metric			
Resolution	Order No.*	Range	Accuracy
0.001mm	543-260	12.7mm	0.003mm

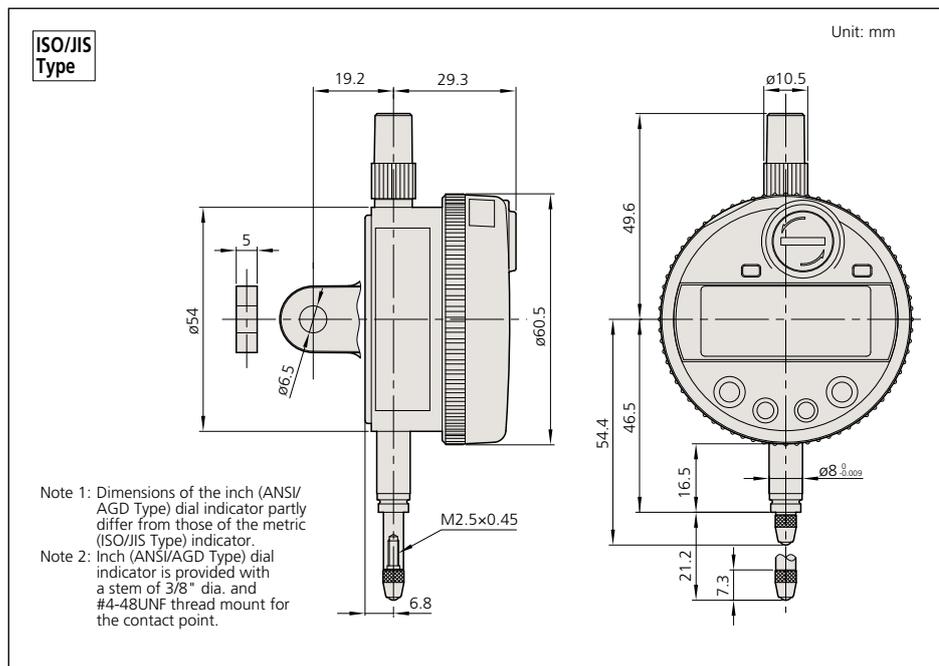
*Back with lug

ISO/JIS type ANSI/AGD type

Inch/Metric			
Resolution	Order No.*	Range	Accuracy
.00005"/0.001mm	543-261	.5"	.00012"
.00005"/0.001mm	543-262	.5"	.00012"
.00005"/0.001mm	543-263	.5"	.00012"

*Back with lug

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.001mm, .00005"/0.001mm or .0001"/0.001mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Measuring force: 1.5N or less
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type) Carbide ball with #4-48UNF (ANSI/AGD type)
 Battery: SR44 (2 pcs.), 938882
 Battery life: Approx. 800 - 1300 hours under normal use
 Dust/Water protection level: IP42

Function

Origin-set/Preset, Zeroset, GO/±NG judgment, Max/Min/Runout value holding, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

- 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
- Backs (See page 266.)
- Contact points (See page 264.)



Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.001mm or .00005"/0.001mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Measuring force: 1.5N or less
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type)
 Carbide ball with #4-48UNF (ANSI/AGD type)
 Battery: SR44 (2 pcs.), **938882**
 Battery life: Approx. 2000 hours under normal use
 Dust/Water protection level: IP42

Function

Origin-set/Preset, Zeroset, GO/±NG judgment, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

905338: SPC cable (1m)
905409: SPC cable (2m)
526-170: Bore gage probe (0.95 - 1.55mm)
526-160: Bore gage probe (1.5 - 4.0mm)
526-150: Bore gage probe (3.7 - 7.3mm)
526-101: Bore gage probe (7.0 - 10.0mm)
526-102: Bore gage probe (10 - 18mm)
526-126: Bore gage probe (18 - 35mm)
526-127: Bore gage probe (35 - 60mm)
526-132: Bore gage probe (50 - 150mm)



Installed on bore gage probe (511-127)

ABSOLUTE Digimatic Indicator ID-C

SERIES 543 — Specially Designed for Bore Gage Application

This ID-C Series Digimatic Indicators are exclusively designed for ID measurement.

FEATURES

- The minimum value holding function provides the easy of detection of hole diameter.
- 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.



543-264B

SPECIFICATIONS

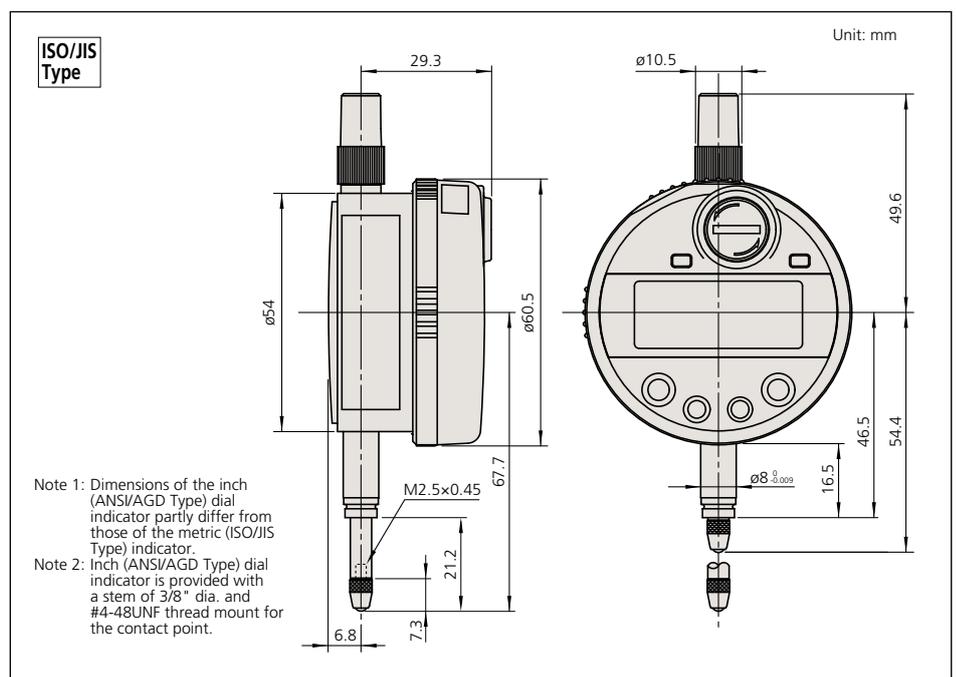
Metric			
Resolution	Order No.*	Range	Accuracy
0.001mm	543-264B	12.7mm	0.003mm

*Back with lug

Inch/Metric			
Resolution	Order No.*	Range	Accuracy
.00005"/0.001mm	543-266B	.5"	.00012"

*Back with lug

DIMENSION



ABSOLUTE Digimatic Indicator ID-H

SERIES 543 — High Accuracy and High Functional Type

FEATURES

- This new-generation digital indicator offers the excellent accuracy and functionality expected from this class of indicator. Take advantage of its high accuracy backed up by 0.5μm / .00002" resolution, remote control functionality via a handheld controller (or an RS-232C interface) and easy runout measurements with the well-established analog bar display.
- The maximum, minimum, or runout value can be displayed during measurement.
- 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.
- With SPC data output.
- With RS-232C input/output



Remote controller (optional)



543-561

543-563

SPECIFICATIONS

Metric			
Resolution	Order No.*	Range	Accuracy
0.0005mm, 0.001mm	543-561	30.4mm	0.0015mm
	543-563	60.9mm	0.0025mm

* To denote your AC line voltage add the following suffixes to the order No.
A for 120V **K** for 100V **D** for 220V **E** for 240/220V **DC** for China
No suffix is required for 100V

Inch/Metric			
Resolution	Order No.*	Range	Accuracy
.00005", .0001", 0.0005mm, 0.001mm	543-562	1.2"	0.0015mm
	543-564	2.4"	0.0025mm

* To denote your AC line voltage add the following suffixes to the order No.
A for 120V **K** for 100V **D** for 220V **E** for 240/220V **DC** for China
No suffix is required for 100V

Tolerance judgment



Analog bar display



Max/Min value measurement



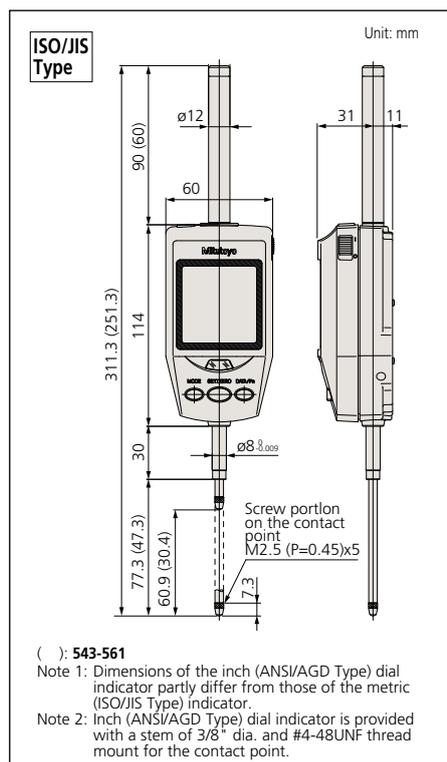
Runout measurement



Resolution switching



DIMENSION



(Refer to the page 9 for details.)

Technical Data

- Accuracy: Refer to the list of specifications (excluding quantizing error)
- Resolution: 0.0005mm/0.001mm or .00002"/.00005"/.0001"/0.0005mm/0.001mm
- Display: LCD
- Length standard: Linear encoder
- Max. response speed: 1000mm/s
- Measuring force: 2.0N/2.5N* or less (*60mm range models)
- Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
- Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type)
Carbide ball with #4-48UNF (ANSI/AGD type)
- Power supply: 6V DC (via AC adaptor)

Function

- Origin-set/Presets, Zeroset, GO/±NG judgment, Max/Min value hold, Runout measurement, Resolution switching, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
- Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

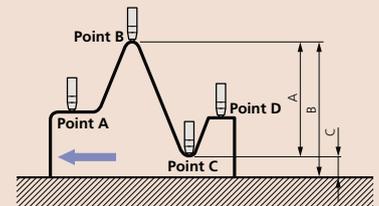
- 936937: SPC cable (1m)
- 965014: SPC cable (2m)
- 21EAA131: RS-232C cable (2m)
- 21EZA099: Remote controller
- 540774: Spindle lifting cable (stroke: 30mm)
- 21EZA101: Spindle lifting knob
- 264-504: Digimatic Min-processor DP-1VR
- 543-004: Digimatic presetter
- 215-154: Granite comparator stand
- 215-504: Comparator stand
- 215-821: Comparator stand
- Backs (See page 266.)
- Contact points (See page 264.)

*Required when orienting the indicator upside down.

Application

Difference/Runout measurement

Example: Indicator travel from points A to D
 Difference (or Total Runout) is displayed as A. Dimensions B (maximum value) and C (minimum value) can be recalled from memory with a simple key sequence.





Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01mm/0.001mm or .00005"/.0001"/.0005"/.001"/0.001mm/0.01mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Measuring force: 1.8N/2.3N* or less (*50mm range models)
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type) Carbide ball with #4-48UNF (ANSI/AGD type)
 Power supply: 9V DC (via AC adaptor)

Function

Origin-set/Preset, Zeroset, GO/±NG judgment, Max/Min value hold, Runout measurement, Resolution switching, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

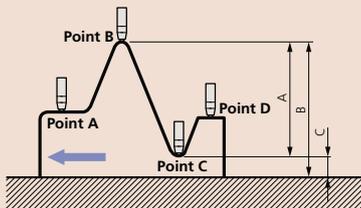
936937: SPC cable (1m)
 965014: SPC cable (2m)
 21EAA131: RS-232C cable (2m)
 540774: Spindle lifting cable (stroke: 10mm)
 02ACA571: Auxiliary spindle spring for 25mm/1" models*
 02ACA773: Auxiliary spindle spring for 50mm/2" models*
 264-504: Digimatic Min-processor DP-1VR
 543-004: Digimatic presetter
 215-154: Granite comparator stand
 215-504: Comparator stand
 215-821: Comparator stand
 —: Backs (See page 266.)
 —: Contact points (See page 264.)
 *Required when orienting the indicator upside down.

Application

Difference/Runout measurement

Example: Indicator travel from points A to D

Difference (or Total Runout) is displayed as A. Dimensions B (maximum value) and C (minimum value) can be recalled from memory with a simple key sequence.



ABSOLUTE Digimatic Indicator ID-F

SERIES 543 — with Back-lit LCD Screen

FEATURES

- 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.
- 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 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.
- With SPC data output.



SPECIFICATIONS

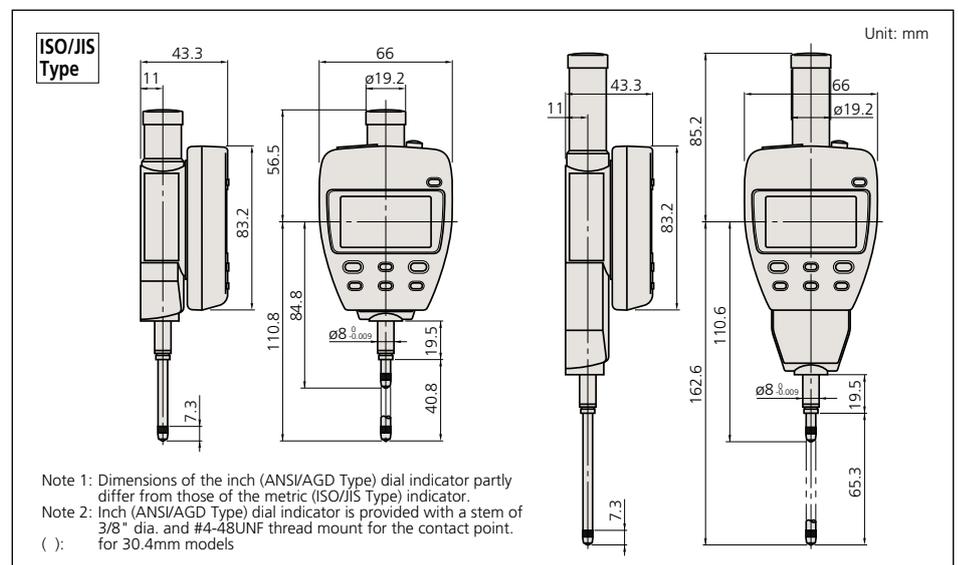
Metric			
Resolution	Order No.*	Range	Accuracy
0.001mm, 0.01mm	543-551	25mm	0.003mm
	543-557	50mm	0.003mm
	543-553	50mm	0.006mm

* To denote your AC line voltage add the following suffixes to the order No.
 A for 120V K for 100V D for 220V E for 240/220V DC for China
 No suffix is required for 100V

Inch/Metric			
Resolution	Order No.*	Range	Accuracy
.00002", .00005", .0001", .0005", .001", 0.001mm, 0.01mm	543-552	1"	.00012"
	543-558	2"	.00012"
	543-554	2"	.00024"

* To denote your AC line voltage add the following suffixes to the order No.
 A for 120V K for 100V D for 220V E for 240/220V DC for China
 No suffix is required for 100V

DIMENSION



ABSOLUTE Digimatic Indicator ID-N / B

SERIES 543 — with Dust/Water Protection Conforming to IP66

FEATURES

- Proven ABSOLUTE sensor.
- Rated to IP66 water- and dust-proofing standard and oil resistance improved.
- Slim body design is advantageous for multi-point measurements.
- Improvement in workability with the LCD readout-rotation function.
- Back plunger design (ID-B).
- Built-in tolerance judgment function.
- Switchable resolution.
- Waterproof data output connector.
- Built-in hold/preset function



Slim type ID-N
543-552

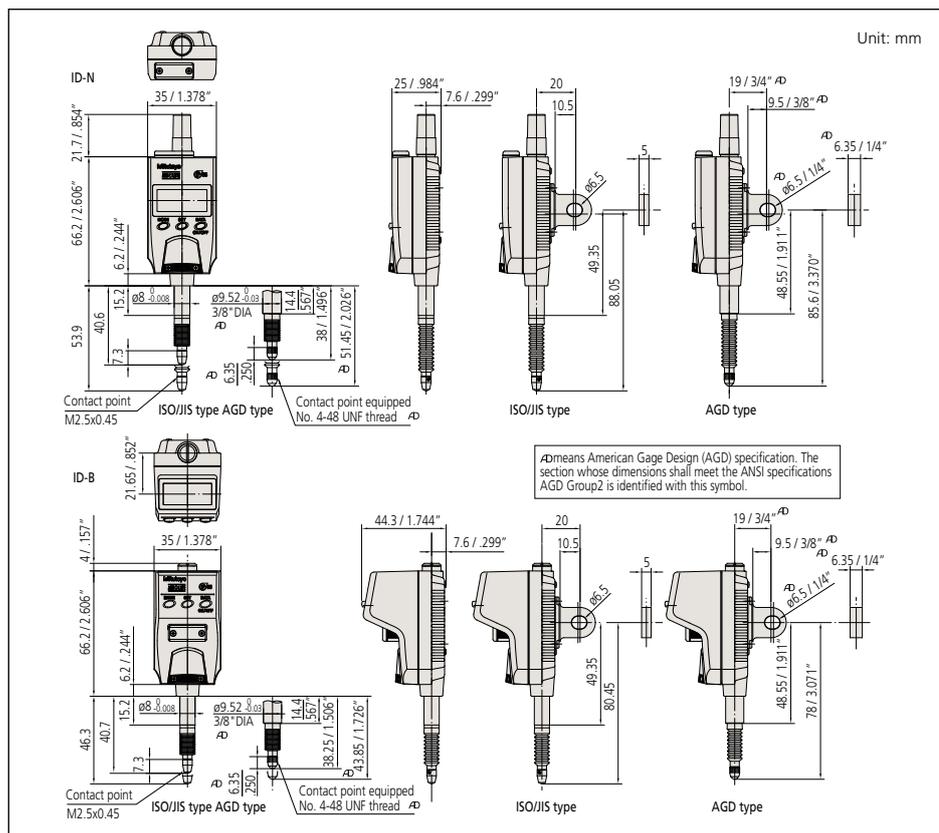
Back plunger type ID-B
543-552

SPECIFICATIONS

Metric				
Resolution	Order No.	Range	Accuracy	Remarks
0.01mm	543-570	12.7mm	0.02mm	Slim type ID-N
0.01mm	543-580	5.0mm	0.02mm	Back plunger type ID-B
0.01mm / 0.001mm	543-575	12.7mm	0.01mm / 0.003mm	Slim type ID-N
0.01mm / 0.001mm	543-585	5.0mm	0.01mm / 0.003mm	Back plunger type ID-B

Inch/Metric				
Resolution	Order No.	Range	Accuracy	Remarks
.0005", 0.01mm	543-570	.5"	.0008"	Slim type ID-N
	543-580	.2"	.0008"	Back plunger type ID-B
0.01mm / 0.001mm	543-575	.5"	.0004" / .00012"	Slim type ID-N
.0005" / .00005"	543-585	.2"	.0004" / .00012"	Back plunger type ID-B

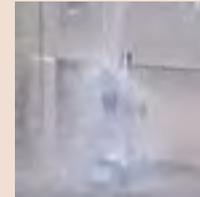
DIMENSION



(Refer to the page 9 for details.)



(Refer to the page 9 for details.)



Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)

Resolution: 0.01mm, 0.01mm/0.001mm, .0005"/0.01mm or .0005"/.00005"/0.01mm/0.001mm

Display: LCD

Length standard: ABSOLUTE electrostatic capacitance type linear encoder

Max. response speed: Unlimited

Measuring force: 2.5N (2.0N: Back plunger type)

Stem dia.: 8mm (3/8": inch/metric models)

Contact point: Carbide ball with M2.5x0.45 (#4-48UNF: inch/metric models)

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

Battery life: Approx. 7000 hours under normal use

Dust/Water protection level: IP66

Function

Zero-setting, Presetting, Direction switching, Tolerance judgment, Display hold, Data output, inch/mm conversion (inch/mm models)

Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

- 21EZA105: Lifting knob (for ISO/JIS model)
 - 21EZA150: Lifting knob (for AGD model)
 - 21EZA145: Lug (for JIS/ISO model)
 - 21EZA146: Lug (for AGD model)
 - 02ACA376: Rubber boot (for ID-N, NBR)
 - 238774: Rubber boot (for ID-N, silicon)
 - 125317: Rubber boot (for ID-B, NBR)
 - 21EAA212: Rubber boot (for ID-B, silicon)
 - 21EAA194: Connecting cable (1m)
 - 21EAA190: Connecting cable (2m)
 - 21EAA210: Bifurcated connecting cable with zero-setting terminal (1m)
 - 21EAA211: Bifurcated connecting cable with zero-setting terminal (2m)
- : Contact points (See page 264.)



EC Counter

SERIES 543 — Low-cost, Assembly, Type Display Unit

FEATURES

- Employed the DIN size (96 X 48mm) and mount-on-panel configuration, which greatly facilitates the incorporation into a system.
- Possible to produce either tolerance judgment output or Digimatic output.

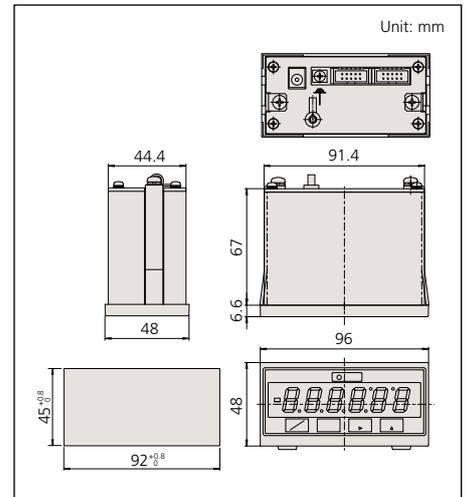


EC Counter

Order No.: 542-007

Function: Preset, GO/±NG judgment

DIMENSION



Multi-Unit, Difference/Sum Unit

SERIES 572 — For Multi-gage Measurements



Multi-Unit

Order No. 572-052*

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **519-351A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

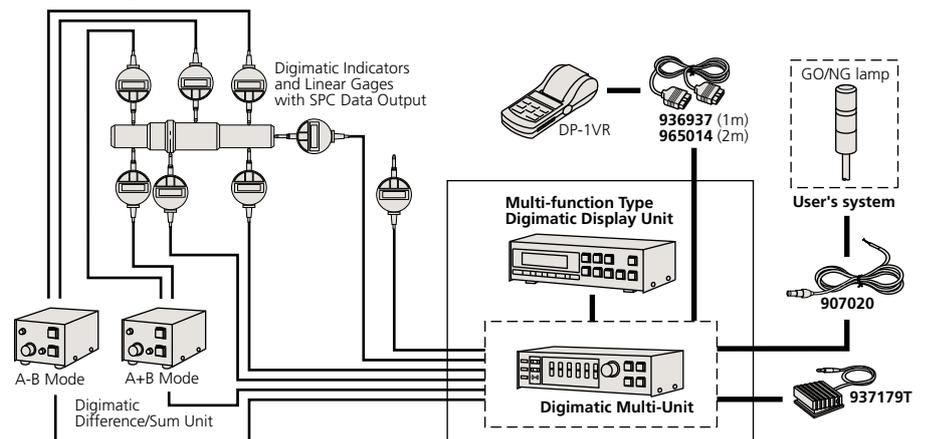


Difference/Sum Unit

Order No. 572-041*

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **519-351A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

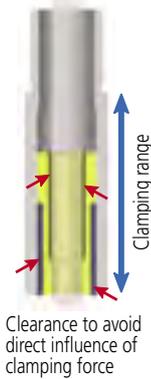
System Diagram



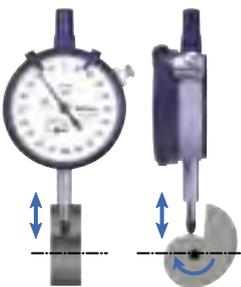
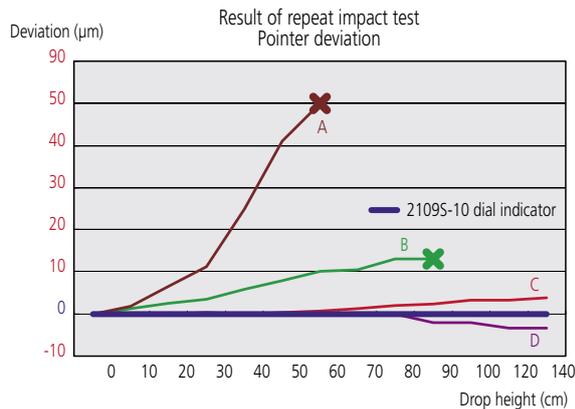
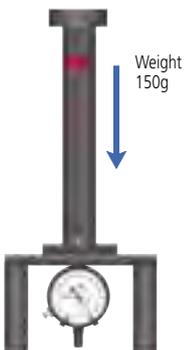
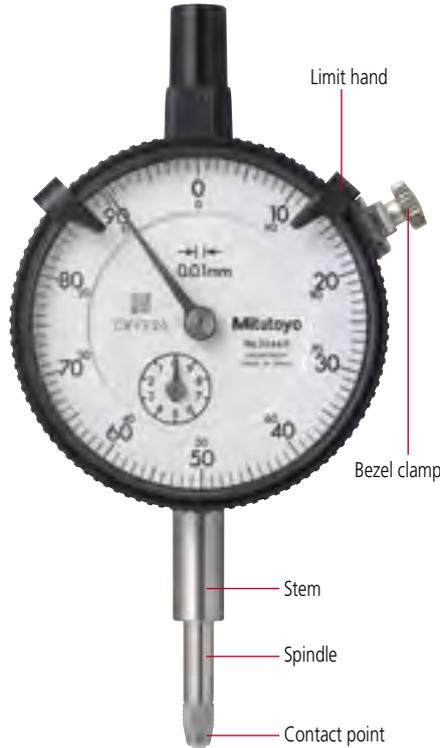
Dial Indicator

FEATURES: S Series

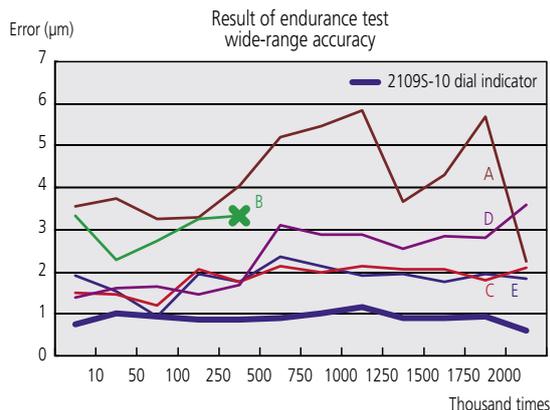
- Revolutionary stem-bush design for trouble free stem clamping (longer clamping range).
- No through screw-hole on the frame for high dust-resistance.



- Involute curved lifting lever for smooth movement of spindle and dovetail joint for tool-less connection.
- Grater rigidity in the bearing plate for reducing the retracing error (20%) and 4-screw mounting for increasing impact resistance.



Endurance testing with cam
Rotation speed: 120rpm



Description of Icon

Icon	Description
	Reverse reading type suitable for depth and step measurement.
	One revolution type for easy and error-free reading
	Double scale spacing type, easy-on-the-eyes
	Shockproof type
	Waterproof type
	With damper at lowest rest point
	Jeweled bearing type
	Peak retaining type
	Long stem type
	Dustproof type
	With coaxial revolution counter
	Back plunger type
	Adjustable hand type
	Double-face type

Dial Indicator

SERIES 1 — Compact One Revolution Type for Error-free Reading



(Refer to the page 9 for details.)



One revolution type



1929F-62

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. An unique shock-proof mechanism is incorporated, providing improved immunity to shock due to sudden spindle retraction caused by high impact.



1929F
1929F-60
1929F-62



1900F
1900F-60
1900F-62

- Shockproof type
- Dustproof type
- Waterproof type
- Jeweled bearing type

SPECIFICATIONS

Graduation	Order No.		Range (range/full stroke)	Accuracy	Dial reading	Measuring force	ISO/JIS type				
	w/ lug	Flat-back									—
0.01mm	1929F	1929FB	1mm / 1.4mm	±11µm	50-0-50	1.4N or less	✓	—	—	—	—
0.01mm	1929F-60	1929FB-60	1mm / 1.4mm	±11µm	50-0-50	1.4N or less	✓	—	✓	—	—
0.01mm	1929F-62	1929FB-62	1mm / 1.4mm	±11µm	50-0-50	1.4N or less	✓	✓	—	—	—
0.001mm	1900F	1900FB	0.1mm / 0.14mm	±6µm	50-0-50	1.5N or less	✓	—	—	✓	—
0.001mm	1900F-60	1900FB-60	0.1mm / 0.14mm	±6µm	50-0-50	1.5N or less	✓	—	✓	✓	—
0.001mm	1900F-62	1900FB-62	0.1mm / 0.14mm	±6µm	50-0-50	1.5N or less	✓	✓	—	✓	—
0.01mm	1960*	—	1mm / 1.27mm	±14µm	50-0-50	1.4N or less	✓	—	—	—	—

Graduation	Order No.		Range (range/full stroke)	Accuracy	Dial reading	Measuring force	ANSI/AGD type				
	w/ lug	Flat-back							—	—	—
.0005"	1909F-62	1909FB-62	.04" / .055"	±.0005"	20-0-20	1.4N or less	✓	✓	—	—	—
.0001"	1910F-72	1910FB-72	.006" / .0079"	±.0001"	3-0-3	1.4N or less	✓	✓	—	—	—
.001"	1961*	—	.04" / .05"	±.001"	20-0-20	1.4N or less	✓	—	—	—	—

*Back plunger type (see page 262.)

Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)

DIMENSION

ISO/JIS Type

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
1929F	47.5	13	14
1929F	55.5	11.5	23.5
1929F-62	47.5	13	14
1900F	53.5	16	17
1900F-60	54.5	11.5	22.5
1900F-62	53.5	16	17

Dial Indicator

SERIES 1 — Compact Type

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.



1911



1911



1003



1040F



1913-10



1044F-60



1013F



1003



(Refer to the page 9 for details.)

Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)

Dial Indicator

SERIES 2 — Standard Type, 0.01mm Resolution

Series 2 dial indicators are Mitutoyo's most popular, and have the widest application.

FEATURES

- Standard 0.01mm graduation dial gauges having an outer frame with an outside diameter of 57mm. All types come with limit pins and an outer frame clamp as standard.
- The outer clamp and lifting lever (optional) can be attached to either the right or left side. These parts can be easily installed and removed without tools.
- Secured adhesion between the outer frame and crystal as well as the use of an O-ring ensure countermeasures against water and oil permeation via the front face.
- The stem spindle is made of high-strength quench-hardened stainless steel which resists strenuous use.
- A carbide contact point is used.
- The grand gear uses stainless steel that is resistant to wear and deformation.
- Application of a hard coating on the surface of the crystal makes the gauge highly scratch- and chemical-resistant.



(Refer to the page 9 for details.)



20465



20465-60



20465
20465H
20465-09
20465-15
20465-80
20465LB



20465Y



20465-60
20465-69



20475



Shockproof type



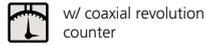
Waterproof type



Long stem type



Jeweled bearing type



w/ coaxial revolution counter



Reverse reading type

SPECIFICATIONS

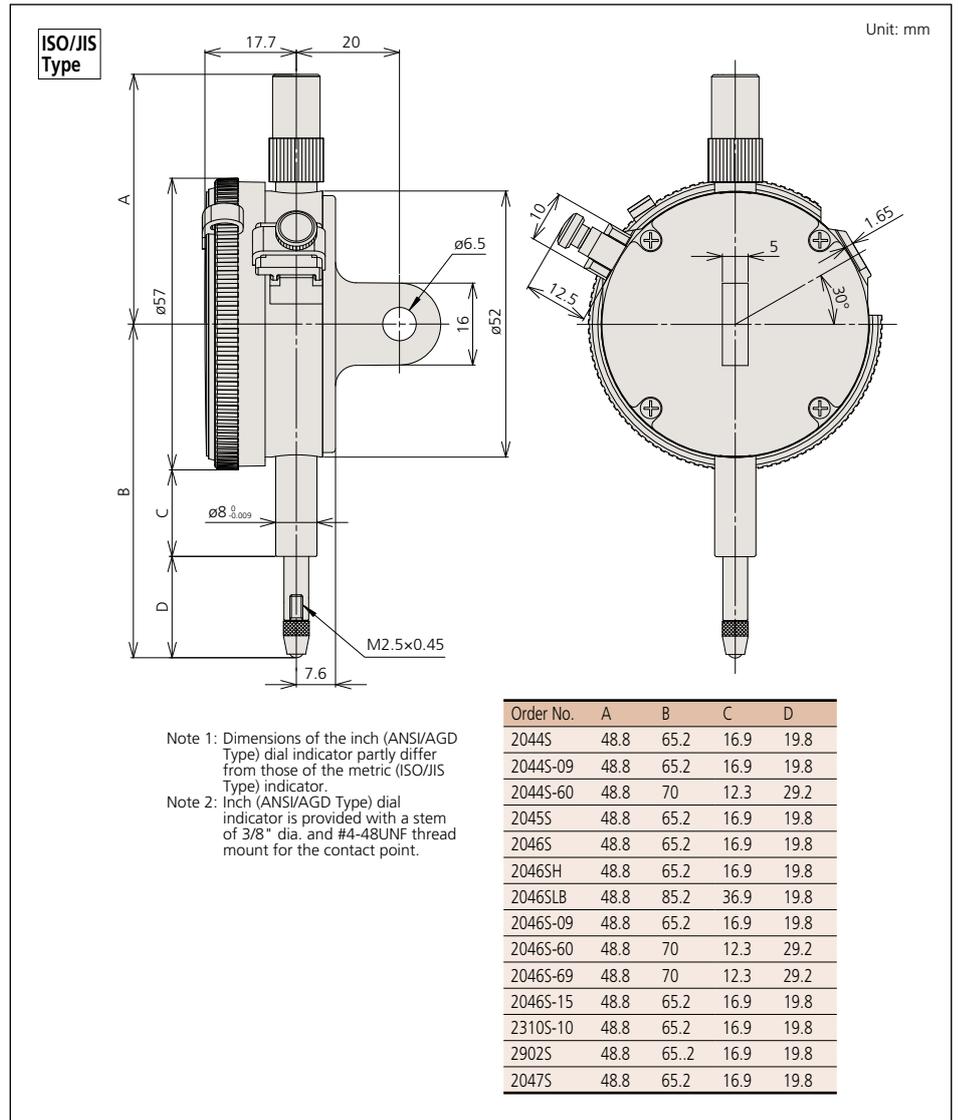
Metric

ISO/JIS type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force						
	w/ lug	Flat-back										
0.01mm	2044S	2044SB	5mm (1mm)	±12μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	2044S-09	2044SB-09	5mm (1mm)	±13μm	0-100	1.4N or less	✓	—	—	—	—	—
0.01mm	2044S-60	2044SB-60	5mm (1mm)	±12μm	0-100	2.5N or less	—	✓	—	—	—	—
0.01mm	2045S	2045SB	5mm (1mm)	±12μm	0-50-0	1.4N or less	—	—	—	—	—	—
0.01mm	2046S	2046SB	10mm (1mm)	±13μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	2046SY	2046SYB	10mm (1mm)	±13μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	2046SH	2046SHB	10mm (1mm)	±8μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	—	2046SLB	10mm (1mm)	±13μm	0-100	1.4N or less	—	—	✓	—	—	—
0.01mm	2046S-09	2046SB-09	10mm (1mm)	±15μm	0-100	1.4N or less	✓	—	—	—	—	—
0.01mm	2046S-60	2046SB-60	10mm (1mm)	±13μm	0-100	2.5N or less	—	✓	—	—	—	—
0.01mm	2046S-69	2046SB-69	10mm (1mm)	±15μm	0-100	2.5N or less	✓	✓	—	—	—	—
0.01mm	2046S-15	2046SB-15	10mm (1mm)	±13μm	0-100	0.8N or less*	—	—	—	✓	—	—
0.01mm	2310S-10	2310SB-10	10mm (1mm)	±15μm	0-100	1.4N or less	—	—	—	✓	✓	—
0.01mm	2902S	2902SB	10mm (1mm)	±13μm	100-0	1.4N or less	—	—	—	—	—	✓
0.01mm	2047S	2047SB	10mm (1mm)	±13μm	0-50-0	1.4N or less	—	—	—	—	—	—

*Use in a vertical position only (contact point downward).

DIMENSION



2902S



2310S-10

2044S
2044S-60
2044S-09

2045S

Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)

Dial Indicator

SERIES 2 — Standard Type, 0.001mm Resolution

FEATURES

- Standard 0.01mm graduation dial gauges having an outer frame with an outside diameter of $\varnothing 57\text{mm}$. All types come with limit pins and an outer frame clamp.
- The outer clamp and lifting lever (optional) can be attached to either the right or left side. These parts can be easily installed and removed without tools.
- Secured adhesion between the outer frame and crystal as well as the use of an O-ring ensure countermeasures against water and oil permeation via the front face.
- The stem spindle is made of high-strength quench-hardened stainless steel which resists strenuous use.
- A carbide contact point is used.
- The grand gear uses stainless steel that is resistant to wear and deformation.
- Application of a hard coating on the surface of the crystal makes the gauge highly scratch- and chemical-resistant.
- A special alloy is used for the sector gears to provide improved wear resistance.
- The bearing part uses jeweled bearings, providing excellent indication sensitivity and durability.



2109S-10



2110S-10



2119S-10



(Refer to the page 9 for details.)



2109S-10
2109SH-10
2109S-70
2109SLB-10



2110S-10
2110S-70



2113S-10



Shockproof type



Waterproof type



Long stem type



Jeweled bearing type



Double scale spacing type

SPECIFICATIONS

Metric

ISO/JIS type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force						
	w/ lug	Flat-back					Shockproof	Waterproof	Long stem	Jeweled bearing	Double scale spacing	
0.005mm	2124S-10	2124SB-10	5mm (0.5mm)	±12μm	0-50	1.5N or less	—	—	—	✓	—	—
0.001mm	2110S-10	2110SB-10	1mm (0.1mm)	±5μm	0-100	1.5N or less	✓	—	—	✓	✓	—
0.001mm	2110S-70	2110SB-70	1mm (0.1mm)	±5μm	0-100	2.0N or less	✓	✓	—	✓	✓	—
0.001mm	2109S-10	2109SB-10	1mm (0.2mm)	±5μm	0-100-0	1.5N or less	✓	—	—	✓	—	—
0.001mm	2109SH-10	2109SHB-10	1mm (0.2mm)	±3μm	0-100-0	1.5N or less	✓	—	—	✓	—	—
0.001mm	—	2109SLB-10	1mm (0.2mm)	±5μm	0-100-0	1.5N or less	✓	—	✓	✓	—	—
0.001mm	2109S-70	2109SB-70	1mm (0.2mm)	±5μm	0-100-0	2.0N or less	✓	✓	—	✓	—	—
0.001mm	2113S-10	2113SB-10	2mm (0.2mm)	±7μm	0-100-0	1.5N or less	✓	—	—	✓	—	—
0.001mm	2118S-10	2118SB-10	5mm (0.2mm)	±10μm	0-100-100	1.5N or less	—	—	—	✓	—	—
0.001mm	2119S-10	2119SB-10	5mm (0.2mm)	±10μm	0-100-0	1.5N or less	—	—	—	✓	—	—



2118S-10

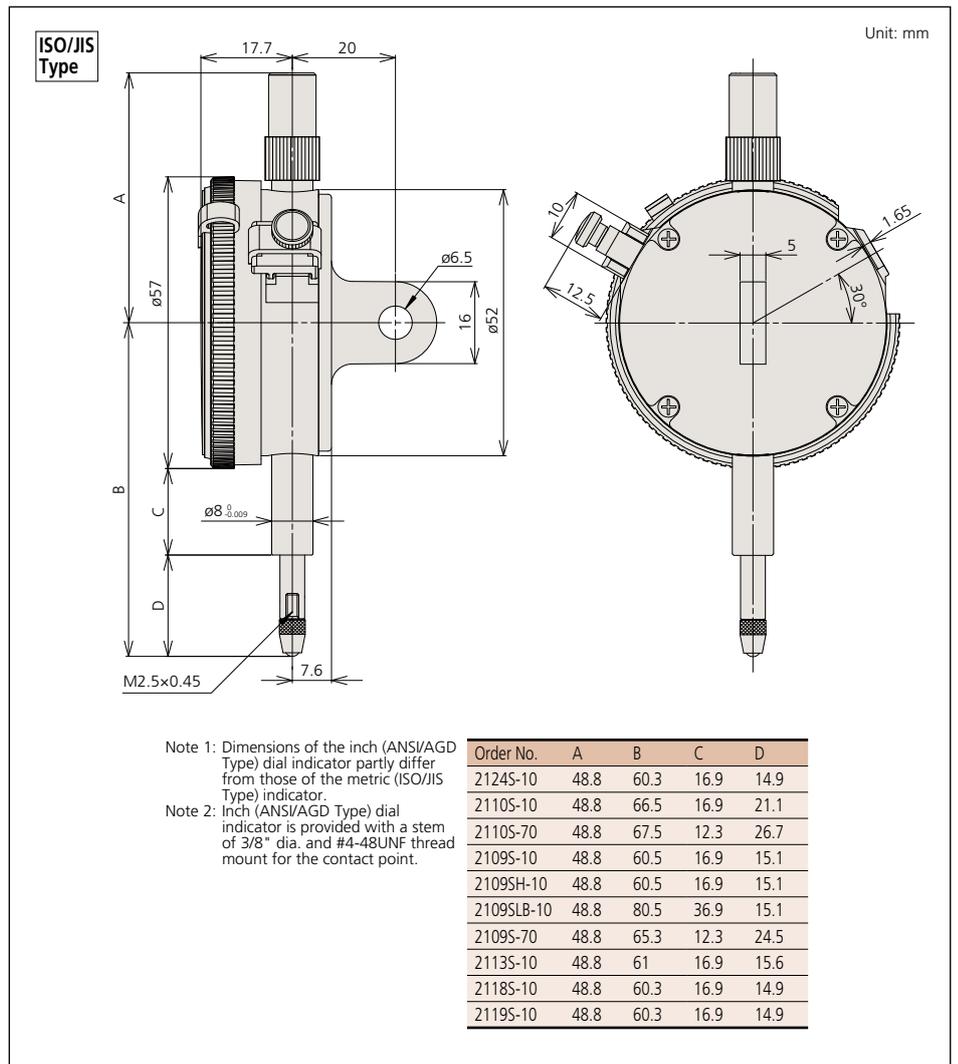


2119S-10



2124S-10

DIMENSION



Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)

Dial Indicator

SERIES 2 — Standard Type, Inch Reading

SPECIFICATIONS

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force	ANSI/AGD type					
	w/ lug	Flat-back									—	—
.001"	2780S	2780SB	.125" (.05")	±.001"	0-50	1.8N or less	—	—	—	—	—	—
.001"	2781S	2781SB	.125" (.05")	±.001"	0-25-0	1.8N or less	—	—	—	—	—	—
.001"	2410S	2410SB	.25" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	2410S-06	2410SB-06	.25" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	2410S-10	2410SB-10	.25" (.1")	±.001"	0-100	1.8N or less	—	—	—	✓	—	—
.001"	2410S-60	2410SB-60	.25" (.1")	±.001"	0-100	2.5N or less	—	✓	—	—	—	—
.001"	2411S	2411SB	.25" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	—	—	—
.001"	2411S-10	2411SB-10	.25" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	✓	—	—
.001"	2411S-60	2411SB-60	.25" (.1")	±.001"	0-50-0	2.5N or less	—	✓	—	—	—	—
.001"	2414S	2414SB	.5" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	2414S-06	2414SB-06	.5" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	2414S-10	2414SB-10	.5" (.1")	±.001"	0-100	1.8N or less	—	—	—	✓	—	—
.001"	2414S-60	2414SB-60	.5" (.1")	±.001"	0-100	2.5N or less	—	✓	—	—	—	—
.001"	2415S	2415SB	.5" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	—	—	—
.001"	2415S-10	2415SB-10	.5" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	✓	—	—
.001"	2415S-60	2415SB-60	.5" (.1")	±.001"	0-50-0	2.5N or less	—	✓	—	—	—	—
.001"	2914S	2914SB	.5" (.1")	±.001"	100-0	1.8N or less	—	—	✓	—	—	—
.0005"	2506S	2506SB	.125" (.05")	±.0005"	0-50	1.8N or less	—	—	—	—	—	—
.0005"	2506S-10	2506SB-10	.125" (.05")	±.0005"	0-50	1.8N or less	—	—	—	✓	—	—
.0005"	2507S	2507SB	.125" (.05")	±.0005"	0-25-0	1.8N or less	—	—	—	—	—	—
.0005"	2507S-10	2507SB-10	.125" (.05")	±.0005"	0-25-0	1.8N or less	—	—	—	✓	—	—
.0005"	2514S	2514SB	.5" (.05")	±.0015"	0-50	1.8N or less	—	—	—	—	—	—
.0005"	2514S-10	2514SB-10	.5" (.05")	±.0015"	0-50	1.8N or less	—	—	—	✓	—	—
.0005"	2514S-60	2514SB-60	.5" (.05")	±.0015"	0-50	2.5N or less	—	✓	—	—	—	—
.0005"	2570S-10	2570SB-10	.075" (.03")	±.0005"	0-30	1.8N or less	—	—	—	✓	—	—
.0005"	2570S-70	2570SB-70	.075" (.03")	±.0005"	0-30	2.5N or less	—	✓	—	✓	—	—
.0005"	2571S-10	2571SB-10	.075" (.03")	±.0005"	0-15-0	1.8N or less	—	—	—	✓	—	—
.0005"	2571S-70	2571SB-70	.075" (.03")	±.0005"	0-15-0	2.5N or less	—	✓	—	✓	—	—
.0005"	2576S-70	2576SB-70	.3" (.03")	±.001"	0-30	2.5N or less	—	✓	—	✓	—	—
.0005"	2670S	2670SB	.1" (.04")	±.0005"	0-40	1.8N or less	—	—	—	—	—	—
.0005"	2671S	2671SB	.1" (.04")	±.0005"	0-20-0	1.8N or less	—	—	—	—	—	—
.0005"	2675S	2675SB	.4" (.04")	±.0015"	0-20-0	1.8N or less	—	—	—	—	—	—
.0005"	2906S	2906SB	.125" (.05")	±.0005"	50-0	1.8N or less	—	—	✓	—	—	—
.0005"	2922S	2922SB	.125" (.05")	±.0005"	0-25-0	1.8N or less	—	—	—	—	—	—
.00025"	2470S-10	2470SB-10	.05" (.02")	±.00025"	0-20	1.8N or less	—	—	—	✓	—	—
.00025"	2471S-10	2471SB-10	.05" (.02")	±.0005"	0-10-0	1.8N or less	—	—	—	✓	—	—
.00025"	2476S-10	2476SB-10	.2" (.02")	±.0005"	0-20	1.8N or less	—	—	—	✓	—	—
.00025"	2476S-70	2476SB-70	.2" (.02")	±.0005"	0-20	2.5N or less	—	✓	—	✓	—	—
.0001"	2356S-10	2356SB-10	.25" (.01")	±.0008"	0-10	2.0N or less	—	—	—	✓	—	—
.0001"	2358S-10	2358SB-10	.5" (.01")	±.0002"	0-10	2.0N or less	—	—	—	✓	—	—
.0001"	2802S-10	2802SB-10	.025" (.01")	±.0001"	0-10	2.0N or less	✓	—	—	✓	—	—
.0001"	2802S-70	2802SB-70	.025" (.01")	±.0001"	0-10	2.5N or less	✓	✓	—	✓	—	—
.0001"	2803S-10	2803SB-10	.025" (.01")	±.0001"	0-5-0	2.0N or less	✓	—	—	✓	—	—
.0001"	2803S-70	2803SB-70	.025" (.01")	±.0001"	0-5-0	2.5N or less	✓	✓	—	✓	—	—
.0001"	2804S-10	2804SB-10	.05" (.01")	±.0002"	0-10	2.0N or less	✓	—	—	✓	—	—
.0001"	2805S-10	2805SB-10	.05" (.01")	±.0002"	0-5-0	2.0N or less	✓	—	—	✓	—	—
.0001"	2806S-10	2806SB-10	.1" (.01")	±.0003"	0-10	2.0N or less	✓	—	—	✓	—	—
.0001"	2806S-70	2806SB-70	.1" (.01")	±.0003"	0-10	2.5N or less	✓	✓	—	✓	—	—
.0001"	2905S-10	2905SB-10	.05" (.01")	±.0002"	10-0	2.0N or less	✓	—	✓	✓	—	—
.0001"	2923S-10	2923SB-10	.05" (.01")	±.0002"	0-5-0	2.0N or less	✓	—	—	✓	—	—
.0001"	2937S-10	2937SB-10	.02" (.008")	±.0001"	0-4-0	2.0N or less	✓	—	—	✓	—	—
.0001"	2938S-10	2938SB-10	.02" (.008")	±.0001"	0-8	2.0N or less	✓	—	—	✓	—	—



(Refer to the page 9 for details.)

Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)



Schockproof type



Waterproof type



Reverse reading type



Jeweled bearing type

Special Dial Indicator

SERIES 2



(Refer to the page 9 for details.)



Adjustable hand



Peak hold



Double-face type



20485-10

Adjustable hand dial gauge

The hand position can be adjusted independently of the vertical movement of the spindle by rotating the top knob.



20465-80

Peak hold type dial gauge

A mechanism that stops the pointer and the spindle at the depressed position where the spindle is depressed makes the pointer stop and display the maximum value.



29405

Double-face type dial gauge

The displacement of the spindle can be read from either the front or rear face.

Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)

SPECIFICATIONS

Metric

ISO/JIS type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force	Measuring force
	w/ lug	Flat-back					
0.01mm	20485-10	2048SB-10	10mm (1mm)	±15μm	0-100	1.4N or less	Adjustable hand
0.01mm	20465-80	2046SB-80	10mm (1mm)	±15μm	0-100	5.0N or less	Peak hold
0.01mm	29405	—	10mm (1mm)	±15μm	0-100	3.0N or less	Double-face

Inch

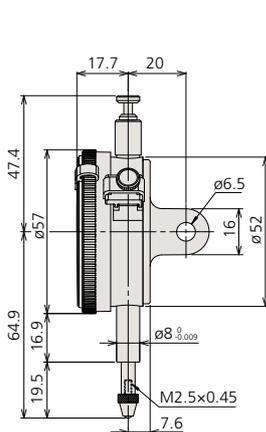
ANSI/AGD type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force	Remarks
	w/ lug	Flat-back					
.001"	29155-10	2915SB-10	.5" (.1")	±.001"	0-100	1.8N or less	Jeweled bearing, adjustable hand
.001"	29185-10	2918SB-10	.5" (.1")	±.001"	0-50-0	1.8N or less	Jeweled bearing, adjustable hand
.001"	29195-10	2919SB-10	.25" (.1")	±.001"	0-100	1.8N or less	Jeweled bearing, adjustable hand
.001"	29205-10	2920SB-10	.25" (.1")	±.001"	0-50-0	1.8N or less	Jeweled bearing, adjustable hand

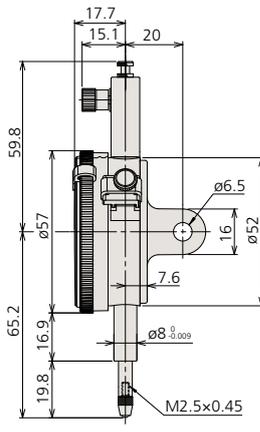
DIMENSION

ISO/JIS Type

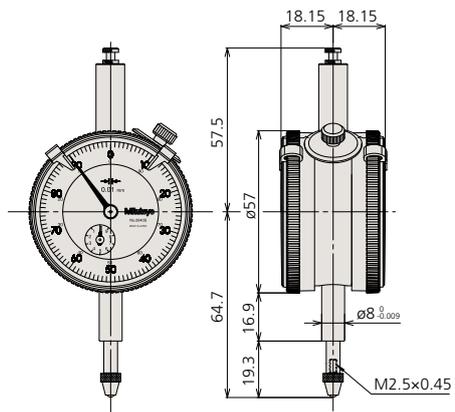
Unit: mm



20485-10



20465-80



29405

Dial Indicator

SERIES 2 — Standard One Revolution Type for Error-free Reading

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.

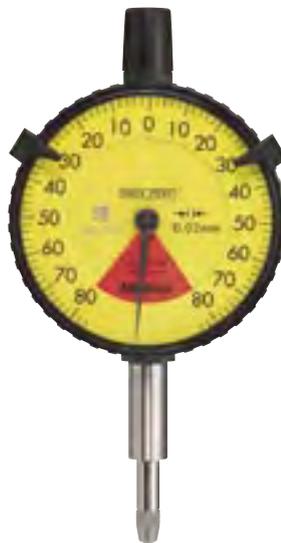
- The crystal is hard coated for durability and scratch resistance.
- Approximately 40% lighter than the conventional dial indicator.
- Provided with an improved resistance to shop floor contaminants such as water and dust.
- Due to the spindle bushing being offset from the stem, spindle movement will 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).



2971



2972



2973



29295



29005-10



2990



(Refer to the page 9 for details.)



2971



2972



2973



29285



Shockproof type



Waterproof type



Dustproof type



Jeweled bearing type

SPECIFICATIONS

Metric

ISO/JIS type

Graduation	Order No.		Range (range/full stroke)	Accuracy	Dial reading	Measuring force					—
	w/ lug	Flat-back									
0.1mm	2928S	2928SB	4mm / 10mm	±40µm	2-0-2	1.4N or less	✓	—	—	—	—
0.01mm	2929S	2929SB	0.8mm / 1mm	±9µm	40-0-40	1.4N or less	✓	—	—	—	—
0.01mm	2929S-60	2929SB-60	0.8mm / 1mm	±9µm	40-0-40	2.0N or less	✓	✓	—	—	—
0.01mm	2929S-62	2929SB-62	0.8mm / 1mm	±9µm	40-0-40	2.0N or less	✓	—	✓	—	—
0.01mm	2959S	2959SB	1.6mm / 2mm	±13µm	80-0-80	1.4N or less	✓	—	—	—	—
0.001mm	2900S-10	2900SB-10	0.08mm / 0.1mm	±3µm	40-0-40	1.4N or less	✓	—	—	✓	—
0.001mm	2900S-70	2900SB-70	0.08mm / 0.1mm	±3µm	40-0-40	2.0N or less	✓	✓	—	✓	—
0.001mm	2900S-72	2900SB-72	0.08mm / 0.1mm	±3µm	40-0-40	2.0N or less	✓	—	✓	✓	—
0.001mm	2901S-10	2901SB-10	0.16mm / 0.2mm	±4µm	80-0-80	1.4N or less	✓	—	—	✓	—
0.02mm	—	2973	1.6mm / 2mm	±16µm	80-0-80	1.4N or less	✓	—	✓	—	—
0.01mm	—	2971	0.5mm / 0.7mm	±10µm	25-0-25	1.4N or less	✓	—	✓	—	—
0.01mm	—	2972	1mm / 1.4mm	±12µm	50-0-50	1.4N or less	✓	—	✓	—	—
0.01mm	2990*	—	0.1mm / 0.14mm	±6.5µm	50-0-50	1.5N or less	✓	—	—	✓	—
0.001mm	—	2960F*	1mm / 1.27mm	±14µm	50-0-50	1.4N or less	✓	—	—	—	—

*Back plunger type (see page 262.)

Inch

ANSI/AGD type

Graduation	Order No.		Range (range/full stroke)	Accuracy	Dial reading	Measuring force					—	—
	w/ lug	Flat-back										
.001"	2908S	2908SB	.08" / .1"	±.001"	40-0-40	1.8N or less	✓	—	—	—	—	—
.001"	2908S-62	2908SB-62	.08" / .1"	±.001"	40-0-40	2.5N or less	✓	✓	—	—	—	—
.0005"	2909S-62	2909SB-62	.04" / .05"	±.0005"	20-0--20	2.5N or less	✓	✓	—	—	—	—
.0001"	2910S-10	2910SB-10	.008" / .01"	±.0001"	4-0-4	1.8N or less	✓	—	✓	—	—	—
.0001"	2910S-72	2910SB-72	.008" / .01"	±.0001"	4-0-4	2.5N or less	✓	—	✓	✓	—	—
.001"	—	2978	.06" / .079"	±.001"	30-0-30	1.4N or less	✓	✓	—	—	—	—
.0005"	—	2976	.02" / .028"	±.0005"	10-0-10	1.4N or less	✓	✓	—	—	—	—
.0005"	—	2977	.04" / .055"	±.0005"	20-0-20	1.4N or less	✓	✓	—	—	—	—
.0001"	—	2991*	.008" / .01"	±.0002"	4-0-4	1.5N or less	✓	—	✓	—	—	—

*Back plunger type (see page 262.)

2929S
2929S-60
2929S-62

2959S

2900S-10
2900S-70
2900S-72

2901S-10

DIMENSION

ISO/JIS Type

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
2971	43.2	65.6	55.6	16.2	—	21	16.8	55	7.6
2972	43.2	66.0	55.6	16.2	—	21	17.2	55	7.6
2973	43.2	66.3	55.6	16.2	—	21	17.5	55	7.6
2929S	48.8	65.2	57	17.7	20	12.3	19.8	52	7.6
2929S-62	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2929S-60	48.8	70	57	17.7	20	12.3	29.2	52	7.6
2959S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2900S-10	48.8	66	57	17.7	20	16.9	20.6	52	7.6
2900S-72	48.8	66	57	17.7	20	16.9	20.6	52	7.6
2900S-70	48.8	67	57	17.7	20	12.3	26.2	52	7.6
2901S-10	48.8	66.1	57	17.7	20	16.9	20.7	52	7.6
2928S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6

Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)

Dial Indicator

SERIES 2 — Long Stroke Type



2050S



2330S-10



2052S



(Refer to the page 9 for details.)



2050S-60
2050S
2050S-19



2052S
2052S-19



2330S-10



2320S-10



2952S



Shockproof type



Waterproof type



w/ damper at lowest rest point



Jeweled bearing type



w/ coaxial revolution counter



Reverse reading type

SPECIFICATIONS

Metric

ISO/JIS type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force						
	w/ lug	Flat-back										
0.01mm	2050S	2050SB	20mm (1mm)	±20μm	0-100	2.0N or less	—	—	✓	—	—	—
0.01mm	2050S-60	2050SB-60	20mm (1mm)	±20μm	0-100	2.5N or less	—	✓	—	—	—	—
0.01mm	2050S-19	2050SB-19	20mm (1mm)	±20μm	0-100	2.0N or less	✓	—	✓	✓	—	—
0.01mm	2320S-10	2320SB-10	20mm (1mm)	±20μm	0-100	2.0N or less	—	—	✓	✓	✓	—
0.01mm	2052S	2052SB	30mm (1mm)	±25μm	0-100	2.5N or less	—	—	✓	—	—	—
0.01mm	2052S-19	2052SB-19	30mm (1mm)	±25μm	0-100	2.5N or less	✓	—	✓	✓	—	—
0.01mm	2330S-10	2330SB-10	30mm (1mm)	±25μm	0-100	2.5N or less	—	—	✓	✓	✓	—
0.01mm	2952S	2952SB	30mm (1mm)	±25μm	100-0	2.5N or less	—	—	✓	—	—	✓

Inch

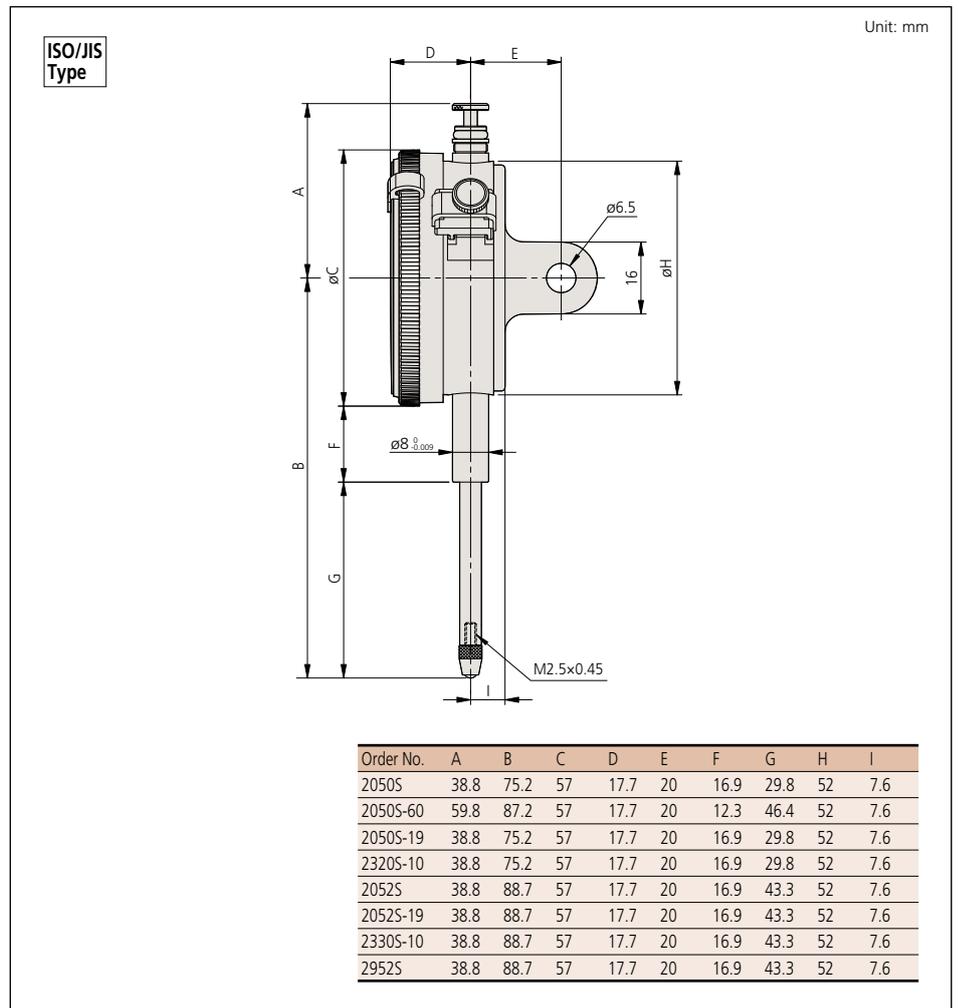
ANSI/AGD type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force						
	w/ lug	Flat-back										
.01"	2204S	2204SB	1" (1")	±.005"	0-1000	1.8N or less	—	—	—	—	—	—
.001"	2416S	2416SB	1" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	2416S-06	2416SB-06	1" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	2416S-10	2416SB-10	1" (.1")	±.001"	0-100	1.8N or less	—	—	—	✓	—	—
.001"	2416S-60	2416SB-60	1" (.1")	±.001"	0-100	2.5N or less	—	✓	—	—	—	—
.001"	2417S	2417SB	1" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	—	—	—
.001"	2424S-19	2424SB-19	2" (.1")	±.003"	0-100	2.5N or less	✓	—	—	✓	—	✓
.0005"	2776S	2776SB	1" (.05")	±.002"	0-50	1.8N or less	—	—	—	—	—	—
.0005"	2776S-60	2776SB-60	1" (.05")	±.002"	0-50	2.5N or less	—	✓	—	—	—	—
.001"	2904S	2904SB	1" (.1")	±.002"	100-0	2.0N or less	—	—	✓	—	—	—

Optional Accessory

- : Backs (See page 266.)
- : Contact points (See page 264.)

DIMENSION



Dial Indicator

SERIES 3, 4 — Large Dial Face and Long Stroke Type

- Dial gauges with a large-diameter graduation face to ease reading.
- All types come with limit pins and an outer frame clamp as standard.



3109S-10

3058S-19

4046S



(Refer to the page 9 for details.)



3046S



3047S

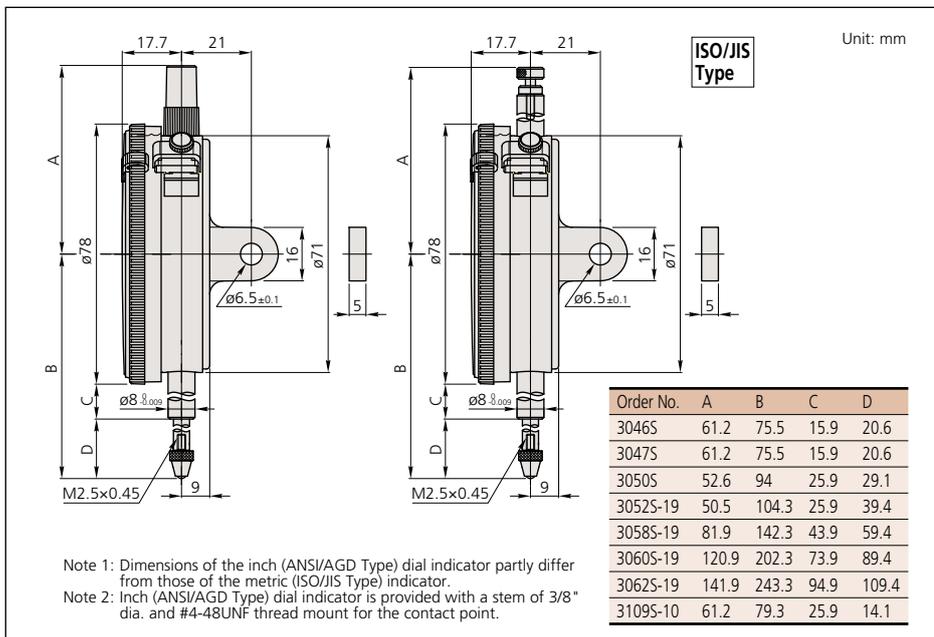


3050S



3052S-19

DIMENSION





Schockproof type



w/ damper at lowest rest point



Jeweled bearing type



w/ coaxial revolution counter

SPECIFICATIONS

Metric

ISO/JIS type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force					—	—
	w/ lug	Flat-back										
0.01mm	3046S	3046SB	10mm (1mm)	±15μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	3047S	3047SB	10mm (1mm)	±15μm	0-50-0	1.4N or less	—	—	—	—	—	—
0.01mm	3050S	3050SB	20mm (1mm)	±20μm	0-100	2.0N or less	—	✓	—	—	—	—
0.01mm	3052S-19	3052SB-19	30mm (1mm)	±25μm	0-100	2.5N or less	✓	—	✓	✓	—	—
0.01mm	3058S-19	3058SB-19	50mm (1mm)	±35μm	0-100	3.0N or less	✓	—	✓	✓	—	—
0.01mm	3060S-19*	3060SB-19*	80mm (1mm)	±45μm	0-100	3.0N or less	✓	—	✓	✓	—	—
0.01mm	3062S-19*	3062SB-19*	100mm (1mm)	±50μm	0-100	3.2N or less	✓	—	✓	✓	—	—
0.001mm	3109S-10	3109SB-10	1mm (0.2mm)	±6μm	0-100-0	1.5N or less	✓	—	✓	—	—	—
0.01mm	4046S	4046SB	10mm (1mm)	±15μm	0-100	1.4N or less	—	—	—	—	—	—

*Use in a vertical position only.

Inch

ANSI/AGD type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force				—	—	—
	w/ lug	Flat-back										
.001"	3410S	3410SB	.25" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	3411S	3411SB	.25" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	—	—	—
.001"	3414S	3414SB	.5" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	3415S	3415SB	.5" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	—	—	—
.001"	3416S	3416SB	1" (.1")	±.002"	0-100	1.8N or less	—	—	—	—	—	—
.001"	3417S	3417SB	1" (.1")	±.002"	0-50-0	1.8N or less	—	—	—	—	—	—
.001"	3424S-19	3424SB-19	2" (.1")	±.003"	0-100	3.0N or less	✓	✓	✓	—	—	—
.001"	3426S-19	3426SB-19	3" (.1")	±.005"	0-100	3.0N or less	✓	✓	✓	—	—	—
.001"	3428S-19	3428SB-19	4" (.1")	±.005"	0-100	3.2N or less	✓	✓	✓	—	—	—
.001"	3780S	3780SB	.125" (.05")	±.001"	0-50	1.8N or less	—	—	—	—	—	—
.001"	3781S	3781SB	.125" (.05")	±.001"	0-25-0	1.8N or less	—	—	—	—	—	—
.0005"	3570S-10	3570SB-10	.075" (.03")	±.0005"	0-30	1.8N or less	—	✓	—	—	—	—
.0005"	3571S-10	3571SB-10	.075" (.03")	±.0005"	0-15-0	1.8N or less	—	✓	—	—	—	—
.0001"	3802S-10	3802SB-10	.025" (.01")	±.0001"	0-10	2.0N or less	✓	✓	—	—	—	—
.0001"	3803S-10	3803SB-10	.025" (.01")	±.0001"	0-5-0	2.0N or less	✓	✓	—	—	—	—
.001"	4410S	4410SB	.25" (.1")	±.001"	0-100	1.8N or less	—	—	—	—	—	—
.001"	4411S	4411SB	.25" (.1")	±.001"	0-50-0	1.8N or less	—	—	—	—	—	—
.001"	4887S-19	4887SB-19	3" (.1")	±.005"	0-100	3.0N or less	✓	✓	✓	—	—	—
.0005"	4570S-10	4570SB-10	.075" (.03")	±.0005"	0-30	1.8N or less	—	✓	—	—	—	—
.0005"	4571S-10	4571SB-10	.075" (.03")	±.0005"	0-15-0	1.8N or less	—	✓	—	—	—	—
.0001"	4802S-10	4802SB-10	.025" (.01")	±.0001"	0-10	2.0N or less	✓	✓	—	—	—	—
.0001"	4803S-10	4803SB-10	.025" (.01")	±.0001"	0-5-0	2.0N or less	✓	✓	—	—	—	—
.0001"	4818S-10	4818SB-10	.05" (.02")	±.0003"	0-20	2.0N or less	✓	✓	—	—	—	—



3058S-19



3060S-19



3062S-19



3109S-10

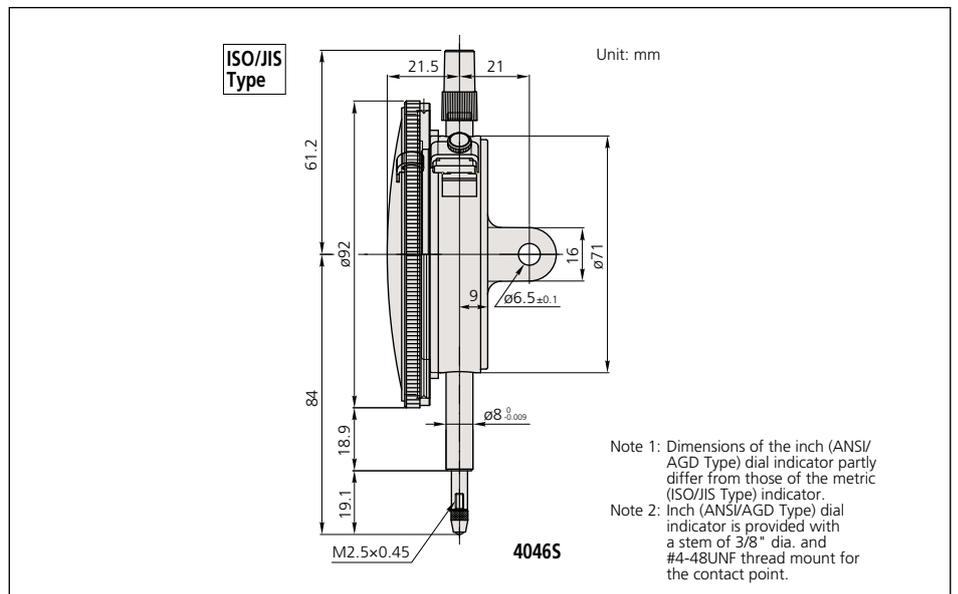


4046S

Optional Accessory

—: Contact points (See page 262.)

DIMENSION



ANSI/AGD Type Metric Dial Indicator

with 3/8" DIA. Stem and #4-48UNF-Thread Contact Point Compatible Type

SPECIFICATIONS

Metric Series 1 ANSI/AGD type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force						
	w/ lug	Flat-back										
0.01mm	1230F-01	1230FB-01	2.5mm (1mm)	±10µm	0-100	1.5N or less	—	—	—	—	—	—
0.01mm	1231F-01	1231FB-01	2.5mm (1mm)	±10µm	0-50-0	1.5N or less	—	—	—	—	—	—
0.01mm	1044F-01	1044FB-01	5mm (1mm)	±10µm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	1045F-01	1045FB-01	5mm (1mm)	±10µm	0-50-0	1.4N or less	—	—	—	—	—	—
0.002mm	1010F-11	1010FB-11	0.5mm (0.2mm)	±2µm	0-20	1.5N or less	✓	—	—	—	—	—
0.002mm	1011F-11	1011FB-11	0.5mm (0.2mm)	±2µm	0-10-0	1.5N or less	✓	—	—	—	—	—



(Refer to the page 9 for details.)

Metric Series 2 ANSI/AGD type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force							
	w/ lug	Flat-back											
0.02mm	2032S-11	2032SB-11	5mm (2mm)	±20µm	0-200	1.4N or less	—	✓	—	—	—	—	—
0.02mm	2033S-11	2033SB-11	5mm (2mm)	±20µm	0-100-0	1.4N or less	—	✓	—	—	—	—	—
0.01mm	2230S-01	2230SB-01	2.5mm (1mm)	±10µm	0-100	1.4N or less	—	—	—	—	—	—	—
0.01mm	2231S-01	2231SB-01	2.5mm (1mm)	±10µm	0-100	1.4N or less	—	—	—	—	—	—	—
0.01mm	2231S-11	2231SB-11	2.5mm (1mm)	±10µm	0-50-0	1.4N or less	—	✓	—	—	—	—	—
0.01mm	2044S-01	2044SB-01	5mm (1mm)	±10µm	0-100	1.4N or less	—	—	—	—	—	—	—
0.01mm	2044S-61	2044SB-61	5mm (1mm)	±10µm	0-100	2.5N or less	✓	—	—	—	—	—	—
0.01mm	2045S-01	2045SB-01	5mm (1mm)	±10µm	0-50-0	1.4N or less	—	—	—	—	—	—	—
0.01mm	2046S-01	2046SB-01	10mm (1mm)	±13µm	0-100	1.4N or less	—	—	—	—	—	—	—
0.01mm	2046S-11	2046SB-11	10mm (1mm)	±13µm	0-100	1.4N or less	—	✓	—	—	—	—	—
0.01mm	2046S-61	2046SB-61	10mm (1mm)	±13µm	0-100	2.5N or less	✓	—	—	—	—	—	—
0.01mm	2048S-11	2048SB-11	10mm (1mm)	±13µm	0-100	1.4N or less	—	✓	✓	✓	—	—	—
0.01mm	2047S-01	2047SB-01	10mm (1mm)	±13µm	0-50-0	1.4N or less	—	—	—	—	—	—	—
0.01mm	2047S-11	2047SB-11	10mm (1mm)	±13µm	0-50-0	1.4N or less	—	✓	—	—	—	—	—
0.01mm	2902S-01	2902SB-01	10mm (1mm)	±13µm	100-0	1.4N or less	—	—	—	—	—	—	—
0.01mm	2050S-01	2050SB-01	20mm (1mm)	±20µm	0-100	2.0N or less	—	—	—	—	—	—	—
0.01mm	2050S-11	2050SB-11	20mm (1mm)	±20µm	0-100	2.0N or less	—	✓	—	—	—	—	—
0.01mm	2056S-01	2056SB-01	25mm (1mm)	±25µm	0-100	2.5N or less	—	—	—	—	—	—	—
0.005mm	2124S-11	2124SB-11	5mm (0.5mm)	±12µm	0-50	1.5N or less	—	✓	—	—	—	—	—
0.005mm	2124S-71	2124SB-71	5mm (0.5mm)	±12µm	0-50	2.5N or less	✓	✓	—	—	—	—	—
0.005mm	2125S-11	2125SB-11	5mm (0.5mm)	±12µm	0-25-0	1.5N or less	—	✓	—	—	—	—	—
0.005mm	2125S-71	2125SB-71	5mm (0.5mm)	±12µm	0-25-0	2.5N or less	✓	✓	—	—	—	—	—
0.002mm	2010S-11	2010SB-11	0.5mm (0.2mm)	±3µm	0-20	1.5N or less	—	✓	—	—	✓	—	—
0.002mm	2010S-71	2010SB-71	0.5mm (0.2mm)	±3µm	0-20	2.5N or less	✓	✓	—	—	—	—	—
0.002mm	2011S-11	2011SB-11	0.5mm (0.2mm)	±3µm	0-10-0	1.5N or less	—	✓	—	—	✓	—	—
0.002mm	2011S-71	2011SB-71	0.5mm (0.2mm)	±3µm	0-10-0	2.5N or less	✓	✓	—	—	—	—	—
0.001mm	2900S-73*	2900SB-73*	0.08mm (0.1mm)	±2µm	40-0-40	1.4N or less	—	✓	—	—	✓	✓	—
0.001mm	2109S-11	2109SB-11	1mm (0.2mm)	±4µm	0-10-0	1.5N or less	—	✓	—	—	✓	—	—
0.001mm	2119S-11	2119SB-11	5mm (0.2mm)	±10µm	0-10-0	1.5N or less	—	✓	—	—	—	—	—

*One revolution type

Metric Series 3 ANSI/AGD type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force							
	w/ lug	Flat-back											
0.01mm	3230S-01	3230SB-01	2.5mm (1mm)	±10µm	0-100	1.4N or less	—	—	—	—	—	—	—
0.01mm	3231S-01	3231SB-01	2.5mm (1mm)	±10µm	0-50-0	1.4N or less	—	—	—	—	—	—	—
0.01mm	3052S-11	3052SB-11	30mm (1mm)	±30µm	0-100	2.5N or less	✓	✓	✓	—	—	—	—
0.01mm	3058S-11	3058SB-11	50mm (1mm)	±40µm	0-100	3.0N or less	✓	✓	✓	—	—	—	—
0.002mm	3010S-11	3010SB-11	0.5mm (0.2mm)	±2µm	0-20	1.5N or less	✓	—	✓	—	—	—	—
0.002mm	3011S-11	3011SB-11	0.5mm (0.2mm)	±2µm	0-10-0	1.5N or less	✓	—	✓	—	—	—	—

Metric Series 4 ANSI/AGD type

Graduation	Order No.		Range (range/rev)	Accuracy	Dial reading	Measuring force						
	w/ lug	Flat-back										
0.01mm	4230S-01	4230SB-01	2.5mm (1mm)	±10µm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	4231S-01	4231SB-01	2.5mm (1mm)	±10µm	0-50-0	1.4N or less	—	—	—	—	—	—



Waterproof type



Jeweled bearing type



Adjustable hand type



w/ coaxial revolution counter



Schockproof type



Dustproof type

Hicator, Signal Hicator

SERIES 524 — High Accuracy One-Revolution Dial Indicator

FEATURES

The Hicator is Mitutoyo's ultra-sensitive, one-revolution dial indicator. The spindle is made of highly durable stainless steel, and this device features jeweled bearings for extreme sensitivity as well as a shock-proof and dust-proof structure.

- The maximum, minimum, or runout value can be displayed during measurement.
- The Hicator is capable of probing measurements up to 0.0005mm.
- Connected to an optional Signal Box, the Signal Hicator can output limit signals to perform GO/±NO-GO judgment.
- Splash-proof structure.
- Lug-on-center back is optional.



Hicator
524-501



Signal Hicator
524-601

Optional Accessory

- 524-001: Signal box (100V AC)
- 524-001A: Signal box (120V AC)
- : Backs (See page 266.)
- : Contact points (See page 264.)

SPECIFICATIONS

Metric		Hicator		ISO/JIS type			
Graduation	Order No.*	Range	Dial reading	Spindle travel	Accuracy	Measuring force	Remarks
0.001mm	524-501	±0.05mm	50-0-50	3mm	±1μm	1.2N or less	w/ spindle lifting cable
0.0005mm	524-500	±0.03mm	30-0-30	3mm	±0.5μm	1.2N or less	w/ spindle lifting cable

*Flat back

Metric		Signal Hicator		ISO/JIS type			
Graduation	Order No.*	Range	Dial reading	Spindle stroke	Accuracy	Measuring force	Remarks
0.01mm	524-603	±0.5mm	50-0-50	3mm	±5μm	1.2N or less	w/ 2m signal cable
0.002mm	524-602	±0.1mm	100-0-100	3mm	±1.5μm	1.2N or less	w/ 2m signal cable
0.001mm	524-601	±0.05mm	50-0-50	3mm	±1μm	1.2N or less	w/ 2m signal cable

*Flat back

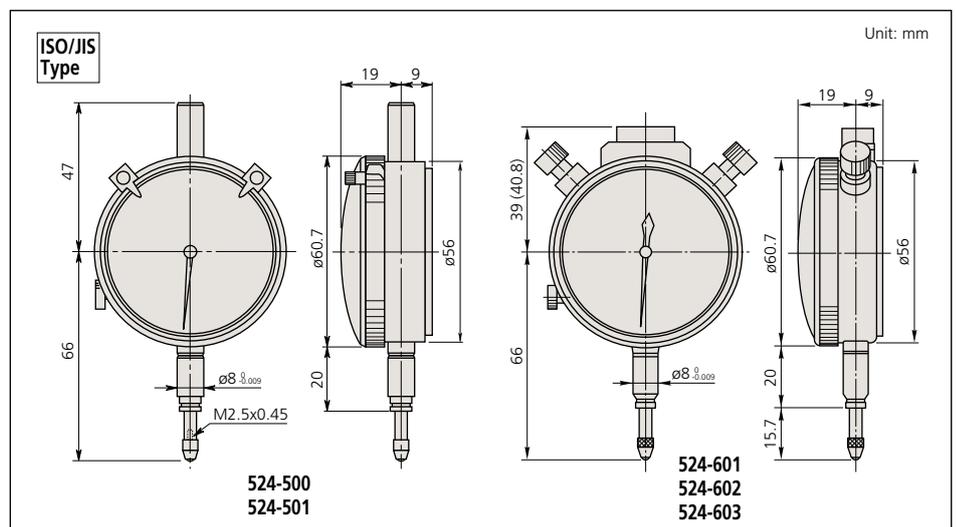
ABSOLUTE Digimatic Indicator ID-C SERIES 543 — with Green/Red LED and GO/NG Signal Output Function



FEATURES (See page 237.)

- With the max./min. value holding function, the signal ID-C 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.

DIMENSION



Back Plunger Type Dial Indicator

SERIES 1 and 2

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.

- Back plunger type dial gauges are suitable for mounting onto leveling machine tool tables or inspection jigs, and for use in small spaces where the graduations of standard dial gauges are difficult to see.
- Model No. 1960, which uses Mitutoyo's proprietary shock-proofing mechanism, has excellent durability and shock resistance.
- Model No. 2990 is back plunger type and allows 0.001mm readings.



(Refer to the page 9 for details.)



1160



1960



1180-6

Holding bar (optional)



2960F



2990



One revolution type



Shockproof type



Jeweled bearing type

SPECIFICATIONS

Metric Series 1

ISO/JIS type

Graduation	Order No.	Range (range/rev)	Accuracy	Dial reading	Measuring force						
0.01mm	1960	1mm / 1.27mm*	±14μm	50-0-50	1.4N or less	✓	✓	—	—	—	—
0.01mm	1160	5mm (1mm)	±16μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	1162	5mm (1mm)	±16μm	100-0	1.4N or less	—	—	✓	—	—	—
0.01mm	1180-6	5mm (1mm)	±16μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	1180-7	5mm (1mm)	±16μm	0-100	1.4N or less	—	—	—	—	—	—
0.01mm	1180-8	5mm (1mm)	±16μm	0-100	1.4N or less	—	—	—	—	—	—

Inch Series 1

ANSI/AGD type

Graduation	Order No.	Range (range/rev)	Accuracy	Dial reading	Measuring force						
.001"	1961	.04" / .05"*	±.001"	20-0-20	1.4N or less	✓	✓	—	—	—	—
.001"	1156	.1" (.1")	±.001"	0-100	2.1N or less	—	—	—	—	—	—
.001"	1157	.1" (.1")	±.001"	0-50-0	2.1N or less	—	—	—	—	—	—
.001"	1166	.2" (.05")	±.001"	0-50	1.4N or less	—	—	—	—	—	—
.001"	1167	.2" (.05")	±.001"	0-25-0	1.4N or less	—	—	—	—	—	—
.001"	1168	.2" (.05")	±.001"	50-0	1.4N or less	—	—	✓	—	—	—

*Full stroke

Metric Series 2

ISO/JIS type

Graduation	Order No.	Range (range/full stroke)	Accuracy	Dial reading	Measuring force						
0.01mm	2960F	1mm / 1.27"	±14μm	50-0-50	1.4N or less	✓	✓	—	—	—	—
0.001mm	2990	0.1mm / 0.14"	±6.5μm	50-0-50	1.5N or less	✓	✓	✓	—	—	—

Inch Series 2

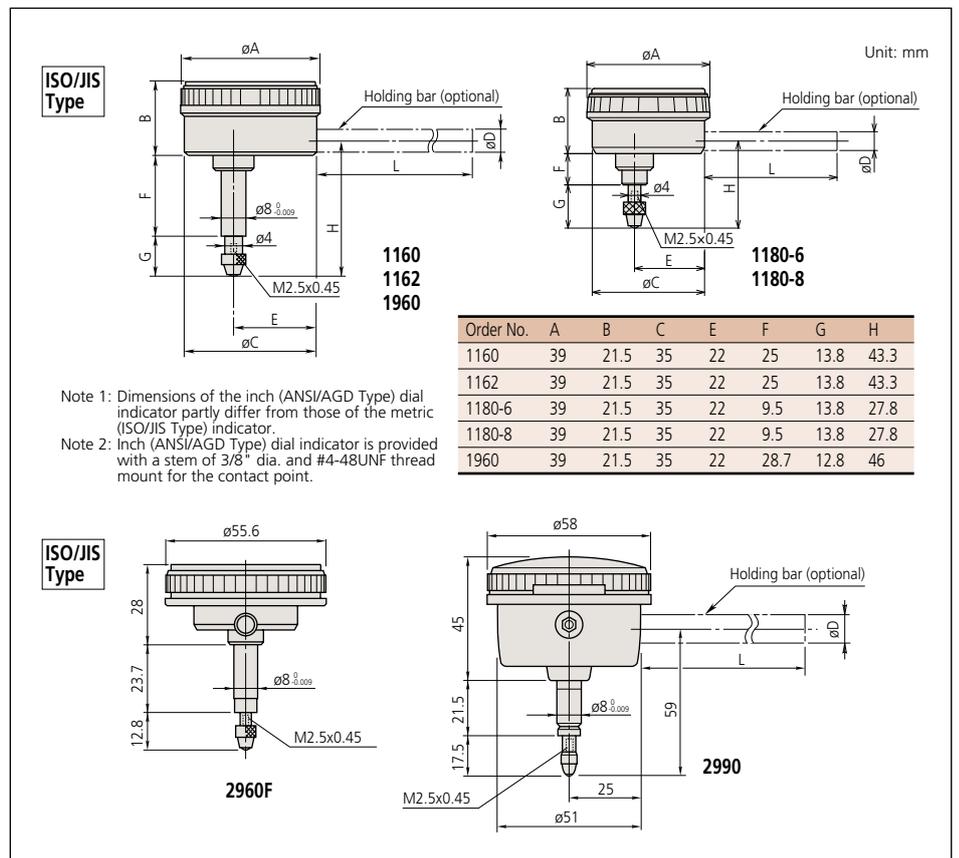
ANSI/AGD type

Graduation	Order No.	Range (range/full stroke)	Accuracy	Dial reading	Measuring force						
.0005"	2961	.04" / .05"	±.0005"	20-0-20	1.8N or less	✓	✓	—	—	—	—
.0001"	2991	.008" / .01"	±.0002"	4-0-4	1.5N or less	✓	✓	✓	—	—	—

Optional Accessory

- 136567: Holding bar (ø6mm, L=81mm)
- 21AAA166: Holding bar (ø6mm, L=42mm)
- 136568: Holding bar (ø8mm, L=81mm)
- 21AAA168: Holding bar (ø8mm, L=42mm)
- 124625: Holding bar (.25" DIA, L=3.19")
- 21AAA167: Holding bar (.25" DIA, L=1.65")
- : Backs (See page 266.)
- : Contact points (See page 264.)

DIMENSION



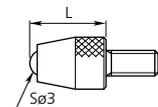
Contact Point

Optional Accessory for Digimatic and Dial Indicators and Linear Gages

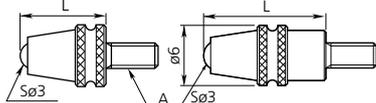
SPECIFICATIONS

Ball Points

Unit: mm



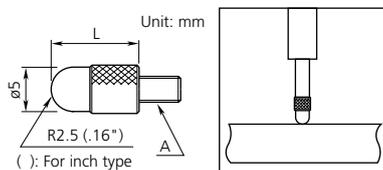
For waterproof model (w/ groove for rubber booth)



L	Material	Order No.	A
7.3	Carbide	901312	M2.5x0.45
		901454	#4-48UNF
	Plastic	901994	M2.5x0.45
		902018	#4-48UNF
	Ruby	120047	M2.5x0.45
8.3	Carbide	21AZA319	M2.5x0.45
8.3*	Carbide	902119	M2.5x0.45
12.1*	Carbide	21AZA320	M2.5x0.45
14	Carbide	21JAA225	M2.5x0.45
15	Carbide	120049	M2.5x0.45
	Ruby	120051	M2.5x0.45
17	Carbide	21JAA224	M2.5x0.45
19.3*	Carbide	21AZA321	M2.5x0.45
20	Carbide	137391	M2.5x0.45
	Ruby	137392	M2.5x0.45
22	Carbide	21JAA226	M2.5x0.45
25	Carbide	120053	M2.5x0.45
	Ruby	120055	M2.5x0.45
30	Carbide	21AAA252	M2.5x0.45
	Ruby	21AAA253	M2.5x0.45

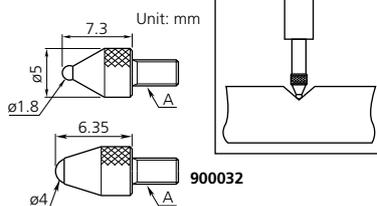
*For waterproof dial indicators

Shell Type Points



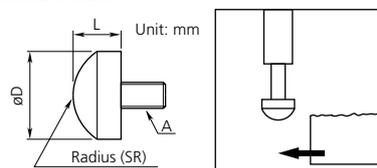
L	Order No.	A
3.97	101184	#4-48UNF
5	101386	M2.5x0.45
10	101118	M2.5x0.45
12.7	101185	#4-48UNF
15	137393	M2.5x0.45
19.05	101186	#4-48UNF
20	101387	M2.5x0.45
25	101388	M2.5x0.45
25.4	101187	#4-48UNF
30	21AAA254	M2.5x0.45

Ball Point



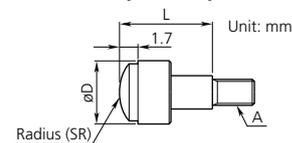
SφD	φd	Order No.	A
1mm, carbide	5mm	21AAA349	M2.5x0.45
1.5mm, carbide	5mm	21AAA350	M2.5x0.45
1.8mm, steel	5mm	101122	M2.5x0.45
2.5mm, carbide	5mm	21AAA351	M2.5x0.45
4mm, carbide	5mm	21AAA352	M2.5x0.45
4mm, carbide	5mm	900032	#4-48UNF

Spherical Points



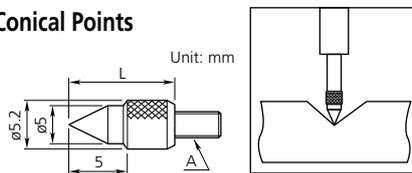
D	L	SR	Order No.	A
10	5	7	101119	M2.5x0.45
12.7	3.18	7	101205	#4-48UNF
9.53	2.38	9	101204	#4-48UNF

Spherical Points (Carbide)

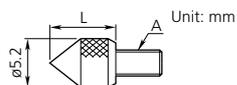


D	L	SR	Order No.	A
5.2	5	5	120058	M2.5x0.45
7.5	10	7	120059	M2.5x0.45
10.5	10	10	120060	M2.5x0.45

Conical Points

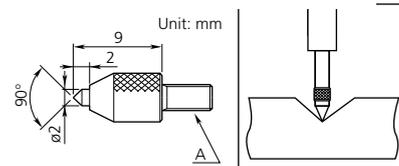


Tip angle	L	Order No.	A
60°	10	101120	M2.5x0.45
60°	12.7	101190	#4-48UNF

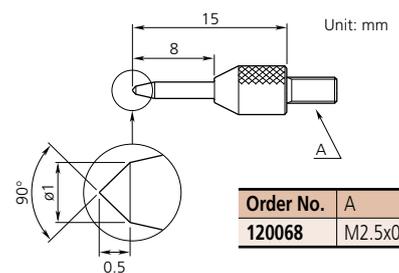


Tip angle	L	Order No.	A
90°	5	101385	M2.5x0.45
90°	7.14	101191	#4-48UNF

Conical Points (Carbide)

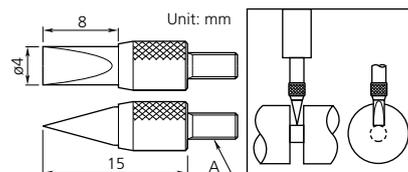


Order No.	A
120057	M2.5x0.45



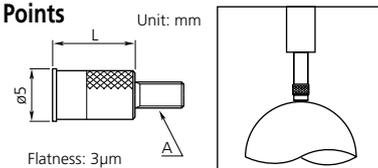
Order No.	A
120068	M2.5x0.45

Knife Edge Point (Carbide)

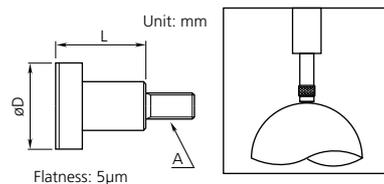


Order No.	A
120067	M2.5x0.45

Flat Points

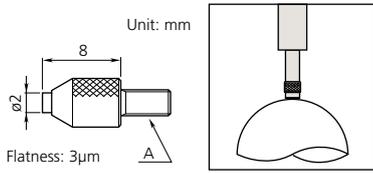


L	Order No.	A
8	131365	M2.5x0.45
10	21AAA340	M2.5x0.45
8	133017	#4-48UNF

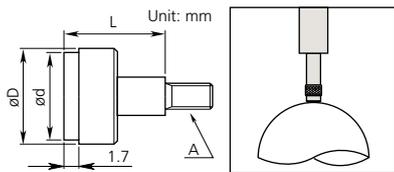


D	L	Order No.	A
10	10	101117	M2.5x0.45
15	10	21AAA341	M2.5x0.45
20	10	21AAA342	M2.5x0.45
25	10	21AAA343	M2.5x0.45
20	10	21AAA344	M2.5x0.45
12.7	9.53	101188	#4-48UNF
9.53	9.53	101189	#4-48UNF

Flat Points (Carbide)

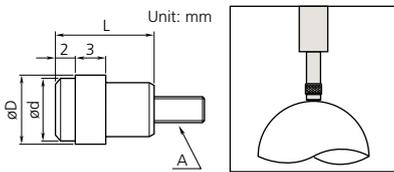


Order No.	A
120056	M2.5x0.45



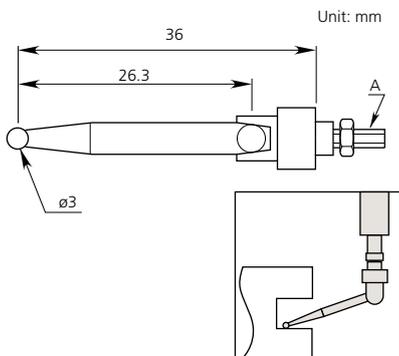
D	d	L	Order No.	A
5.2	4.3*	5	120041	M2.5x0.45
7	6.5*	10	120042	M2.5x0.45
10.5	9.5*	10	120043	M2.5x0.45
17	15**	10	21AAA345	M2.5x0.45
22	20**	10	21AAA346	M2.5x0.45
27	25**	10	21AAA347	M2.5x0.45
32	30**	10	21AAA348	M2.5x0.45

Flatness: *3µm, **5µm



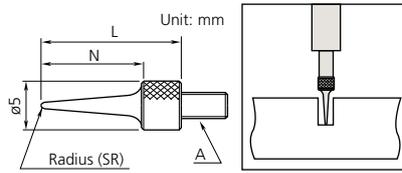
D	d	L	Order No.	A
7	6.4	10	137255	M2.5x0.45
9	8	10	137399	M2.5x0.45

Lever Points



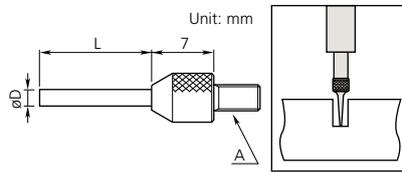
Order No.	A
900391	M2.5x0.45
900393	#4-48UNF

Lever Points



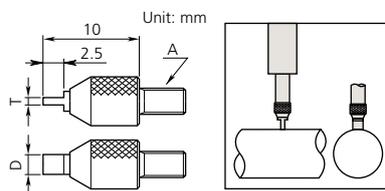
N	L	SR	Order No.	A
11	15	0.4	101121	M2.5x0.45
13	17	0.2	137413	M2.5x0.45
21	25	0.4	21AAA255	M2.5x0.45
31	35	0.4	21AAA256	M2.5x0.45

Needle Points (Carbide)



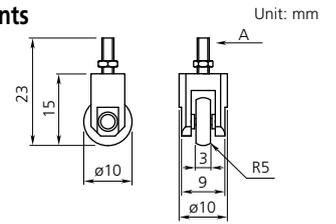
D	L	Order No.	A
0.45	3	120066	M2.5x0.45
0.45	5	21AAA329	M2.5x0.45
1	3	120065	M2.5x0.45
1	5	21AAA330	M2.5x0.45
1	8	21AAA331	M2.5x0.45
1	10	21AAA332	M2.5x0.45
1	20	21AAA333	M2.5x0.45
1	40	21AAA334	M2.5x0.45
1.5	5	21AAA335	M2.5x0.45
1.5	10	21AAA336	M2.5x0.45
1.5	13	120064	M2.5x0.45
1.5	20	21AAA337	M2.5x0.45
1.5	40	21AAA338	M2.5x0.45
2	8	137257	M2.5x0.45
2	18	21AAA257	M2.5x0.45
2	28	21AAA258	M2.5x0.45
2	40	21AAA339	M2.5x0.45

Blade Points (Carbide)



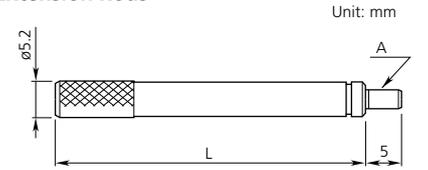
T	W	Order No.	A
0.4	2	120061	M2.5x0.45
0.6	2	120062	M2.5x0.45
1	4	120063	M2.5x0.45

Roller Points



Order No.	A
901954	M2.5x0.45
901991	#4-48UNF

Extension Rods



L	Order No.	A
10	303611	M2.5x0.45
15	21AAA259A	M2.5x0.45
20	303612	M2.5x0.45
25	21AAA259B	M2.5x0.45
30	303613	M2.5x0.45
35	21AAA259C	M2.5x0.45
40	21AAA259D	M2.5x0.45
45	21AAA259E	M2.5x0.45
50	21AAA259F	M2.5x0.45
55	21AAA259G	M2.5x0.45
60	304146	M2.5x0.45
65	21AAA259H	M2.5x0.45
70	21AAA259J	M2.5x0.45
75	21AAA259L	M2.5x0.45
80	21AAA259M	M2.5x0.45
90	304147	M2.5x0.45
100	303614	M2.5x0.45
1"	301655	#4-48UNF
2"	301657	#4-48UNF
4"	301659	#4-48UNF

Interchangeable Contact Point Set (M2.5x0.45)

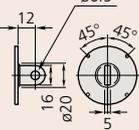
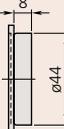
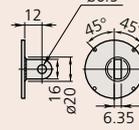
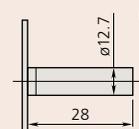
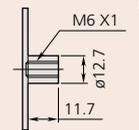
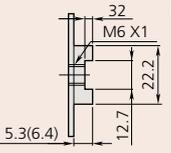
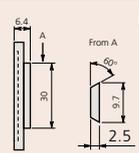
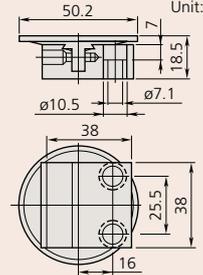


Order No.	Components
7822	Flat Point (131365, 5mm)
	Flat Point (101117, 10mm)
	Needle Point (101121)
	Spherical Point (101119)
	Shell Type Point (101118)
	Shell Type Point (101387)

Back

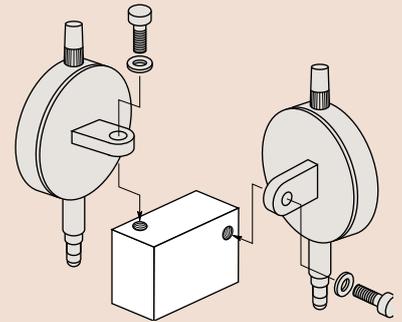
Optional Accessory for Digimatic and Dial Indicators

SPECIFICATIONS

Description		Order No.		
		Series 1 (ø41mm)	Series 2 (ø57mm)	Series 3, 4 (ø77, 91mm)
Flat Back 	 Unit: mm	101211: a=2.2 136872: for water-proof type 191559: for 1911, 1913-10 137906: for 1003	101039: a=2.5 21AZB231: for water-proof of S type	100836: a=3.0
Lug-on-Center Back 	 Unit: mm	101210: metric type 101307: inch type 190561: for 1911, 1913-10 137905: for 1003	101040: metric type 101306: inch type 21AZB230: for water-proof of S type	100691: metric type 100797: inch type
Magnetic Back 	 Unit: mm	Special order	900928	900929
Back with Offset Lug 	 Unit: mm	Special order	101167	100837
Back with Post 	 Unit: mm	193172: Order-to-made	101169	100839
Back with Screw Mount 	 Unit: mm	193173: M6x1, Order-to-made 193174: #1/4-28UNF, Order-to-made	136023: M6x1 193174: #1/4-28UNF	136024: M6x1 100840: #1/4-28UNF
Adjustable Back 	 Unit: mm	136025: M6x1 129721: #1/4-28UNF	136026: M6x1 101168: #1/4-28UNF)	136027: M6x1 100838: #1/4-28UNF
Back with Dovetail 	 Unit: mm	—	900008	Special order
Back with Adjustable Bracket 	 Unit: mm	—	901963	—

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.

Application



Spindle Lifting Lever and Cable

Optional Accessory for Digimatic and Dial Indicators

Spindle Lifting Lever

- 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.

21BZA205

Use for Series 1 dial indicators.



21AZB149

Use for S type Series 2, 3, and 4 dial indicators (up to 10mm/.4").



21AZB150

Use for S type Series 2 and 3 dial indicators (from 10mm/.4" up to 20mm/.8").



Spindle Lifting Cable

901975: with auto-stop function

540774: without auto-stop function

Lifting range: 10mm

Cable length: 300mm



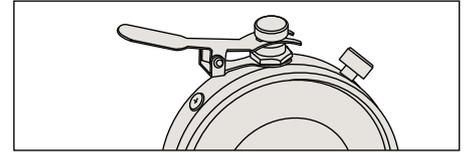
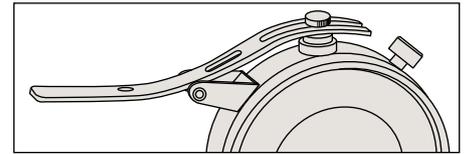
Spindle Lifting Knob

137693

Applicable spindle diameter; 4.8mm



Application



902011

Use for Series 2 dial indicators (up to 10mm/.4" range).



902100

Use for Series 2 dial indicators (up to 10mm/.4" range).

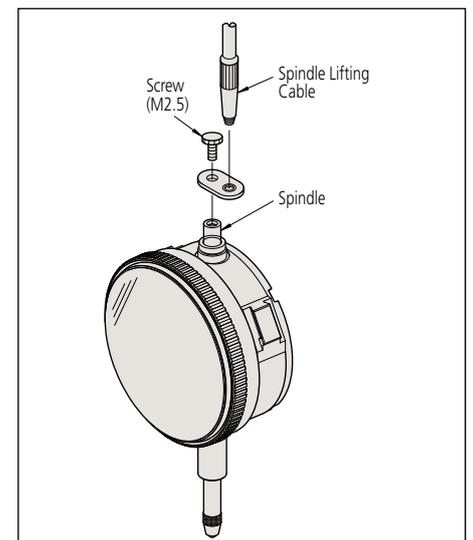


903424

Use for Series 2 dial indicators (up to 20mm/.8" range) and Series 3 and 4 dial indicators (up to 10mm/.4" range).



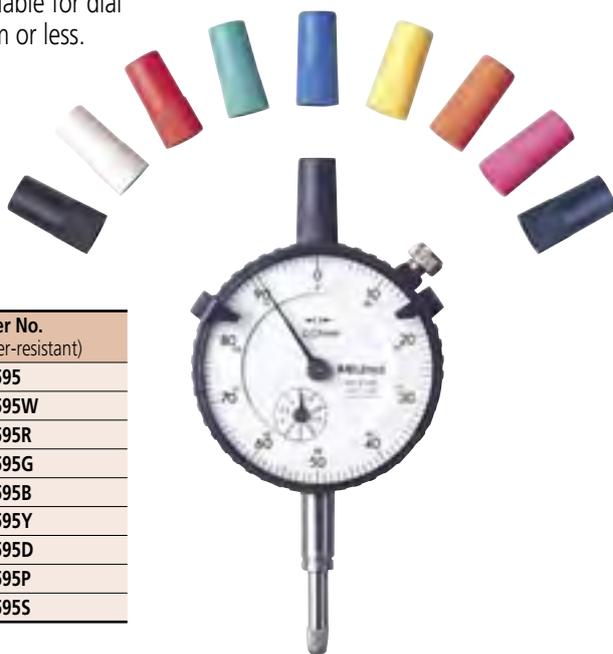
Application



Color Spindle Cap

Optional Accessory for Digimatic and Dial Indicators

8 colors of spindle caps are available for dial indicators with a range of 10mm or less.



SPECIFICATIONS

Color	Order No. (normal)	Order No. (water-resistant)
Black	193051	193595
White	193051W	193595W
Red	193051R	193595R
Green	193051G	193595G
Blue	193051B	193595B
Yellow	193051Y	193595Y
Orange	193051D	193595D
Pink	193051P	193595P
Dark blue	193051S	193595S

Limit Sticker

Optional Accessory for Digimatic and Dial Indicators

FEATURES

- Stuck on the dial face or crystal of a Series 2 dial indicator (55.6mm or 57mm bezel dia.) to indicate tolerance limits.



136420: Red (10-sheet/set)



136421: Green (10-sheet/set)



136422: Yellow (10-sheet/set)

Dial Indicator Repair Tool Kit

Optional Accessory for Digimatic and Dial Indicators

Set Configuration

- 901171: Molykote (lubricant)
- 901172: Lubricating oil
- 901173: Screwdriver (Phillips)
- 901174: Screwdriver (Phillips/flat blade)
- 129729: Tweezers
- 901175: Pin-vise
- 901176: Brush
- 901177: Brush
- 901177: Brush
- 901178: Hammer
- 129730: Spindle rest
- 129731: Pin rest
- 901179: Nippers
- 901180: Pliers
- 901181: Hand remover
- 129732: Pin remover
- 129733: Punch
- 129734: Bearing adjuster
- 129735: Pinion rest
- 129736: Reamer $\varnothing 1$
- 193702: Reamer $\varnothing 0.6$
- 901182: Case

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.



7823

Dial Indicator Crystal Setter

Optional Accessory for Digimatic and Dial Indicators

FEATURES

- Used for fitting a crystal on dial indicators, dial test indicators, and dial calipers.



7000

With 8 sizes of crystal setting pads

Dial Test Indicator

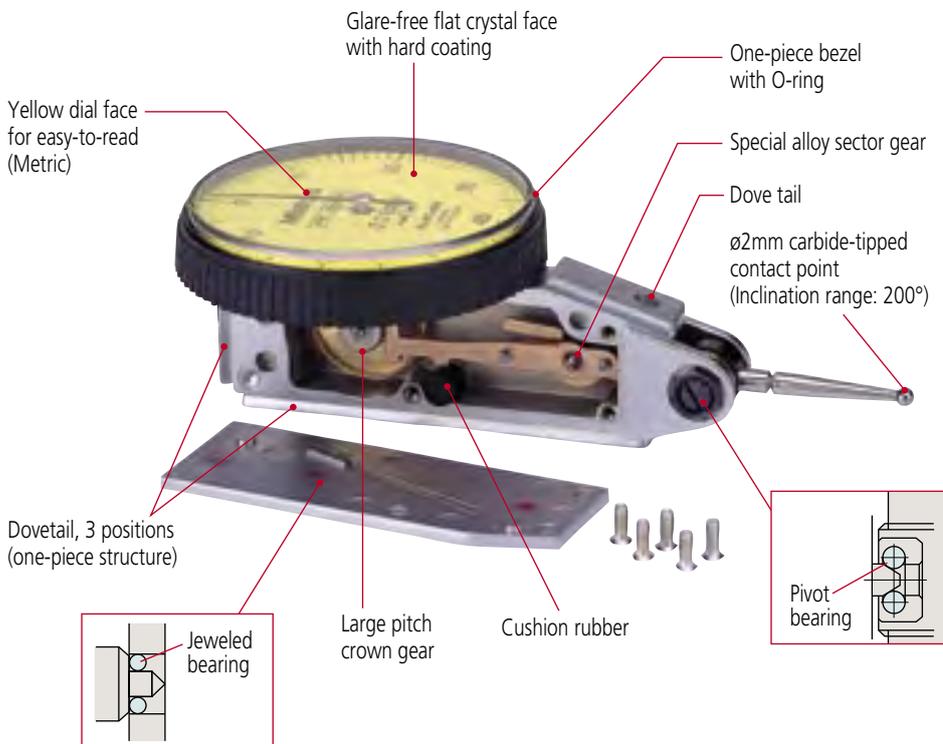
SERIES 513

FEATURES

- Narrow or deep places, which cannot be measured with a normal dial gauge, can be easily and accurately measured.
- Mitutoyo's proprietary new structure permits smooth pointer operation.
- Use of a hard frame body provides excellent rigidity and durability.
- Non-magnetic pointer and contact point permit secure operation even in environments with magnetism.
- Use of a clear and concise wide dial face allows excellent visibility.
- The surface of the crystal is hard-coated, to make it scratch-resistant.
- Flat crystal makes gradations easy to read. Moreover, the unified structure of the outer frame prevents oil and water from permeating via the front face.
- Six types are available: vertical, inclined, perpendicular, horizontal, universal, and pocketable, allowing users to select the model most suited to their needs.
- Vertical: Standard
- Inclined: Dial face inclined 20°, compared with the vertical type, allows easy reading.
- Perpendicular: Best suited for centering holes.
- Horizontal: The graduations can be read from the front, with the probe on the tip of the horizontal conical rod abutting the workpiece.
- Universal: The direction of the probe movement can be freely changed.
- Pocketable: Compact type

Description of Icon

Icon	Description
	With revolution counter type
	Long contact point type
	Jeweled bearing type
	Double scale spacing type, easy-on-the-eyes
	Compact type
	Dustproof type
	Anti-magnetic type

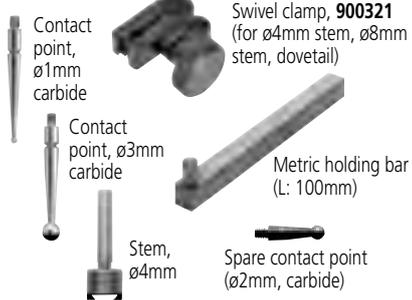


Dial Test Indicator

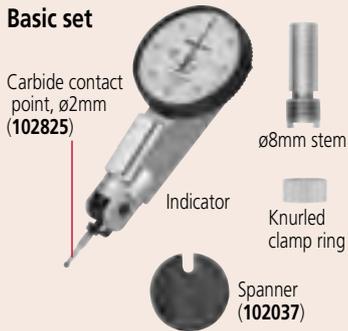
SERIES 513 — Universal Type

Set Configuration: Metric

Full set

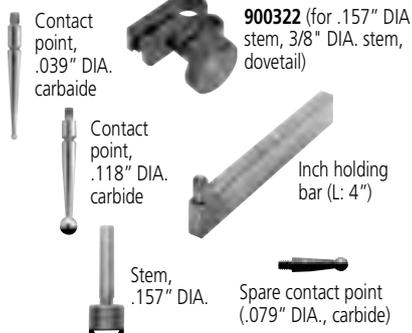


Basic set

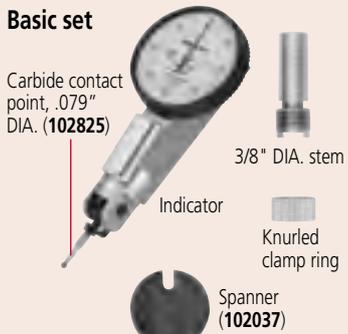


Set Configuration: Inch

Full set



Basic set

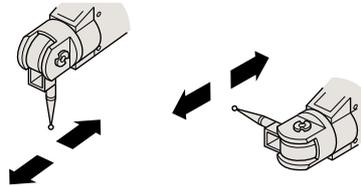


Optional Accessory

- : Swivel clamp (See page 278.)
- : Holding bar (See page 278.)
- : Stem (See page 278.)
- 102824: Contact point, ø1mm ball (carbide)
- 102825: Contact point, ø2mm ball (carbide)
- 102826: Contact point, ø3mm ball (carbide)

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.)



513-304GE

SPECIFICATIONS



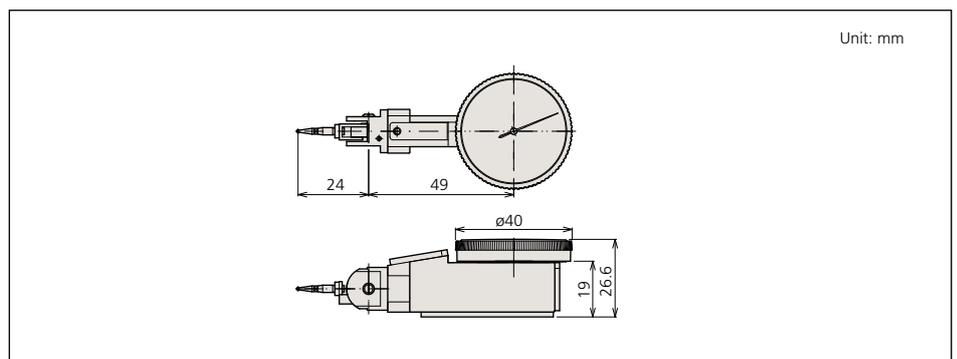
Metric

Graduation	Order No.		Range	Accuracy	Dial reading	Measuring force	Jeweled bearing type				
	Basic set	Full set									
0.01mm	513-304GE	513-304GT	0.8mm	8µm	0-40-0	0.3N or less	✓	—	—	—	—

Inch

Graduation	Order No.		Range	Accuracy	Dial reading	Measuring force	Jeweled bearing type				
	Basic set	Full set									
.0005"	513-302G	513-302GT	.03"	.0005"	0-15-0	0.3N or less	✓	—	—	—	—

DIMENSION



Unit: mm

Dial Test Indicator

SERIES 513 — Horizontal Type

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.



513-424E



513-404E



513-414E



513-415E



513-426E



513-405E



513-425E



513-401E



513-474E

Ruby contact point

Optional Accessory

- : Swivel clamp (See page 278.)
- : Holding bar (See page 278.)
- : Stem (See page 278.)
- : Contact points (See page 278.)

Special Set: No. 513-908 (mm)

- 513-404E: Dial test indicator
- 7014: Mini magnetic stand

No. 513-907 (inch)

- 513-402: Dial test indicator
- 7014: Mini magnetic stand

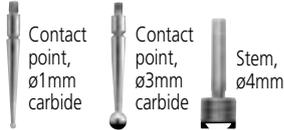


Set Configuration: Metric and Metric/Inch

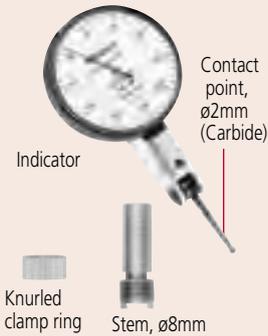
Full set

Swivel clamp (900321, for $\phi 4\text{mm}$, $\phi 8\text{mm}$, dovetail) Metric holding bar (L: 100mm)

Plus set



Basic set

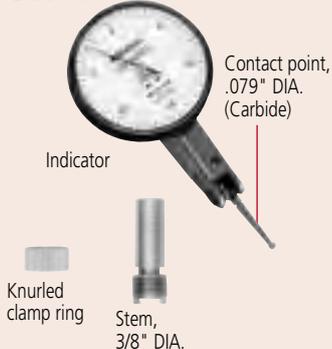


Set Configuration: Inch and Inch/Metric

Full set

Contact point, .039" DIA. carbide; Contact point, .118" DIA. carbide; Stem, .157" DIA.; Swivel clamp (900322, for .157" DIA., 3/8" DIA., dovetail) Inch holding bar (L: 4")

Basic set



Anti-magnet type



Double scale spacing type



Long contact point type



Jeweled bearing type



Compact type



With revolution counter type



513-466E



513-464E



513-465E

SPECIFICATIONS

Metric

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force						
	Basic set	Plus set	Full set					Anti-magnet type	Double scale spacing type	Long contact point type	Jeweled bearing type	Compact type	With revolution counter type
0.01mm	513-424E	513-424A	513-424T	0.5mm	5 μm	0-25-0	0.3N or less	✓	✓	—	✓	—	—
0.01mm	513-414E	513-414A	513-414T	0.5mm	10 μm	0-25-0	0.2N or less	✓	✓	✓	✓	—	—
0.01mm	513-466E	—	—	0.5mm	5 μm	0-25-0	0.3N or less	✓	✓	—	✓	—	—
0.01mm	513-404E	513-404A	513-404T	0.8mm	8 μm	0-40-0	0.3N or less	✓	—	—	✓	—	—
0.01mm	513-474E*	—	—	0.8mm	8 μm	0-40-0	0.3N or less	✓	—	—	✓	—	—
0.01mm	513-464E	—	—	0.8mm	8 μm	0-40-0	0.3N or less	✓	—	—	✓	—	—
0.01mm	513-415E	513-415A	513-415T	1mm	10 μm	0-50-0	0.2N or less	✓	—	✓	✓	—	—
0.01mm	513-426E	513-426A	—	1.5mm	8 μm	0-25-0	0.4N or less	✓	✓	—	✓	—	✓
0.002mm	513-405E	513-405A	513-405T	0.2mm	3 μm	0-100-0	0.3N or less	✓	—	—	✓	—	—
0.002mm	513-465E	—	—	0.2mm	3 μm	0-100-0	0.3N or less	✓	—	—	✓	✓	—
0.002mm	513-425E	513-425A	—	0.6mm	6 μm	0-100-0	0.4N or less	✓	—	—	✓	—	✓
0.001mm	513-401E	—	—	0.14mm	3 μm	0-70-0	0.3N or less	✓	—	—	✓	—	—

*provided with a $\phi 2\text{mm}$ ruby contact point as a substitute for $\phi 2\text{mm}$ carbide contact point.

Inch

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force						
	Basic set	Plus set	Full set					Anti-magnet type	Long contact point type	Jeweled bearing type	Compact type	With revolution counter type	
.0005"	513-402	—	513-402T	.03"	.0005"	0-15-0	0.3N or less	✓	—	✓	—	—	—
.0005"	513-412	—	513-412T	.03"	.0005"	0-15-0	0.2N or less	✓	✓	✓	—	—	—
.0005"	513-462	—	—	.03"	.0005"	0-15-0	0.3N or less	✓	—	✓	✓	—	—
.0001"	513-403	—	513-403T	.008"	.0001"	0-4-0	0.3N or less	✓	—	✓	—	—	—
.0001"	513-463	—	—	.008"	.0001"	0-4-0	0.3N or less	✓	—	✓	✓	—	—

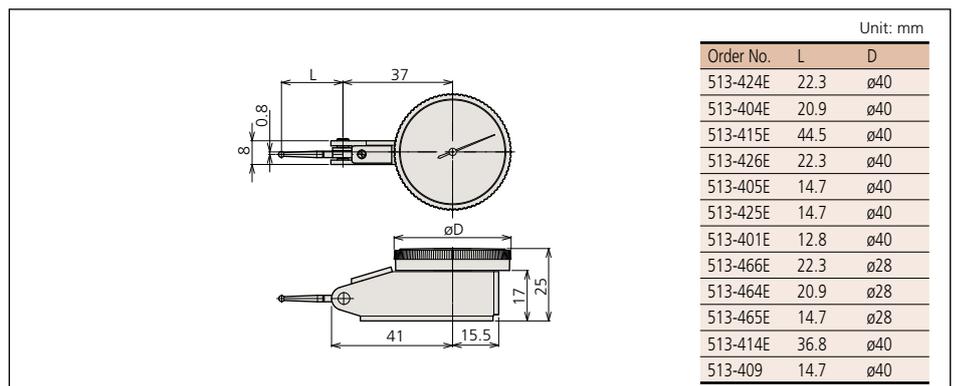
Metric/inch

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force						
	Basic set	Plus set	Full set					Anti-magnet type	Jeweled bearing type	—	—	—	—
0.002mm, .0001"	513-409	—	513-409T	0.2mm, .0075"	3 μm	0-10-0, 0-38-0	0.3N or less	✓	✓	—	—	—	—

Inch/Metric

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force						
	Basic set	Plus set	Full set					Anti-magnet type	Jeweled bearing type	—	—	—	—
.0005", 0.01mm	513-406	—	513-406T	.03", 0.7mm	.0005"	0-15-0, 0-35-0	0.3N or less	✓	✓	—	—	—	—

DIMENSION

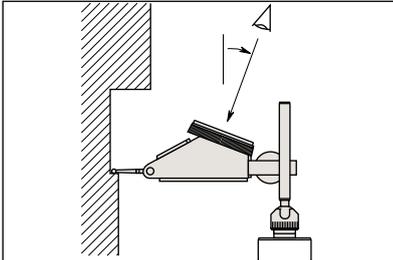


Dial Test Indicator

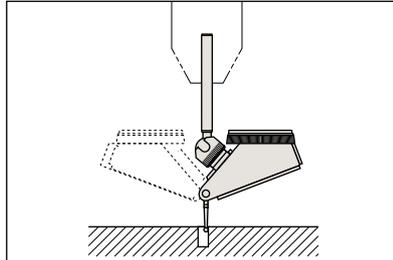
SERIES 513 — Horizontal (20 Tilted Face), Vertical, and Parallel Types

FEATURES

- Specially designed for easy viewing of measurements.



- The dial face obliquely faces upward, allowing users to read the graduations from the user's side. It is convenient when measuring on the side of a large workpiece and the workbench is high.



- Using the universal holder allows easy hole centering. The dial face always faces upward when the indicator is rotated, which makes reading easy.



513-454E



513-455E



513-444E



513-445E



513-284G



(Refer to the page 9 for details.)



513-444E



513-445E



513-454E
513-284GE



513-455E

Optional Accessory

- : Swivel clamp (See page 278.)
- : Holding bar (See page 278.)
- : Stem (See page 278.)
- : Contact points (See page 278.)



Anti-magnet type



With revolution counter type



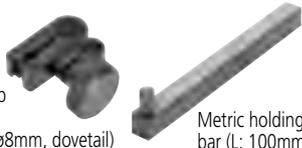
Jeweled bearing type



Long contact point type

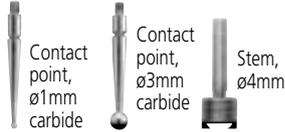
Set Configuration: Metric

Full set

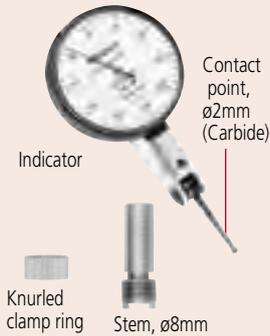
Swivel clamp
(900321,
for $\phi 4\text{mm}$, $\phi 8\text{mm}$, dovetail)

Metric holding bar (L: 100mm)

Plus set

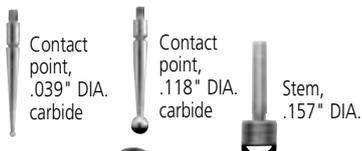


Basic set



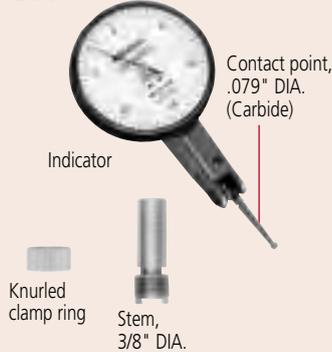
Set Configuration: Inch

Full set

Swivel clamp
(900322, for
.157" DIA., 3/8" DIA.,
dovetail)

Inch holding bar (L: 4")

Basic set



SPECIFICATIONS

Metric Horizontal (20° tilted face) type

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force					—	—	—
	Basic set	Plus set	Full set											
0.01mm	513-444E	513-444A	513-444T	1.6mm	10 μm	0-40-0	0.3N or less	✓	✓	✓	—	—	—	—
0.002mm	513-445E	513-445A	513-445T	0.4mm	5 μm	0-100-0	0.3N or less	✓	✓	✓	—	—	—	—

Inch Horizontal (20° tilted face) type

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force					Remarks
	Basic set	Plus set	Full set									
.0005"	513-442	—	513-442T	.06"	.0005"	0-15-0	0.3N or less	✓	✓	✓	—	—
.0005"	513-442-01	—	513-442T-01	.06"	.0005"	0-15-0	0.3N or less	✓	✓	✓	—	Blue dial
.0005"	513-442-06	—	513-442T-06	.06"	.0005"	0-15-0	0.3N or less	✓	✓	✓	—	Black dial
.0005"	513-446	—	513-446T	.06"	.0005"	0-15-0	0.2N or less	✓	✓	✓	✓	—
.0005"	513-446-06	—	513-446T-06	.06"	.0005"	0-15-0	0.2N or less	✓	✓	✓	✓	Black dial
.0001"	513-443	—	513-443T	.016"	.0002"	0-4-0	0.3N or less	✓	✓	✓	—	—
.0001"	513-443-06	—	513-443T-06	.016"	.0002"	0-4-0	0.3N or less	✓	✓	✓	—	Black dial

Metric Vertical type

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force			—	—	—	—
	Basic set	Plus set	Full set										
0.01mm	513-454E	513-454A	513-454T	0.8mm	8 μm	0-40-0	0.3N or less	✓	✓	—	—	—	—
0.002mm	513-455E	513-455A	513-455T	0.2mm	3 μm	0-100-0	0.3N or less	✓	✓	—	—	—	—

Inch Vertical type

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force			—	—	—	—
	Basic set	Plus set	Full set										
.0005"	513-452	—	513-452T	.03"	.0005"	0-15-0	0.3N or less	✓	✓	—	—	—	—
.0001"	513-453	—	513-453T	.008"	.0001"	0-4-0	0.3N or less	✓	✓	—	—	—	—

Metric Parallel type

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force			—	—	—	—
	Basic set	Plus set	Full set										
0.01mm	513-284GE	513-284GA	513-284GT	0.8mm	8 μm	0-40-0	0.3N or less	✓	—	—	—	—	—

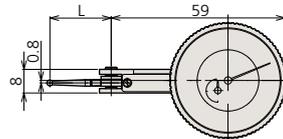
Inch Parallel type

Graduation	Order No.			Range	Accuracy	Dial reading	Measuring force			—	—	—	—
	Basic set	Plus set	Full set										
.0005"	513-282G	—	513-282GT	.03"	.0005"	0-15-0	0.3N or less	✓	—	—	—	—	—

DIMENSION

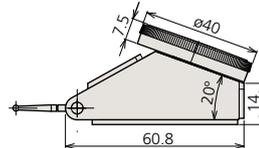
Horizontal (20° Tilted Face) Type

unit: mm

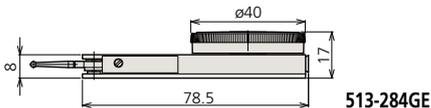
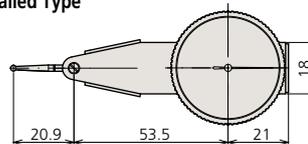


Order No.	L
513-444E	20.9
513-445E	14.7

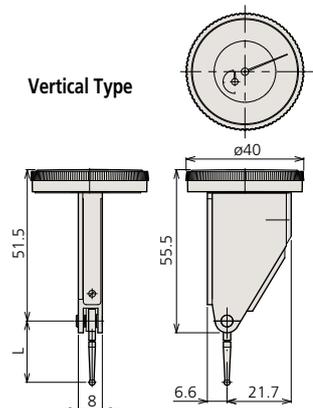
Order No.	L
513-454E	20.9
513-455E	14.7



Parallel Type



Vertical Type

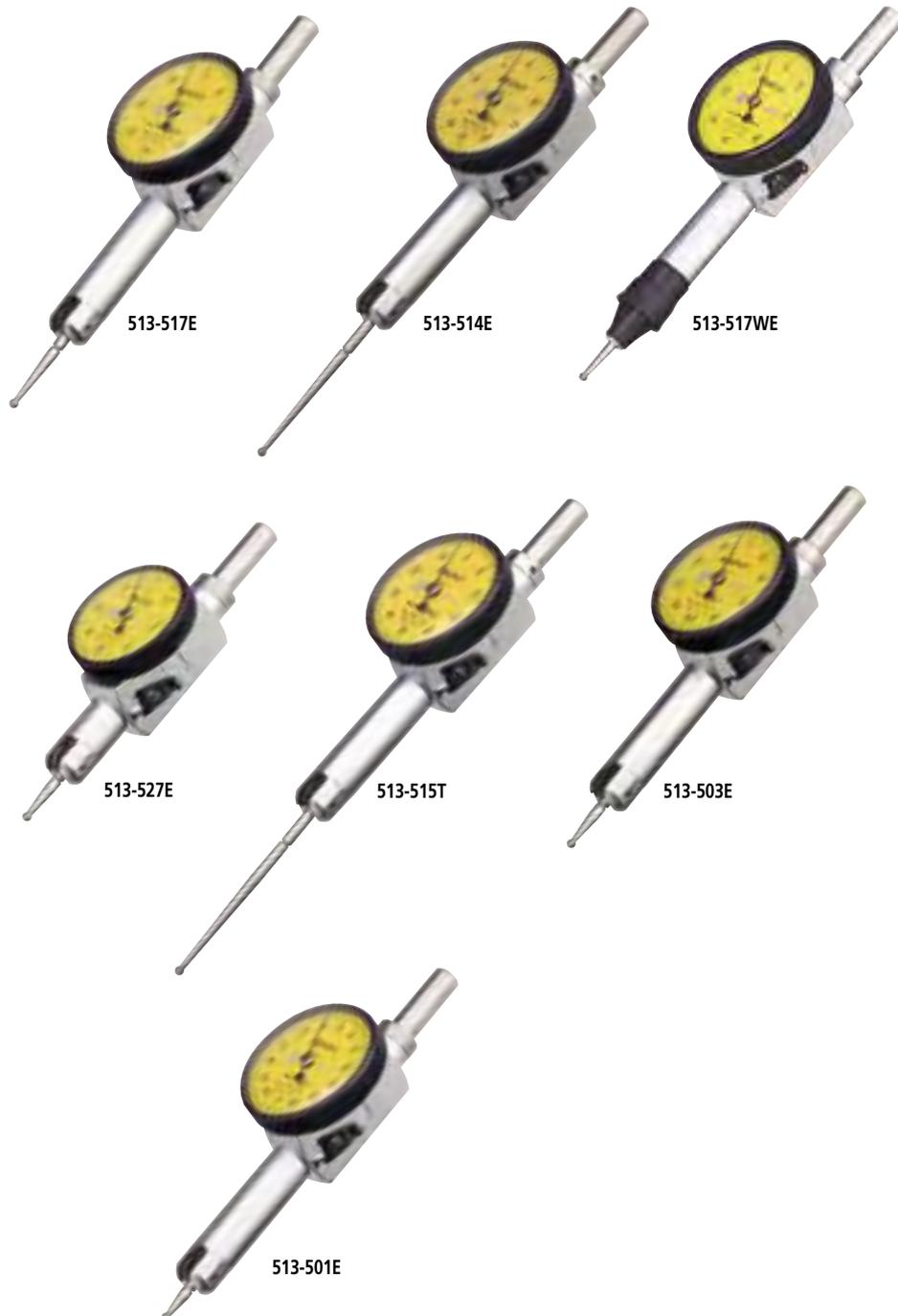


Pocket Type Dial Test Indicator

SERIES 513

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°.
- Bezel is sealed with on O-ring to keep out water / oil.



513-514E



513-517E
513-517WE
513-527E



513-515T



513-503E



513-501E

Optional Accessory

- : Swivel clamp (See page 279.)
- : Holding bar (See page 279.)
- : Stem (See page 279.)
- : Contact points (See page 279.)



Long contact point type



Jeweled bearing type



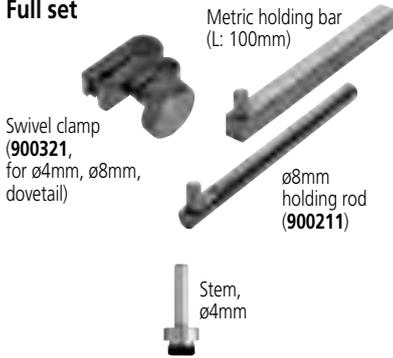
Dustproof type



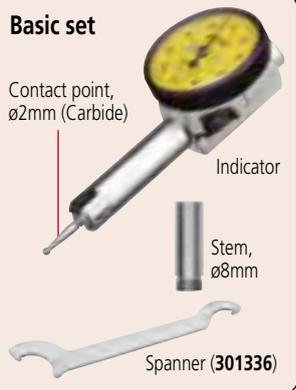
Compact type

Set Configuration: Metric

Full set

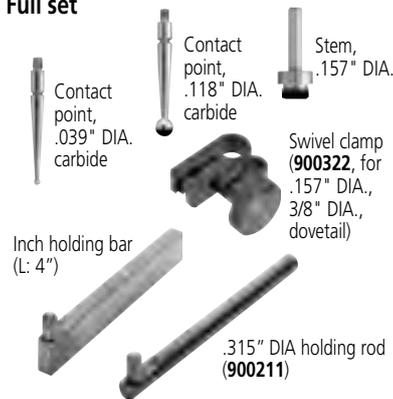


Basic set

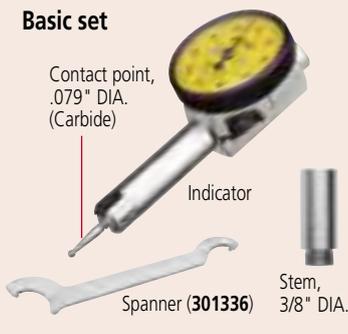


Set Configuration: Inch

Full set



Basic set



SPECIFICATIONS

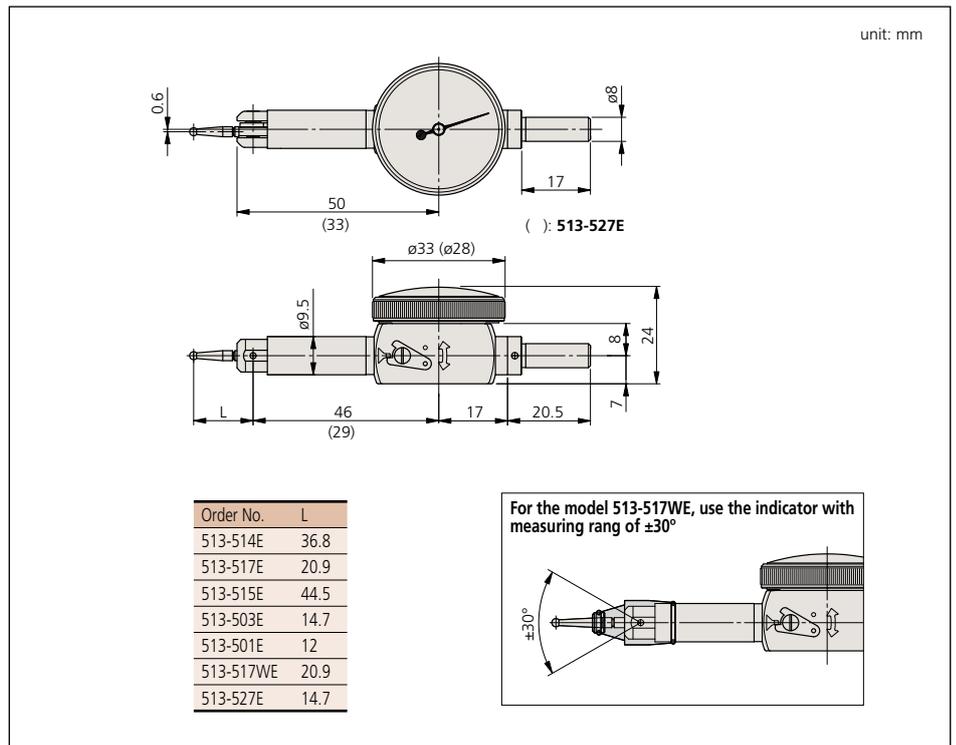
Metric

Graduation	Order No.		Range	Accuracy	Dial reading	Measuring force					—	—
	Basic set	Full set										
0.01mm	513-514E	513-514T	0.5mm	10µm	0-25-0	0.3N or less	✓	✓	—	—	—	—
0.01mm	514-517E	513-517T	0.8mm	8µm	0-40-0	0.3N or less	—	✓	—	—	—	—
0.01mm	513-517WE	513-517WT	0.8mm	8µm	0-40-0	0.3N or less	—	✓	✓	—	—	—
0.01mm	513-527E	513-527T	0.8mm	8µm	0-40-0	0.3N or less	—	✓	—	✓	—	—
0.01mm	—	513-515T	1mm	10µm	0-50-0	0.3N or less	✓	✓	—	—	—	—
0.002mm	513-503E	513-503T	0.2mm	3µm	0-100-0	0.3N or less	—	✓	—	—	—	—
0.001mm	513-501E	513-501T	0.14mm	3µm	0-70-0	0.4N or less	—	✓	—	—	—	—

Inch

Graduation	Order No.		Range	Accuracy	Dial reading	Measuring force					—	—
	Basic set	Full set										
.001"	513-518	513-518T	.04"	.001"	0-20-0	0.3N or less	—	✓	—	—	—	—
.001"	513-528	513-528T	.04"	.001"	0-20-0	0.3N or less	—	✓	✓	—	—	—
.0005"	513-512	513-512T	.02"	.0005"	0-10-0	0.3N or less	✓	✓	—	—	—	—
.0001"	513-504	513-504T	.01"	.0002"	0-5-0	0.3N or less	—	✓	—	—	—	—

DIMENSION



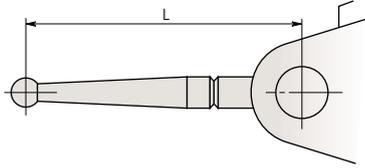
Contact Point, Stem and Clamp Holder

Optional Accessory for Dial Test Indicator

Contact Points (for Metric Model Only*)

*Except for universal type dial test indicator (513-304G).

- 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 (Carbide)



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)

ø3mm ball (Carbide)



21CZA045 (L=12.8mm)
103018 (L=14.7mm)
103014 (L=20.9mm)
137559 (L=22.3mm)
137747 (L=36.8mm)
136236 (L=44.5mm)

Spanner



102037

Stems with Knurled Clamp Ring

ø4mm (.157" DIA.)



902802

ø8mm



902804

3/8" DIA.



902805

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



9 x 9mm

953638 (Length: 50mm)
900209 (Length: 100mm)



ø8mm

900211 (Length: 115mm)



.25" x .5"

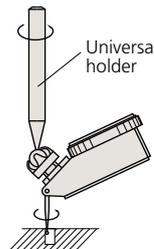
953639 (Length: 2")
900306 (Length: 4")

Universal Holder

- Allows the indicator to be set at a desired position.



901916 (ø8mm stem)
901459 (.25" DIA. stem)



Universal holder

Spanner

Stems with Knurled Clamp Ring

ø4mm (.157" DIA.)



902802

ø8mm



902804

3/8" DIA.



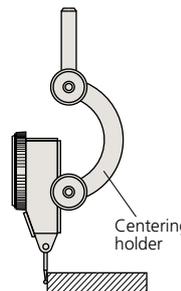
902805

Centering Holder

- Allows large diameter cylinders or holes to be centered.



901959 (ø8mm stem)
901997 (.25" DIA. stem)



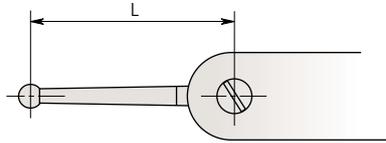
Centering holder

Contact Point, Stem and Clamp Holder

Optional Accessory for Pocket Type Dial Test Indicator

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 (Carbide)



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)

ø3mm ball (Carbide)



136758 (L=12.1mm)
103018 (L=14.7mm)
103014 (L=20.9mm)
136236 (L=44.5mm)

Stems

ø4mm (.157" DIA.)



102389

ø8mm



102822

3/8" DIA.



102081

Swivel Clamps

- Can be used with Holding Bars.

For ø4mm stem
and ø8mm stem, and
dovetail



900321

For .157" DIA. stem and
3/8" DIA. stem, and
dovetail



900322

Holding Bars



9 x 9mm

953638 (Length: 50mm)
900209 (Length: 100mm)



ø8mm

900211 (Length: 115mm)



.25" x .5"

953639 (Length: 2")
900306 (Length: 4")

Spanner



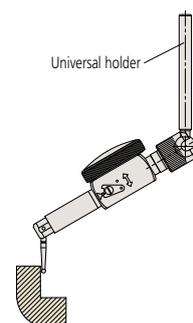
301336

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)



Thickness Gage

SERIES 547, 7

The 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.

FEATURES

- Wide range of applications with various types of measuring faces (on the spindle and anvil).

- The digital models incorporate Mitutoyo's popular ID-C and ID-S Series Digimatic Indicators to provide error-free LCD readings as well as data output for SPC analysis.
- **547-401 (547-400)** is ideally suited for measuring thicknesses of paper, film, wire, sheet metal and similar materials.

Standard Type / Digital



Deep Throat Type / Digital



Standard Type / Dial



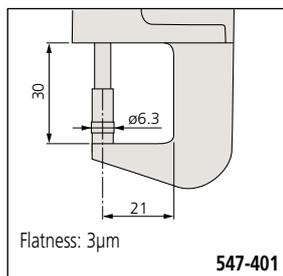
Deep Throat Type / Dial



High Accuracy Type / Digital



DIMENSION



SPC

ABSOLUTE®

Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data of Digital Models

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01mm, 0.001mm, .0005"/0.01mm, .0001"/0.001mm or .00005"/0.001mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Measuring force: Refer to the list of specifications
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type) Carbide ball with #4-48UNF (ANSI/AGD type)
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 5,000 hours under normal use
 Dust/Water protection level: IP42 or IP53 (dust-proof type)

Function of Digital Models

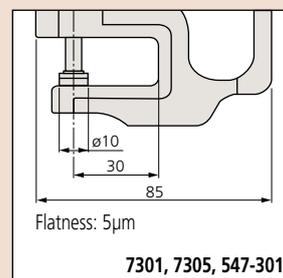
Origin-set/Preset, Zeroset, GO/±NG judgment, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

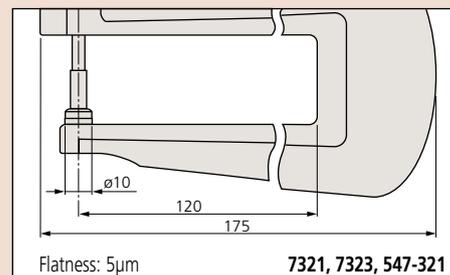
- 905338:** SPC cable (1m) for digital models
- 905409:** SPC cable (2m) for digital models
- 902011:** Spindle lifting lever (ISO/JIS type)*
- 902794:** Spindle lifting lever (ANSI/AGD type)*
- 137693:** Spindle lifting hook**
- 540774:** Spindle lifting cable
- 125317:** Spare rubber boot (for dust-proof type)
- 02ACA571:** Auxiliary spindle spring for 25mm/1" models***
- 02ACA773:** Auxiliary spindle spring for 50mm/2" models***
- : Backs (See page 266.)
- : Contact points (See page 264.)

*Can be used on 12mm/.5" models only.
 **Can be used on 25mm/1" or 50mm/2" models.
 ***Required when orienting the indicator upside down.

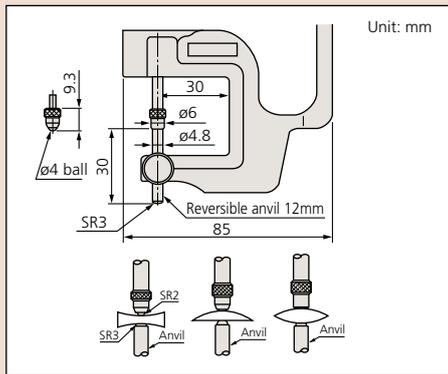
DIMENSION



Unit: mm



DIMENSION



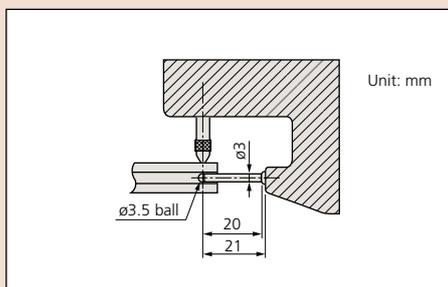
Lens thickness measurement



SPC
ABSOLUTE
Mitsubishi System Partnered by MITSUBISHI



DIMENSION



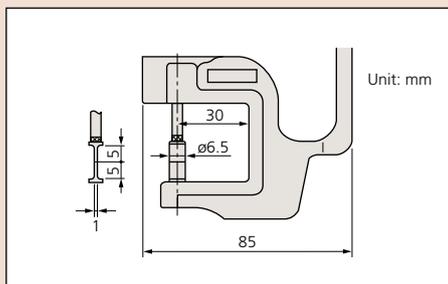
Tube thickness measurement



SPC
ABSOLUTE
Mitsubishi System Partnered by MITSUBISHI



DIMENSION



Groove thickness measurement



SPC
ABSOLUTE
Mitsubishi System Partnered by MITSUBISHI



SPECIFICATIONS

Metric Digital Type			Inch/Metric Digital Type			Accuracy	Measuring force	Remarks
Range	Order No.	Resolution	Range	Order No.	Resolution			
0 - 12mm	547-401	0.001mm	0 - .47"	547-400 /	.00005"/0.001mm	±3µm	3.5N or less	High accuracy, carbide spindle/anvil
0 - 10mm	547-301	0.01mm	0 - .4" / 0 - .47"*	547-300 / 547-500*	.0005"/0.01mm	±20µm	1.5N or less	Standard, ceramic spindle/anvil
0 - 10mm	547-321	0.01mm	0 - .4" / 0 - .47"*	547-320 / 547-520*	.0005"/0.01mm	±20µm	1.5N or less	Deep throat, ceramic spindle/anvil
0 - 10mm	547-313	0.01mm	0 - .4" / 0 - .47"*	547-312 / 547-512*	.0005"/0.01mm	±20µm	1.5N or less	Lens thickness
0 - 10mm	547-315	0.01mm	0 - .4" / 0 - .47"*	547-316 / 547-516*	.0005"/0.01mm	±20µm	1.5N or less	Groove thickness
0 - 10mm	547-360	0.01mm	0 - .4" / 0 - .47"*	547-361 / 547-561*	.0005"/0.01mm	±20µm	1.5N or less	Tube thickness

*using ID-S Digimatic indicator, Standard model with .0001"/0.001mm resolution ID-S is available (547-526).

Metric Dial Type			Inch Dial Type			Accuracy	Measuring force	Remarks
Range	Order No.	Dial reading	Range	Order No.	Dial reading			
0 - 1mm	7327	0.001mm	0 - .05"	7326S	.00005"	±5µm	1.4N or less	Fine dial reading, ceramic spindle/anvil
0 - 10mm	7301	0.01mm	0 - .5"	7300S	.001"	±15µm	1.4N or less	Standard, ceramic spindle/anvil
0 - 20mm	7305	0.01mm	0 - 1"	7304S	.001"	±20µm	2.0N or less	Standard, ceramic spindle/anvil
0 - 10mm	7321	0.01mm	—	—	—	±15µm	1.4N or less	Deep throat, ceramic spindle/anvil
0 - 20mm	7323	0.01mm	0 - 1"	7322S	.001"	±22µm	2.0N or less	Deep throat, ceramic spindle/anvil
0 - 10mm	7313	0.01mm	0 - .5"	7312S	.001"	±15µm	1.4N or less	Lens thickness
0 - 10mm	7315	0.01mm	0 - .5"	7316S	.001"	±15µm	1.4N or less	Groove thickness
0 - 10mm	7360	0.01mm	0 - .5"	7361S	.001"	±15µm	1.4N or less	Tube thickness

Light-Weight Dial Thickness Gage

SERIES 7



Ceramic spindle/anvil

7331

Application

Measuring paper thickness



Measuring thickness of a human hair

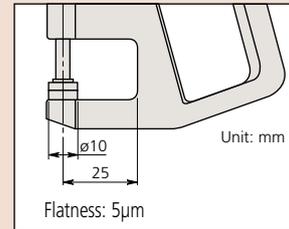


SPECIFICATIONS

Metric

Range	Order No.	Dial reading	Accuracy	Measuring force
0 - 10mm	7331	0.01mm	±20µm	1.4N or less

DIMENSION



Pocket Thickness Gage

SERIES 7

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.



7309

SPECIFICATIONS

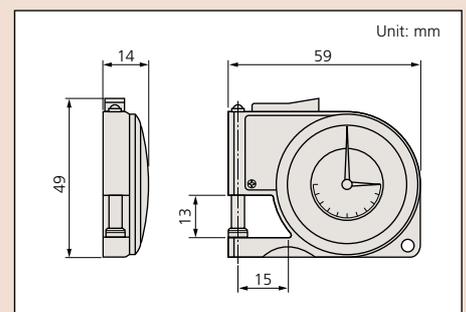
Metric

Range	Order No.	Dial reading	Accuracy
0 - 10mm	7309	0.01mm	±20µm

Inch

Range	Order No.	Dial reading	Accuracy
0 - .4"	7308	.001"	±.001"

DIMENSION





Digimatic Caliper Gage

SERIES 209 — Internal, External and Tube Thickness Measurement Type

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

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01mm or 0.005mm
 Display: LCD
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Contact point: Carbide ball with M2.5x0.45 (ISO/JIS type)
 Steel ball with #4-48UNF (ANSI/AGD type)
 Battery: CR-123A or DL-123A (1 pc.)
 Battery life: Approx. 350 hours
 Dust/Water protection level: IP63

Function

Zeraset, Preset, Auto power OFF, Data hold, Max/Min value holding, Data output

Optional Accessory

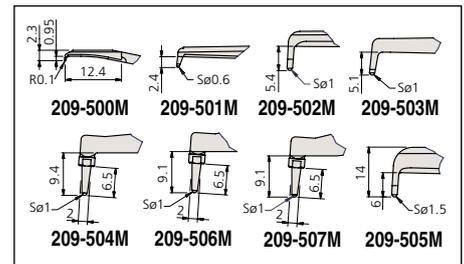
21JAA300: SPC cable (2m)

Internal measurement type



209-506M

Unit: mm

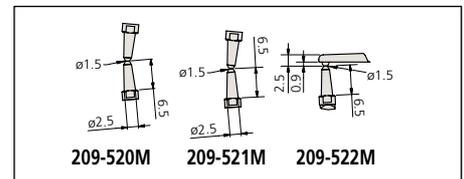


External measurement type



209-521M

Unit: mm

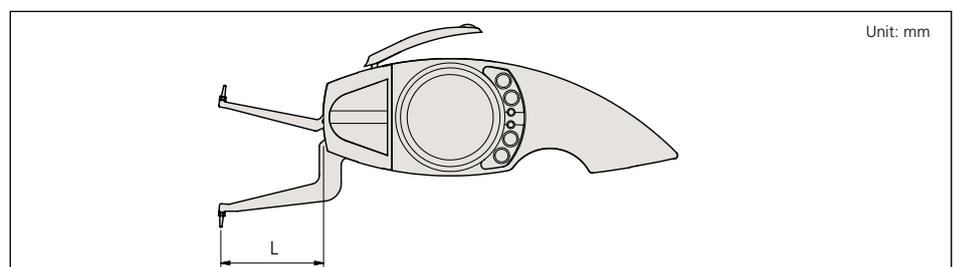


SPECIFICATIONS

Metric

Range	Order No.	Resolution	Accuracy	Measuring force	Dimension (L)	Remarks
2.5 - 12.5mm	209-500M	0.005mm	±15µm	0.7 - 1.2N	12mm	Internal measurement type
5 - 25mm	209-501M	0.01mm	±20µm	0.9 - 1.4N	22mm	Internal measurement type
10 - 30mm	209-502M	0.01mm	±20µm	0.9 - 1.4N	47mm	Internal measurement type
20 - 40mm	209-503M	0.01mm	±20µm	1.1 - 1.7N	50mm	Internal measurement type
30 - 50mm	209-504M	0.01mm	±20µm	1.1 - 1.7N	55mm	Internal measurement type
15 - 55mm	209-505M	0.02mm	±40µm	1.2 - 1.7N	120mm	Internal measurement type
50 - 70mm	209-506M	0.01mm	±20µm	1.1 - 1.7N	55mm	Internal measurement type
70 - 90mm	209-507M	0.01mm	±20µm	1.1 - 1.7N	55mm	Internal measurement type
0 - 10mm	209-520M	0.005mm	±10µm	0.6 - 1.2N	10mm	External measurement type
0 - 20mm	209-521M	0.01mm	±20µm	0.7 - 1.3N	46mm	External measurement type
0 - 20mm	209-522M	0.01mm	±20µm	0.7 - 1.3N	46mm	External measurement type

DIMENSION



Unit: mm

Dial Caliper Gage

SERIES 209 — Internal Measurement Type

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.



209-122



209-152

SPECIFICATIONS

Metric

Range	Order No.	Graduation	Dial face	Accuracy	Measuring force	Dimension [L / A (max) / B (min)]		
6 - 18mm	209-122	0.01mm	0-100-100	±40µm	1.2N or less	40mm	1.0mm	2.5mm
10 - 22mm	209-123	0.01mm	0-100-100	±40µm	1.2N or less	40mm	2.0mm	2.5mm
20 - 32mm	209-124	0.01mm	0-100-100	±40µm	1.2N or less	40mm	4.2mm	2.5mm
5 - 15mm	209-152	0.01mm	0-100	±25µm	1.2N or less	30mm	2.0mm	0.7mm
10 - 20mm	209-153	0.01mm	0-100	±25µm	1.2N or less	30mm	5.0mm	0.7mm
10 - 30mm	209-171	0.01mm	0-100-100	±25µm	1.2N or less	65mm	5.2mm	0.7mm
20 - 40mm	209-172	0.01mm	0-100-100	±25µm	1.2N or less	65mm	9.5mm	0.7mm



209-650



209-608



209-609



209-884



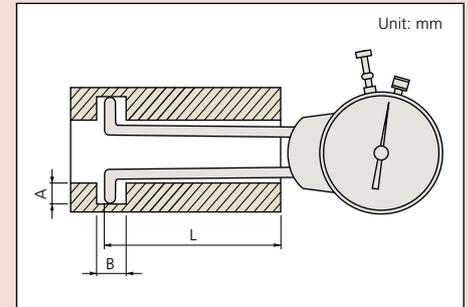
209-896

SPECIFICATIONS

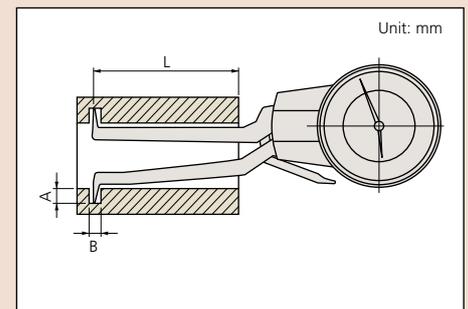
Metric

Range	Order No.	Graduation	Accuracy	Measuring force	Contact point	Dimension [L / A (max) / B (min)]		
2.5 - 7.5mm	209-650	0.005mm	±15µm	1.7N or less	R0.1mm	12.4mm	0.7mm	0.6mm
5 - 10mm	209-651	0.005mm	±15µm	1.7N or less	ø0.6mm	27mm	2.3mm	1.9mm
5 - 15mm	209-652	0.01mm	±20µm	1.7N or less	ø0.6mm	23mm	2.3mm	1.7mm
10 - 20mm	209-653	0.01mm	±20µm	1.7N or less	ø1.0mm	60.6mm	4.5mm	1.8mm
10 - 30mm	209-608	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	5.0mm	1.7mm
20 - 30mm	209-654	0.01mm	±20µm	1.7N or less	ø1.0mm	60.6mm	4.5mm	2.0mm
20 - 40mm	209-609	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	6.5mm	2.3mm
30 - 40mm	209-655	0.01mm	±20µm	1.7N or less	ø1.0mm	60.6mm	4.5mm	2.0mm
30 - 50mm	209-600	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	6.5mm	2.5mm
40 - 50mm	209-656	0.01mm	±20µm	1.7N or less	ø1.0mm	60.6mm	4.5mm	1.8mm
40 - 60mm	209-884	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	9.0mm	2.3mm
50 - 70mm	209-885	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	8.0mm	3.7mm
60 - 80mm	209-886	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	8.0mm	3.7mm
70 - 90mm	209-887	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	8.0mm	3.7mm
80 - 100mm	209-888	0.01mm	±30µm	1.5N or less	ø1.0mm	80mm	8.0mm	3.7mm
15 - 65mm	209-896	0.05mm	±50µm	2.0N or less	ø1.5mm	175mm	5.0mm	2.1mm
40 - 90mm	209-897	0.05mm	±50µm	2.0N or less	ø2.0mm	175mm	10.0mm	3.8mm
70 - 120mm	209-898	0.05mm	±50µm	2.0N or less	ø2.0mm	175mm	8.0mm	3.8mm

DIMENSION



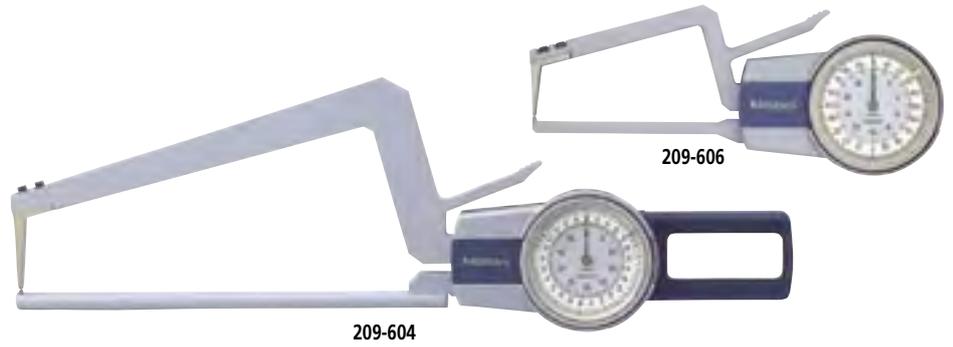
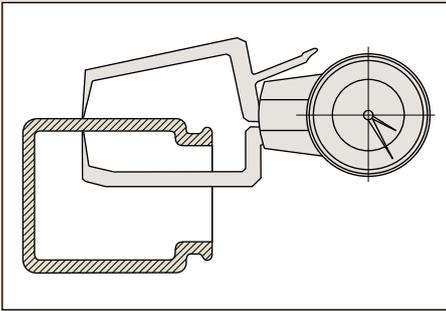
DIMENSION



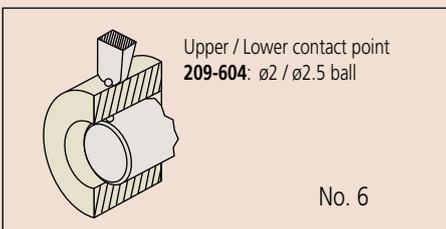
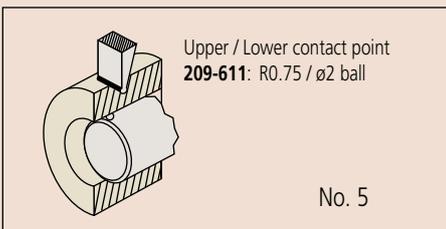
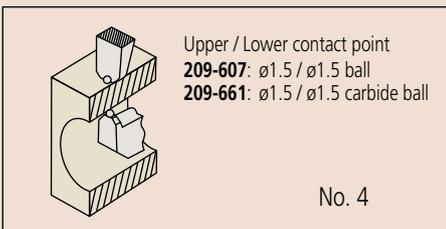
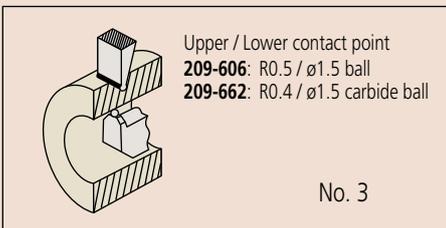
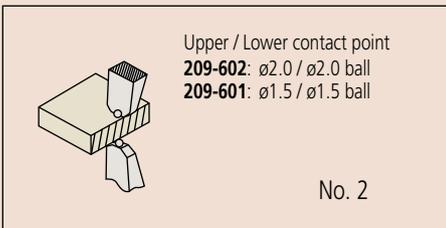
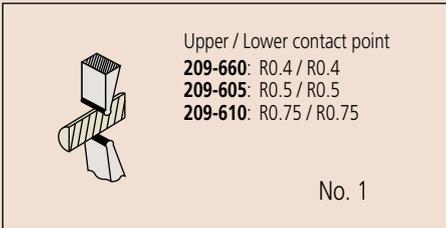
Dial Caliper Gage

SERIES 209 — External Measurement Type

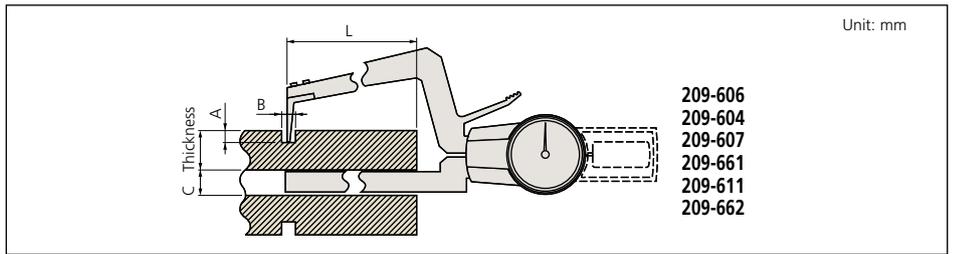
Application



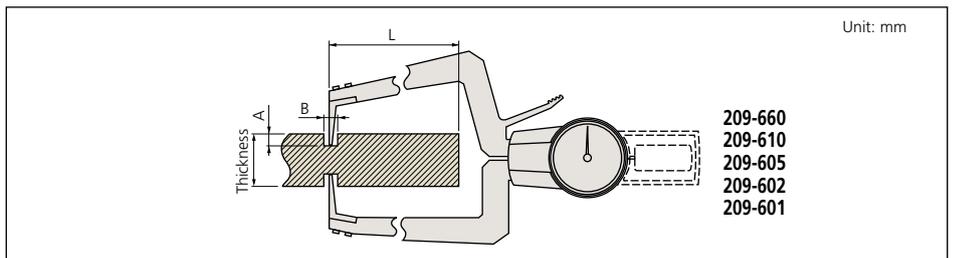
Type of Contact Points



DIMENSION



DIMENSION



SPECIFICATIONS

Metric

Range	Order No.	Graduation	Accuracy	Measuring force	Contact point	Dimension [L / A (max) / B (min) / C (min)]			
0 - 10mm	209-660	0.01mm	$\pm 20\mu\text{m}$	1.3N or less	No. 1	60.5mm	7mm	2mm	—
0 - 10mm	209-661	0.01mm	$\pm 20\mu\text{m}$	1.3N or less	No. 4	60.5mm	7mm	2mm	3mm
0 - 10mm	209-662	0.01mm	$\pm 20\mu\text{m}$	1.3N or less	No. 3	60.5mm	7mm	2mm	3mm
0 - 20mm	209-605	0.01mm	$\pm 30\mu\text{m}$	1.5N or less	No. 1	80mm	10mm	5mm	—
0 - 20mm	209-601	0.01mm	$\pm 30\mu\text{m}$	1.5N or less	No. 2	80mm	10mm	5mm	—
0 - 20mm	209-606	0.01mm	$\pm 30\mu\text{m}$	1.5N or less	No. 3	80mm	10mm	5mm	10mm
0 - 20mm	209-607	0.01mm	$\pm 30\mu\text{m}$	1.5N or less	No. 4	80mm	10mm	5mm	10mm
0 - 50mm	209-610	0.05mm	$\pm 50\mu\text{m}$	1.8N or less	No. 1	170mm	20mm	7mm	—
0 - 50mm	209-602	0.05mm	$\pm 50\mu\text{m}$	1.8N or less	No. 2	170mm	20mm	7mm	—
0 - 50mm	209-611	0.05mm	$\pm 50\mu\text{m}$	1.8N or less	No. 5	170mm	20mm	7mm	12mm
0 - 50mm	209-604	0.05mm	$\pm 50\mu\text{m}$	1.8N or less	No. 6	170mm	20mm	7mm	12mm

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 $\varnothing 20\text{mm}$ workpiece rest.



7060

547-064

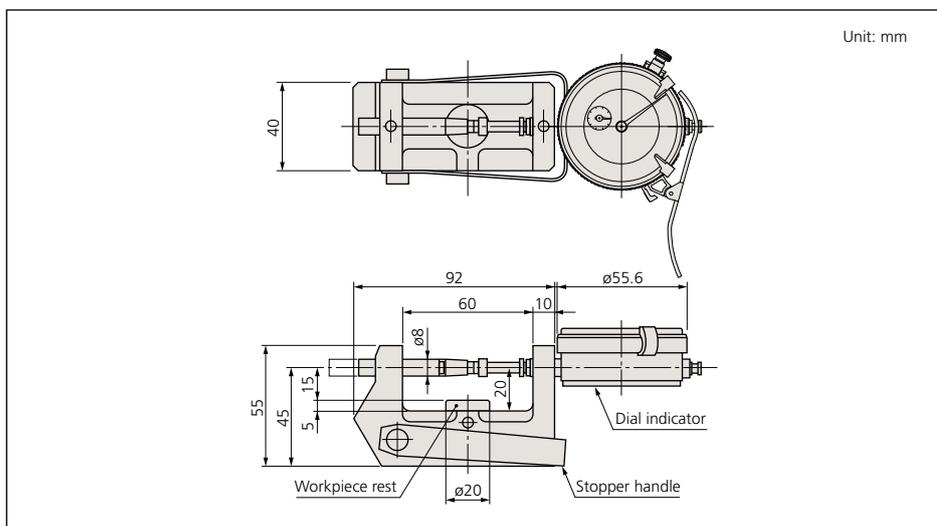
SPECIFICATIONS

Metric		Digital Type				
Range	Order No.	Resolution	Workpiece height	Accuracy	Measuring force	Remarks (contact point)
12mm	547-064	0.01mm	13mm	$\pm 0.02\text{mm}$	1.5N or less	$\varnothing 6.3\text{mm}$ flat type

Inch/Metric		Digital Type				
Range	Order No.	Resolution	Workpiece height	Accuracy	Measuring force	Remarks (contact point)
.5"	547-066	.0005"/0.01mm	1"	$\pm .001"$	1.5N or less	.248" DIA flat type

Metric		Dial Type				
Range	Order No.	Graduation	Workpiece height	Accuracy	Measuring force	Remarks (contact point)
10mm	7060	0.01mm	20mm	$\pm 0.02\text{mm}$	1.4N or less	$\varnothing 6.3\text{mm}$ flat type

DIMENSION



SPC

ABSOLUTE
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)



Digital indicator used

Technical Data of Digital Models

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Display: LCD
 Length standard: ABSOLUTE electrostatic capacitance type linear encoder
 Max. response speed: Unlimited
 Contact point: $\varnothing 6.3\text{mm}$ flat type
 Measuring force: Refer to the list of specifications
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 5,000 hours under normal use

Function of Digital Models

Origin-set/Preset, Zeroset, GO/ \pm NG judgment, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error, Over-flow error, Tolerance limit setting error

Optional Accessory

905338: SPC cable (1m) for digital models
905409: SPC cable (2m) for digital models



ABSOLUTE[®]

Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)



Digimatic indicator used
(0.001mm resolution)

Digimatic indicator used
(0.01mm resolution)

Technical Data of Digital Models

Accuracy: Refer to the list of specifications
(excluding quantizing error)

Resolution: 0.01mm, 0.001mm, .0005"/0.01mm or
.00005"/0.001mm

Display: LCD

Length standard: ABSOLUTE electrostatic capacitance type
linear encoder

Max. response speed: Unlimited

Contact point: ø3mm carbide flat type
(7051: ø6mm flat type)

Measuring force: Refer to the list of specifications

Battery: SR44 (1 pc.), 938882

Battery life: Approx. 5,000 hours under normal use

Function of Digital Models

Origin-set/Preset, Zeroret, GO/±NG judgment, Counting
direction switching, Power ON/OFF, Data output, inch/mm
conversion (inch/mm models)

Alarm: Low voltage, Counting value composition error,
Over-flow error, Tolerance limit setting error

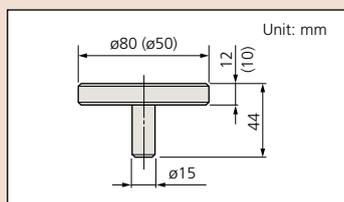
Optional Accessory

905338: SPC cable (1m) for digital models

905409: SPC cable (2m) for digital models

902190: ø80mm large diameter anvil

903526: ø50mm ceramic anvil



Upright Gage

SERIES 547, 7

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: 40mm or 50mm in diameter.



SPECIFICATIONS

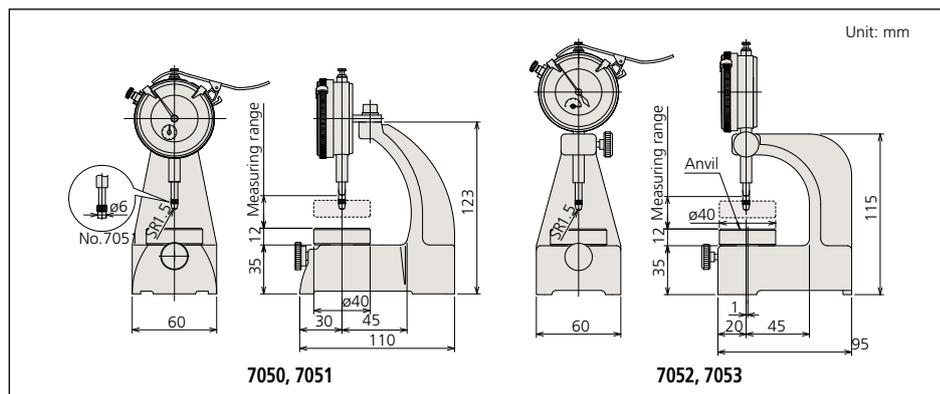
Metric		Digital Type				
Range	Order No.	Resolution	Workpiece height	Accuracy	Measuring force	Remarks (type of anvil)
12mm	547-054	0.01mm	30mm	±0.02m	1.5N or less	ø40mm steel type
12mm	547-053	0.001mm	30mm	±3µm	1.5N or less	ø50mm ceramic type
12mm	547-055	0.001mm	30mm	±3µm	1.5N or less	ø40mm steel type

Inch/Metric		Digital Type				
Range	Order No.	Resolution	Workpiece height	Accuracy	Measuring force	Remarks (type of anvil)
.5"	547-034	.0005"/0.01mm	1.2"	±.001"	1.5N or less	1.57" DIA steel type
.5"	547-033	.00005"/0.001mm	1.2"	±.00015"	1.5N or less	1.97" DIA ceramic type
.5"	547-035	.00005"/0.001mm	1.2"	±.00015"	1.5N or less	1.57" DIA steel type

Metric		Dial Type				
Range	Order No.	Graduation	Workpiece height	Accuracy	Measuring force	Remarks (type of anvil)
10mm	7050	0.01mm	20mm	±0.02m	1.4N or less	ø40mm steel type
10mm	7051	0.01mm	20mm	±0.02m	1.4N or less	ø40mm steel type
10mm	7052	0.01mm	35mm	±0.02m	1.4N or less	ø40mm steel type
1mm	7053	0.001mm	30mm	±3µm	1.5N or less	ø40mm steel type

Inch		Dial Type				
Range	Order No.	Graduation	Workpiece height	Accuracy	Measuring force	Remarks (type of anvil)
1"	7056	.001"	1"	±.002"	1.4N or less	1.57" DIA steel type

DIMENSION

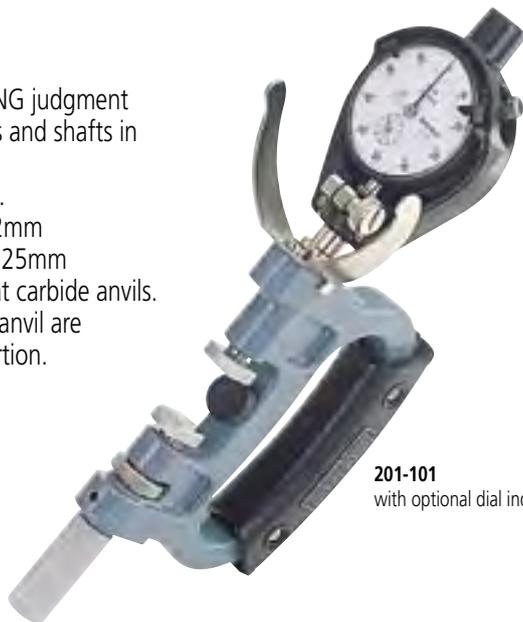


Dial Snap Gage

SERIES 201

FEATURES

- Designed for quick GO/NG judgment of diameters of cylinders and shafts in machining processes.
- Dial indicator is optional.
- Anvil retracting stroke: 2mm
- Anvil positioning range: 25mm
- Wide (13.5 x 12mm), flat carbide anvils.
- Both front edges of the anvil are chamfered for easy insertion.



201-101
with optional dial indicator

Technical Data

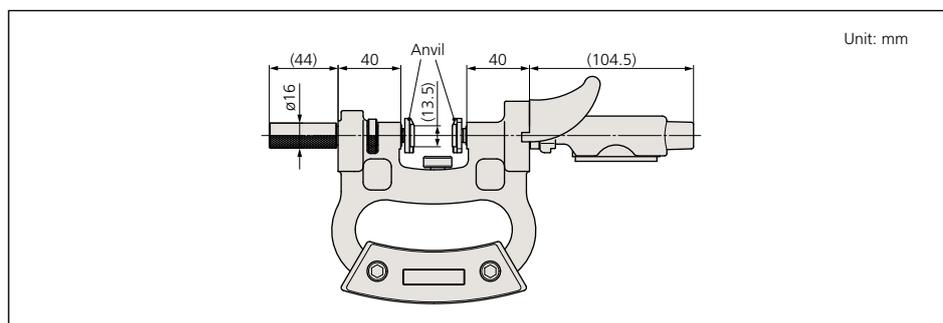
Accuracy: Refer to the list of specifications
 Anvil retracting stroke: 2mm
 Anvil positioning range: 25mm
 Anvil flatness: 1µm

SPECIFICATIONS

Metric				
Range	Order No.	Parallelism	Measuring force	Recommended dial indicator (optional)
0 - 25mm	201-101	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
25 - 50mm	201-102	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
50 - 75mm	201-103	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
75 - 100mm	201-104	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
100 - 125mm	201-105	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
125 - 150mm	201-106	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
150 - 175mm	201-107	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
175 - 200mm	201-108	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
200 - 225mm	201-109	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
225 - 250mm	201-110	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
250 - 275mm	201-111	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
275 - 300mm	201-112	5µm or less	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)

Inch				
Range	Order No.	Parallelism	Measuring force	Recommended dial indicator (optional)
0 - 1"	201-151	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
1 - 2"	201-152	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
2 - 3"	201-153	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
3 - 4"	201-154	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
4 - 5"	201-155	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
5 - 6"	201-156	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
6 - 7"	201-157	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
7 - 8"	201-158	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
8 - 9"	201-159	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
9 - 10"	201-160	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
10 - 11"	201-161	.00025" or less	15N±3N	2803SB-10 (.0001" reading)
11 - 12"	201-162	.00025" or less	15N±3N	2803SB-10 (.0001" reading)

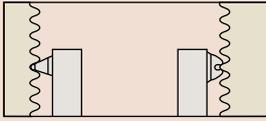
DIMENSION



Female Screw Thread Comparator

SERIES 243

Application



Optional Accessory

- 243-800:** Interchangeable inserts set for Metric and Unified screws
 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**)
 5.5 - 7mm / 4.5 - 3.5TPI (**243-806**)
- 243-810:** Interchangeable inserts set for Whitworth screws
 60 - 48TPI (**243-811**)
 48 - 40TPI (**243-812**)
 40 - 32TPI (**243-813**)
 32 - 24TPI (**243-814**)
 24 - 18TPI (**243-815**)
 18 - 14TPI (**243-816**)
 14 - 10TPI (**243-817**)
 10 - 7TPI (**243-818**)
 7 - 4.5TPI (**243-819**)
 4.5 - 3.5TPI (**243-820**)

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.



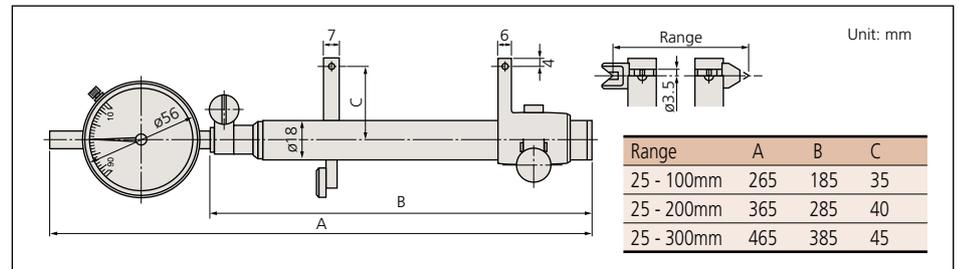
243-102
(including dial indicator)

SPECIFICATIONS

Metric

Range	Order No.	Graduation	Probe depth	Measuring force
25 - 100mm	243-101	0.01mm	20mm	7N±1N
25 - 200mm	243-102	0.01mm	25mm	7N±1N
25 - 300mm	243-103	0.01mm	30mm	7N±1N

DIMENSION



Roll Caliper

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.



310-132
with optional dial indicator

SPECIFICATIONS

Metric

Range	Order No.
ø500 - ø1400mm	310-131
ø400 - ø1050mm	310-132
ø275 - ø825mm	310-133
ø200 - ø600mm	310-134
ø100 - ø450mm	310-135

Inch

Range	Order No.
ø20" - ø56"	310-141
ø16" - ø42"	310-142
ø11" - ø32"	310-143
ø8" - ø24"	310-144
ø4" - ø17"	310-145

Dial Tension Gage

SERIES 546

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

Standard		
Minimum reading	Order No.	Range
2mN	546-112	6mN - 50mN
5mN	546-113	10mN - 100mN
10mN	546-114	30mN - 300mN
0.02N	546-115	0.06N - 0.5N
0.05N	546-116	0.1N - 1N
0.05N	546-117	0.15N - 1.5N
0.1N	546-118	0.3N - 3N
0.2N	546-119	0.6N - 5N

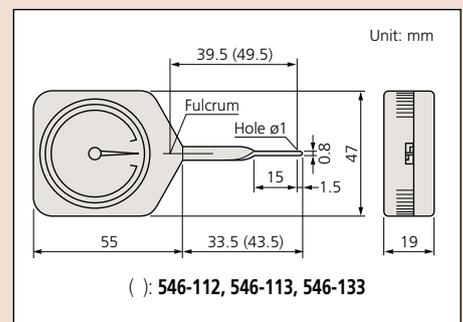
Peak hold		
Graduation	Order No.	Range
5mN	546-133	10mN - 100mN
10mN	546-134	30mN - 300mN
0.02N	546-135	0.06N - 0.5N
0.05N	546-136	0.1N - 1N
0.05N	546-137	0.15N - 1.5N
0.1N	546-138	0.3N - 3N
0.2N	546-139	0.6N - 5N

Application

Measuring contact force of relay



DIMENSION



V-Block Set

SERIES 181

FEATURES

- Two V-blocks per set.
- Magnetic type is available. (The magnetic type V-block is not provided with a workpiece clamp.)

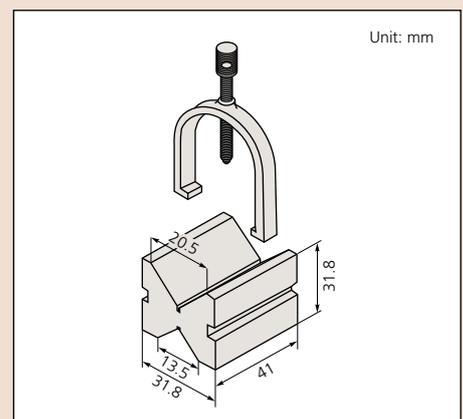


SPECIFICATIONS

Metric		
Max. workpiece dia.	Order No.	Remarks
25mm	181-902	With clamp

Inch		
Max. workpiece dia.	Order No.	Remarks
1"	181-901	With clamp

DIMENSION



Dial Gage Stand

SERIES 7

The Dial Gage 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, Transfer Stand: 335mm
- Fine-adjustment of 1mm available for zero-setting of the indicator.
- With an interchangeable anvil. Domed anvil (**101463**) is optional.



7001
with ø58mm serrated anvil

7002
with ø58mm flat anvil

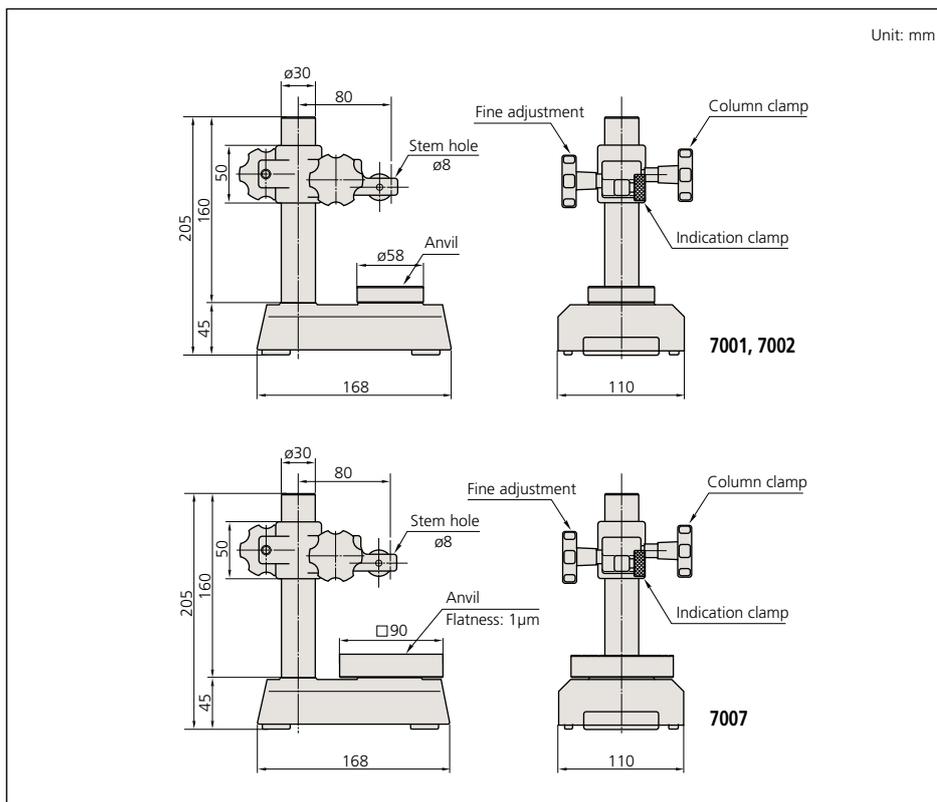
7007
90mm square anvil

SPECIFICATIONS

Metric		
Order No.	Stem hole	Remarks
7001	ø8mm	with serrated anvil
7002	ø8mm	with flat anvil
7007	ø8mm	with square anvil

Inch		
Order No.	Stem hole	Remarks
7003	3/8" DIA	with serrated anvil
7004	3/8" DIA	with flat anvil
7008	3/8" DIA	with square anvil

DIMENSION



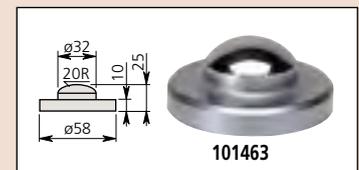
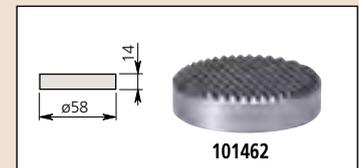
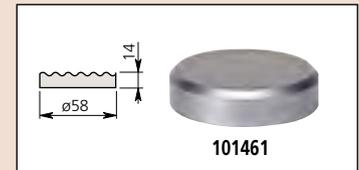
Optional Accessory

101462: Hardened steel serrated anvil (flatness: 1µm)*

101463: Hardened steel domed anvil*

101461: Hardened steel flat anvil (flatness: 1µm)*

*Not available for **7007** and **7008**



Transfer Stand

SERIES 519

The 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, Transfer Stand: 335mm
- Fine-adjustment of 1mm available for zero-setting of the indicator.
- With an interchangeable anvil. Domed anvil (**101463**) is optional.

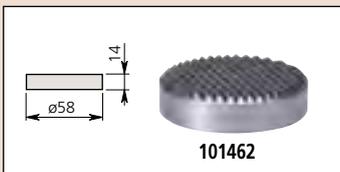


519-109M
with $\varnothing 58\text{mm}$ serrated anvil

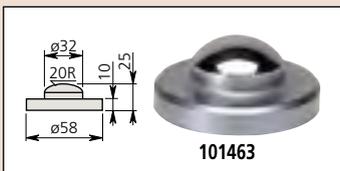
Optional Accessory

101462: Hardened steel serrated anvil (flatness: $1\mu\text{m}$)

101463: Hardened steel domed anvil



101462



101463

SPECIFICATIONS

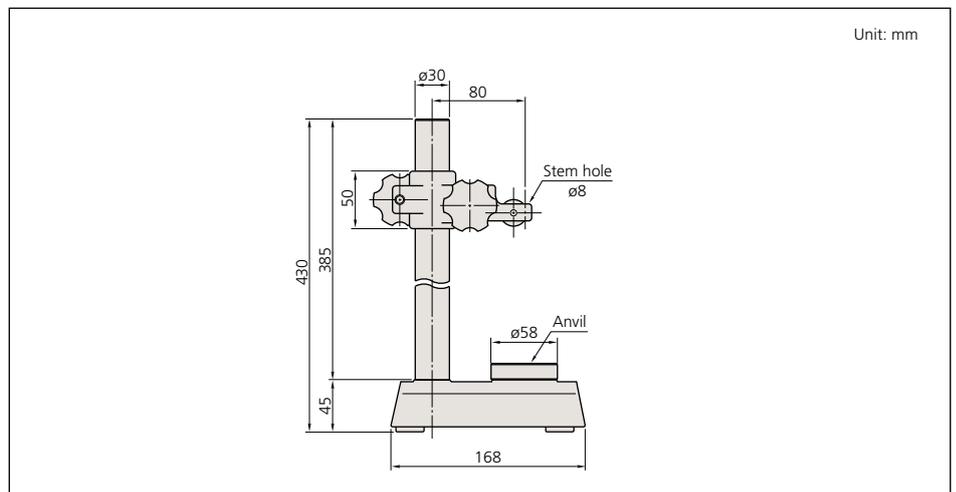
Metric

Order No.	Stem hole	Remarks
519-109M	$\varnothing 8\text{mm}$	with serrated anvil

Inch

Order No.	Stem hole	Remarks
519-109E	3/8" DIA	with serrated anvil

DIMENSION



Granite Comparator Stand

SERIES 215

Mitutoyo's Granite Comparator Stands are basic building-blocks for the assembly of special-purpose, precision measuring equipment. By mounting precision measuring in-

struments 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.



215-153

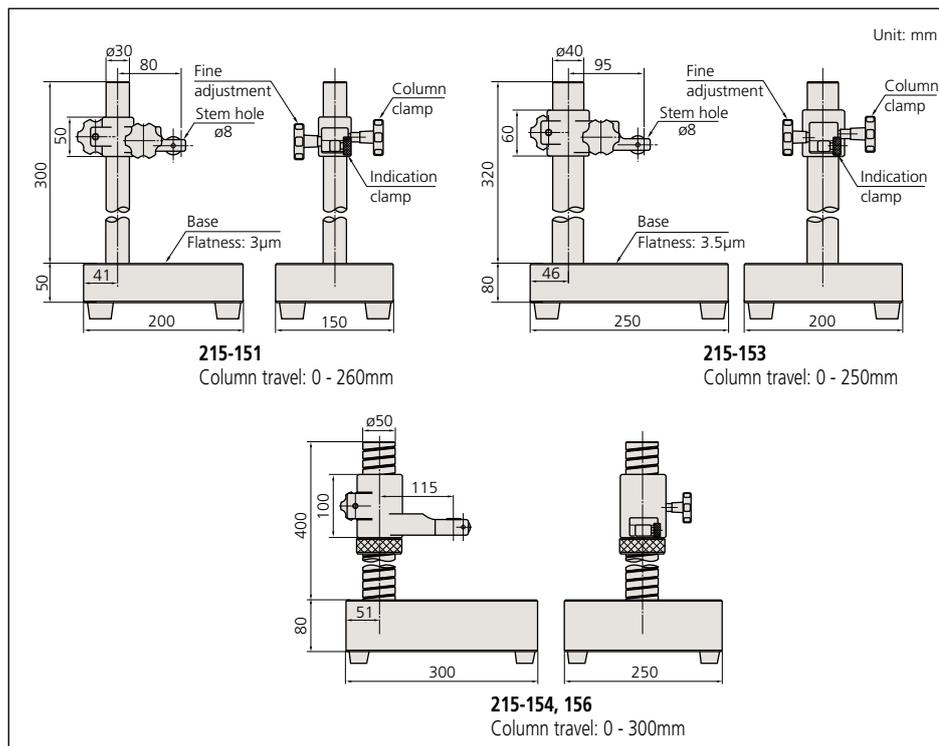


215-154

SPECIFICATIONS

Order No.	Granite base size (W x D x H)	Column travel	Stem hole	Remarks
215-151	150 x 200 x 50mm	260mm	ø8mm	With fine adjustment of 1mm range
215-153	200 x 250 x 80mm	250mm	ø8mm	With fine adjustment of 1mm range
215-154	300 x 250 x 80mm	300mm	ø8mm	With fine adjustment of 1mm range
215-156	300 x 250 x 80mm	300mm	ø8mm, ø20mm	With fine adjustment over the entire travel

DIMENSION



Optional Accessory

58AAA151: ø8mm bush*

58AAA273: ø9.53mm (3/8") bush*

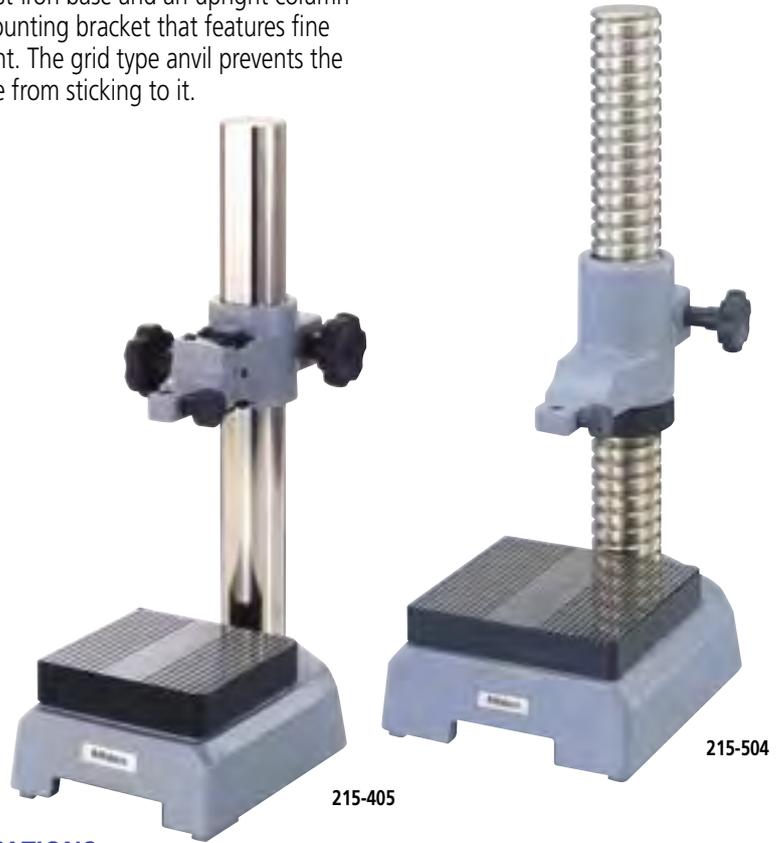
58AAA276: ø15mm bush*

*Only available for 215-156.

Comparator Stand

SERIES 215

The Comparator Stands consists 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.



Optional Accessory

58AAA151: ø8mm bush*

58AAA273: ø9.53mm (3/8") bush*

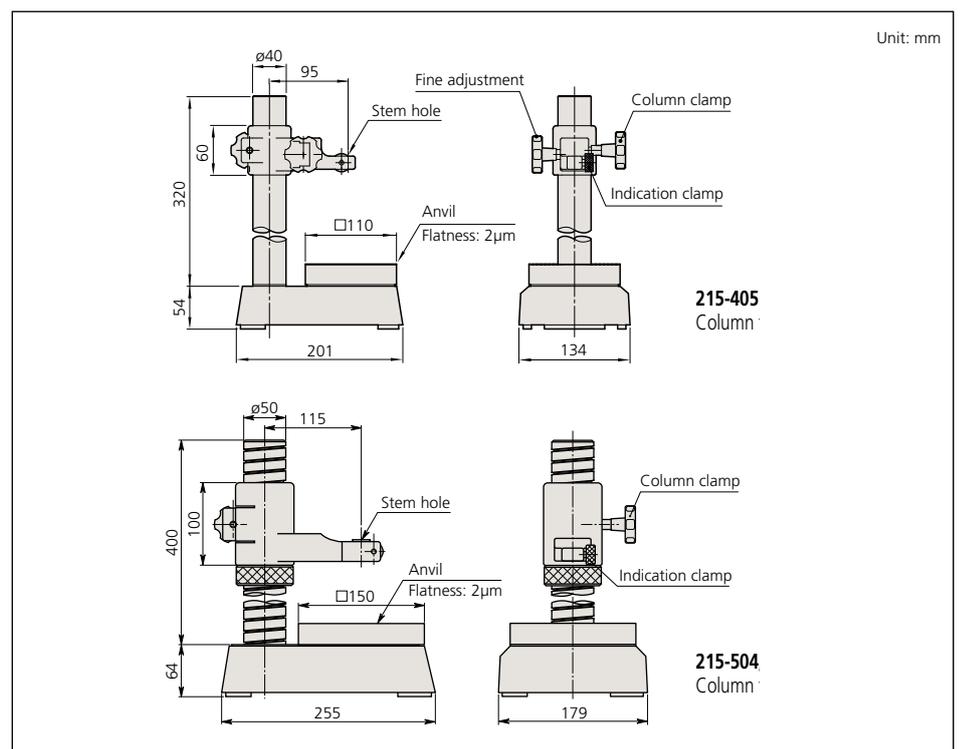
58AAA276: ø15mm bush*

*Only available for 215-505.

SPECIFICATIONS

Order No.	Square anvil size (W x D)	Column travel	Stem hole	Remarks
215-405	110 x 110mm	200mm	ø8mm	With fine adjustment of 1mm range
215-504	150 x 150mm	250mm	ø8mm	With fine adjustment over the entire travel
215-505	150 x 150mm	250mm	ø8mm, ø20mm	With fine adjustment over the entire travel

DIMENSION



Heavy Duty Comparator Stand

SERIES 215

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.

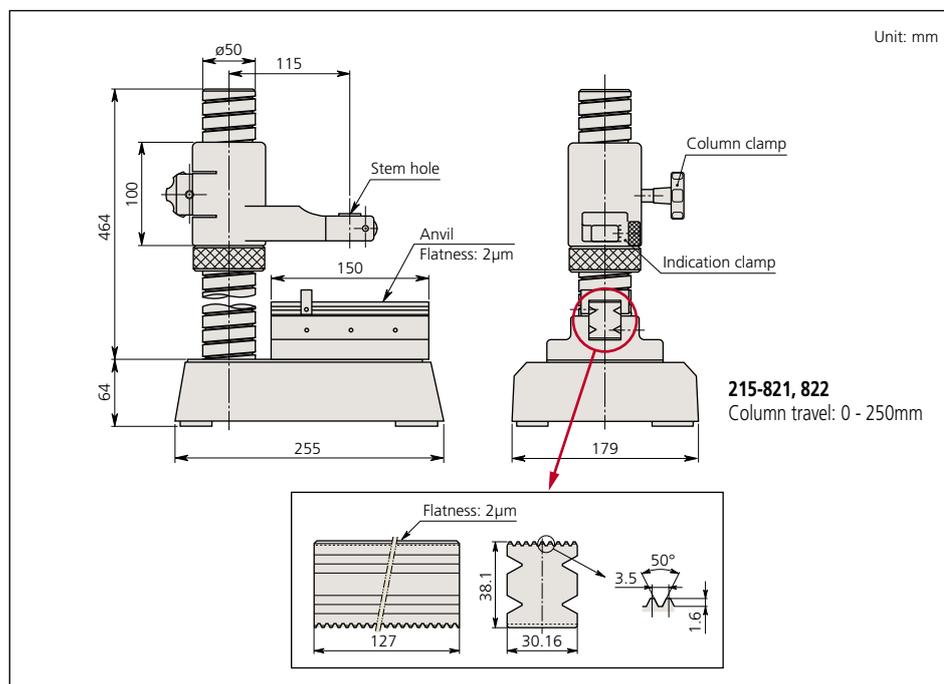


215-822

SPECIFICATIONS

Order No.	Base size (W x D x H)	Column travel	Stem hole	Remarks
215-821	255 x 179 x 64mm	250mm	ø8mm	With fine adjustment over the entire travel
215-822	255 x 179 x 64mm	250mm	ø8mm, ø20mm	With fine adjustment over the entire travel

DIMENSION



Optional Accessory

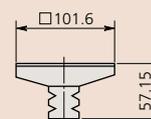
58AAA151: ø8mm bush*

58AAA273: ø9.53mm (3/8") bush*

58AAA276: ø15mm bush*

990015: 101.6 x 101.6mm large square anvil

*Only available for 215-822.



990015

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Linear Gage



Mu-Checker



Laser Scan Micrometers

New Products



Linear Gage LGS



Laser Scan Micrometer
LSM-500S

Linear Gage / Display Unit Selection Guide

Representative Code No.	KH Counter	EC Counter	EG Counter				EB Counter			EF Counter				EV Counter		
		542-007	542-015	542-017	542-016	542-092	542-094	542-093	542-060	542-065	542-062	542-066	542-063	542-064	542-067	
Applicable gages																
0.0001mm Laser Hologage	●															
0.0001mm Laser Hologage			●						●		●					
0.0001mm LG/LGM			●						●		●					
0.0001mm LGK/LGB/LGF			●						●		●					
0.0005mm LGK/LGF			●			●			●		●		●			
0.0005mm LGF w/origin point mark				●			●			●		●		●		
0.001mm LGF w/origin point mark				●			●			●		●		●		
0.001mm LG/LGM			●			●			●		●		●			
0.001mm LGK/LGB/LGF			●			●			●		●		●			
0.005mm LGE			●			●			●		●		●			
0.01mm LGD/LGD-ML		●			●			●						●		
0.01mm LGS		●			●			●						●		
Functions																
Number of connectable gages	1	1	1	1	1	1	1	1	1	1	2	2	6	6	6	
Display	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Zero set	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Presetting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Direction switch	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
GO/NG indication		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
GO/NG output		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
5-stage tolerance display/output			●	●	●	●	●	●	●	●	●	●				
3-stage tolerance display/output		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
mm/inch switch	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
ABS gage zero set		●			●			●						●	●	
ABS/INC gage changeover		●			●			●						●	●	
Peak hold			●	●	●	●	●	●	●	●	●	●	●	●	●	
Run out (TIR) measurement			●	●	●	●	●	●	●	●	●	●	●	●	●	
Double count	●								●	●	●	●				
Sum/difference calculation										●	●					
Lower digit blank-out		●	●	●	●				●	●	●	●				
External zero set		*2	*2	*2	*2	*2	*2	*2	●	●	●	●	●	●	●	
External preset		*3	●	●	●	●	●	●	●	●	●	●	●	●	●	
External hold		*3	●	●	●	●	●	●	●	●	●	●	●	●	●	
External tolerance set (when a PC is used)									●	●	●	●	●	●	●	
External tolerance memory switch (when I/O is used)			●	●	●	●	●	●								
External peak-hold cancel			●	●	●	●	●	●	●	●	●	●	●	●	●	
Inter-axial calculation function													●	●	●	
Output																
Power-supply voltage error		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Overspeed error			●	●		●	●		●	●	●	●	●	●	●	
Overflow error		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Gage error		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Tolerance setting error		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Communication error									●	●	●	●	●	●	●	
Parallel BCD output			●	●	●								●	●	●	
Serial BCD output						●	●	●								
Simple analog output						●	●	●								
Tolerance judgment output		*3	●	●	●	●	●	●	●	●	●	●	●	●	●	
Limit output						●	●	●								
Segment output													●	●	●	
RS-232C output	●								*3	*3	*3	*3	●	●	●	
Digimatic output		*5				●	●	●	*4	*4	*4	*4				
RS link (Maximum number of gages)									*3 (6)	*3 (6)	*3 (12)	*3 (12)	● (60)	● (60)	● (60)	

*1: When an optional D-EV is connected.
*4: Switchable between the RS-232C output.

*2: Enabled by setting "0" via external presetting.
*5: Switchable between the tolerance judgment output.

*3: Switchable between the Digimatic output.

Linear Gage LGK

SERIES 542 — with Slime Dimensions

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 1 μ m, 0.5 μ m or 0.1 μ m
 Length standard: Photoelectric linear encoder
 Max. response speed: 1500mm/s, 400mm/s (542-158)
 Contact point: \varnothing 3mm carbide
 Stem: \varnothing 8mm
 Bearing type: Stroke ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent)
 Signal pitch: 0.4 μ m (542-158), 2 μ m (542-157), 4 μ m (542-156)
 Dust/Water protection level: IP66

Optional Accessory

238772: Rubber boot (10mm)
 902434: Extension cable (5m)
 902433: Extension cable (10m)
 902432: Extension cable (20m)
 02ADE230: Air drive unit
 02ADB680: Thrust stem set
 02ADB682: Clamping nut
 02ADB683: Wrench

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.
- Employs linear stroke bearings on the spindle movement for durability
- Thrust Stem with a clamping nut is optional.
- Interchangeable contact points for dial indicators can be used. (See pages 200 and 201.)

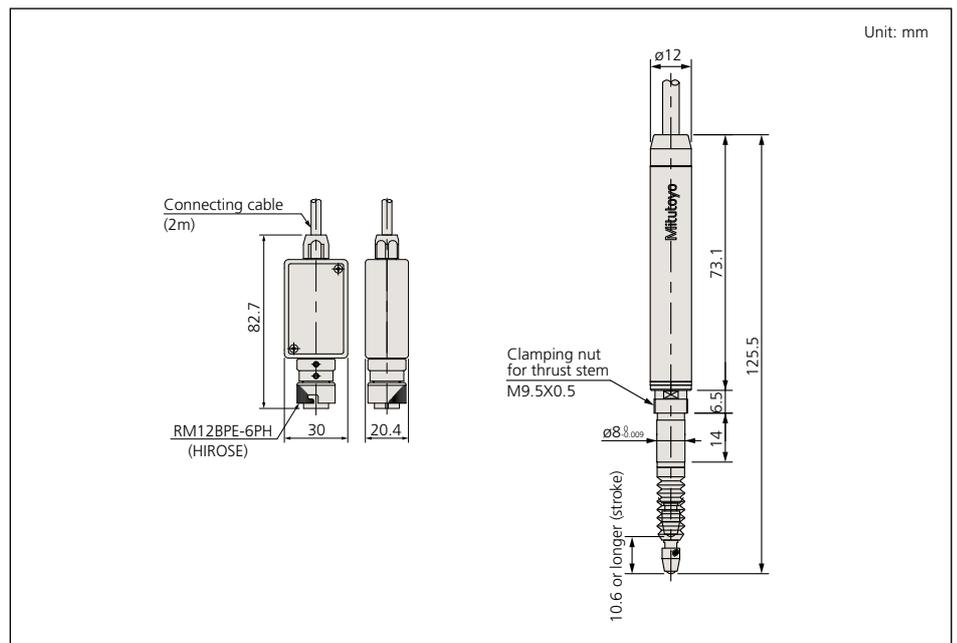


SPECIFICATIONS

Range	Order No.	Resolution	Accuracy*	Measuring force**	Stem dia.	Remarks
10mm (.4")	542-156	0.001mm	(1.5+L/50) μ m	0.65N / 0.6N / 0.55N	8mm	—
10mm (.4")	542-157	0.0005mm	(1.5+L/50) μ m	0.65N / 0.6N / 0.55N	8mm	—
10mm (.4")	542-158	0.0001mm	(0.8+L/50) μ m	0.65N / 0.6N / 0.55N	8mm	—

*L = Measured length (mm) **Posture of gage: Upward / Horizontal / Downward

DIMENSION



Refer to the Linear Gage leaflet (E4174) for more details.

Linear Gage LGF

SERIES 542 — Economical Design

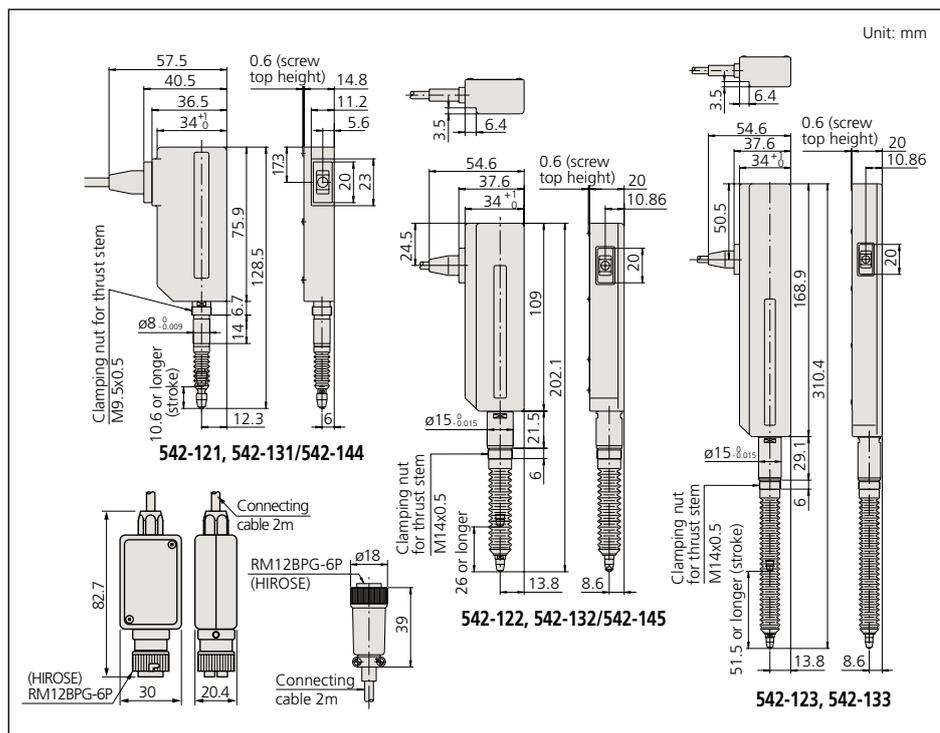


SPECIFICATIONS

Range	Order No.	Resolution	Accuracy*	Measuring force**	Stem dia.	Remarks
10mm (.4")	542-144	0.0001mm	(0.8+L/50) μ m	1.2N / 1.1N / 1.0N	8mm	—
10mm (.4")	542-131	0.0005mm	(1.5+L/50) μ m	1.2N / 1.1N / 1.0N	8mm	—
10mm (.4")	542-121	0.001mm	(1.5+L/50) μ m	1.2N / 1.1N / 1.0N	8mm	—
25mm (1")	542-145	0.0001mm	(0.8+L/50) μ m	4.6N / 4.3N / 4.0N	15mm	—
25mm (1")	542-132	0.0005mm	(1.5+L/50) μ m	4.6N / 4.3N / 4.0N	15mm	—
25mm (1")	542-122	0.001mm	(1.5+L/50) μ m	4.6N / 4.3N / 4.0N	15mm	—
50mm (2")	542-133	0.0005mm	(1.5+L/50) μ m	5.7N / 5.3N / 4.9N	15mm	—
50mm (2")	542-123	0.001mm	(1.5+L/50) μ m	5.7N / 5.3N / 4.9N	15mm	—

*L = Measured length (mm) **Posture of gage: Upward / Horizontal / Downward

DIMENSION



Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 1 μ m, 0.5 μ m or 0.1 μ m
 Length standard: Photoelectric linear encoder
 Max. response speed: 1500mm/s, (400mm/s: 542-144, 542-145)
 Contact point: ϕ 3mm carbide
 Stem: ϕ 8mm or ϕ 15mm
 Bearing type: Stroke ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent)
 Signal pitch: 4 μ m (542-121, 542-122, 542-123), 2 μ m (542-131, 542-132, 542-133) or 0.4 μ m (542-144, 542-145)
 Dust/Water protection level: IP66

Optional Accessory

238772: Rubber boot (10mm)
 962504: Rubber boot (25mm)
 962505: Rubber boot (50mm)
 902434: Extension cable (5m*)
 902433: Extension cable (10m*)
 902432: Extension cable (20m*)
 02ADB680: Thrust stem set (for 10mm range models)
 02ADB690: Thrust stem set (for 25, 50mm range models)
 *not available for 542-144 and 542-145



Refer to the Linear Gage leaflet (E4174) for more details.

Linear Gage LGF

SERIES 542 — Economical Design with Origin Point Mark

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 1µm or 0.5µm
 Length standard: Photoelectric linear encoder
 Max. response speed: 1500mm/s
 Contact point: ø3mm carbide
 Stem: ø8mm or ø15mm
 Bearing type: Stroke ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent)
 Signal pitch: 4µm (542-124, 542-125, 542-126) or 2µm (542-134, 542-135, 542-136)
 Dust/Water protection level: IP66



Optional Accessory

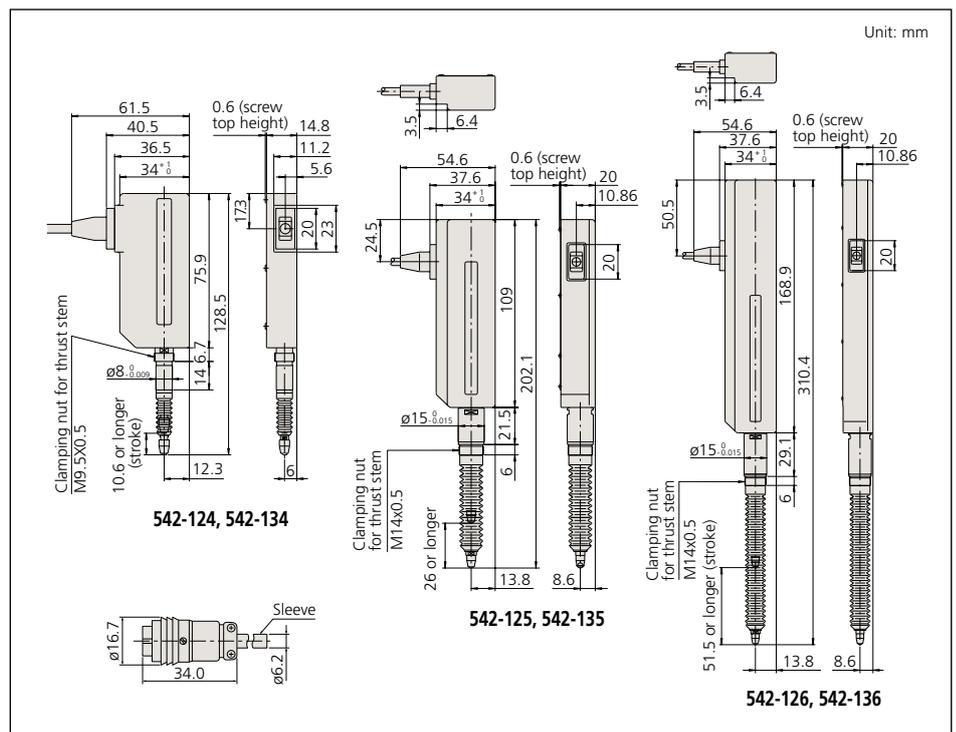
- 238772: Rubber boot (10mm)
- 962504: Rubber boot (25mm)
- 962505: Rubber boot (50mm)
- 02ADB680: Thrust stem set (for 10mm range models)
- 02ADB690: Thrust stem set (for 25, 50mm range models)

SPECIFICATIONS

Range	Order No.	Resolution	Accuracy*	Measuring force**	Stem dia.	Remarks
10mm (.4")	542-134	0.0005mm	(1.5+L/50)µm	1.2N / 1.1N / 1.0N	8mm	w/ origin point mark
10mm (.4")	542-124	0.001mm	(1.5+L/50)µm	1.2N / 1.1N / 1.0N	8mm	w/ origin point mark
25mm (1")	542-135	0.0005mm	(1.5+L/50)µm	4.6N / 4.3N / 4.0N	15mm	w/ origin point mark
25mm (1")	542-125	0.001mm	(1.5+L/50)µm	4.6N / 4.3N / 4.0N	15mm	w/ origin point mark
50mm (2")	542-136	0.0005mm	(1.5+L/50)µm	5.7N / 5.3N / 4.9N	15mm	w/ origin point mark
50mm (2")	542-126	0.001mm	(1.5+L/50)µm	5.7N / 5.3N / 4.9N	15mm	w/ origin point mark

*L = Measured length (mm) **Posture of gage: Upward / Horizontal / Downward

DIMENSION



Refer to the Linear Gage leaflet (E4174) for more details.

Linear Gage LGB

SERIES 542 — with Extra Slim Dimensions

FEATURES

- Extremely compact design. Available with an outside diameter as small as 8mm.
- The small photoelectric linear encoder assures high precision over the entire stroke range.
- The ball bearings used in the spindle unit ensure superb durability.



Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 1µm
 Length standard: Photoelectric linear encoder
 Max. response speed: 900mm/s
 Contact point: ø3mm carbide
 Stem: ø8mm or ø9.5mm
 Bearing type: Stroke ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent) (Sign-wave output: **542-401, 542-424**)
 Signal pitch: 4µm
 Dust/Water protection level: IP54

Optional Accessory

238773: Rubber boot for 5mm LGB (spare)
238772: Rubber boot for 10mm LGB (spare)
902434: Extension cable (5m)
902433: Extension cable (10m)
902432: Extension cable (20m)

SPECIFICATIONS

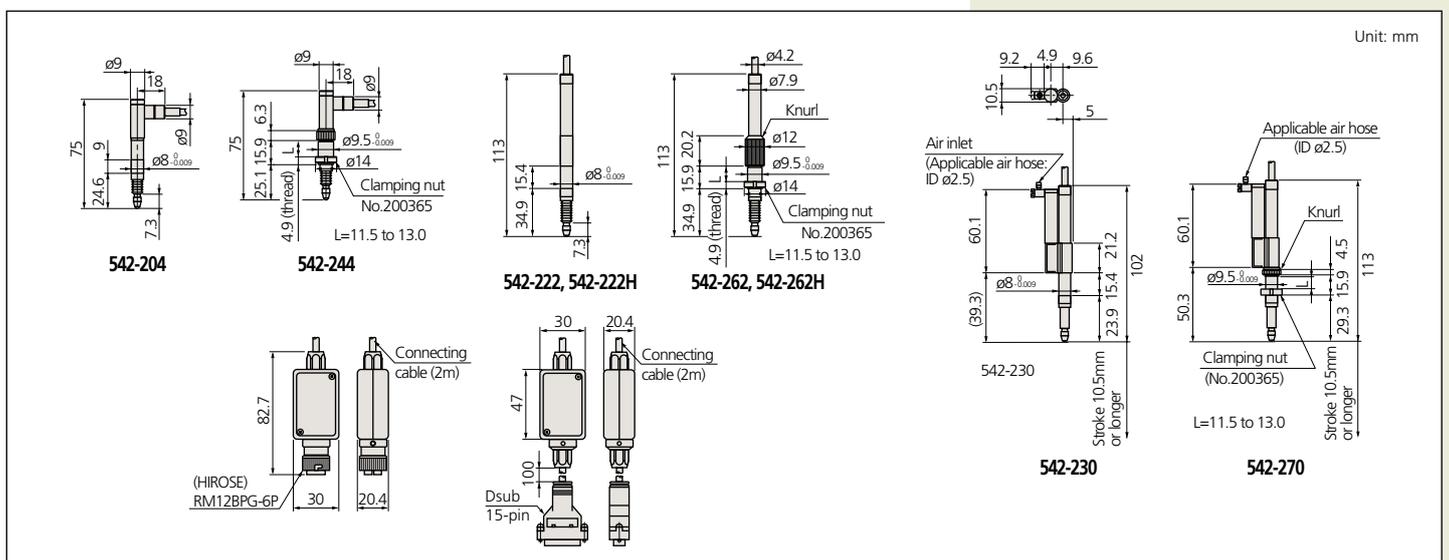
Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
5mm (.2")	542-204	0.001mm	2µm	0.65N / 0.6N / 0.55N	8mm	—
5mm (.2")	542-204H	0.001mm	1µm	0.65N / 0.6N / 0.55N	8mm	—
10mm (.4")	542-222	0.001mm	2µm	0.8N / 0.75N / 0.7N	8mm	—
10mm (.4")	542-222H	0.001mm	1µm	0.8N / 0.75N / 0.7N	8mm	—
10mm (.4")	542-401	0.001mm	2µm	0.8N / 0.75N / 0.7N	8mm	Sine-wave output
10mm (.4")	542-224	0.001mm	2µm	0.6N / 0.55N / 0.5N	8mm	—
10mm (.4")	542-230	0.001mm	2µm	0.8N / 0.75N / 0.7N	8mm	w/ pneumatic cylinder
10mm (.4")	542-223	0.001mm	2µm	0.8N / 0.75N / 0.7N	8mm	w/ pneumatic cylinder
5mm (.2")	542-244	0.001mm	2µm	0.65N / 0.6N / 0.55N	9.5mm	Low measuring force
10mm (.4")	542-262	0.001mm	2µm	0.8N / 0.75N / 0.7N	9.5mm	—
10mm (.4")	542-262H	0.001mm	1µm	0.8N / 0.75N / 0.7N	9.5mm	—
10mm (.4")	542-421	0.001mm	2µm	0.8N / 0.75N / 0.7N	9.5mm	Sine-wave output
10mm (.4")	542-264	0.001mm	2µm	0.6N / 0.55N / 0.5N	9.5mm	Low measuring force
10mm (.4")	542-270	0.001mm	2µm	0.8N / 0.75N / 0.7N	9.5mm	w/ pneumatic cylinder

*Posture of gage: Upward / Horizontal / Downward



Refer to the Linear Gage leaflet (E4174) for more details.

DIMENSION



Linear Gage LGE

SERIES 542 — IP66 Water/Dust Protection

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 5µm
 Length standard: Photoelectric linear encoder
 Max. response speed: 1400mm/s
 Contact point: ø3mm carbide
 Stem: ø8mm or ø15mm
 Bearing type: Stroke ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent)
 Signal pitch: 20µm
 Dust/Water protection level: IP66 (IP54: 542-604)

Optional Accessory

238772: 10mm rubber boot (spare)
 962504: 25mm rubber boot (spare)
 962505: 50mm rubber boot (spare)
 02ADC730: ø9.5mm Thrust stem set (for 10mm LGE model)
 02ADC740: ø18mm Thrust stem set (for 25mm/50mm LGE model)

The LGE Series Linear Gages are 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.
- Optional thrust stem and tightening nut facilitate setup of the LGE linear gage in holes of a plate or fixture.

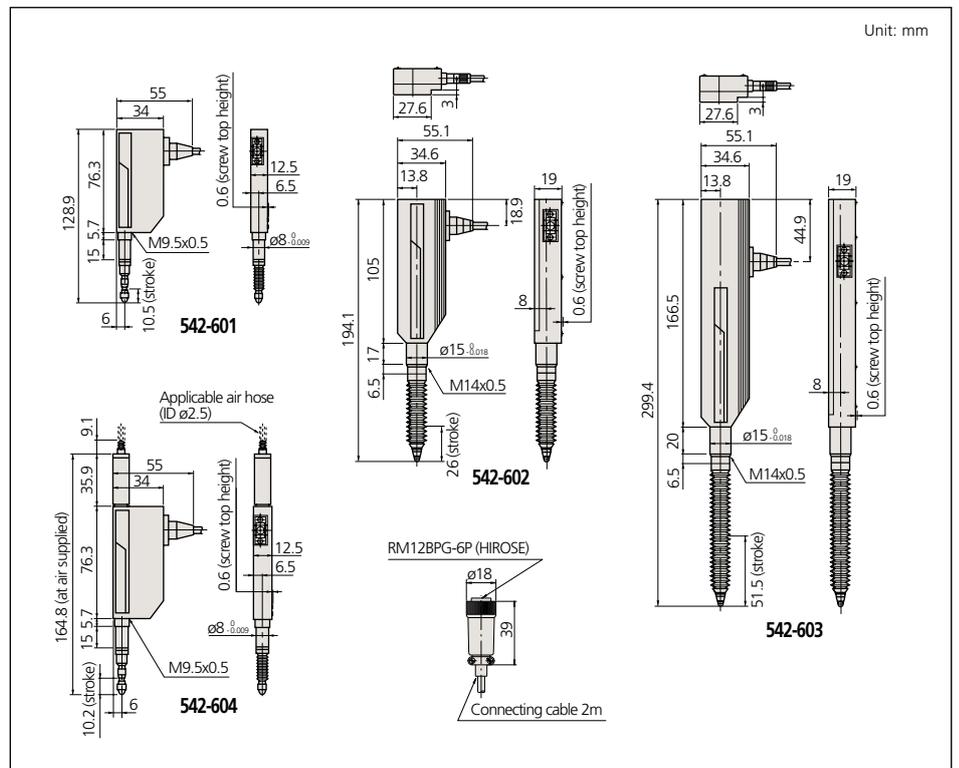


SPECIFICATIONS

Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
10mm (.4")	542-601	0.005mm	20µm	1.2N / 1.1N / 1.0N	8mm	—
10mm (.4")	542-604	0.005mm	20µm	1.2N / 1.1N / 1.0N	8mm	w/ pneumatic cylinder
25mm (1")	542-602	0.005mm	20µm	4.6N / 4.3N / 4.0N	15mm	—
50mm (2")	542-603	0.005mm	30µm	5.7N / 5.3N / 4.9N	15mm	—

*Posture of gage: Upward / Horizontal / Downward

DIMENSION



Refer to the Linear Gage leaflet (E4174) for more details.

Linear Gage LGD / LGD-M

SERIES 542 — with ABSOLUTE Linear Encoder

The LGD is an ultra-compact ABS Linear Gage designed to fit into very tight spaces. It keeps track of its origin point once set.

FEATURES

- The use of an absolute scale* in the sensor makes it possible to maintain the origin setting even when the power is switched off.

- Special linear ball bearings are used for the spindle guide to ensure a long service life.
- Optional thrust stem and tightening nut facilitate setup of the LGD linear gage in holes of a plate or fixture.
- LGD-M employs the slide-bearing for higher cost-effectiveness.



SPECIFICATIONS

Metric		LGD				
Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
10mm	575-321	0.01mm	20µm	1.2N / 1.1N / 1.0N	8mm	—
10mm	575-324	0.01mm	20µm	1.2N / 1.1N / 1.0N	8mm	w/ pneumatic cylinder
25mm	575-322	0.01mm	20µm	4.6N / 4.3N / 4.0N	15mm	—
50mm	575-323	0.01mm	30µm	5.7N / 5.3N / 4.9N	15mm	—

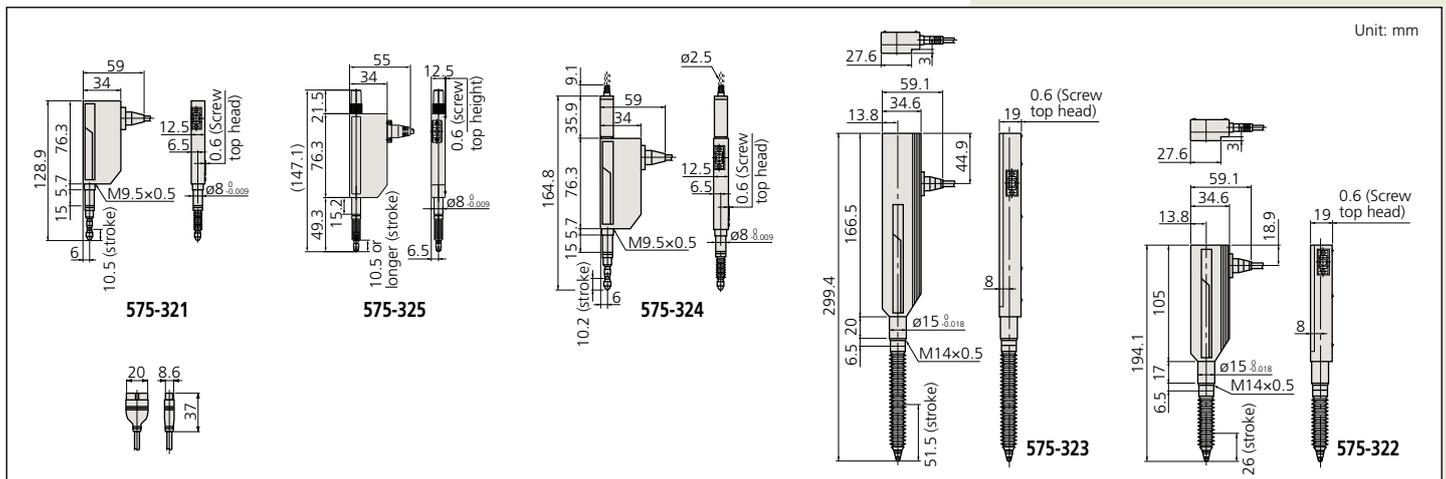
Inch		LGD				
Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
.4"	575-331	.0005"	.001"	1.2N / 1.1N / 1.0N	8mm	—
.4"	575-334	.0005"	.001"	1.2N / 1.1N / 1.0N	8mm	w/ pneumatic cylinder
1"	575-332	.0005"	.001"	4.6N / 4.3N / 4.0N	15mm	—
2"	575-333	.0005"	.0012"	5.7N / 5.3N / 4.9N	15mm	—

Metric		LGD-M				
Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
10mm	575-325	0.01mm	15µm	2.0N / 1.8N / 1.6N	8mm	Using slide-bearing

Inch		LGD-M				
Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
.4"	575-335	.0005"	.0006"	2.0N / 1.8N / 1.6N	8mm	Using slide-bearing

*Posture of gage: Upward / Horizontal / Downward

DIMENSION



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 1µm or .0005"
 Length standard: Capacitance-type ABSOLUTE linear encoder
 Max. response speed: Unlimited
 Contact point: ø3mm carbide
 Stem: ø8mm or ø15mm
 Bearing type: Stroke ball bearing (Slide-bearing: 542-325, 542-335)
 Measuring force: Refer to the list of specifications
 Output signal: Digimatic output
 External input: Origin-setting signal (Absolute origin position can be changed externally.)
 Dust/Water protection level: IP66 (IP54: 542-324, 542-334)

Optional Accessory

238772: 10mm rubber boot (spare)
 962504: 25mm rubber boot (spare)
 962505: 50mm rubber boot (spare)
 02ADC730: ø9.5mm Thrust stem set (for 10mm model)
 02ADC740: ø18mm Thrust stem set (for 25mm/50mm model)
 965275*: Digimatic Power Supply Unit

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: 965275A):
A for UL/CSA, **D** for CEE, **E** for BS, **F** for SAA, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V



Refer to the Linear Gage leaflet (E4174) for more details.

Linear Gage LGS

SERIES 542 — IP66 Water/Dust Protection with ABSOLUTE Linear Encoder



(Refer to the page 9 for details.)

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01mm or .0005"
 Length standard: Capacitance-type ABSOLUTE linear encoder
 Max. response speed: Unlimited
 Contact point: \varnothing 3mm carbide (\varnothing 3mm steel: **575-313**)
 Stem: \varnothing 8mm or 3/8" DIA
 Bearing type: Slide-bearing
 Measuring force: Refer to the list of specifications
 Output signal: Digimatic output
 Dust/Water protection level: IP66

Optional Accessory

238774: Spare rubber boot
903594: Air Drive Unit (metric)
903598: Air Drive Unit (inch)
02ADF640: SPC cable extension adapter
02ADD950: Extension cable (0.5m)
936937: Extension cable (1m)
965014: Extension cable (2m)
 —: EC Counter (See page 252.)

The LGS is compact Linear Gage designed to fit into tight spaces.



SPECIFICATIONS

Metric

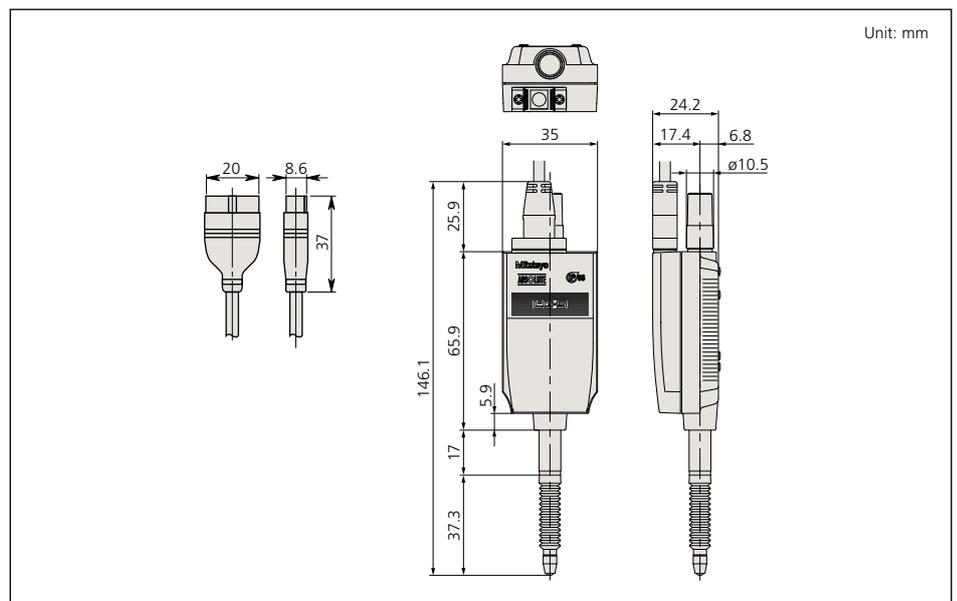
Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
12.7mm	575-303	0.01mm	0.015mm	2.0N / 1.8N / 1.6N	8mm	—

Inch

Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
.5"	575-313	.0005"	.0006"	2.0N / 1.8N / 1.6N	3/8 DIA	—

*Posture of gage: Upward / Horizontal / Downward

DIMENSION



Refer to the Linear Gage leaflet (E4174) for more details.

Laser Hologage

SERIES 542 — 0.0001mm Resolution Type

These are extra-high accuracy gaging heads provided with resolution up to 0.0001mm. The compact dimensions allow easy installation to very tight spaces. The Laser Hologage employs a unique holography scale as the length standard, ensuring excellent measuring accuracy and repeatability (See page 3 for explanation on hologram.). The dedicated display unit (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.



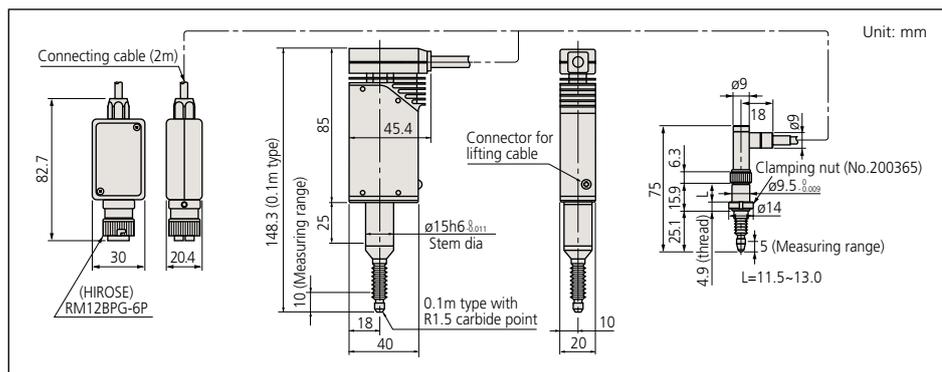
542-711-1

SPECIFICATIONS

Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
10mm (.4")	542-711-1	0.1μm	0.2μm	0.55N / 0.45N / 0.35N	15mm	—
10mm (.4")	542-712-1	0.1μm	0.2μm	0.1N / — / —	15mm	Low measuring force

*Posture of gage: Upward / Horizontal / Downward

DIMENSION



Linear Gage LGB

SERIES 542 — 0.0001mm Resolution Type



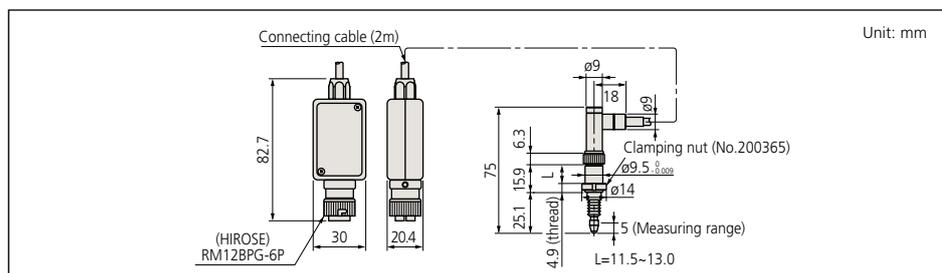
542-246

SPECIFICATIONS

Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
5mm (.2")	542-246	0.1μm	0.8μm	0.65N / 0.60N / 0.55N	9.5mm	—

*Posture of gage: Upward / Horizontal / Downward

DIMENSION



Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.1μm
 Length standard: Laser-hologram measurement sensor
 Max. response speed: 250mm/s
 Contact point: R1.5mm carbide
 Stem: ø15mm
 Bearing type: High precision linear ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent)
 Signal pitch: 0.25μm

Optional Accessory

- 238773: Rubber boot
- 971751: Stem fixture for fixing to top surface
- 971752: Stem fixture for fixing to bottom surface
- 971753: Spindle lifting cable
- 971750: Laser Hologage stand

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.1μm
 Length standard: Photoelectric linear encoder
 Max. response speed: 380mm/s
 Contact point: R1.5mm carbide
 Stem: ø9.5mm
 Bearing type: Linear ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent)
 Signal pitch: 0.4μm
 Dust/Water protection level: IP54

Optional Accessory

- 902434: Extension cable (5m)
- 902433: Extension cable (10m)
- 902432: Extension cable (20m)
- 238773: Rubber boot



Refer to the Linear Gage leaflet (E4174) for more details.

Laser Hologage

SERIES 542 — 0.0001mm Resolution Type

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 0.01 μm
 Length standard: Laser-hologram measurement sensor
 Max. response speed: 250mm/s
 Contact point: R5mm carbide
 Stem: $\varnothing 15\text{mm}$
 Bearing type: High precision linear ball bearing
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, two-phase sine wave
 Signal pitch: 0.25 μm

Optional Accessory

09CAA335: Zero-set remote controller
971751: Stem fixture for fixing to top surface
971752: Stem fixture for fixing to bottom surface
971753: Spindle lifting cable
971750: Laser Hologage stand

The Mitutoyo Laser Hologage is a high-end digital gaging system that employs diffracted laser 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 (See page 3 for explanation on hologram.).

FEATURES

- Highly accurate measurement due to an ultra-high resolution of 0.0001mm (0.01 μm), which is close to the performance of laser interferometers.
- Excellent measuring stability — the design is also highly resistant to unfavorable environmental conditions such as air movement and atmospheric pressure changes.
- High-precision linear ball bearings are used in the guide for extremely smooth movement and exceptional durability.
- A display unit is provided.



Gage head



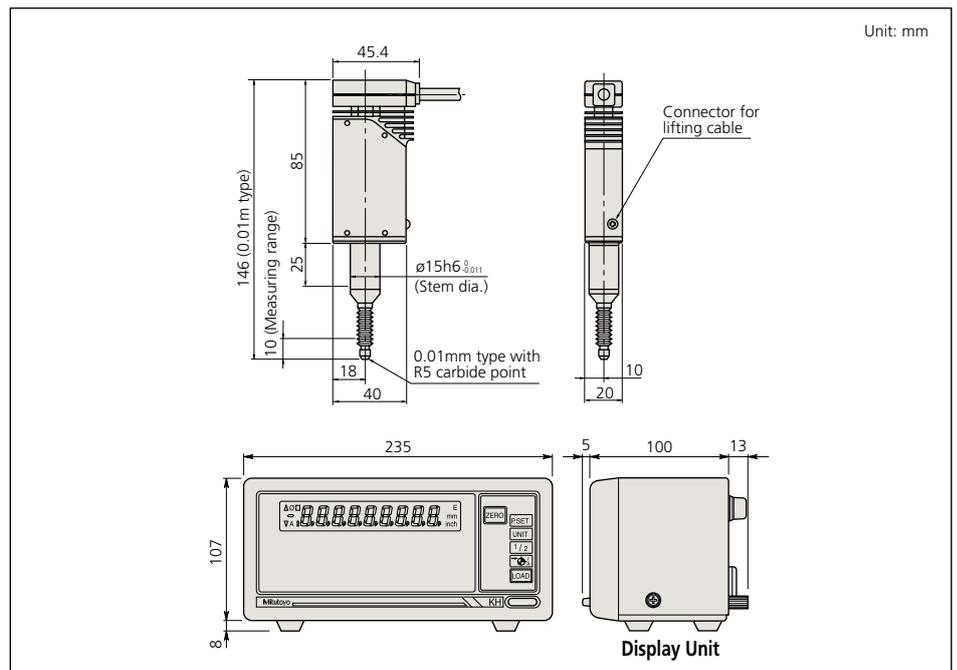
Display unit

SPECIFICATIONS

Range	Order No.	Resolution	Accuracy	Measuring force*	Stem dia.	Remarks
10mm (.4")	542-923	0.01 μm / 1 μinch	0.1 μm	0.55N / 0.45N / 0.35N	15mm	—
10mm (.4")	542-924	0.01 μm / 1 μinch	0.1 μm	0.1N / — / —	15mm	Low measuring force

*Posture of gage: Upward / Horizontal / Downward

DIMENSION



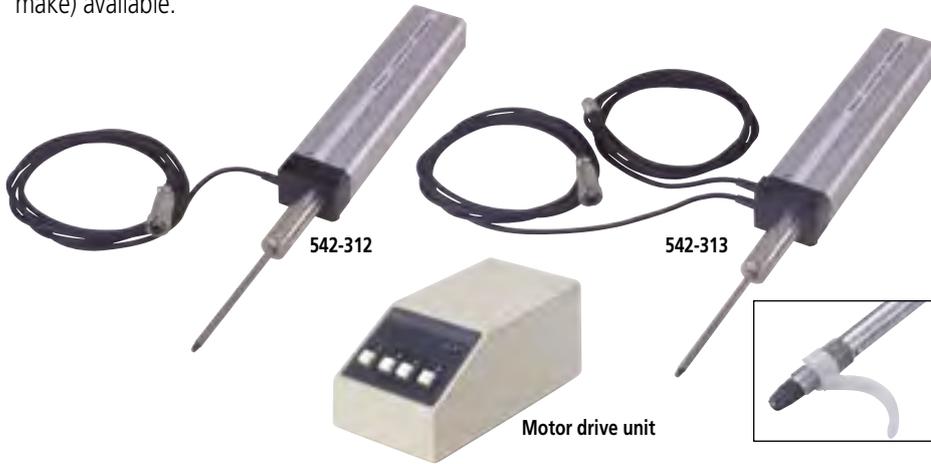
Refer to the Linear Gage leaflet (E4174) for more details.

Long Stroke Linear Gage

SERIES 542 — 100mm Stroke Type

FEATURES

- There are three types including the standard model, low measuring force model, and rubber boot model (order-to-make) available.
- The resolution of each model can be selected from 0.1μm and 1μm.



Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: 1μm or 0.1μm
 Length standard: Photoelectric linear encoder
 Max. response speed: 400mm/s (800mm/s: motor-driven type)
 Contact point: ø3mm carbide
 Stem: ø8mm
 Bearing type: Bearing guide
 Measuring force: Refer to the list of specifications
 Output signal: 90° phase difference, differential square wave (RS-422A equivalent)
 Dust/Water protection level: IP54

SPECIFICATIONS

Range	Order No.	Resolution	Accuracy*	Measuring force**	Stem dia.	Remarks
100mm (4")	542-312	0.1μm	(2+L/100)μm ≤ 2.5μm	8.0N / 6.5N / 5.0N	20mm	Standard
100mm (4")	542-316	0.1μm	(2+L/100)μm ≤ 2.5μm	3.0N / — / —	20mm	Low measuring force
100mm (4")	542-314	0.1μm	(2+L/100)μm ≤ 2.5μm	8.0N / 6.5N / 5.0N	20mm	w/ rubber boot
100mm (4")	542-332	1μm	(2.5+L/100)μm ≤ 3μm	8.0N / 6.5N / 5.0N	20mm	Standard
100mm (4")	542-336	1μm	(2.5+L/100)μm ≤ 3μm	3.0N / — / —	20mm	Low measuring force
100mm (4")	542-334	1μm	(2.5+L/100)μm ≤ 3μm	8.0N / 6.5N / 5.0N	20mm	w/ rubber boot

*L = Measured length (mm) **Posture of gage: Upward / Horizontal / Downward

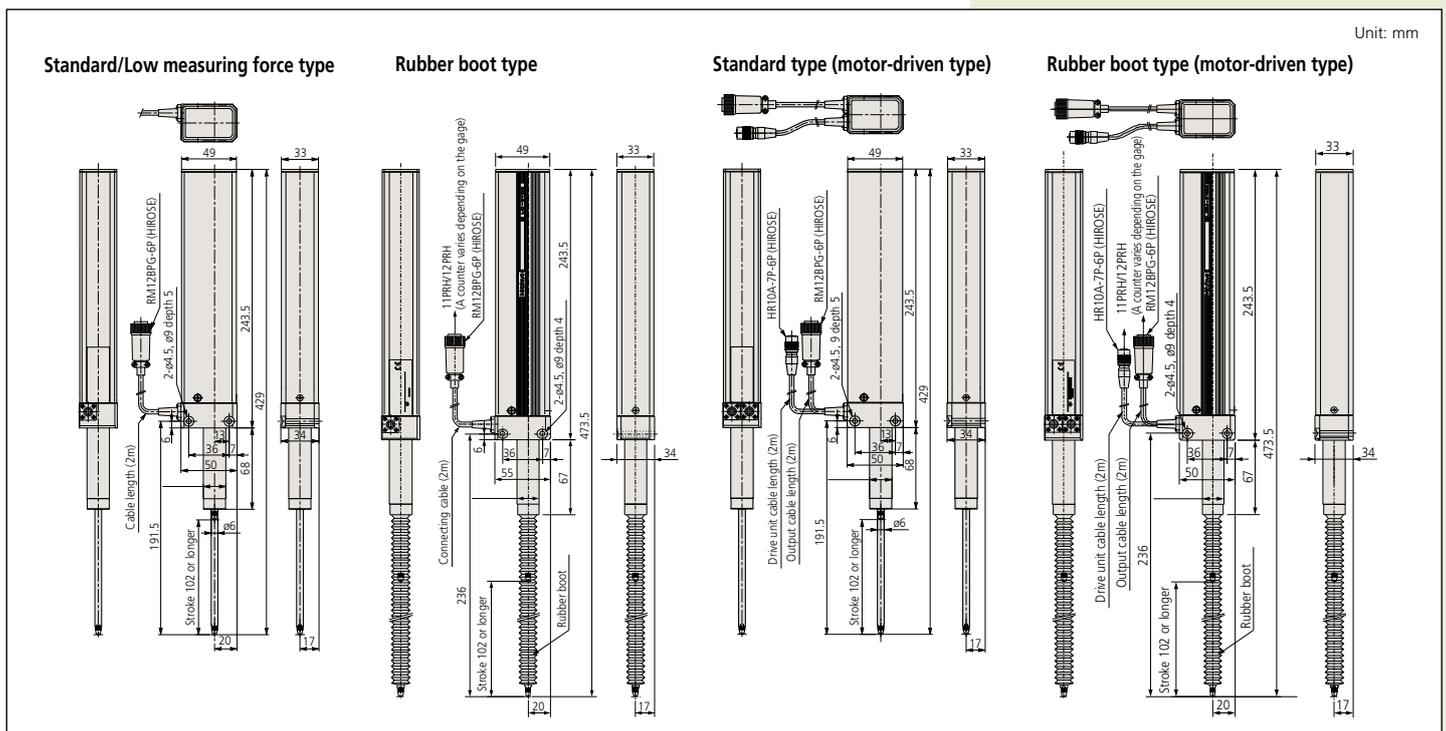
Range	Order No.	Resolution	Accuracy*	Measuring force**	Stem dia.	Remarks
100mm (4")	542-313	0.1μm	(2+L/100)μm ≤ 2.5μm	3.0N / 6.5N / 9.5N	20mm	Motor-driven Type
100mm (4")	542-315	0.1μm	(2+L/100)μm ≤ 2.5μm	4.5N / — / 6.0N	20mm	Motor-driven Type
100mm (4")	542-333	1μm	(2.5+L/100)μm ≤ 3μm	3.0N / 6.5N / 9.5N	20mm	Motor-driven Type
100mm (4")	542-335	1μm	(2.5+L/100)μm ≤ 3μm	4.5N / — / 6.0N	20mm	Motor-driven Type

*L = Measured length (mm) **Posture of gage: Upward / Horizontal / Downward With rubber boot: 542-315, 542-335



Refer to the Linear Gage leaflet (E4174) for more details.

DIMENSION



EC Counter

SERIES 542 — Low-cost, Assembly Type Display Unit for LGD and LGS

FEATURES

- Employed the DIN size (96X48mm) and mount-on-panel configuration, which greatly facilitates the incorporation into a system.
- Possible to produce either tolerance judgment output or Digimatic output.

Function

Preset, GO/±NG judgment

Output (selectable)

Tolerance judgment: -NG, OK, +NG (open-collector)

Data: Digimatic code

External control signal input

Preset, data hold

Power supply

Via AC adaptor



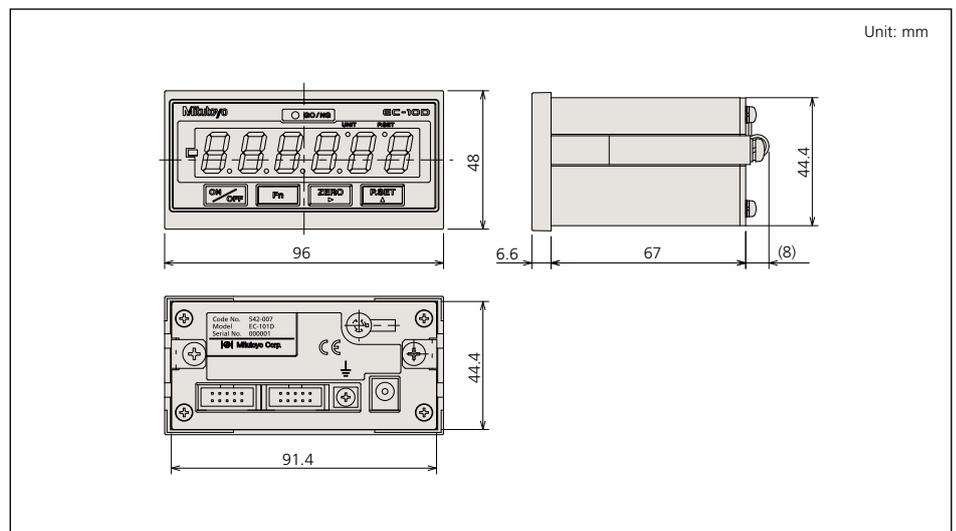
542-007



SPECIFICATIONS

Order No.	542-007
Applicable input	Digimatic code (SPC)
Applicable gage	LGD, LGD-L, LGD-ML, LGS
Number of gage input	1
Resolution	0.01mm, 0.001mm (Automatically set depending on the gage.)
Display	6-digit and a negative [-] sign LED (Amber, Green, Red)

DIMENSION



Refer to the Linear Gage leaflet (E4174) for more details.

EG Counter

SERIES 542 — Low-cost, Assembly Type Display Unit

FEATURES

- Possible to produce 3-step/5-step X 3 kinds of tolerance output and BCD output.
- The smoothing function can reduce the fluctuation of display digits.
- Employed the DIN size (96X48mm) and mount-on-panel configuration, which greatly facilitates the incorporation into a system.



542-015



542-016

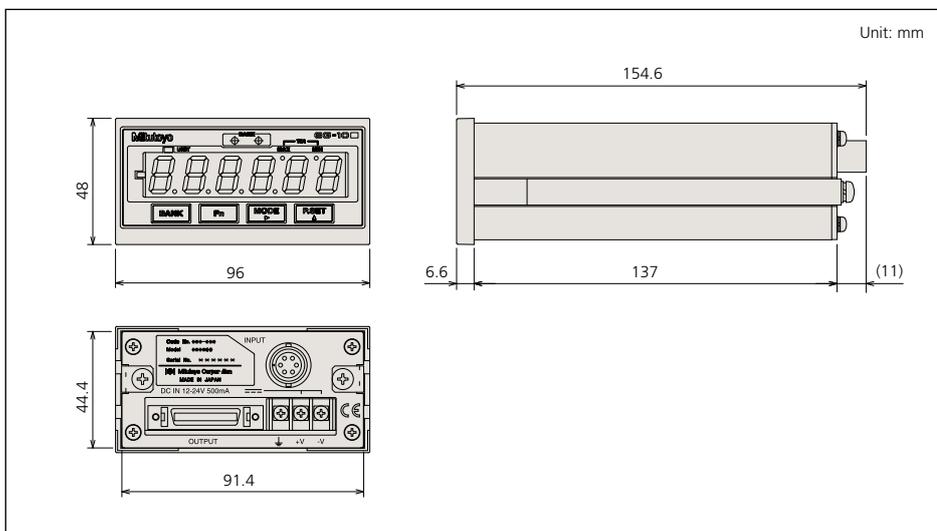


542-017

SPECIFICATIONS

Order No.	542-015	542-017	542-016
Applicable input	Differential square-wave	Differential square-wave w/origin point mark	Digimatic code (SPC)
Applicable gage	LGK, LGF, LGB, LGE, LGM, LGH (excluding with origin point and sign wave types)	LGF with origin point mark	LGD, LGS
Number of gage input	1		
Resolution (Depending on the linear gage type connected)	0.01mm, 0.005mm, 0.001mm, 0.0005mm, 0.0001mm		0.01mm, 0.001mm
Tolerance judgment display	LED display (3 steps: Amber, Green, Red/5 steps: Amber, Amber flash, Green, Red flash, Red)		

DIMENSION



Function

Preset, direction switch, tolerance judgment (3/5-step, 3 kinds), peak (max., min., runout) measurement, constant number, smoothing, error display/output, protection over keys

Output

Tolerance judgment: L1 to L5 (Switchover between open-collector output and BCD output by means of the parameter)

Control: NOM (normal signal) open-collector

BCD: 6-digit (positive/negative-true logic) open-collector (Switchover between tolerance judgment output by means of the parameter)

External control signal input

Preset, display hold, peak value clear, tolerance judgment BANK switch

Quantization error

±1 count

Maximum input frequency

1.25MHz (The response speed depends on the gage being used.)

Power supply voltage

DC+12 to 24V

Power consumption

6W (500mA) or less (Secure power supply more than 1A for each unit.)



Refer to the Linear Gage leaflet (E4174) for more details.

EB Counter

SERIES 542 — Assembly Type Display Unit with Multiple Limit Setting

Function

Preset, tolerance judgment output (3/5-step X 7 kinds), limit value output (2 kinds independently for each of the 7 channels), peak (maximum, minimum, runout) measurement, diverse data output (serial BCD, simplified analog)

Output

Tolerance judgment: L1 to L5, open-collector

Control: Normal operation signal (NORMAL), open-collector

External control signal input

Preset, display hold, peak value clear, tolerance judgment BANK switch, open-collector or no-voltage contact signal (with/without contact point)

Interface

Serial BCD: Bit-serial format, open-collector

Analog output: 2.5V + Counting value X voltage resolution (25mV/2.5mV): Full-scale 0 to 5V

Digimatic input/output:

- Connecting to the external switch box (No. 02ADF180) makes it easy to enter tolerance limits and preset values. (Note) This can not be used when the gage is connected to a Mitutoyo DP-1VR Digimatic Mini-Processor
- Possible to connect with a Mitutoyo DP-1VR Digimatic Mini-Processor.
- Number of tolerance steps can be expanded by making a set of EB-D counters.

Quantization error

±1 count

Maximum input frequency

1.25MHz (The response speed depends on the gage being used.)

The response speed depends on the gage being used. (542-093)

Power supply voltage

DC+12 to 24V

Power consumption

6W (500mA) or less (Secure power supply more than 1A for each unit.)

Optional Accessory

02ADB440: I/O output connector

02ADF180: 10-key unit

936937: SPC data ooutput cable (1m)

965014: SPC data ooutput cable (2m)

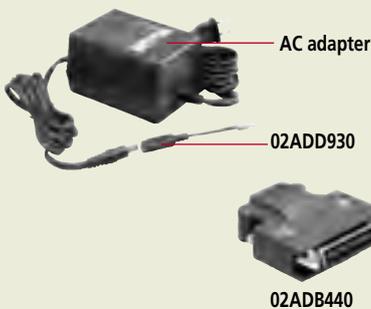
527428: AC adapter (100V)

527428A: AC adapter (120V)

527428CED: AC adapter (220V)

527428CEE: AC adapter (240V)

02ADD930: Terminal block connecting cable



FEATURES

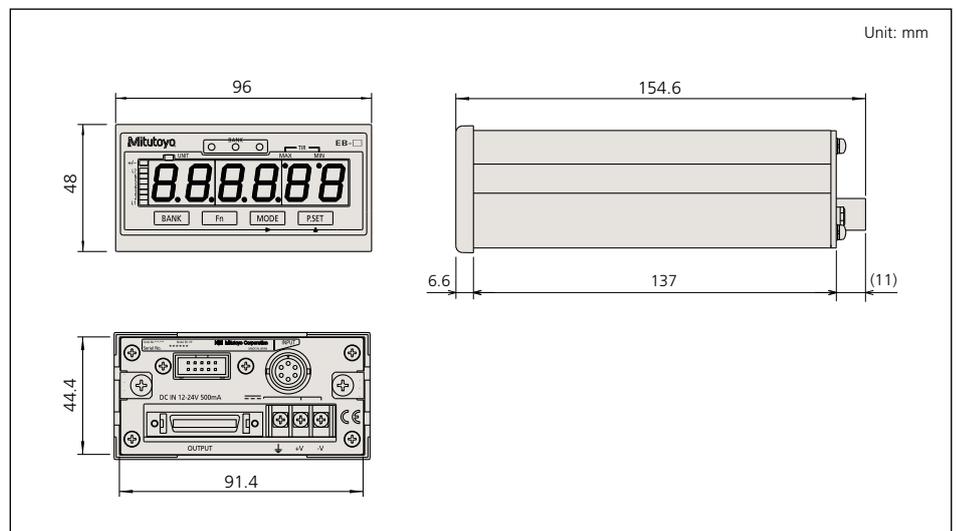
- Possible to produce 3-step/5-step X 7 kinds of tolerance output and limit value output independently for each of 7 channels.
- Provided with serial BCD output capability, which makes the connection to a programmable controller or personal computer, etc. possible with the minimum cabling requirement.
- Possible to perform dynamic measurement with the simplified analog output.
- Employed the DIN size (96X48mm) and mount-on-panel configuration, which greatly facilitates the incorporation into a system.



SPECIFICATIONS

Order No.	542-092	542-094	542-093
Applicable input	Differential square-wave	Differential square-wave w/origin point mark	Digimatic code (SPC)
Applicable gage	LGK, LGF, LGB, LGE	LGF with origin point mark	LGD, LGS
Number of gage input	1		
Resolution	0.01mm, 0.005mm, 0.001mm, 0.0005mm		0.01mm, 0.001mm
Tolerance judgment display	LED display (3 steps: Amber, Green, Red/5 steps: Amber, Amber flash, Green, Red flash, Red)		

DIMENSION



EF Counter

SERIES 542 — Multi-function Display Unit

FEATURES

- DIN compatible Panel-mounting type and DIN size (144 x 72mm). It can be easily incorporated into each system instrument.
- This counter can be used on a desktop by mounting it on the supplied stand leg.
- 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 with daisy chain and data to be input/output from one channel of the terminal RS-232C interface.
- The maximum value, minimum value, and TIR (runout) measurements are possible.
- The 2-gage input type can perform 2-axis display and make addition or subtraction calculations between 2 gages.



542-060



542-062



542-065

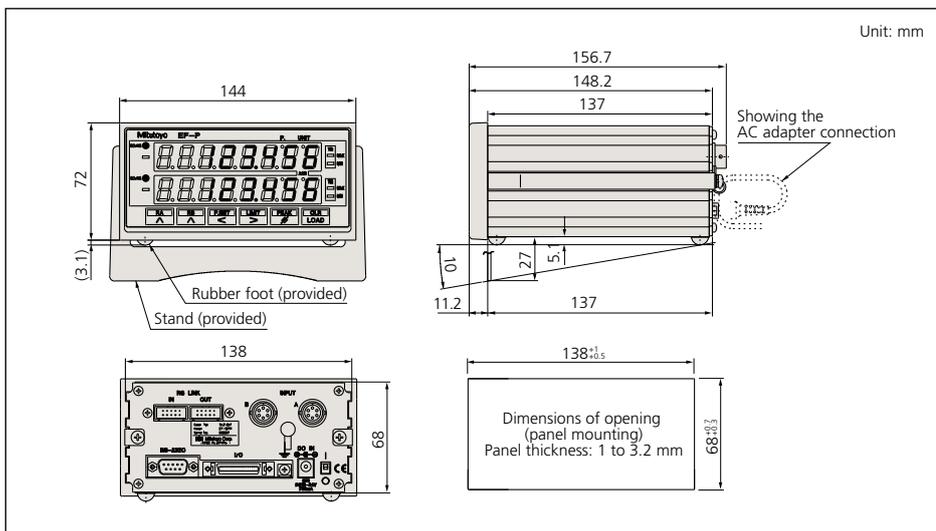


542-066

SPECIFICATIONS

Order No.	542-060	542-062	542-065	542-066
Applicable input	Differential square-wave			
Applicable gage	LGK, LGF (excluding with scale reference point), LGB (excluding sign wave type), LGE, LGH (excluding sign wave type)		LGF with scale reference point	
Number of gage input	1 (Single-display)	2 (Double-display)	1 (Single-display)	2 (Double-display)
Resolution (Depending on the linear gage type connected)	0.0001mm, 0.0005mm, 0.001mm, 0.005mm, 0.01mm, .000005", .00005", .0005"		0.0005mm, 0.001mm, 0.005mm, 0.01mm, .000005", .00005", .0005"	
Tolerance judgment display	LED display (3 steps: Amber, Green, Red/5 steps: Amber, Amber flash, Green, Red flash, Red)			

DIMENSION



Function

Zeraset, preset, limit setting (3 or 5-step), GO/±NG judgement, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, double reading, mm/inch switching, sum/difference calculation of 2 gages (542-062, 542-066 only), output mode selection

Output

I/O: Tolerance judgment output (3/5 stages), normal operation output RS-232C or Digimatic code (selectable): Various measurement data

External Control

I/O: Preset, Data hold and Error clear RS-232C: Displayed value output, MAX/MIN/TIR switching, Zero set, peak value clear, preset value input, tolerance value input and error clear

RS Link

Up to six EF counters may be connected via one RS-232C port. (daisy chain)

Error display/output

Power-supply voltage error, overspeed error, overflow error, gage error, communication error, and tolerance setting error

Maximum input frequency

1.25MHz (differential square-wave): Max counting Speed : 5MHz

Power supply

Via AC adaptor (12 - 24V DC, 700mA (max))



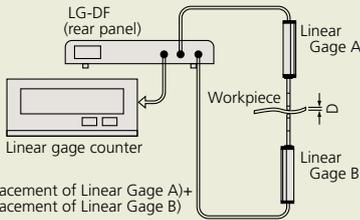
Refer to the Linear Gage leaflet (E4174) for more details.

Difference/Sum Unit

SERIES 542

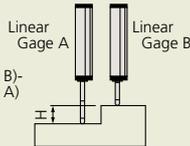
CONNECTION EXAMPLE

Measurement of a curved plate thickness



$$D = (\text{Displacement of Linear Gage A}) + (\text{Displacement of Linear Gage B})$$

Step measurement



$$H = (\text{Displacement of Linear Gage B}) - (\text{Displacement of Linear Gage A})$$

Over-speed error output and the remedies

If either of the gages being connected A and B input connectors displaces as to exceed the rated moving speed, the counter will display over-speed error.

Technical Data

Response speed: 250mm/s (when 5/10 μ m linear gages are connected) 50mm/s (when 1 μ m linear gages are connected)
 Power supply: Via AC adaptor (DC9V, 500mA)
 Power consumption: 4.5W
 Dimensions: 236 (w) x 160 (D) x 44.2 (H) mm

FEATURES

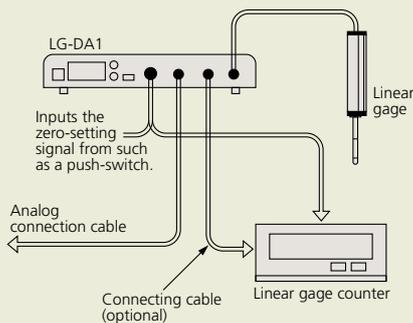
- This unit serves to output a differential calculation result (A+B, A-B) or single value (A, B) of the counting values obtained from the linear gages that are connected to A and B input connectors, respectively.

*The minimum readings of the linear gages that are connected to A and B input connectors should be identical.



542-004

CONNECTION EXAMPLE



Technical Data

Power supply: Via AC adaptor (DC9V, 500mA)
 Dimensions: 236 (w) x 160 (D) x 44.2 (H) mm

Switching of D/A conversion range and resolution

When connected to a 0.001mm linear gage

Range	Resolution
±1mm	0.001mm
±2mm	0.002mm
±5mm	0.005mm
±10mm	0.01mm
±20mm	0.02mm
±50mm	0.05mm

When connected to a 0.005/0.01mm linear gage

Range	Resolution
±5mm	0.005mm
±10mm	0.01mm
±25mm	0.025mm
±50mm	0.05mm
±100mm	0.10mm
±250mm	0.25mm

D/A Conversion Unit

SERIES 542

FEATURES

- This unit consists of the pulse control circuit, counting circuit, and D/A conversion circuit to output the amount of linear gage displacement in the form of analog voltage.



542-003

EV Counter

SERIES 542 — For Multi-gage System

FEATURES

- Up to six gages can be connected to one unit.
- Able to connect up to 10 EV counters to one personal computer using the RS link function to facilitate the configuration of a multi-point measurement system comprising a maximum of 60 gages.
- A range of output modes to choose from; I/O output for tolerance judgment and segment output, BCD data output and RS-232 output are available.
- Peak-hold measurements are possible for maximum value, minimum value, runout (TIR), etc.
- Able to calculate a sum, average, maximum, minimum, maximum difference, etc., between gages connected to the same unit.



542-063



542-064



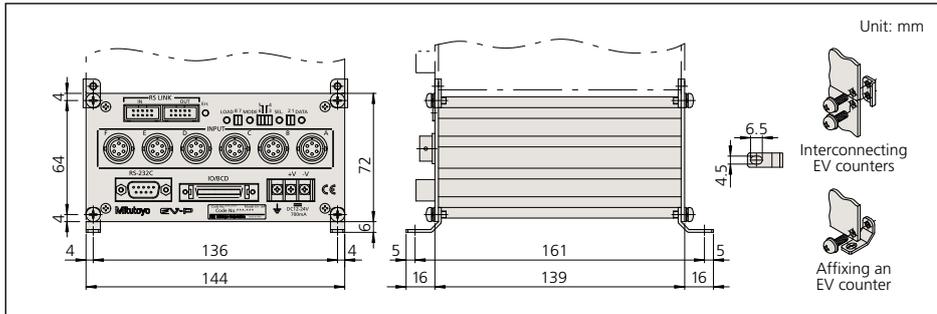
542-067

SPECIFICATIONS

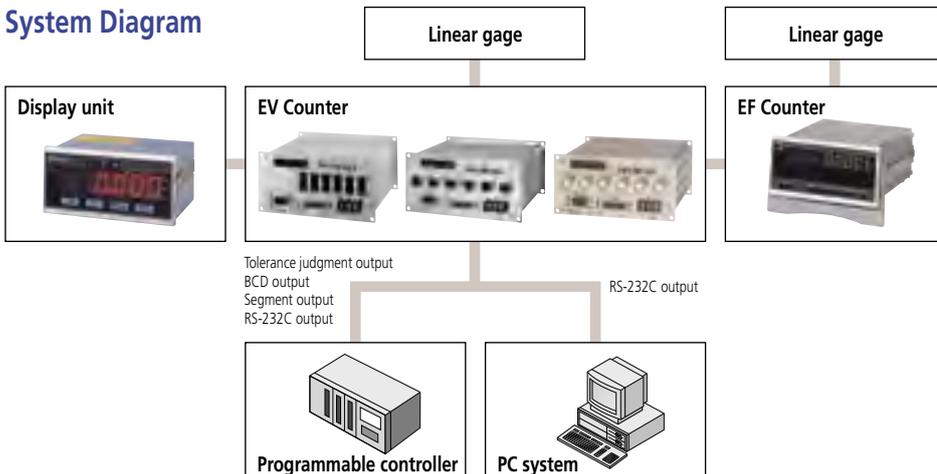
Order No.	542-063	542-067	542-064
Applicable input	Differential square-wave		Digimatic code (SPC)
Applicable gage	LGB (ex. 0.0001mm resolution), LGF, LGE, LG	LGF with origin point mark	LGD, LGD-M, LGS
Number of gage input	6		
Resolution (internal) - no display capability	0.0005mm, 0.001mm, 0.005mm, 0.01mm, .00005", .00005", .0005"		0.001mm*, 0.01mm, .00005"*, .0005"

*: Will not be indicated when combined with a LG gage.

DIMENSION



System Diagram



Function

GO/±NG judgment, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, mm/inch switching, calculation of sum, average, maximum, minimum and maximum difference between specified axes, and output-mode selection

Output

I/O: Normal operation output and GO/±NG signal (three steps), measurement data (BCD code), or 21-stage segment output (selectable) RS-232C: Various measurement data

External Control

I/O: Axis designation, preset, data hold, and error clear
RS-232: Displayed value output command, MAX/MIN/TIR switching and peak value clear, zero set, preset value input, tolerance value input, error clear, and command to output calculated value between specified axes

RS Link

Up to 10 EV counters may be connected via a single RS-232 port. (daisy chain) EV and EF counters can be mixed (in which case a total of six counters can be connected).

Error display/output

Power-supply voltage error, overspeed error, overflow error, gage error, communication error, and tolerance setting error

Maximum input frequency

1.25MHz (differential square-wave): Max counting Speed : 5MHz

Power supply

Terminal block (M3 screws), DC +12 to +24V, 700mA (max.)

D-EV Display Unit

Technical Data

Number of connectable units: One display unit allows external display and setting for one EV counter.

Displayed digits: It uses a single sign plus six digits (EV counter operates on eight-digit data internally but displays only the last six digits).

LED display: Channel display (also for display of judgment result): 3 (three-color LED) Measurement mode display (current, maximum, minimum, and runout): 2 Status display: 1 (two-color)

Operating switches: 4

Switches and their functions: Channel switching, measurement mode switching (current value, maximum value, minimum value and runout), parameter setting, preset, and tolerance setting

Input/output: RS Link connectors: 1 in and 1 out.

Error display: Overspeed, gage error and others.

Power supply: Terminal block (M3 screws), DC +12 to +24V, 200mA



Refer to the Linear Gage leaflet (E4174) for more details.

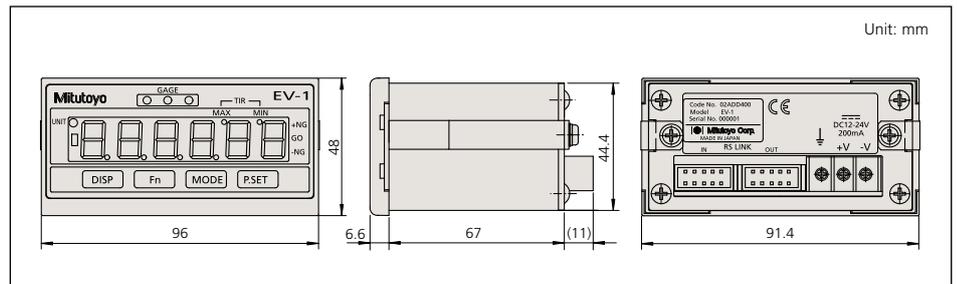
FEATURES

- Display unit for the EV counter.
- Using this display allows various settings for the EV counter without a personal computer or other equipment.
- Able to display each axis measurement value and GO/NG judgment result, total GO/NG judgment result for all axes, setting details, and errors.
- DIN compatible compact panel-mounting - cutout dimensions $45^{+0.8} \times 92^{+0.8}$
- The required power supply is DC +12 to +24V, 200mA at the terminal block.



02ADD400

DIMENSION



SENSORPAK

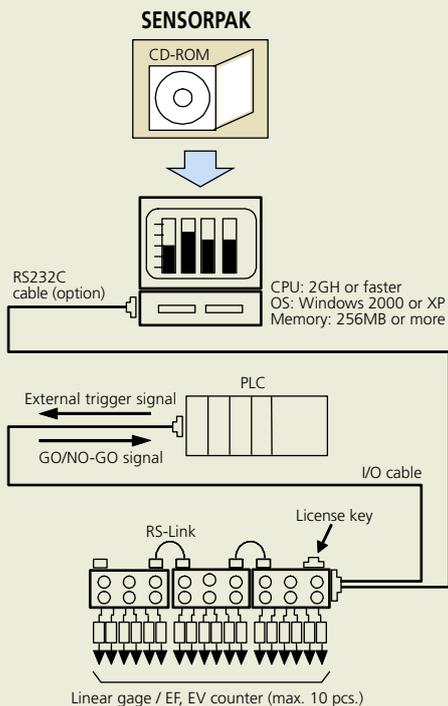
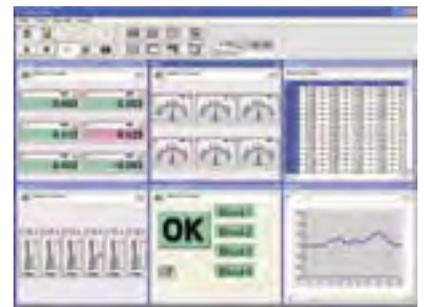
This software facilitates the loading of measurement data from a linear gage counter with the RS-232C interface into user's personal computer.

FEATURES

- Maximum 60 channels of measuring points can be processed.
- Possible to perform arithmetical calculation and maximum width calculation using the measurement data.
- Possible to export the measurement data into MS-Excel.
- Diverse graphic functions (numeric value display, meter display, bar-graph display, overall judgment display)
- Frequency of data loading: Max. 9999 times (60ch) to 60000 times (6CH)

MiCAT
Mitutoyo Intelligent Computer Aided Technology

the standard in world
metrology software
SENSOR



Litematic and Litematic Head

SERIES 318 — High-resolution Measuring Unit

FEATURES

- The Litematic is designed 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).
- Super Litematic employs a unique Laser Hologscale as the length standard, ensuring excellent measuring accuracy and repeatability.
- Ceramic anvil is free from corrosion and easy to maintain (Litematic).
- The measuring unit can be mounted onto fixtures or an optional stand to allow great flexibility of use (Litematic Head).
- With SPC output.



318-211
Litematic



318-217
Super Litematic



318-213
Litematic Head



SPECIFICATIONS

Range	Order No.*	Resolution	Accuracy (at 20°C±1°C)**	Remarks
0 - 50mm	318-217	0.01µm, 0.1µm, 1µm,	0.15µm (0.25µm: 35 - 50mm)	w/ ø26mm grooved ceramic anvil
0 - 50mm	318-211	.5µinch, 5µinch, 50µinch	(0.5+L/100)µm	w/ ø100mm grooved ceramic anvil
0 - 50mm	318-213	switchable	L=Measured length (mm)	Litematic Head

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: 318-217A):

A for UL/CSA, D for CEE, E for BS, F for SAA, DC for China, K for EK, No suffix is required for JIS/100V

** 20°C±0.5°C: Super Litematic (318-217)



Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)
 Resolution: Refer to the list of specifications
 Repeatability: $\sigma=0.05\mu\text{m}$ ($\sigma=0.02\mu\text{m}$: 318-217)
 Display unit: 8 digits and 14mm character height
 Stroke: 51.2mm (using standard contact point)
 Measuring force: 0.01N
 Spindle feed speed: 2mm/s, 4mm/s, 8mm/s
 (1mm/s, 2mm/s, 3mm/s, 5mm/s: 318-217)
 Length standard: Photoelectric linear encoder
 (Laser Hologscale: 318-217)
 Contact point: ø3mm carbide ball (R5 carbide ball: 318-217)
 Power supply: 85 - 264V AC

Optional Accessory

936937: SPC cable (1mm)
 965014: SPC cable (2mm)
 957460: 300x250mm granite stand with bracket for Litematic Head
 101118: Contact point, Shell
 120066: Contact point, ø0.45mm needle (carbide)
 120065: Contact point, ø1.0mm needle (carbide)
 120064: Contact point, ø1.5mm needle (carbide)
 137257: Contact point, ø2.0mm needle (carbide)
 120059: Contact point, ø7.0mm spherical (carbide)
 120060: Contact point, ø10.5mm spherical (carbide)
 937179T: Foot switch
 264-504: Digimatic Mini-processor DP1-VR
 264-012: Input tool (for USB port)
 02ADM270: Sensorpak (data capture software w/ I/O cable)



Sensorpak



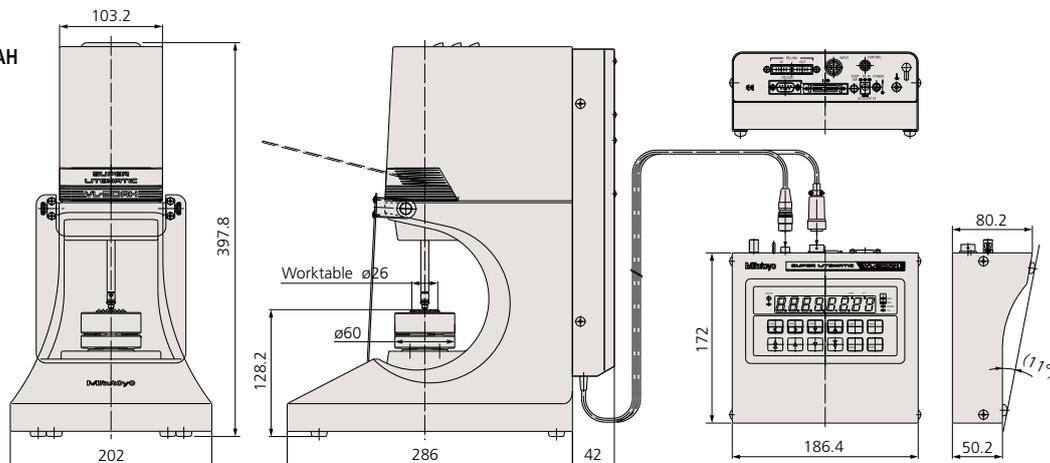
Application



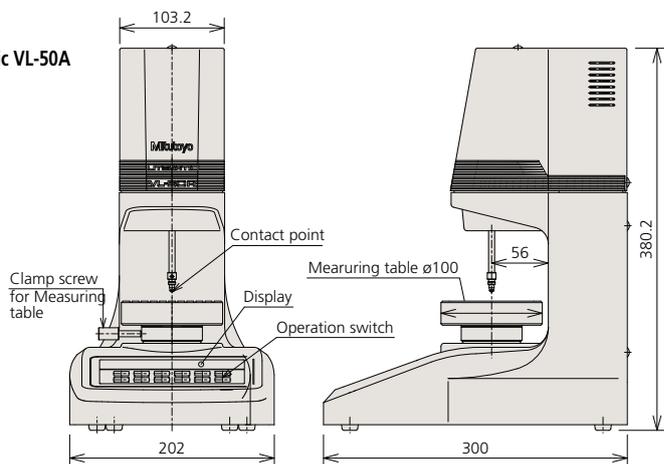
DIMENSION

Unit: mm

Litematic VL-50AH

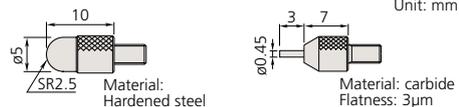


Litematic VL-50A



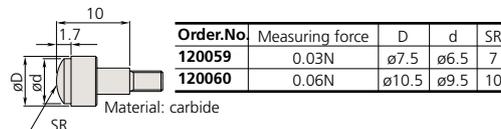
Interchangeable contact points

Unit: mm



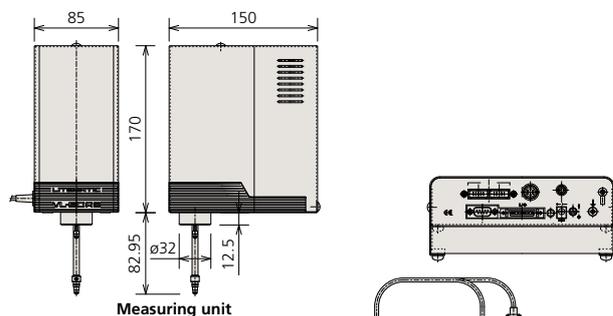
Order No.	Measuring force
101118	0.02N

Order No.	Measuring force
120066	0.01N

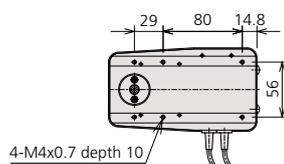


Order.No	Measuring force	D	d	SR
120059	0.03N	ø7.5	ø6.5	7
120060	0.06N	ø10.5	ø9.5	10

Litematic Head VL-50AS

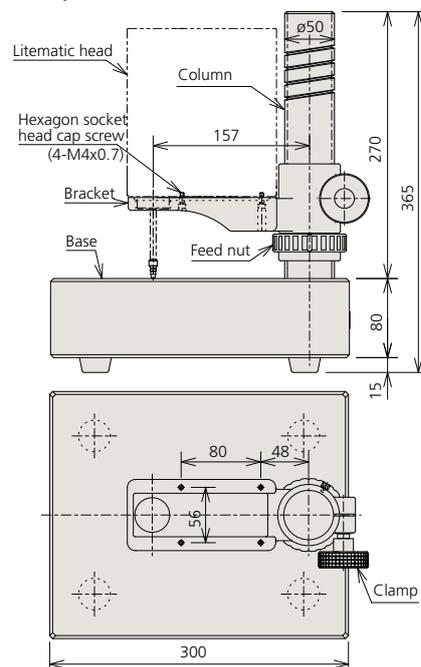


Measuring unit



Display unit

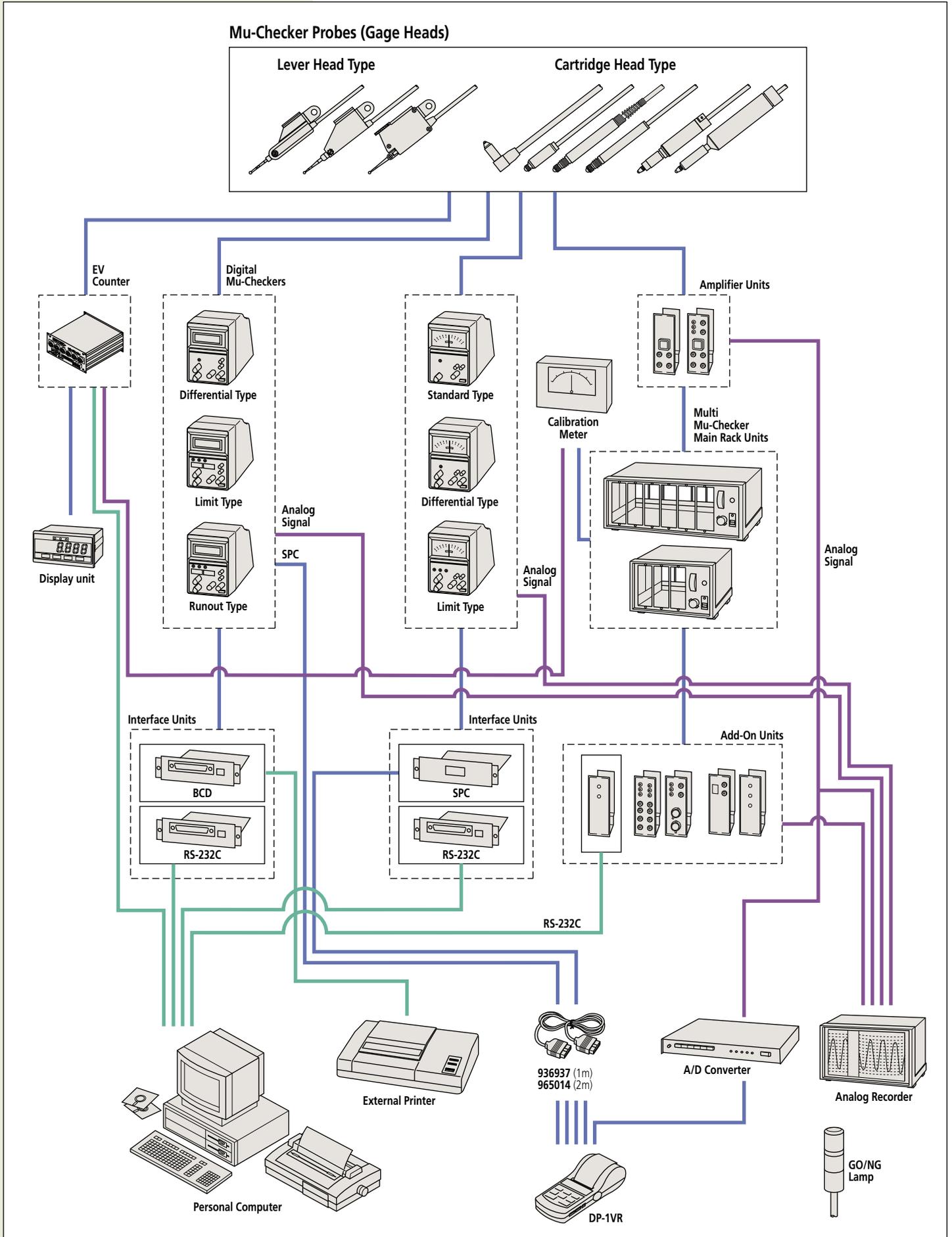
Optional stand for VL-50AS



Mu-Checker Probe Selection Guide

Type	Remarks	Effective range					
		±0.25mm	±0.5mm	±1.0mm	±1.5mm	±2.5mm	±5.0mm
Lever Head	Non-clutch Type						
	Clutch Type (with Direction Switch)						
	Low Measuring Force (Non-clutch Type)						
	High-Accuracy (Non-clutch Type)						
Cartridge Head	Slim Type (with Linear Ball Bearing)						
	Plain Type						

Mu-Checker System Diagram



Lever Heads

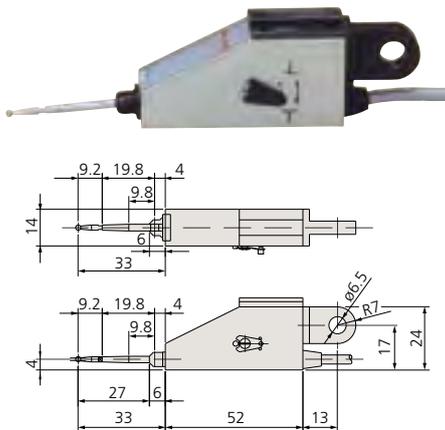
SERIES 519 — Lever Type Probe Head for Electric Micrometer

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.

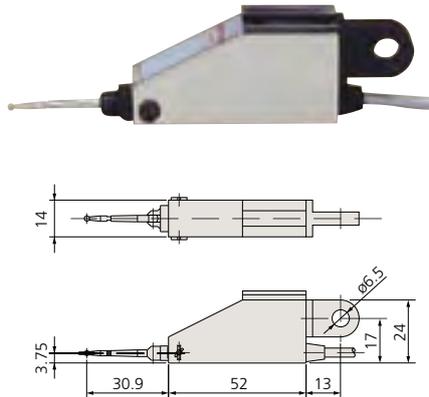
Switch type reversible direction

Order No.: 519-321



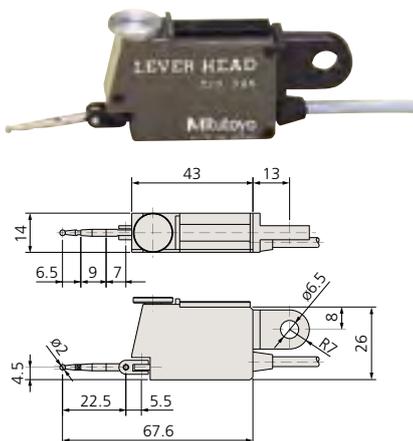
Low measuring force type

Order No.: 519-322



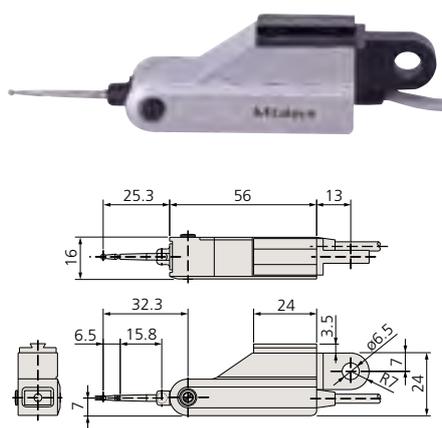
High-accuracy type

Order No.: 519-326



Non-clutch type reversible direction

Order No.: 519-327



Technical Data: 519-327

Effective range: ± 0.5 mm (head stroke: ± 0.65 mm)
 Linearity: $\pm 0.5\%$
 Measuring force: 0.15N or less
 Contact point: $\varnothing 2$ mm carbide ball
102824 ($\varnothing 1$ mm)*
102832 ($\varnothing 2$ mm)
102825 ($\varnothing 2$ mm, carbide)*
102826 ($\varnothing 3$ mm)*
 *optional

Technical Data: 519-321

Effective range: ± 0.5 mm (head stroke: ± 0.6 mm)
 Linearity: 0.5%
 Measuring force: 0.2N or less
 Contact point: $\varnothing 2$ mm carbide ball
520940 ($\varnothing 1$ mm)
520939 ($\varnothing 2$ mm)
520938 ($\varnothing 3$ mm)

Technical Data: 519-322

Effective range: ± 0.5 mm (head stroke: ± 0.6 mm)
 Linearity: 0.5%
 Measuring force: 0.02N or less
 Contact point: $\varnothing 2$ mm carbide ball
520940 ($\varnothing 1$ mm)
520939 ($\varnothing 2$ mm)
520938 ($\varnothing 3$ mm)

Technical Data: 519-326

Effective range: ± 0.5 mm (head stroke: ± 0.6 mm)
 Linearity: $\pm 0.3\%$
 Measuring force: 0.15N or less
 Contact point: $\varnothing 2$ mm carbide ball
102824 ($\varnothing 1$ mm)*
102832 ($\varnothing 2$ mm)
102826 ($\varnothing 3$ mm)*
 *optional

Cartridge Heads

SERIES 519 — Cartridge Type Probe Head for Electric Micrometer

FEATURES

- A half-bridge circuit connection.
- The Slim Type Cartridge Head employs a linear ball bearing for excellent durability.

Technical Data: 519-331, 519-332

Effective range: $\pm 0.5\text{mm}$ (head stroke: $\pm 0.65\text{mm}$)
 Linearity: 0.5%
 Measuring force: 0.25N or less
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5 (#4-48UNF: 519-332)

Technical Data: 519-333

Effective range: $\pm 1.0\text{mm}$ (head stroke: $\pm 1.2\text{mm}$)
 Linearity: 0.5%
 Measuring force: 1N or less
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-335

Effective range: $\pm 1.5\text{mm}$ (head stroke: $\pm 4.0\text{mm}$)
 Linearity: $\pm 0.3\%$
 Measuring force: $0.6\text{N} \pm 0.15\text{N}$
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-338

Effective range: $\pm 5\text{mm}$ (head stroke: $\pm 5.5\text{mm}$)
 Linearity: $\pm 0.5\%$
 Measuring force: 1.05N or less
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-341

Effective range: $\pm 2.5\text{mm}$ (head stroke: $\pm 3.0\text{mm}$)
 Linearity: $\pm 0.5\%$
 Measuring force: 0.9N or less
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-346

Effective range: $\pm 0.25\text{mm}$ (head stroke: 0.6mm)
 Linearity: 0.3%
 Measuring force: 0.65N or less
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-347

Effective range: $\pm 0.5\text{mm}$ (head stroke: 1.5mm)
 Linearity: 0.3%
 Measuring force: 0.6N or less
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-348

Effective range: $\pm 1.0\text{mm}$ (head stroke: 2.5mm)
 Linearity: 0.3%
 Measuring force: 0.7N or less
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-349

Effective range: $\pm 1.0\text{mm}$ (head stroke: 2.5mm)
 Linearity: 0.3%
 Measuring force: 0.7N or less
 Stem diameter: 6mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-161-1

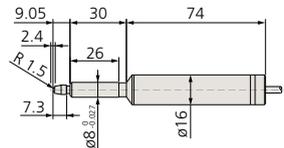
Effective range: $\pm 0.5\text{mm}$ (head stroke: 1.25mm)
 Linearity: $\pm 0.3\%$
 Measuring force: $0.13\text{N} \pm 0.04\text{N}$
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

Technical Data: 519-163-1

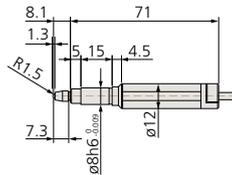
Effective range: $\pm 1.0\text{mm}$ (head stroke: 2.6mm)
 Linearity: $\pm 0.4\%$
 Measuring force: $0.15\text{N} \pm 0.045\text{N}$
 Stem diameter: 8mm
 Contact point*: R1.5, M2.5 x 5

*Compatible with contact points of dial indicator (see page XXX.)

Order No.: 519-333



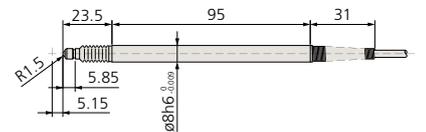
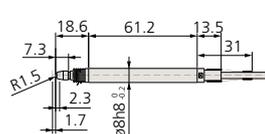
Order No.: 519-331, 519-332



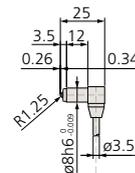
Order No.: 519-338



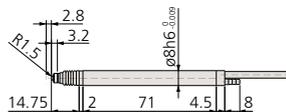
Order No.: 519-335



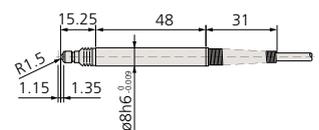
Order No.: 519-346



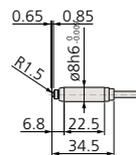
Order No.: 519-341



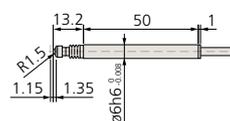
Order No.: 519-348



Order No.: 519-347



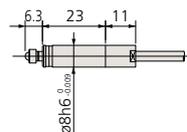
Order No.: 519-349



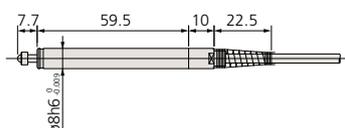
Optional Accessory

- 625029: Right angle adapter (applicable head: 519-338, 519-348)
 685014: Spindle lifting unit (applicable head: 519-335, 519-348)

Order No.: 519-161-1



Order No.: 519-163-1



Analog Mu-Checker

SERIES 519 — Standard, Differential and Limit Type Electric Micrometer

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.



Standard type analog Mu-Checker
Order No.*: 519-401 (Metric)
519-402 (Inch/Metric)

Probe channels: 1ch



Differential type analog Mu-Checker
Order No.*: 519-403 (Metric)
519-404 (Inch/Metric)

Probe channels: 2ch (A, B)
 Display mode: A, B, A + B, A - B, B - A, -(A + B)



Limit type analog Mu-Checker
Order No.*: 519-405 (Metric)
519-406 (Inch/Metric)

Probe channels: 2ch (A, B)
 Display mode: A, B, A + B, A - B, B - A, -(A + B)

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **519-401A**):
A for UL/CSA, **D** for CEE, **E** for BS, **F** for SAA, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Functions

	Standard type	Differential type	Limit type
Zero-set	✓	✓	✓
-/+ switching	✓	✓	✓
GO/±NG judgment	—	—	✓
GO/±NG output	—	—	✓
2-probe measurement	—	✓	✓
SPC output	▲*	▲*	▲*
RS-232C output	▲	▲	▲
Analog output	✓	✓	✓

✓: Available, ▲: Optional, ▲*: Optional (Metric model only)

Technical Data

Range: $\pm 5 / 0.1\mu\text{m}$, $\pm 15 / 0.5\mu\text{m}$, $\pm 50 / 1\mu\text{m}$,
 graduation $\pm 150 / 5\mu\text{m}$, $\pm 500 / 10\mu\text{m}$, $\pm 1500 / 50\mu\text{m}$
 ($\pm 0.0015 / .000005''$, $\pm 0.005 / .0001''$,
 $\pm 0.015 / .0005''$, $\pm 0.05 / .001''$, $\pm 0.15 / .0005''$, $\pm 0.5 / .001''$) (): Inch/Metric models
 Signal output: $\pm 1\text{V DC}$ / full scale
 Power supply: Via AC adapter

Optional Accessory

965690A: RS-232C interface unit



965691A: SPC output unit for metric models



271214: Vertical stand
 Used for supporting the analog Mu-Checker in vertical position.



934795: Analog output cable (1m)



529035: Analog limit signal output connector (7-pin)

Digital Mu-Checker

SERIES 519 — Differential, Limit and Runout Type Electric Micrometer

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.

Technical Data

Range: $\pm 200 / 0.1 \mu\text{m}$, $\pm 2000 / 1 \mu\text{m}$,
 graduation ($\pm .008 / .000005''$, $\pm .08 / .00005''$)
 (): Inch/Metric models
 Signal output: $\pm 1\text{V DC}$ / full scale
 Power supply: Via AC adapter

Optional Accessory

965838B: RS-232C interface unit



965839A: BCD output unit



936937: SPC cable (1m)

271214: Vertical stand
 Used for supporting the analog Mu-Checker in vertical position.



934795: Analog output cable (1m)



529035: Analog limit signal output connector (7-pin)



Differential type digital Mu-Checker
Order No.*: 519-411 (Metric)
519-412 (Inch/Metric)

Probe channels: 2ch (A, B)
 Display mode: A, B, A + B, A - B, B - A, -(A + B)



Limit type digital Mu-Checker
Order No.*: 519-413 (Metric)
519-414 (Inch/Metric)

Probe channels: 2ch (A, B)
 Display mode: A, B, A + B, A - B, B - A, -(A + B)



Runout digital Mu-Checker
Order No.*: 519-417 (Metric)
519-418 (Inch/Metric)

Probe channels: 1ch

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **519-401A**):
A for UL/CSA, **D** for CEE, **E** for BS, **F** for SAA, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Functions

	Differential type	Limit type	Runout type
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

Multi Mu-Checker

SERIES 519 — Module Type Electric Micrometer

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.



519-352 (6-slot model)



System sample



519-030: Calibration meter

Technical Data

Accuracy of indication: $\pm 2.5\%$
 Analog output: $\pm 1V$ DC / full scale for optional calibration meter
 Power supply: 100 - 240V AC

SPECIFICATIONS

Number of slots	Order No.*
3 slots	519-351
6 slots	519-352

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **519-351A**):
A for UL/CSA, **D** for CEE, **E** for BS, **F** for SAA, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Function Capabilities of Optional Add-On Units

	519-361 Amplifier unit	519-363 Amplifier unit with GO/NG	519-374 Differential unit	519-371 Analog memory unit	519-372 Classification unit	519-373 Total judgment unit	519-360 RS-232C interface unit
Probe input	✓	✓	—	—	—	—	—
Range/graduation setting	✓	✓	—	—	—	—	—
-/+ switching	✓	✓	—	—	—	—	—
Difference/sum (2-probe)	✓	✓	—	—	—	—	—
GO/±NG judgment	—	✓	✓	✓	✓	—	—
GO/±NG output	—	✓	✓	✓	✓	—	—
Classification of tolerance	—	—	—	—	✓	—	—
Total GO/±NG judgment	—	—	—	—	—	✓	—
Max, Min, Runout, Mean	—	—	—	—	—	—	—
Difference/sum (2-unit)	—	—	—	—	—	—	—
Analog output	✓	✓	✓	✓	—	—	—
SPC output	▲	▲	▲	▲	—	—	—
RS-232C output	—	—	—	—	—	—	✓

✓: Available, ▲: Optional

Optional Accessory

- 519-030:** Calibration meter
625200: Bus line connector
937929: Blind panel set for a blank slot

Multi Mu-Checker Add-On Units

Optional Accessory for Amplifier Unit

- 625030: Range Plug, $\pm 5\mu\text{m}$ (Graduation: $0.1\mu\text{m}$)
- 625031: Range Plug, $\pm 15\mu\text{m}$ (Graduation: $0.5\mu\text{m}$)
- 625032: Range Plug, $\pm 50\mu\text{m}$ (Graduation: $1\mu\text{m}$)
- 625033: Range Plug, $\pm 150\mu\text{m}$ (Graduation: $5\mu\text{m}$)
- 625035: Range Plug, $\pm 1500\mu\text{m}$ (Graduation: $50\mu\text{m}$)
- 625036: Range Plug, $\pm 2500\mu\text{m}$
- 625037: Range Plug, $\pm 5000\mu\text{m}$ (Graduation: $100\mu\text{m}$)
- 625040: Range Plug, $\pm .00015''$ (Graduation: $.000005''$)
- 625041: Range Plug, $\pm .0005''$ (Graduation: $.00001''$)
- 625042: Range Plug, $\pm .0015''$ (Graduation: $.00005''$)
- 625043: Range Plug, $\pm .005''$ (Graduation: $.0001''$)
- 625044: Range Plug, $\pm .015''$ (Graduation: $.0005''$)
- 625045: Range Plug, $\pm .05''$ (Graduation: $.001''$)
- 529035: Analog output connector
- 625200: Bus line connector

Optional Accessory for Differential Unit

- 529035: Analog output connector
- 625200: Bus line connector

Optional Accessory for Analog Memory Unit

- 529035: Analog output connector (OUT1)
- 625201: Analog output connector (OUT2)
- 625202: External control connector
- 625200: Bus line connector

Optional Accessory for Classification Unit

- 625203: BCD output connector
- 625200: Bus line connector
- 625202: External control connector

Optional Accessory for Total Judgment Unit

- 625204: GO/ \pm NG output connector
- 625202: External control connector
- 625200: Bus line connector

Optional Accessory for RS-232C Unit

- 965000: Main Rack Unit connecting cable (BUS IN)
- 625200: Bus line connector



Amplifier Unit

Order No.: 519-361
519-363 (w/ GO/ \pm NG LED)

Probe channels: 2ch (A, B)
Range: $\pm 500\mu\text{m}$ (By Range Plug 625034 provided)
Graduation: $10\mu\text{m}$ (on Calibration Meter)
Display mode: A, B, A + B, A - B, B - A, -(A + B)
GO/ \pm NG judgment: By LED (**519-363**)
Analog output: $\pm 1\text{V DC}$ / \pm fullscale
GO/ \pm NG output: Open collector (**519-363**)



Differential Unit

Order No.: 519-374

Calculation: Difference/sum between Add-On Units
Probe channels: 2ch (A, B)
GO/ \pm NG judgment: By LED
Analog output: $\pm 1\text{V DC}$ / \pm fullscale
GO/ \pm NG output: Open collector



Analog Memory Unit

Order No.: 519-371

Measurement: Maximum, Minimum, Runout, Mean
GO/ \pm NG judgment: By LED
Analog output: $\pm 1\text{V DC}$ / \pm fullscale
GO/ \pm NG output: Open collector



Classification Unit

Order No.: 519-372

Classification display: Digital (0 - 9)
Limit setting range: 10% - 100% fullscale
Data output: BCD (0-9 classification)
GO/ \pm NG output: TTL



Total Judgment Unit

Order No.: 519-373

GO/ \pm NG judgment: By LED
GO/ \pm NG output: Relay circuit



RS-232C Interface Unit

Order No.: 519-360

Analog input channels: 11
Applicable range: $\pm 50\mu\text{m}$ and more
Analog input: $\pm 1\text{V DC}$ / \pm fullscale
Sampling speed: 12 times/s

A/D Conversion Unit

SERIES 519 — For SPC Data Output

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.



Rear panel

Order No.: **519-391 (Metric)**
519-392 (Inch/Metric)

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **519-351A**):
A for UL/CSA, **D** for CEE, **E** for BS, **F** for SAA, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Technical Data

Range: $\pm 5 / 0.01\mu\text{m}$, $\pm 15 / 0.01\mu\text{m}$, $\pm 50 / 0.1\mu\text{m}$,
resolution $\pm 150 / 0.5\mu\text{m}$, $\pm 500 / 1\mu\text{m}$, $\pm 1500 / 1\mu\text{m}$
($\pm .00015 / .00001''$, $\pm .0005 / .00001''$,
 $\pm .0015 / .0001''$, $\pm .005 / .0001''$, $\pm .015 / .001''$, $\pm .05 / .001''$) (): Inch/Metric models

Analog input channel: 1ch
Signal input: $\pm 1\text{V DC}$ / full scale
Sampling time: 7.5times/s
Data output: SPC
Power supply: Via AC adapter

Optional Accessory

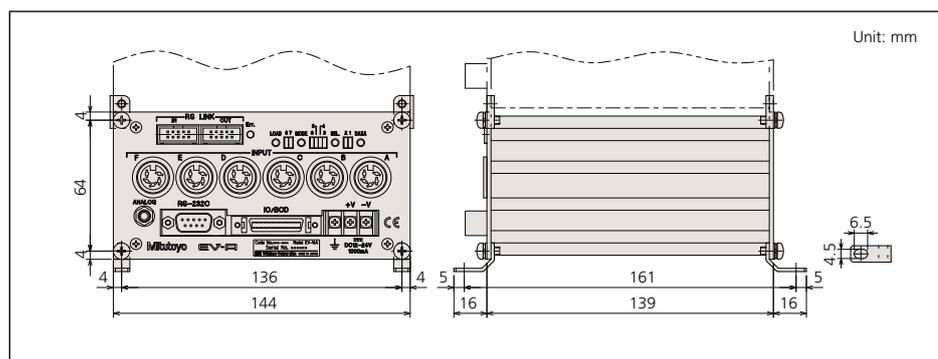
526688: AC adapter (100V AC)
526688A: AC adapter (120V AC)
526688D: AC adapter (220V AC)
526688E: AC adapter (240/220V AC)

EV Counter

SERIES 542 — with 6ch Analog Input for Multi-gage System



DIMENSION



Laser Scan Microtometer Selection Guide

MEASURING UNITS

Appearance	Model	Laser Classification	Measuring range	Resolution (Selectable)
	LSM-902*	Visible (650nm), IEC Class 2/ FDA Class II	0.1 - 25mm (.0002" - .08")	0.01µm - 10µm (.000001" - .0005")
	LSM-500S	Visible (650nm), IEC Class 2/ FDA Class II	0.005 - 2mm (.0002" - .08")	0.01µm - 10µm (.000001" - .0005")
	LSM-501S	Visible (650nm), IEC Class 2/ FDA Class II	0.05 - 10mm (.002" - .4") FDA Class II	0.01µm - 10µm (.000001" - .0005")
	LSM-503S	Visible (650nm), IEC Class 2/ FDA Class II	0.3 - 30mm (.012" - 1.18")	0.02µm - 100µm (.000001" - .005")
	LSM-506S	Visible (650nm), IEC Class 2/ FDA Class II	1 - 60mm (.04" - 2.36")	0.05µm - 100µm (.000002" - .005")
	LSM-512S	Visible (650nm), IEC Class 2/ FDA Class II	1 - 120mm (.04" - 4.72")	0.1µm - 100µm (.000005" - .005")
	LSM-516S	Visible (650nm), IEC Class 2/ FDA Class II	1 - 160mm (.04" - 6.30")	0.1µm - 100µm (.000005" - .005")
 With display unit	LSM-9506N Measuring unit - display unit one-piece structure for bench- top use only	Visible (650nm), IEC Class 2/ FDA Class II	0.5 - 60mm (.02" - 2.36")	0.05µm - 100µm (.000002" - .005")

DISPLAY UNITS

Appearance	Model	Type	Application	Interface units equipped
	LSM-6200 LSM-6900*	Multi-function type	Bench-top use	<ul style="list-style-type: none"> • RS-232C • I/O • Analog output
	LSM-5100** (order-to-made)	Compact type (Low cost)	Assembly/ bench-top use (DIN size)	<ul style="list-style-type: none"> • RS-232C • I/O • Analog output

*LSM-902 and LSM-6900 are factory-set package.

**When connecting with the LSM-500S series, the scanning speed becomes 1600 scans/sec.

LSM-902 / 6900

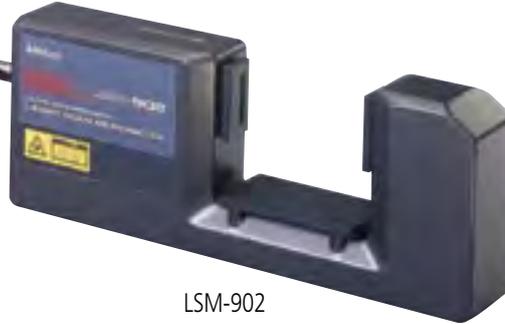
SERIES 544 — Ultra-high Accuracy Non-contact Measuring System

FEATURES

- Suitable for pin and plug gage measurements.
- Wide measuring range of $\varnothing 0.1\text{mm}$ to $\varnothing 25\text{mm}$.
- Provides ultra-high accuracy with a linearity of $\pm 0.5\mu\text{m}$ over the entire measurement range and $\pm(0.3+0.1\Delta D)\mu\text{m}$ in the narrow range.
- Ultra-high repeatability of $\pm 0.05\mu\text{m}$



LSM-6900 display unit

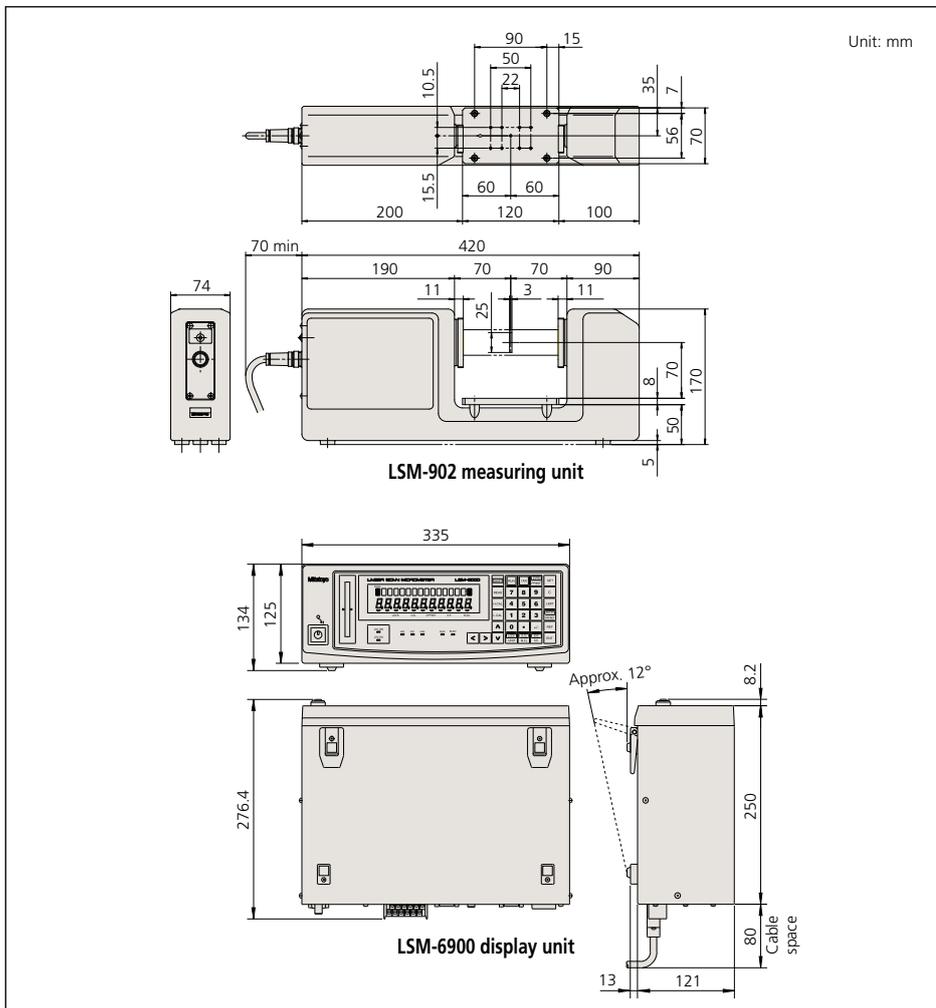


LSM-902 measuring unit

Order No.*: **544-495** (Metric)
544-496 (Inch/Metric)

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **544-495A**):
A for UL/CSA, **D** for CEE, **E** for BS, **F** for SAA, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Technical Data

Range: 0.1 - 25mm
 Resolution: 0.00001 - 0.01mm selectable
 (.000001" - .0005") (): Inch/Metric models
 Linearity at 20°C*: Entire range: $\pm 0.5\mu\text{m}$
 Narrow range: $\pm(0.3+0.1\Delta D)\mu\text{m}$
 Repeatability ($\pm 2\sigma$): $\pm 0.5\mu\text{m}$
 Workpiece positional error: $\pm 0.5\mu\text{m}$
 Measuring region: 3 x 25mm
 Laser wavelength: 650nm, Visible
 Number of scans: 800scans/s
 Laser scanning speed: 56m/s
 Acceptable standard of laser: IEC (FDA: **544-495A**, **544-496A**)
 Main display: 16-digit fluorescent tube
 Interface units equipped: RS-232C, Analog I/O, Foot switch
 Power supply: 100 - 240V AC $\pm 10\%$, 40VA, 50/60Hz
 * At the center of the measuring region.
 ΔD = Difference in diameter between the mastergage and workpiece

Function of Display Unit

Zero-setting, Presetting, GO/ \pm 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

Optional Accessory

- 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)



Refer to the Laser Scan Micrometer leaflet (E4156) for more details.

LSM-9506

SERIES 544 — Bench Top Type Non-contact Measuring System

FEATURES

- With a design that integrates the display section and measuring section into one unit, it is best suited for bench-top measurement in an inspection room.
- A statistical calculation function is provided.
- Standard RS-232C interface and SPC output interface are provided as standard.



LSM-9506

Technical Data

Range: 0.5 - 60mm
 Resolution: 0.0005mm (.000002")
 (): Inch/Metric models
 Linearity at 20°C*: ±2.5µm
 Repeatability (±2σ): ±0.6µm
 Workpiece positional error: ±2.5µm
 Measuring region: 10 x 60mm
 Laser wavelength: 650nm, Visible
 Number of scans: 1600scans/s
 Laser scanning speed: 226m/s
 Acceptable standard of laser: IEC (FDA: **544-115A**, **544-116A**)
 Main display: 16-digit fluorescent tube
 Interface units equipped: RS-232C, SPC, Foot switch
 Power supply: 100 - 240V AC±10%, 40VA, 50/60Hz
 * At the center of the measuring region.

Function

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, Automatic measurement, Abnormal data eliminating

Optional Accessory

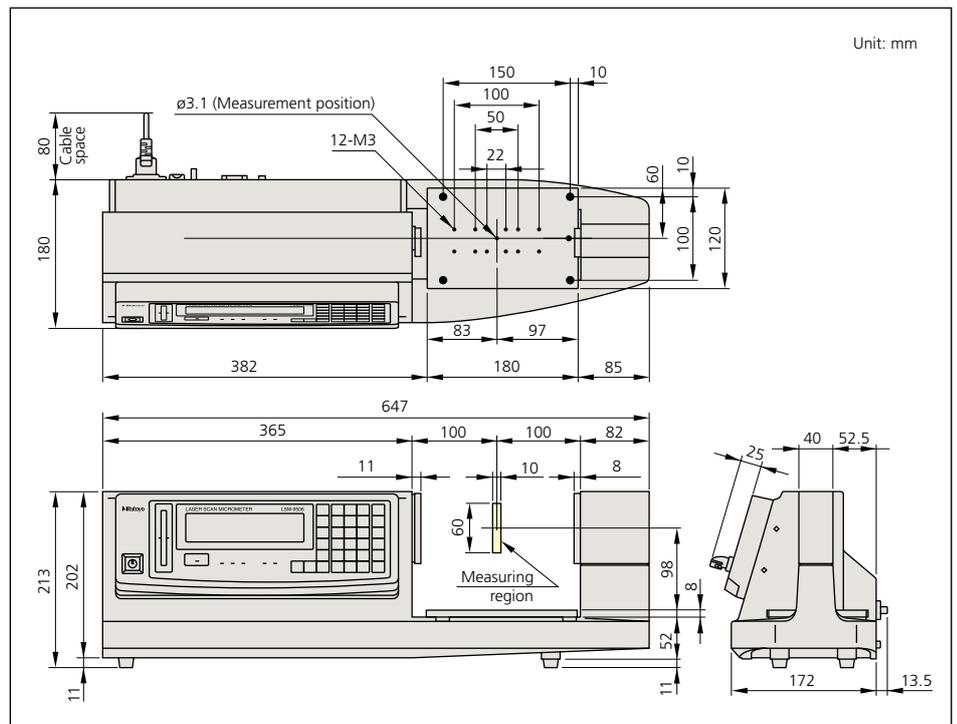
- 02AGD170:** Calibration gage set for LSM-9506
- 02AGD600A:** Thermal printer (w/100V AC adapter)
- 02AGD600B:** Thermal printer (w/120V AC adapter)
- 02AGD600C:** Thermal printer (w/130V AC adapter)

Order No.*: **544-115** (Metric)

544-116 (Inch/Metric)

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **544-495A**):
A for UL/CSA, **D** for CEE, **E** for BS, **F** for SAA, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Refer to the Laser Scan Micrometer leaflet (E4156) for more details.

LSM-500S, LSM-501S, LSM-503S

SERIES 544 — High Accuracy Non-contact Measuring System

FEATURES: LSM-500S

- Permits measurements starting from $\varnothing 5\mu\text{m}$.
- Provides ultra-high accuracy with a linearity of $\pm 0.3\mu\text{m}$ over the entire measurement range (5 μm to 2mm).
- Ultra-high repeatability of $\pm 0.03\mu\text{m}$



Order No.: 544-531 (FDA)
544-532 (IEC)

FEATURES: LSM-501S

- Provides ultra-high accuracy with a linearity of $\pm 0.5\mu\text{m}$ over the entire measurement range (0.05mm to 10mm) and $\pm(0.3+0.1\Delta D)\mu\text{m}$ in the narrow range.
- Ultra-high repeatability of $\pm 0.04\mu\text{m}$



Order No.: 544-533 (FDA)
544-534 (IEC)

FEATURES: LSM-503S

- General-purpose type with a measurement range of 0.3mm to 30mm.
- Provides high accuracy with a linearity of $\pm 1.0\mu\text{m}$ over the entire measurement range and $\pm(0.6+0.1\Delta D)\mu\text{m}$ in the narrow range.
- Excellent repeatability of $\pm 0.1\mu\text{m}$



Order No.: 544-535 (FDA)
544-536 (IEC)

Technical Data of LSM-500S

Range: 0.005 - 2mm
Resolution: 0.00001 - 0.01mm selectable
(.000001" - .0005") (): Inch/Metric models
Linearity at 20°C*: $\pm 0.3\mu\text{m}$
Repeatability ($\pm 2\sigma$): $\pm 0.03\mu\text{m}$
Workpiece positional error: $\pm 0.4\mu\text{m}$
Measuring region: 1x2mm
Laser wavelength: 650nm, Visible
Number of scans: 3200scans/s
Laser scanning speed: 76m/s
Acceptable standard of laser: IEC or FDA
* At the center of the measuring region.

Technical Data of LSM-501S

Range: 0.05 - 10mm
Resolution: 0.00001 - 0.01mm selectable
(.000001" - .0005") (): Inch/Metric models
Linearity at 20°C*: Entire range: $\pm 0.5\mu\text{m}$
Narrow range: $\pm(0.3+0.1\Delta D)\mu\text{m}$
Repeatability ($\pm 2\sigma$): $\pm 0.04\mu\text{m}$
Workpiece positional error: $\pm 0.5\mu\text{m}$
Measuring region: 2x10mm ($\varnothing 0.05 - \varnothing 0.1\text{mm}$)
4x10mm ($\varnothing 0.1 - \varnothing 10\text{mm}$)
Laser wavelength: 650nm, Visible
Number of scans: 3200scans/s
Laser scanning speed: 113m/s
Acceptable standard of laser: IEC or FDA
* At the center of the measuring region.
 ΔD =Difference in diameter between the mastergauge and workpiece

Technical Data of LSM-503S

Range: 0.3 - 30mm
Resolution: 0.00002 - 0.1mm selectable
(.000001" - .005") (): Inch/Metric models
Linearity at 20°C*: Entire range: $\pm 1.0\mu\text{m}$
Narrow range: $\pm(0.6+0.1\Delta D)\mu\text{m}$
Repeatability ($\pm 2\sigma$): $\pm 0.1\mu\text{m}$
Workpiece positional error: $\pm 1.5\mu\text{m}$
Measuring region: 10x30mm
Laser wavelength: 650nm, Visible
Number of scans: 3200scans/s
Laser scanning speed: 226m/s
Acceptable standard of laser: IEC or FDA
* At the center of the measuring region.
 ΔD =Difference in diameter between the mastergauge and workpiece

Optional Accessory for LSM-500S

- 02AGD110:** Calibration gage set (ø0.1mm, ø2.0mm)
- 02AGD200:** Wire guiding pulley
- 02AGD220:** Air blow cover
- 957608:** Air cleaner for air blow cover
- 02AGC780A:** Extension signal cable 5m
- 02AGC780B:** Extension signal cable 10m
- 02AGC780C:** Extension signal cable 15m

Optional Accessory for LSM-501S

- 02AGD120:** Calibration gage set (ø0.1mm, ø10mm)
- 02AGD210:** Wire guiding pulley
- 02AGD400:** Adjustable workstage
- 02AGD440:** Center support*
- 02AGD450:** Adjustable V-block*
- 02AGD230:** Air blow cover
- 957608:** Air cleaner for air blow cover
- 02AGC150A:** Extension relay cable 1m
- 02AGC780A:** Extension signal cable 5m
- 02AGC780B:** Extension signal cable 10m
- 02AGC780C:** Extension signal cable 15m

*Use with an adjustable workstage.

Optional Accessory for LSM-503S

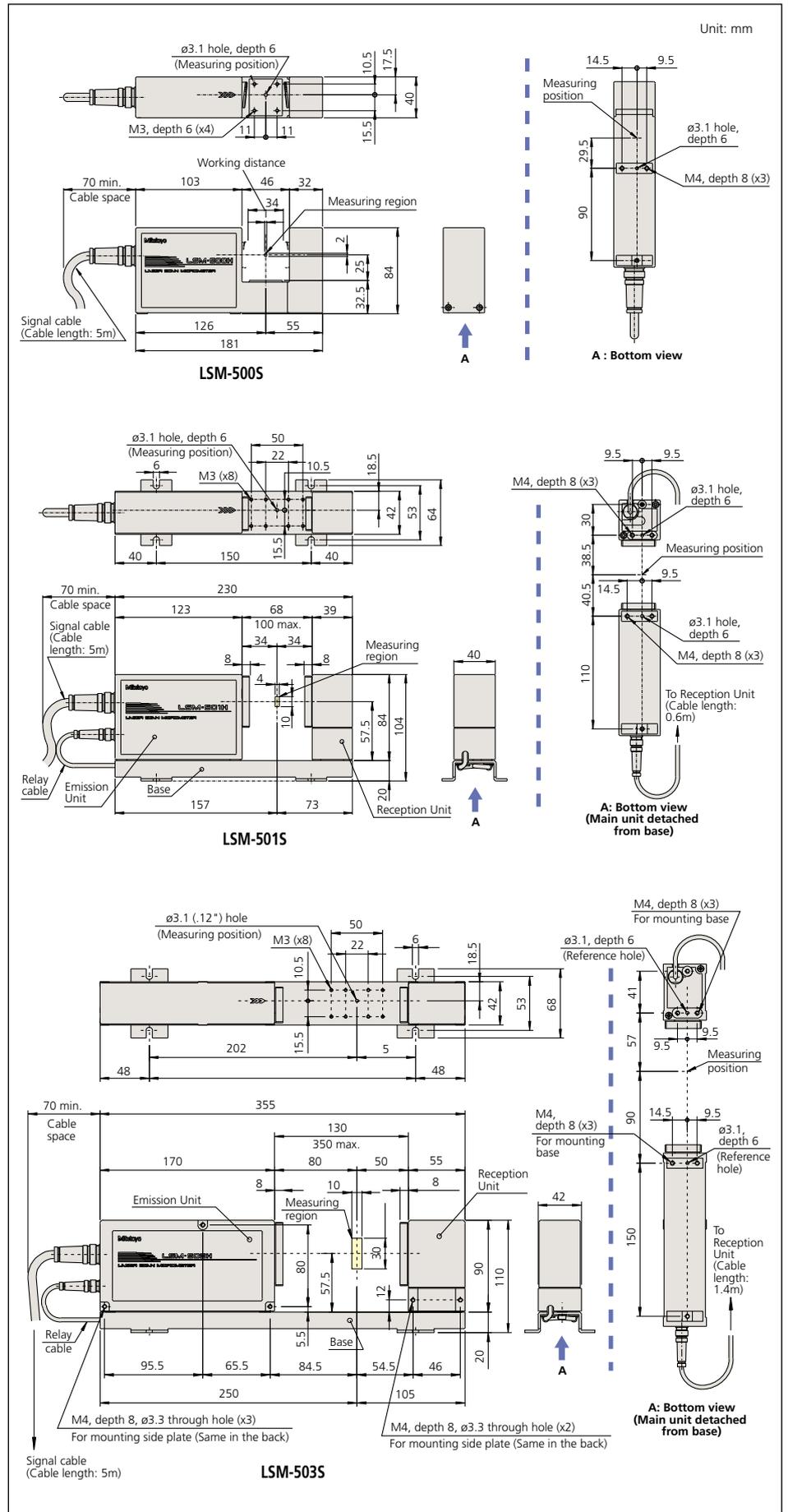
- 002AGD130:** Calibration gage set (ø1mm, ø30mm)
- 02AGD490:** Adjustable workstage
- 02AGD440:** Center support*
- 02AGD450:** Adjustable V-block*
- 02AGD240:** Air blow cover
- 957608:** Air cleaner for air blow cover
- 02AGC150A:** Extension relay cable 1m
- 02AGC150B:** Extension relay cable 3m
- 02AGC150C:** Extension relay cable 5m
- 02AGC780A:** Extension signal cable 5m
- 02AGC780B:** Extension signal cable 10m
- 02AGC780C:** Extension signal cable 15m
- 02AGC780D:** Extension signal cable 20m

*Use with an adjustable workstage.



Refer to the Laser Scan Micrometer leaflet (E4156) for more details.

DIMENSION



LSM-506S, LSM-512S, LSM-516S

SERIES 544 — High Accuracy Non-contact Measuring System

FEATURES: LSM-506S

- General-purpose type with a measurement range of 1mm to 60mm.
- Provides high accuracy with a linearity of $\pm 3\mu\text{m}$ over the entire measurement range and $\pm(1.5+0.5\Delta D)\mu\text{m}$ in the narrow range.
- Excellent repeatability of $\pm 0.36\mu\text{m}$



Order No.: 544-537 (FDA)
544-538 (IEC)

FEATURES: LSM-512S

- General-purpose type with a wide measurement range of 1mm to 120mm.
- Provides high accuracy with a linearity of $\pm 6\mu\text{m}$ over the entire measurement range and $\pm(4.0+0.5\Delta D)\mu\text{m}$ in the narrow range.
- Excellent repeatability of $\pm 0.8\mu\text{m}$



Order No.: 544-539 (FDA)
544-540 (IEC)

FEATURES: LSM-516S

- General-purpose type with a wide measurement range of 1mm to 160mm.
- Provides high accuracy with a linearity of $\pm 7\mu\text{m}$ over the entire measurement range and $\pm(4.0+2.0\Delta D)\mu\text{m}$ in the narrow range.
- Excellent repeatability of $\pm 1.4\mu\text{m}$



Order No.: 544-541 (FDA)
544-542 (IEC)

Technical Data of LSM-506S

Range: 1 - 60mm
Resolution: 0.00005 - 0.1mm selectable
(.000002" - .005") (): Inch/Metric models
Linearity at 20°C*: Entire range: $\pm 3\mu\text{m}$
Narrow range: $\pm(1.5+0.5\Delta D)\mu\text{m}$
Repeatability ($\pm 2\sigma$): $\pm 0.36\mu\text{m}$
Workpiece positional error: $\pm 4\mu\text{m}$
Measuring region: 20 x 60mm
Laser wavelength: 650nm, Visible
Number of scans: 3200scans/s
Laser scanning speed: 452m/s
Acceptable standard of laser: IEC or FDA
* At the center of the measuring region.
 ΔD =Difference in diameter between the mastergauge and workpiece

Technical Data of LSM-512S

Range: 1 - 120mm
Resolution: 0.0001 - 0.1mm selectable
(.000005" - .005") (): Inch/Metric models
Linearity at 20°C*: Entire range: $\pm 6\mu\text{m}$
Narrow range: $\pm(4.0+0.5\Delta D)\mu\text{m}$
Repeatability ($\pm 2\sigma$): $\pm 0.8\mu\text{m}$
Workpiece positional error: $\pm 8\mu\text{m}$
Measuring region: 30 x 120mm
Laser wavelength: 650nm, Visible
Number of scans: 3200scans/s
Laser scanning speed: 904m/s
Acceptable standard of laser: IEC or FDA
* At the center of the measuring region.
 ΔD =Difference in diameter between the mastergauge and workpiece

Technical Data of LSM-516S

Range: 1 - 160mm
Resolution: 0.0001 - 0.1mm selectable
(.000005" - .005") (): Inch/Metric models
Linearity at 20°C*: Entire range: $\pm 7\mu\text{m}$
Narrow range: $\pm(4.0+2.0\Delta D)\mu\text{m}$
Repeatability ($\pm 2\sigma$): $\pm 1.4\mu\text{m}$
Workpiece positional error: $\pm 8\mu\text{m}$
Measuring region: 40 x 160mm
Laser wavelength: 650nm, Visible
Number of scans: 3200scans/s
Laser scanning speed: 603m/s
Acceptable standard of laser: IEC or FDA
* At the center of the measuring region.
 ΔD =Difference in diameter between the mastergauge and workpiece

Optional Accessory for LSM-506S

- 02AGD140: Calibration gage set (ø1mm, ø60mm)
 - 02AGD520: Adjustable workstage
 - 02AGD580: Center support*
 - 02AGD590: Adjustable V-block*
 - 02AGD250: Air blow cover
 - 957608: Air cleaner for air blow cover
 - 02AGC150A: Extension relay cable 1m
 - 02AGC150B: Extension relay cable 3m
 - 02AGC150C: Extension relay cable 5m
 - 02AGC780A: Extension signal cable 5m
 - 02AGC780B: Extension signal cable 10m
 - 02AGC780C: Extension signal cable 15m
 - 02AGC780D: Extension signal cable 20m
- *Use with an adjustable workstage.

Optional Accessory for LSM-512S

- 02AGD150: Calibration gage set (ø20mm, ø120mm)
- 02AGD260: Air blow cover
- 957608: Air cleaner for air blow cover
- 02AGC150A: Extension relay cable 1m
- 02AGC150B: Extension relay cable 3m
- 02AGC150C: Extension relay cable 5m
- 02AGC780A: Extension signal cable 5m
- 02AGC780B: Extension signal cable 10m
- 02AGC780C: Extension signal cable 15m
- 02AGC780D: Extension signal cable 20m

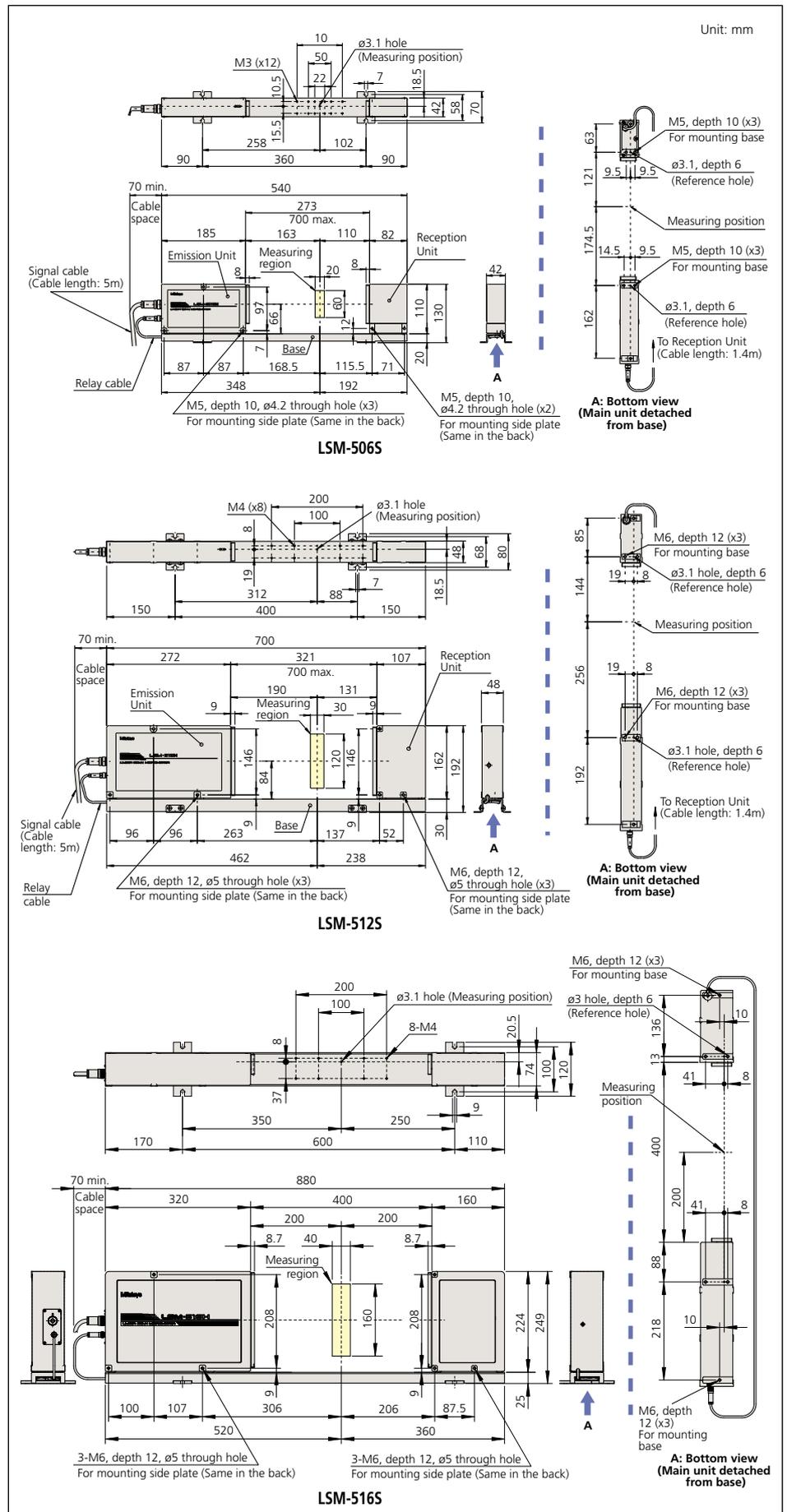
Optional Accessory for LSM-516S

- 002AGM300: Calibration gage set (ø20mm, ø160mm)
- 02AGC150A: Extension relay cable 1m
- 02AGC150B: Extension relay cable 3m
- 02AGC150C: Extension relay cable 5m
- 02AGC780A: Extension signal cable 5m
- 02AGC780B: Extension signal cable 10m
- 02AGC780C: Extension signal cable 15m
- 02AGC780D: Extension signal cable 20m



Refer to the Laser Scan Micrometer leaflet (E4156) for more details.

DIMENSION



LSM-5100 Display Unit

SERIES 544 — Compact Display Unit for Laser Scan Micrometer

FEATURES

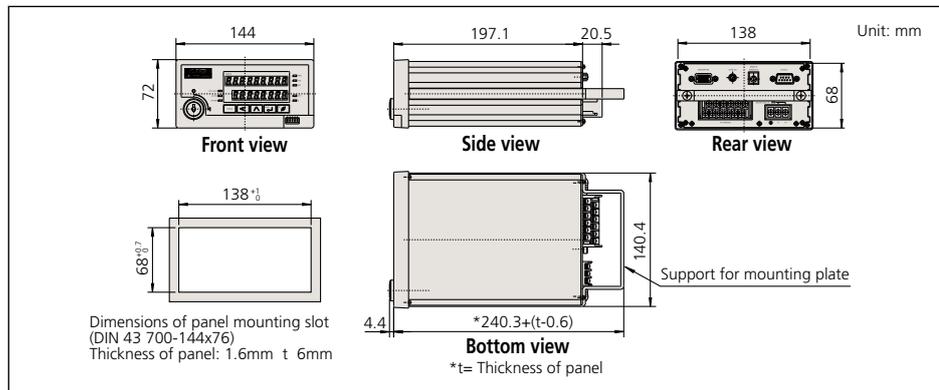
- Panel-mount type (with dimensions conforming to DIN standards) allows easy system integration.
- Capable of calculating mean, maximum, minimum, and range (maximum - minimum).
- Either the segment measurement (7 segments max.) or edge measurement (1 to 255 edges) can be selected.
- The RS-232C interface and the I/O and analog interface are provided as standard.

- The arithmetical average or moving average can be selected.
- GO/±NG judgment function.



Order No.: 544-039 (Metric)
544-040 (Inch/Metric)

DIMENSION



Technical Data

Main display: 9-digit LED
Interface units equipped: RS-232C, Analog I/O, Foot switch
Power supply: +24V DC±10%, 1A

Function of Display Unit

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

LSM-6200 Display Unit

SERIES 544 — Standard Display Unit for Laser Scan Micrometer

FEATURES

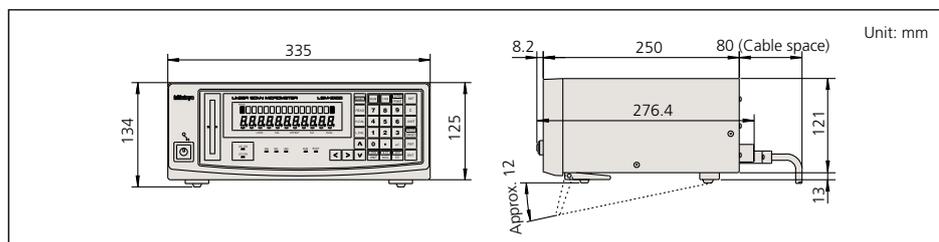
- With a dual-display design setup values can be continuously monitored. Also, two measurement value items can be displayed on the sub-display with the simultaneous measurement function.
- Either the segment measurement (7 segments max.) or edge measurement (1 to 255 edges) can be selected.
- The RS-232C interface and the I/O and analog interface are provided as standard.
- A statistical calculation function and abnormal data eliminating function are provided.



Order No.: 544-071 (Metric)
544-072 (Inch/Metric)

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: 544-495A):
A for UL/CSA, D for CEE, E for BS, F for SAA, DC for China, K for EK. No suffix is required for JIS/100V

DIMENSION



Technical Data

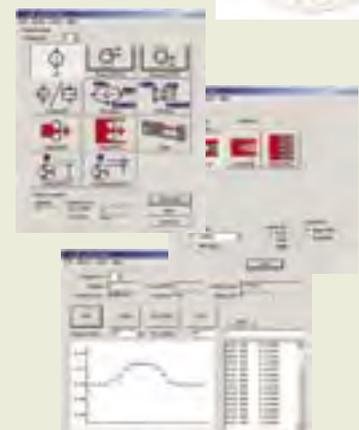
Main display: 16-digit fluorescent tube
Interface units equipped: RS-232C, Analog I/O, Foot switch
Power supply: 100 - 240V AC±10%, 40VA, 50/60Hz

Function of Display Unit

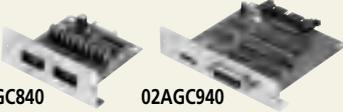
Zero-setting, Presetting, GO/±NG judgment, Multi-limit judgment, Offset value setting, Sample measurement, Statistical calculation, Group judgment, Data output, Workpiece position display, mm/inch switching, Dual-gage calibration, Transparent object measurement, Dual-unit measurement (optional), Automatic measurement, Abnormal data eliminating

QUICKTOOL

QUICKTOOL is a free software that makes the troublesome key operation of LSM-6200 setting simple and easy. Please contact your Mitutoyo office.



Optional Accessories for LSM

Appearance	Order No.	Description	Application
	02AGD110 02AGD120 02AGD180 02AGD130 02AGD140 02AGD150 02AGM300 02AGD170	Calibration gage set Calibration gage set	LSM-500S LSM-501S LSM-902 LSM-503S LSM-506S LSM-512S LSM-516S LSM-9506
	02AGP150	Dual-type add-on unit	LSM-6200
	02AGC840 02AGC880 02AGC910 02AGC940	Digimatic (SPC) codeout unit 2nd I/O & analog interface unit BCD interface unit GP-IB interface unit	LSM-6200/6900 LSM-6200/6900 LSM-6200/6900 LSM-6200/6900
	02AGC780A 02AGC780B 02AGC780C 02AGC780D 02AGC150A 02AGC150B 02AGC150C	Extension signal cable (5m) Extension signal cable (10m) Extension signal cable (15m) Extension signal cable (20m) Extension relay cable (1m) Extension relay cable (3m) Extension relay cable (5m)	Any model of LSM* Any model of LSM* Any model of LSM* Any model of LSM* Any model of LSM** Any model of LSM** Any model of LSM**
	936937	SPC cable (1m)	LSM-6200/6900/9506
	937179T	Footswitch	LSM-6200/6900/9506
	02AGD270 02AGD400 02AGD280 02AGD490 02AGD520 02AGD370 02AGD680 02AGD440 02AGD580 02AGD450 02AGD590	Work stage Adjustable workstage Adjustable workstage Adjustable workstage Adjustable workstage Adjustable workstage Adjustable workstage Center support Center support Adjustable V-block Adjustable V-block	LSM-501S/503S/902 LSM-501S LSM-902 LSM-503S LSM-506S LSM-9506 LSM-9506 LSM-501S/503S/902 LSM-506S/9506 LSM-501S/503S/902 LSM-506S/9506
	02AGD200 02AGD210	Wire guiding pulley Wire guiding pulley	LSM-500S LSM-501S
	02AGD220 02AGD230 02AGD240 02AGD250 02AGD260 957608	Air blow cover Air blow cover Air blow cover Air blow cover Air blow cover Air cleaner	LSM-500S LSM-501S LSM-503S LSM-506S LSM-512S Any model of LSM
	02AGD600A 02AGD600B 02AGD600C	Thermal printer (100V AC) Thermal printer (120V AC) Thermal printer (130V AC)	Any model of LSM Any model of LSM Any model of LSM

* Except for LSM-902
** Except LSM-500S/902

Laser Indicator

SERIES 548 — Non-contact Displacement Measuring System

FEATURES

- Scanning is non-directional due to the pinhole focal point detection method employed.
- Focusing speed is improved with the software servo.
- Automatic intensity compensation allows workpieces with high dispersion surfaces, such as ceramics, to be measured.
- A built-in high-intensity blue LED guide light is used so that the position of the measuring point can be checked visually.



Order No. 548-205
(LI-H1001U)



Order No. 548-206
(LI-H1015U)

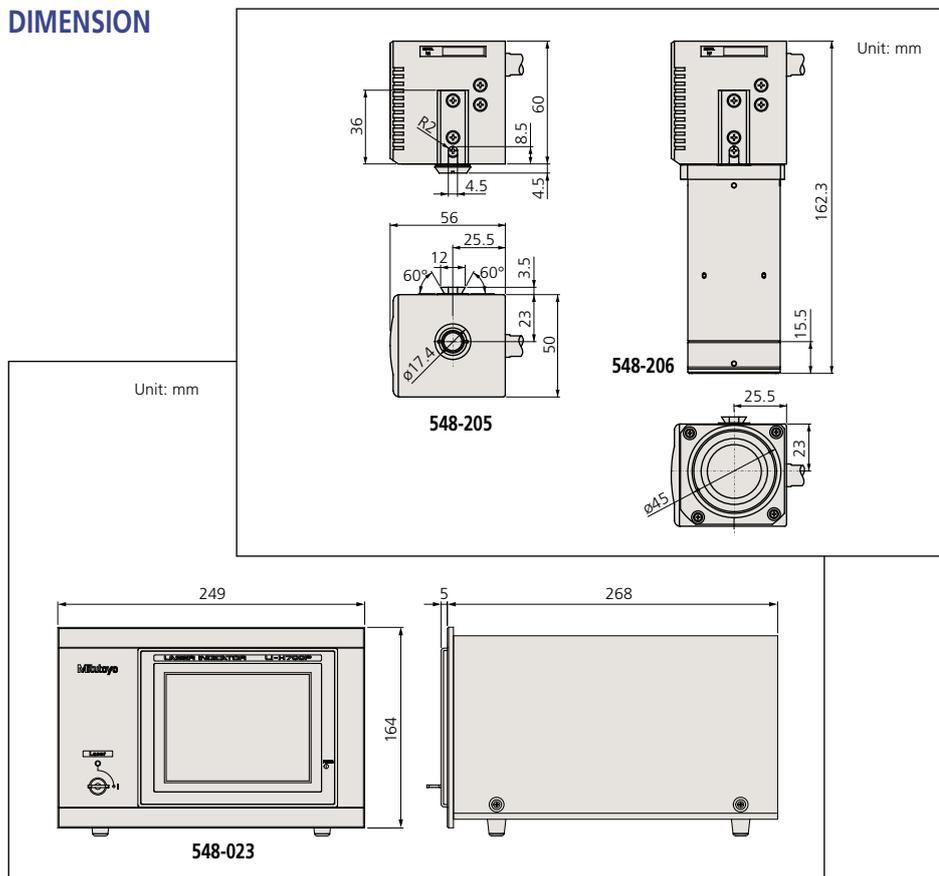


Order No. 548-023 (Display Unit)

Technical Data

Resolution:	0.01μm
Measuring range:	1mm (±500μm)
Working distance:	1.0mm (548-205), 15.5mm (548-206)
Linearity:	1.5μm
Focusing method:	Pinhole method
Laser beam diameter:	Approx. ø2.0μm
Laser wavelength:	780nm
Display:	Touch-panel type 6-inch LCD (black and white)
Power supply:	100 - 240V AC, 50/60Hz, 350W

DIMENSION





Digimatic Scale Units



Linear Scales



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New Products



ABS AT500-S



ABS AT500-H



ABS ST700



ABSOLUTE Coolant Proof Digimatic Scale Units

SERIES 572 — With Dust/Water Protection IP66 Level

FEATURES

- Newly employed detection method (Electromagnetic induction method) enables use in adverse environments with water and cutting oil.
- Specially designed output cables are developed to maintain the water resistant structure.
- No over speed error since it employs absolute scale which reads the absolute value.
- 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".

SPC

IP66

(Refer to the page 9 for details.)

ABSOLUTE[®]
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)



SPECIFICATIONS

Metric		
Range	Order No.	Accuracy
0 - 100mm	572-600	±0.03mm
0 - 150mm	572-601	±0.03mm
0 - 200mm	572-602	±0.03mm

Inch		
Range	Order No.	Accuracy
0 - 4"	572-610	±.001"
0 - 6"	572-611	±.001"
0 - 8"	572-612	±.001"

Inch/Metric		
Range	Order No.	Accuracy
0 - 4"	572-613	±.001"
0 - 6"	572-614	±.001"
0 - 8"	572-615	±.001"

Technical Data

Accuracy: ±0.03mm (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Repeatability: 0.01mm
 Display: LCD
 Length standard: ABSOLUTE electromagnetic induction linear encoder
 Max. response speed: Unlimited
 Battery: SR44 (1 pc.), **938882**
 Battery life: Approx. 1.5 years under normal use
 Dust/Water protection level: IP67

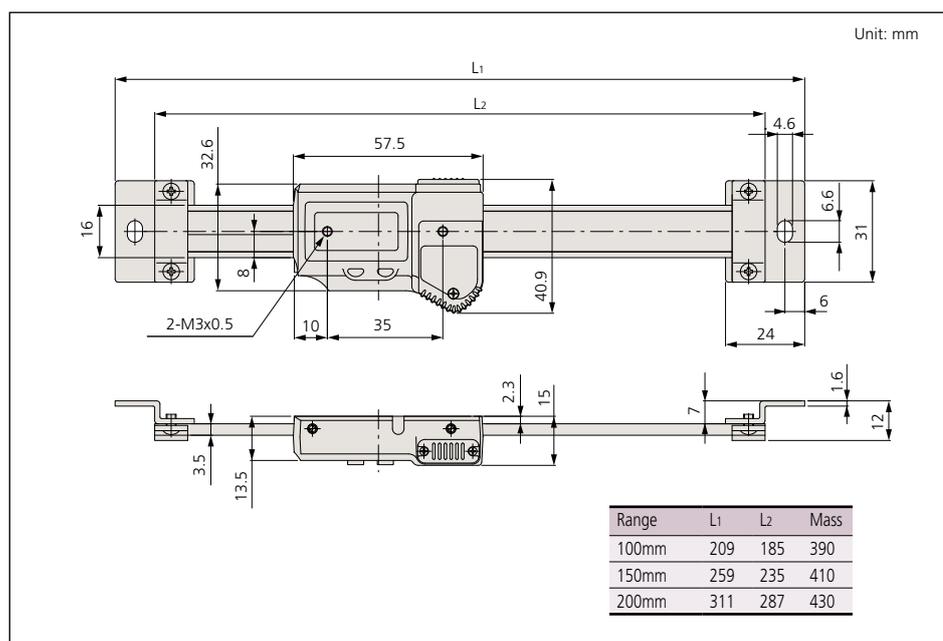
Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessory

- 05CZA624:** SPC cable with data switch (1m)
- 05CZA625:** SPC cable with data switch (2m)

DIMENSION



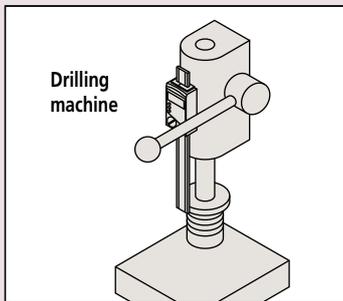
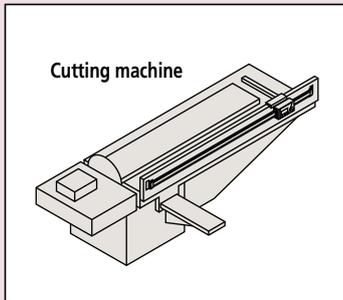
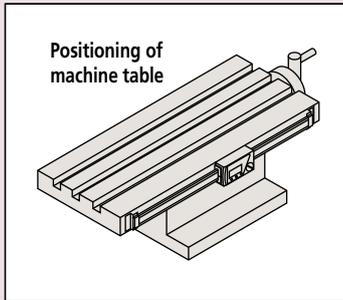
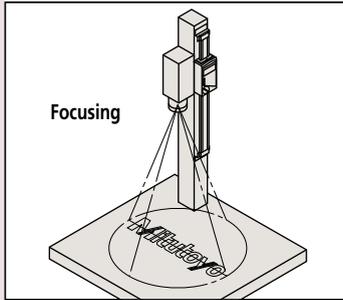
IP67 protection level

- Level 6: Dust-tight
No ingress of dust.
- Level 7: Protected against the effects of temporary immersion in water.
Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed 1 meter in water under standardized conditions of pressure and time (30 min.).

Mitutoyo's 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.

APPLICATIONS

- Positioning of tables, etc., in adverse environments
- Measuring equipment to be used on the workshop floor
- Measurement of structure displacements
- Positioning of plain machine tools
- Measuring equipment to be used outside (in the rain)



EC Counter

FEATURES

- The Digimatic Display Unit with GO/NG judgement function 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.



EC counter: 542-007

Coolant Proof Scale Unit



Single Function Type Scale Unit



Multi-function Type Scale Unit



Multi-function Type Scale Unit



Digimatic Min-Processor DP-1VR: 264-504



Multiplexer MUX-10: 264-002

RS-232C output



Data input device Input Tool: 264-012-10

Data entry via USB



- 1. 05CZA624: 1m cable with data switch
- 05CZA625: 1m cable with data switch
- 2. 959149: 1m cable with data switch
- 959150: 1m cable with data switch
- 3. 905338: 1m cable
- 905409: 2m cable
- 4. 905689: 1m cable
- 905690: 2m cable

- 5. 905691: 1m cable
- 905692: 2m cable
- 6. 905693: 1m cable
- 905694: 2m cable
- 936937: 1m cable
- 965014: 2m cable

ABSOLUTE Digimatic Scale Units

SERIES 572

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. • 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.
- 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 SPC data output.

SPC

ABSOLUTE[®]
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Horizontal single function type



Horizontal multi-function type



Horizontal multi-function type



Vertical single function type



572-301-10

Vertical multi-function type



572-561

Vertical multi-function type



572-581

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Length standard: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 3.5 years under normal use

Function

Origin-set, Zero-setting, Power on/off, Presetting, Data hold, Data output, inch/mm conversion (inch/mm models), Counting direction switching*
Alarm: Low voltage, Counting value composition error
*not available for single function models

Optional Accessory

959143: Data hold unit for single function type
959149: SPC cable with data switch for single function type (1m)
959150: SPC cable with data switch for single function type (2m)
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)

SPECIFICATIONS

Metric			
Range	Order No.		Accuracy
	Horizontal	Vertical	
100mm	572-200-20	572-300-10	0.03mm
	572-460*	572-560*	0.03mm
	572-480-10**	572-580-10**	0.03mm
150mm	572-201-20	572-301-10	0.03mm
	572-461*	572-561*	0.03mm
	572-481-10**	572-581-10**	0.03mm
200mm	572-202-20	572-302-10	0.03mm
	572-462*	572-562*	0.03mm
	572-482-10**	572-582-10**	0.03mm
300mm	572-203-10	572-303-10	0.04mm
	572-463*	572-563*	0.04mm
	572-483-10**	572-583-10**	0.04mm
450mm	572-464*	572-564*	0.04mm
	572-484-10**	572-584-10**	0.04mm
600mm	572-465*	572-565*	0.05mm
	572-485-10**	572-585-10**	0.05mm
800mm	572-466*	572-566*	0.06mm
	572-486-10**	572-586-10**	0.06mm
1000mm	572-467*	572-567*	0.07mm
	572-487-10**	572-587-10**	0.07mm

* Multi-function type

** Multi-function type with diameter displaying function for lathe
(Counting direction switching function is not provided.)

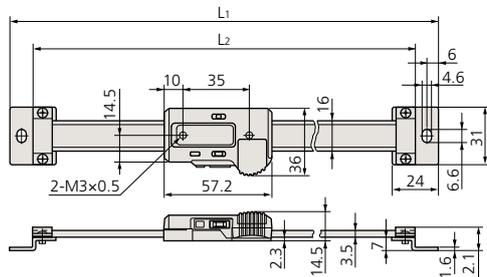
Inch/Metric			
Range	Order No.		Accuracy
	Horizontal	Vertical	
4"	572-210-20	572-310-10	.001"
	572-470*	572-570*	.001"
	572-490-10**	572-590-10**	.001"
6"	572-211-20	572-311-10	.001"
	572-471*	572-571*	.001"
	572-491-10**	572-591-10**	.001"
8"	572-212-20	572-312-10	.001"
	572-472*	572-572*	.001"
	572-492-10**	572-592-10**	.001"
12"	572-213-10	572-313-10	.002"
	572-473*	572-573*	.002"
	572-493-10**	572-593-10**	.002"
18"	572-474*	572-574*	.002"
	572-494-10**	572-594-10**	.002"
24"	572-475*	572-575*	.002"
	572-495-10**	572-595-10**	.002"
32"	572-476*	572-576*	.0025"
	572-496-10**	572-596-10**	.0025"
40"	572-477*	572-577*	.0025"
	572-497-10**	572-597-10**	.0025"

* Multi-function type

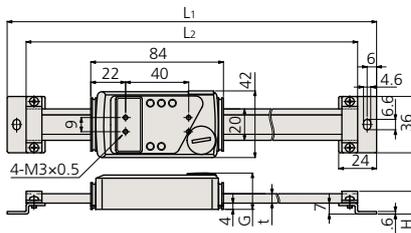
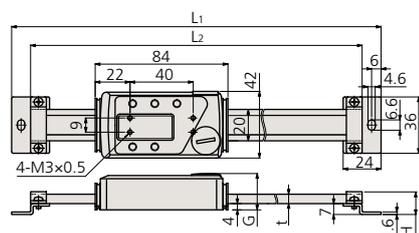
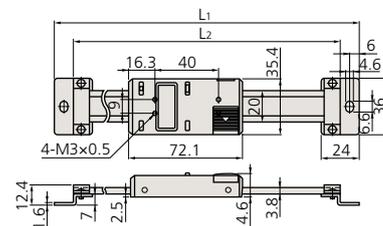
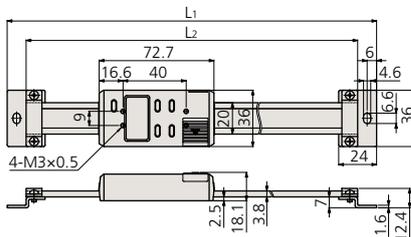
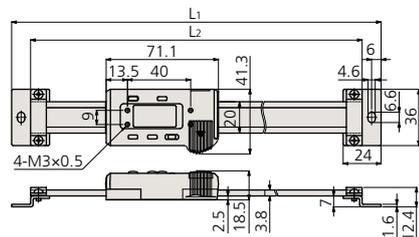
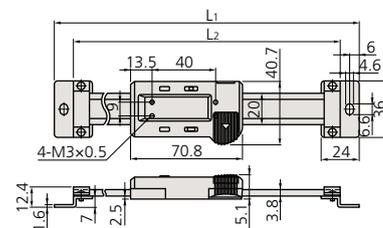
** Multi-function type with diameter displaying function for lathe
(Counting direction switching function is not provided.)

DIMENSION

Unit: mm



Range	L1	L2	Mass
100mm	209	185	230
150mm	259	235	250
200mm	311	287	270
300mm	444	420	370

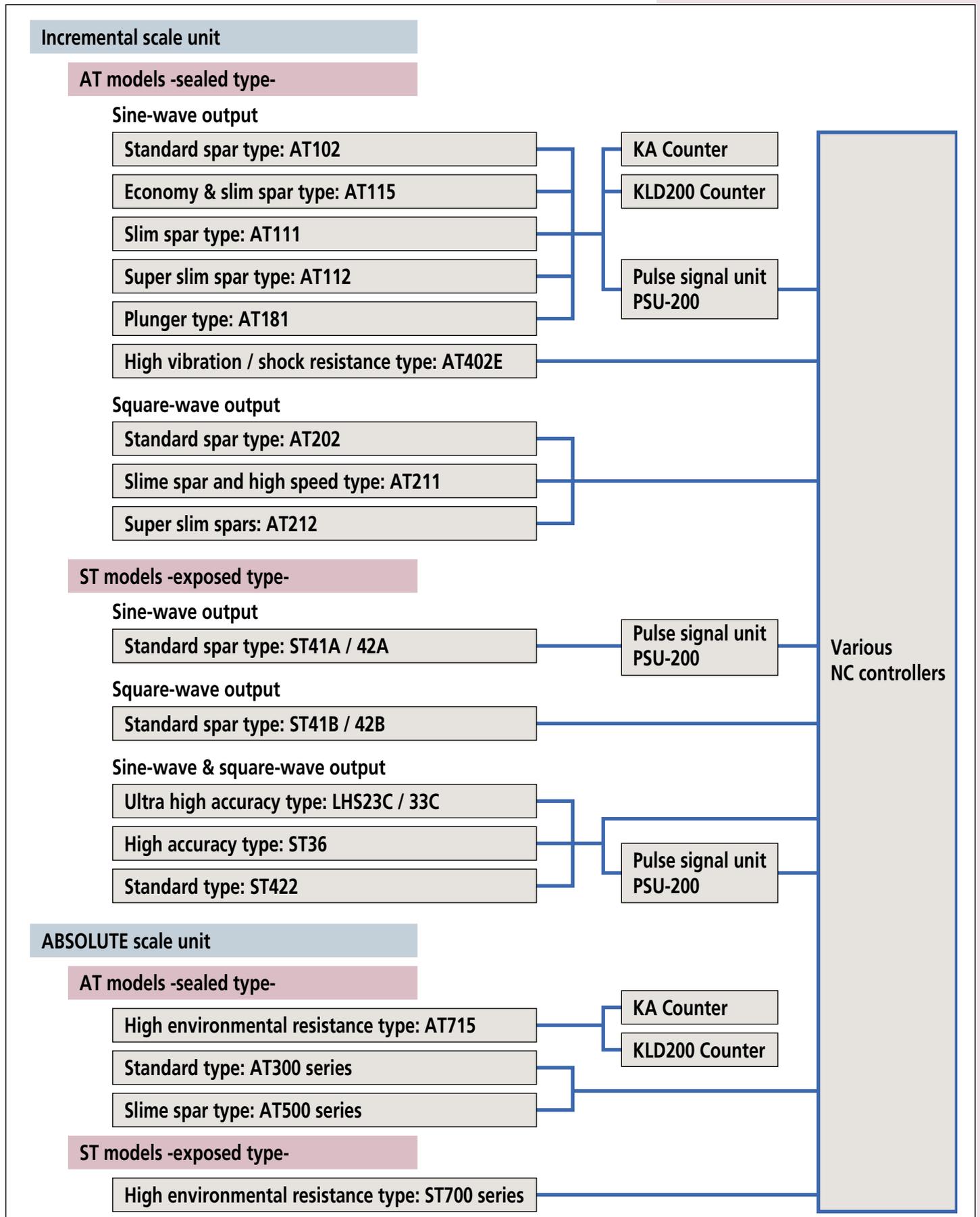


Range	L1	L2	Mass
100mm	244	220	250
150mm	294	270	280
200mm	344	320	310
300mm	444	420	370
450mm	594	570	760
600mm	774	750	900
800mm	974	950	1710
1000mm	1174	1150	2040

Linear Scale

Linear Encoder System

System Guide



AT102 Linear Scales

SERIES 539 — Standard Spar Type

Technical Data

Effective range:	100 - 6000mm	
Accuracy at 20°C:		
Effective range	Standard type	High-accuracy type
100 to 2000mm	(5+5L/1000)µm	(3+3L/1000)µm
2200 to 3000mm	(5+5L/1000)µm	—
3250 to 6000mm	(5+8L/1000)µm	—
	L = Effective range (mm)	
Output wave form:	Two 90° phase-shifted sinusoidal signals	
Maximum response speed:	72m/min. (up to 3000mm)	
	50m/min. (3250mm and over)	
Scale grating pitch:	20µm	
Scale reference point pitch:	50mm	
Dust/water protection level:	IP53	
Operating temperature:	0°C to 45°C	

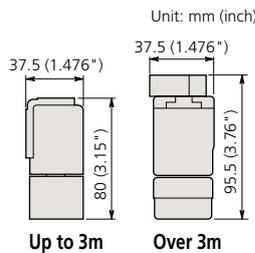
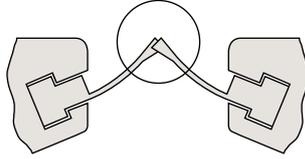
Optional Accessory

- 09AAA033A:** Extension cable (2m)
- 09AAA033B:** Extension cable (5m)
- 09AAA033C:** Extension cable (7m)



FEATURES

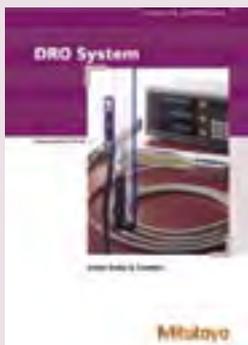
- Enhanced vibration-resistance and durability.
- The innovative rubber lips keep out contaminants on a machine shop.
- An armored signal cable is used to connect the scale unit to the DRO counter for safe operation in harsh shop environment.
- The signal cable outlet can be positioned on either side of the detecting head so the signal cable can be connected from either direction.



SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
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

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
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	—	10m
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



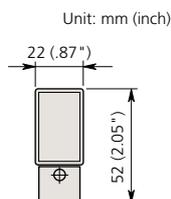
Refer to the DRO System leaflet (E4072) for more details.

AT115 Linear Scales

SERIES 539 — Economy and Slim Spar Type

FEATURES

- Suitable for milling machines, XY tables, jigs, etc.
- Dimensionally compatible with AT111 linear scale units.



SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	539-271	3.5m
150mm (6")	539-272	3.5m
200mm (8")	539-273	3.5m
250mm (10")	539-274	3.5m
300mm (12")	539-275	3.5m
350mm (14")	539-276	3.5m
400mm (16")	539-277	3.5m
450mm (18")	539-278	3.5m
500mm (20")	539-279	3.5m
600mm (24")	539-281	3.5m

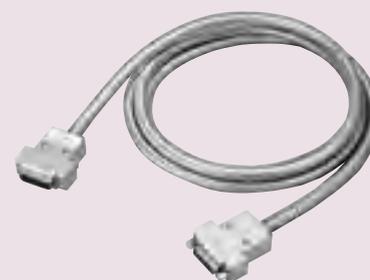
Effective range	Order No.	Signal cable length
700mm (28")	539-283	3.5m
750mm (30")	539-284	3.5m
800mm (32")	539-285	3.5m
900mm (36")	539-286	3.5m
1000mm (40")	539-287	5m
1100mm (44")	539-288	5m
1200mm (48")	539-289	5m
1300mm (52")	539-290	5m
1400mm (56")	539-291	5m
1500mm (60")	539-292	5m

Technical Data

Effective range: 100 - 1500mm
 Accuracy at 20°C: (5+5L/1000)µm
 L = Effective range (mm)
 Output wave form: Two 90° phase-shifted sinusoidal signals
 Maximum response speed: 50m/min.
 Scale grating pitch: 20µm
 Scale reference point pitch: 50mm
 Dust/water protection level: IP53
 Operating temperature: 0°C to 45°C

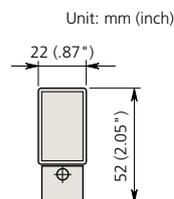
Optional Accessory

- 09AAA720A:** Extension cable (2m)
- 09AAA720B:** Extension cable (5m)
- 09AAA720C:** Extension cable (7m)



AT111 Linear Scales

SERIES 539 — Slim Spar Type



SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
100mm (4")	539-201	539-201-10	3.5m
150mm (6")	539-202	539-202-10	3.5m
200mm (8")	539-203	539-203-10	3.5m
250mm (10")	539-204	539-204-10	3.5m
300mm (12")	539-205	539-205-10	3.5m
350mm (14")	539-206	539-206-10	3.5m
400mm (16")	539-207	539-207-10	3.5m
450mm (18")	539-208	539-208-10	3.5m
500mm (20")	539-209	539-209-10	3.5m
600mm (24")	539-211	539-211-10	3.5m

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
700mm (28")	539-213	539-213-10	3.5m
750mm (30")	539-214	539-214-10	3.5m
800mm (32")	539-215	539-215-10	3.5m
900mm (36")	539-216	539-216-10	3.5m
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

Technical Data

Effective range: 100 - 1500mm
 Accuracy at 20°C:
 Standard type: (5+5L/1000)µm
 High-accuracy type: (3+3L/1000)µm
 L = Effective range (mm)
 Output wave form: Two 90° phase-shifted sinusoidal signals
 Maximum response speed: 72m/min.
 Scale grating pitch: 20µm
 Scale reference point pitch: 50mm
 Dust/water protection level: IP53
 Operating temperature: 0°C to 45°C

Optional Accessory

- 09AAA033A:** Extension cable (2m)
- 09AAA033B:** Extension cable (5m)
- 09AAA033C:** Extension cable (7m)



Refer to the DRO System leaflet (E4072) for more details.

AT112 Linear Scales

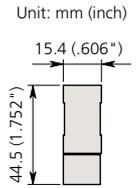
SERIES 539 — Super Slim Spar Type

Technical Data

Effective range:	100 - 1020mm
Accuracy at 20°C:	
Standard type	(5+5L/1000)µm
High-accuracy type	(3+3L/1000)µm
	L = Effective range (mm)
Output wave form:	Two 90° phase-shifted sinusoidal signals
Maximum response speed:	72m/min.
Scale grating pitch:	20µm
Scale reference point pitch:	50mm
Dust/water protection level:	IP53
Operating temperature:	0°C to 45°C

Optional Accessory

- 09AAA033A:** Extension cable (2m)
- 09AAA033B:** Extension cable (5m)
- 09AAA033C:** Extension cable (7m)



SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
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

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
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

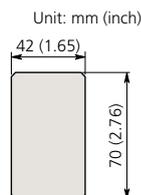
SERIES 539 — Plunger Type (High Water-proof Design)

Technical Data

Effective range:	100 - 600mm
Accuracy at 20°C:	
Standard type	(5+5L/1000)µm
High-accuracy type	(3+3L/1000)µm
	L = Effective range (mm)
Output wave form:	Two 90° phase-shifted sinusoidal signals
Maximum response speed:	50m/min.
Scale grating pitch:	20µm
Scale reference point pitch:	50mm
Dust/water protection level:	IP54
Operating temperature:	0°C to 45°C

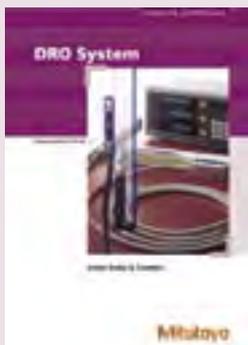
Optional Accessory

- 09AAA033A:** Extension cable (2m)
- 09AAA033B:** Extension cable (5m)
- 09AAA033C:** Extension cable (7m)



SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
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



Refer to the DRO System leaflet (E4072) for more details.

AT715 Linear Scales

SERIES 539 — ABSOLUTE and High Environment Resistance Type

FEATURES

- Thanks to an absolute scale, AT715 detects and outputs an absolute position, no reference point setup needed at every power-on.
- Employing electromagnetic induction system and achieving IP55 environmental resistance..
- The best solution for the digitalization of conventional milling machines in combination with the KA counter.



Unit: mm (inch)

SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	539-801	3.5m
150mm (6")	539-802	3.5m
200mm (8")	539-803	3.5m
250mm (10")	539-804	3.5m
300mm (12")	539-805	3.5m
350mm (14")	539-806	3.5m
400mm (16")	539-807	3.5m
450mm (18")	539-808	3.5m
500mm (20")	539-809	3.5m
600mm (24")	539-811	3.5m
700mm (28")	539-813	3.5m
750mm (30")	539-814	3.5m

Effective range	Order No.	Signal cable length
800mm (32")	539-815	3.5m
900mm (36")	539-816	3.5m
1000mm (40")	539-817	5m
1100mm (44")	539-818	5m
1200mm (48")	539-819	5m
1300mm (52")	539-820	5m
1400mm (56")	539-821	5m
1500mm (60")	539-822	5m
1600mm (64")	539-823	5m
1700mm (68")	539-824	5m
1800mm (72")	539-825	5m



(Refer to the page 9 for details.)

Technical Data

Effective range: 100 - 1800mm
 Accuracy at 20°C: (7+13L/1000)µm
 L = Effective range (mm)
 Detecting method: Electromagnetic induction system
 Maximum response speed: 50m/min.
 Dust/water protection level: IP55
 Operating temperature: 0°C to 45°C

Optional Accessory

- 09AAB674A:** Extension cable (2m)
- 09AAB674B:** Extension cable (5m)
- 09AAB674C:** Extension cable (7m)



Refer to the Linear Scale AT715 leaflet (E4296) for more details.

AT202 Linear Scales

SERIES 539 — Standard Spar Type

Technical Data

Effective range: 100 - 3000mm
 Accuracy (at 20°C):
 100 to 1500mm (3+3L/1000)µm
 1600 to 3000mm (5+5L/1000)µm
 L = Effective range (mm)
 Output signal: Two 90° phase-shifted quadrature signals
 Maximum response speed: 72m/min.
 Resolution: 0.5, 1µm
 Scale reference point pitch: 50mm
 Dust/Water protection level: IP53

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.

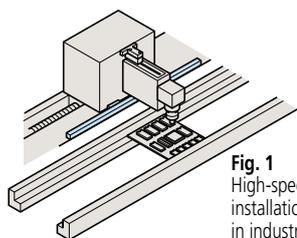


Fig. 1
High-speed, high-accuracy installation of electronics in industrial robots

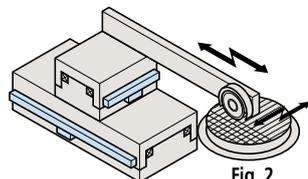


Fig. 2
Positioning dicing saw in semiconductor production process

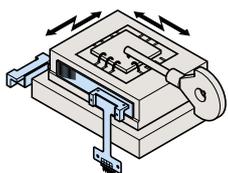


Fig. 3
Positioning IC tip for wire-bonding

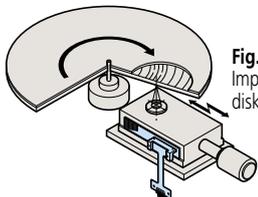


Fig. 4
Improving seek-time of disk drive system

Technical Data

Effective range: 100 - 1500mm
 Accuracy at 20°C:
 Effective range Standard type High-accuracy type
 100 to 500mm (3+3L/1000)µm (2+2L/1000)µm
 500 to 1500mm (3+3L/1000)µm —
 L = Effective range (mm)
 Output signal: Two 90° phase-shifted quadrature signals
 Maximum response speed: 5.4 - 120m/min.
 Resolution: 0.1, 0.2, 0.5, 1, 2.5, 5µm
 Signal output pitch: 20µm
 Dust/Water protection level: IP53

FEATURES

- Sealed type incremental linear scales suitable for feedback system of NC machine tools.
- Direct connection with NC machine tools are possible.



SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	539-411	5m
150mm (6")	539-412	5m
200mm (8")	539-413	5m
250mm (10")	539-414	5m
300mm (12")	539-415	5m
350mm (14")	539-416	5m
400mm (16")	539-417	5m
450mm (18")	539-418	5m
500mm (20")	539-419	5m

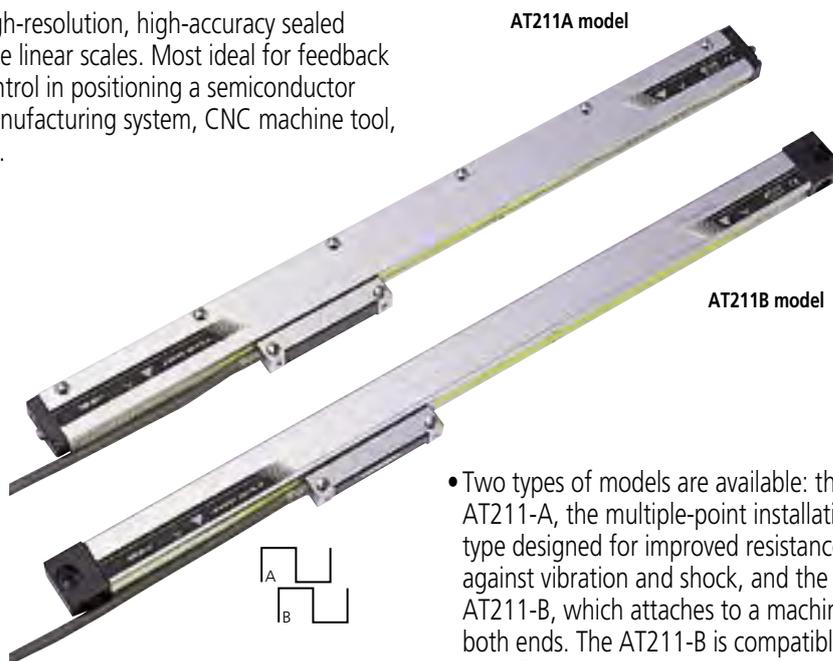
Effective range	Order No.	Signal cable length
600mm (24")	539-421	5m
700mm (28")	539-423	5m
750mm (30")	539-424	5m
800mm (32")	539-425	5m
900mm (36")	539-426	5m
1000mm (40")	539-427	5m
1100mm (44")	539-428	5m
1200mm (48")	539-429	5m
1300mm (52")	539-430	5m
1400mm (56")	539-431	5m
1500mm (60")	539-432	5m
1600mm (64")	539-433	5m
1700mm (68")	539-434	5m
1800mm (72")	539-435	5m
2000mm (80")	539-436	5m
2200mm (88")	539-437	5m
2400mm (96")	539-438	5m
2500mm (100")	539-439	5m
2600mm (104")	539-440	5m
2800mm (112")	539-441	5m
3000mm (120")	539-442	5m

AT211A / AT211B Linear Scales

SERIES 539 — Slim Spar Type

FEATURES

- High-resolution, high-accuracy sealed type linear scales. Most ideal for feedback control in positioning a semiconductor manufacturing system, CNC machine tool, etc.



AT211A model

AT211B model



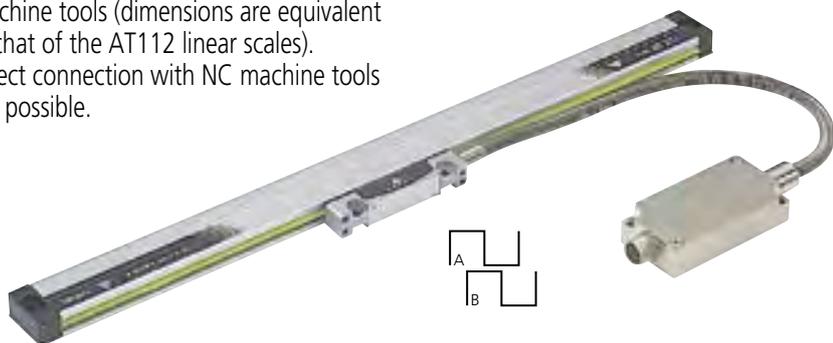
- Two types of models are available: the AT211-A, the multiple-point installation type designed for improved resistance against vibration and shock, and the AT211-B, which attaches to a machine at both ends. The AT211-B is compatible with the AT111 slim type in size.

AT212 Linear Scales

SERIES 539 — Super Slim Sealed Type Linear Encoder

FEATURES

- Super slim sealed type incremental linear scales suitable for feedback system of NC machine tools (dimensions are equivalent to that of the AT112 linear scales).
- Direct connection with NC machine tools are possible.



Technical Data

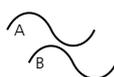
Effective range: 50 - 1020mm
 Accuracy (at 20°C): (3+3L/1000)µm
 L = Effective range (mm)
 Output signal: Two 90° phase-shifted quadrature signals
 Signal output pitch: 20µm
 Maximum response speed: 50m/min.
 Resolution: 0.5, 1µm
 Scale reference point pitch: 50mm
 Dust/Water protection level: IP53

AT402E Linear Scales

SERIES 539 — High Vibration / Shock Resistance Type

FEATURES

- Achieving the world-class vibration resistance (20G) and shock resistance (40G) for using with a heavy cutting machine tool.
- Multi-point elastic fixing for very linear and smooth expansion and contraction with temperature changes
- 1Vpp/20µm signal output for high connectivity with various machine controllers.
- Absolute Interval Code for a simple and affordable Absolute Measuring System.
- High-response speed of 120m/min
- High measuring accuracy of ±2µm (up to 540mm)



Technical Data

Effective range: 140 - 3040mm
 Accuracy (at 20°C):
 140 to 540mm ±2µm
 640 to 940mm ±3µm
 1040 to 3040mm ±3µm/m
 Output signal: Two 90° phase-shifted sinusoidal signals (1 Vpp)
 Maximum response speed: 120m/min.
 Signal output pitch: 20µm
 Dust/water protection level: IP53
 Operating temperature: 0°C to 45°C

SPECIFICATION

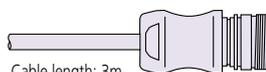
Effective length	Order No. (w/o cable)	Order No. (w/ cable A)	Order No. (w/ cable B)	Order No. (w/ cable C)
140mm	539-371-00	539-371-01	539-371-02	539-371-03
240mm	539-373-00	539-373-01	539-373-02	539-373-03
340mm	539-374-00	539-374-01	539-374-02	539-374-03
440mm	539-375-00	539-375-01	539-375-02	539-375-03
540mm	539-376-00	539-376-01	539-376-02	539-376-03
640mm	539-377-00	539-377-01	539-377-02	539-377-03
740mm	539-378-00	539-378-01	539-378-02	539-378-03
840mm	539-379-00	539-379-01	539-379-02	539-379-03
940mm	539-380-00	539-380-01	539-380-02	539-380-03
1040mm	539-381-00	539-381-01	539-381-02	539-381-03
1140mm	539-382-00	539-382-01	539-382-02	539-382-03
1240mm	539-383-00	539-383-01	539-383-02	539-383-03
1340mm	539-384-00	539-384-01	539-384-02	539-384-03
1440mm	539-385-00	539-385-01	539-385-02	539-385-03
1540mm	539-386-00	539-386-01	539-386-02	539-386-03
1640mm	539-387-00	539-387-01	539-387-02	539-387-03
1740mm	539-388-00	539-388-01	539-388-02	539-388-03
1840mm	539-389-00	539-389-01	539-389-02	539-389-03
2040mm	539-390-00	539-390-01	539-390-02	539-390-03
2240mm	539-391-00	539-391-01	539-391-02	539-391-03
2440mm	539-392-00	539-392-01	539-392-02	539-392-03
2640mm	539-393-00	539-393-01	539-393-02	539-393-03
2840mm	539-394-00	539-394-01	539-394-02	539-394-03
3040mm	539-395-00	539-395-01	539-395-02	539-395-03

Cable A: Lead wires type



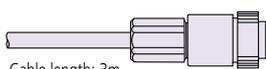
Cable length: 3m

Cable B: Connectable to Euro controller



Cable length: 3m

Cable C: Connectable to FANUC serial board C



Cable length: 3m



Refer to the Linear Scale AT402E leaflet (E4287) for more details.

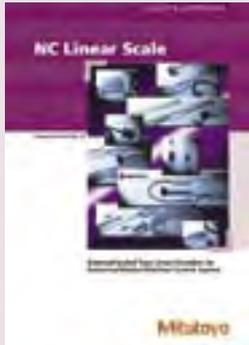
ABSOLUTE[®]

Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Effective range:	100 - 3000mm
Accuracy (at 20°C):	
100 to 1500mm	(3+3L/1000)µm
1600 to 3000mm	(5+5L/1000)µm
	L = Effective range (mm)
Signal output pitch:	20µm
Maximum response speed:	120m/min.
Resolution:	0.05µm
Dust/Water protection level:	IP53



Refer to the NC Linear Scale leaflet (E4189) for more details.

AT300 Series Linear Scales

SERIES 539 — ABSOLUTE and Standard Spar Type

FEATURES

- Sealed type absolute linear scales with very fine resolution up to 0.05µm.
- Direct connection with NC machine tools are possible.
 - ABS AT303: Supports Mitutoyo standard serial interface
 - ABS AT343: Supports Mitsubishi Electric high-speed serial interface
 - ABS AT353: Supports Fanuc high-speed serial interface



AT500 Series Linear Scales

SERIES 539 — ABSOLUTE and Slime Spar Type

FEATURES

- Sealed type absolute linear scales with very fine resolution up to 0.05µm.
- Direct connection with NC machine tools are possible.
 - ABS AT503: Supports Mitutoyo standard serial interface
 - ABS AT543: Supports Mitsubishi Electric high-speed serial interface
 - ABS AT553: Supports Fanuc high-speed serial interface
- Two types are available:
 - S model: high-rigid type
 - H model: high-accuracy type.



ABSOLUTE[®]

Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Effective range:	
-S model	100 - 2200mm
-H model	100 - 1000mm
Accuracy (at 20°C):	
-S model	(3+3L/1000)µm
-H model	(2+2L/1000)µm
	L = Effective range (mm)
Signal output pitch:	20µm
Maximum response speed:	150m/min.
Resolution:	0.05µm
Dust/Water protection level:	IP53



Refer to the ABS Linear Scale AT500-S/H leaflet (E4265) for more details.

ST41A / 42A Linear Scales

SERIES 579 — Standard Type

FEATURES

- Outputs two 90° phase-shifted sinusoidal signals (signal pitch: 20µm).
- Suitable for a positioning sensor of high-accuracy closed loop control as an alternative to the rotary encoder.



Technical Data

Effective range:	100 - 1000mm
Accuracy (at 20°C):	±3µm (up to 300mm) ±2µm (up to 500mm) ±3µm (up to 1000mm)
Output signal:	Two 90° phase-shifted sinusoidal signals
Scale grating pitch:	20µm
Signal output pitch:	20µm
Maximum response speed:	600mm/sec
Scale reference point pitch:	50mm (ST42A only)

ST41B / 42B Linear Scales

SERIES 579 — Standard Type

FEATURES

- Outputs two 90° phase-shifted quadrature signals or up/down pulse signals (signal pitch: 20µm).
- Suitable for a positioning sensor of high-accuracy closed loop control as an alternative to the rotary encoder.
- Directly connectable with a servo controller.



Technical Data

Effective range:	100 - 1000mm
Accuracy (at 20°C):	±3µm (up to 300mm) ±2µm (up to 500mm) ±3µm (up to 1000mm)
Output signal:	Two 90° phase-shifted quadrature signals or up/down pulse
Scale grating pitch:	20µm
Signal output pitch:	20µm
Resolution:	0.5, 1µm
Maximum response speed:	300mm/sec (0.5µm resolution) 600mm/sec (1µm resolution)
Scale reference point pitch:	50mm (ST42B only)

Technical Data

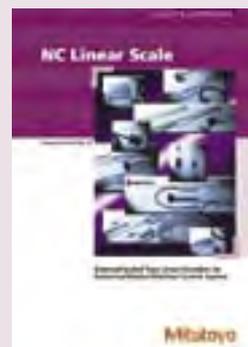
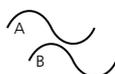
Effective range:	10 - 3000mm
Accuracy (at 20°C):	10 - 300mm ±0.5µm 350 - 500mm ±1µm 500 - 1000mm ±2µm 1000 - 3000mm ±2µm/m
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	8µm
Signal output pitch:	4µm
Resolution:	0.01, 0.02, 0.05, 0.1µm
Maximum response speed:	1200mm/sec
Scale reference point pitch:	10 - 80mm Center point 100 - 3000mm 50mm

ST36 Linear Scales

SERIES 579 — High Accuracy Type

FEATURES

- High-resolution, high-accuracy and portable model designed for exposed installation.
- High-reliability with stable signal output.
- Outputs two-phase sine wave signal (signal pitch 4µm) and two-phase pulse signal simultaneously.
- Equipped with a compact interface box.



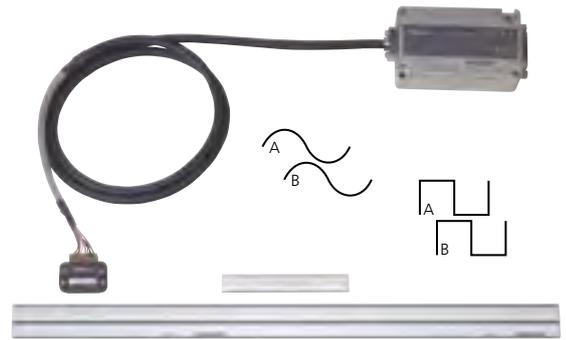
Refer to the NC Linear Scale leaflet (E4189) for more details.

ST422 Linear Scales

SERIES 579 — Standard Type

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

Effective range:	10 - 1000mm
Accuracy (at 20°C):	
10 - 300mm	±1µm
350 - 500mm	±2µm
500 - 1000mm	±3µm
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	40µm
Signal output pitch:	40µm
Resolution:	0.2, 0.5, 1, 5µm
Maximum response speed:	5000mm/sec
Scale reference point pitch:	
10 - 75mm	Center point
100 - 1000mm	50mm

ABSOLUTE®

Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Effective range:	100 - 3000mm
Accuracy (at 20°C):	(8+5L/1000)µm L = Effective range (mm)
Detecting method:	Electromagnetic induction system
Maximum response speed:	5000mm/sec
Dust/Water protection level:	IP65



Refer to the Separate Type Absolute Linear Scale ST700 leaflet (E4266) for more details.

ST700 Series Linear Scales

SERIES 579 — ABSOLUTE and High Environment Resistance Type

FEATURES

- Absolute scales have eliminated the need for origin restoration.
- Optimized for the control of linear motors.
- Optimized for high-speed, high-acceleration control.
- Provides high resistance to the contamination of water and oil.
- A non-contact detection system allows a longer service life.
- Signal adjustment at installation is automatically performed with dedicated software.



Laser HoloScale

SERIES 549 — Ultra High Accuracy Type

Features

- It features ultra-fine diffraction gratings which are holographically recorded on the scale.
- Highly accurate measurement due to an ultra-high resolution of 0.001µm, which is close to the performance of laser interferometers.
- Excellent measuring stability – the compact detecting system is highly resistant to unfavorable environmental conditions such as changes in temperature and atmospheric pressure.
- A semiconductor laser is used as a light source to achieve a compact design for easy installation and adjustment.

The Laser HoloScale is a high-end DRO system that employs diffracted beam interference to make highly accurate and repeatable measurements in a wide range.



KA Counter

SERIES 174 — Standard Type

FEATURES

- High cost performance 2/3-axis counter with new 10-coordinate function and existing KL counter functions
- The KA counter can be used as the "standard counter" or a "lathe counter" by modifying parameters.
- Both the existing AT100 series optical scales and the new AT715 electromagnetic induction scale can be connected.

Technical Data: Common

Scale input ports:	2, 3
Resolution:	0.001mm, 0.005mm, .0001", .0005" (changeable)
Display:	7-digit LED and a negative [-] sign
Power supply:	100V-240V AC, 50/60Hz
Mass:	1.1kg (2-axis), 1.2kg (3-axis)

Optional Accessory

- 938140:** Touch signal probe (shank diameter: 20mm)
- 935094:** Touch signal probe (shank diameter: 32mm)
- 09CAB217:** RS232C code out unit



174-173 (for 1-axis or 2-axis)



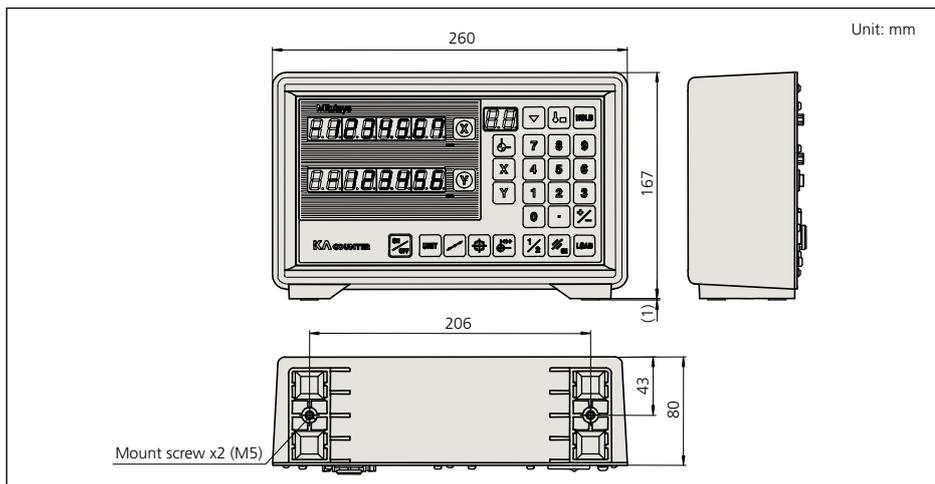
174-175 (for 3-axis)

SPECIFICATIONS

Order No.	174-173*	174-175*
Scale input ports	2	3

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **174-173A**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Functions

Function	Counter	KA	KLD
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
▲*: Only available for AT100 series

KLD Counter

SERIES 174 — Special Purpose Type with Limit Signal Output

Technical Data: Common

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, Ten-keyboard
 Power supply: 100-120V/200-240V AC, 50/60Hz
 Mass: 4.5kg

Optional Accessory

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")



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).

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.)



174-143

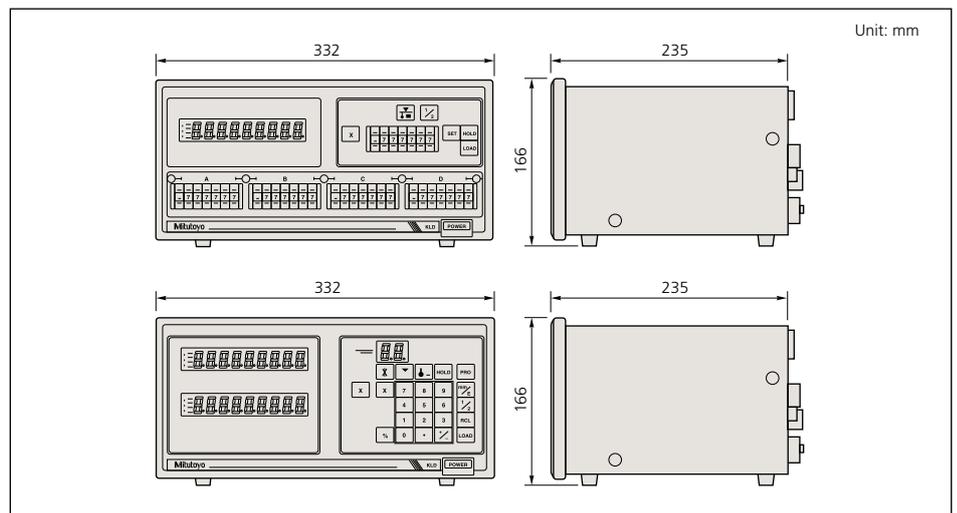
SPECIFICATIONS

Order No.	174-141	174-143	174-145
Limit signal output	1-step	4-step	8-step
Limit value setting method	Digital switch	Digital switch	Ten-keyboard

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **174-141A**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Function	Counter	
	KA	KLD
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	—	●

DIMENSION



PSU-200

SERIES 539 — Pulse Signal Conversion Interface

FEATURES

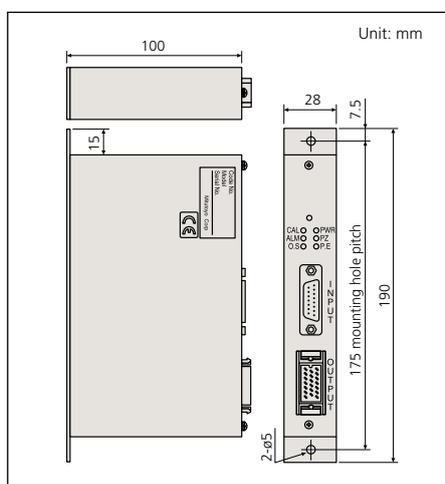
- Applicable with Linear Scales with the sinusoidal signal output.
- Quadrature signal output (conforming to EIA standard RS422-A).
- Alarm function for detecting broken wires or short circuits in the detector, over-speed and fluctuation errors in the input signal from the detector.



SPECIFICATION

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	DC5V±5%
Consumption	200mA
Mass	620g

DIMENSION



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Profile Projectors



Microscopes

New Products



PV-5110



MF



MF-U

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.



PJ-A3010F-200



PJ-A3005D-50
PJ-A3005D-50E
PJ-A3005R-50



PJ-A3010F-100
PJ-A3010F-100E



PJ-A3005F-150
PJ-A3005F-150E



PJ-A3010F-200
PJ-A3010F-200E

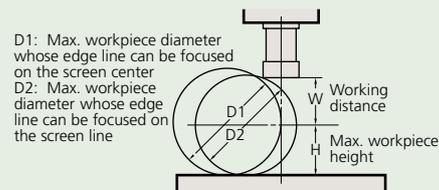


PJ-A3000

Technical Data

- Projected image: Inverted image
 Protractor screen
- Effective diameter: 315mm (12.4")
 - Screen material: Fine ground glass
 - Screen rotation: $\pm 360^\circ$, fine feed and clamp
 - Angle reading: Digital counter (LED)
Resolution: 1' or 0.01° (switchable)
Range: $\pm 370^\circ$
ABS/INC mode switching, Zero Set
 - Reference line: Cross hair line
- Projection lens: 10X (172-202)
Optional: 20X, 50X, 100X
- Magnification accuracy
- Contour illumination: $\pm 0.1\%$ or less
 - Surface illumination: $\pm 0.15\%$ or less
- Maximum workpiece height: Refer to the projection capacity (H) below.
- Contour illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Telecentric system
 - Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Surface illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Vertical illumination with adjustable condenser lens
 - Functions: Heat-absorbing filter, Cooling fan
- Focusing: Manual focus
 Resolution: 0.001mm or .0001"/0.001mm
 (.00005"/0.001mm: digital head)
- Power supply: 100 - 240V AC, 50/60Hz
 Mass: 105kg - 140kg

Projection Capacity



Unit: mm

	Magnification			
	10X	20X	50X	100X
View field	$\phi 31.5$	$\phi 15.7$	$\phi 6.3$	$\phi 3.1$
W	66 (20)	32.5 (2)	12.6	5
H -50 models*	123.5	123.5	123.5	123.5
-100 models	91	91	91	91
-150 models	103.5	103.5	103.5	103.5
200 models	92.5	92.5	92.5	92.5
D1 -50 models*	224 (198)	87 (61)	27	10
-100 models	182	87 (61)	27	10
-150 models	207 (198)	87 (61)	27	10
200 models	185	87 (61)	27	10
D2	69 (23)	69 (23)	25	10

(): When using surface illumination
 *Including PJ-A3000

Optional Accessory

- 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)
- 172-119:** Reading scale (8")
- 172-162:** Reading scale (12")
- 932105:** Overlay chart set
- 172-160-2:** Green filter (for PJ-A3000, -50 models)
- 172-160-3:** Green filter (for -100, -150, -200 models)
- 512305:** Halogen bulb (24V, 150W)
- 965012:** SPC cable (2m) for angle display output

Fixture and Stage accessory

- 176-106:** Rotary table (Effective diameter: 66mm)
- 172-196:** Rotary table (Effective diameter: 100mm)
- 172-198:** Rotary table with fine feed wheel (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

Availability	PJ-A3000 PJ-A3005R-50 PJ-A3005D-50/E	PJ-A3005F-150/E PJ-A3010F-100/E PJ-A3010F-200/E
176-106	✓	—
172-196	—	✓*
172-198	—	✓*
176-105	✓	✓*
172-197	—	✓*
176-107	✓	✓*
172-378	✓	✓*

* Fixture mount adapter (**999678**) is required for PJ-3010F-200/E



QM-Data200
2-D data processing unit.
(Refer to the page 384 for more details.)



Optoeye
Edge detection system for QM-Data 200
(Refer to the page 385 for more details.)

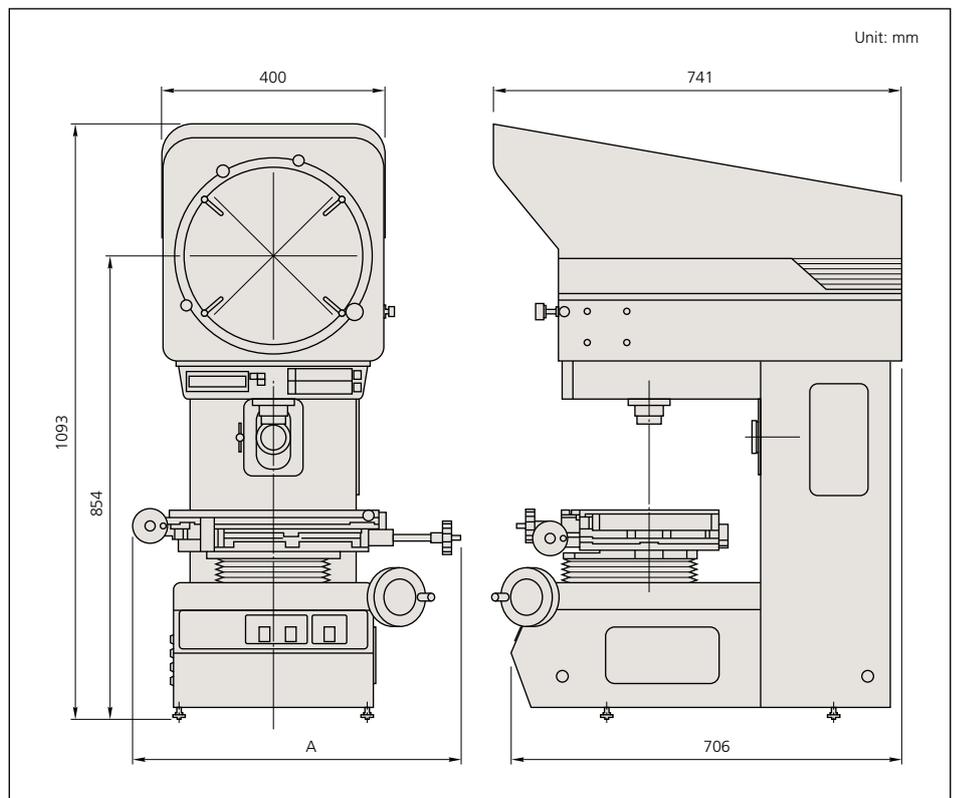
SPECIFICATIONS

Model No.	PJ-A3005R-50	PJ-A3005D-50	PJ-A3005R-50E	PJ-A3010F-100	PJ-A3010F-100E
Order No. (metric)	302-709*	302-704*	302-708*	302-703*	302-707*
Order No. (inch/metric)	302-719*	302-714*	302-718*	302-713*	—
XY stage travel range	50 x 50mm	50 x 50mm	50 x 50mm	100 x 100mm	100 x 100mm
Measurement method	Analog head	Rotary encoder	Rotary encoder	Linear encoder	Linear encoder
Floating function	—	—	—	X and Y axes	X and Y axes
XY stage table top size	152 x 152mm	152 x 152mm	152 x 152mm	250 x 250mm	250 x 250mm
XY stage effective area	82 x 82mm	82 x 82mm	82 x 82mm	142 x 142mm	142 x 142mm
Stage glass No.	380405	380405	380405	12BAE041	12BAE041
Swiveling function	—	—	—	—	—
Max workpiece loading	8kg	8kg	8kg	10kg	10kg
Remarks	w/o digital counter	—	w/o angle counter	—	w/o angle counter

Model No.	PJ-A3005F-150	PJ-A3005F-150E	PJ-A3010F-200	PJ-A3010F-200E	PJ-A3000
Order No. (metric)	302-702*	302-706*	302-701*	302-703*	302-707*
Order No. (inch/metric)	302-712*	—	302-711*	—	—
XY stage travel range	150 x 50mm	150 x 50mm	200 x 100mm	200 x 100mm	Fixed
Measurement method	Linear encoder	Linear encoder	Linear encoder	Linear encoder	—
Floating function	X and Y axes	X and Y axes	X and Y axes	X and Y axes	—
XY stage table top size	280 x 152mm	280 x 152mm	380 x 250mm	380 x 250mm	160 x 145mm
XY stage effective area	185 x 84mm	185 x 84mm	266 x 170mm	266 x 170mm	ø70mm
Stage glass No.	381349	381349	382762	382762	200673
Swiveling function	—	—	±3°	±3°	—
Max workpiece loading	10kg	10kg	15kg	15kg	8kg
Remarks	—	w/o angle counter	—	w/o angle counter	w/o angle counter

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **302-700A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



PJ-H30

SERIES 303 — Profile Projectors

By separating axial motion, and stabilizing the XY measuring table in the vertical direction, high measuring accuracy of $(3+0.02L)\mu\text{m}$ has been achieved on the PJ-H30 Series Profile Projectors. Focusing is accomplished by moving the screen head itself up & down with the hand wheel or motorized unit. The power focusing (PJ-H30D type) provides higher performance.

FEATURES

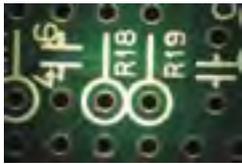
- Newly designed optical system with high NA lenses provide drastically brighter and clearer screen images during surface illumination.
- The three-lens mounting turret includes a 10X lens as standard. Four types of projection lenses (5X, 20X, 50X, 100X) are available.



Adjustable / oblique switchable surface illumination



Vertical illumination



Oblique illumination



PJ-H30A3017B
XY stage travel range: 300 x 170mm

Selection of XY stage



PJ-H30A505B
XY stage travel range: 50 x 50mm



PJ-H30A1010B
XY stage travel range: 100 x 100mm



PJ-H30A2010B
XY stage travel range: 200 x 100mm



PJ-H30A2017B
XY stage travel range: 200 x 170mm

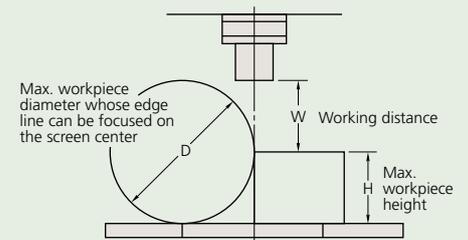
Selection of machine type

	PJ-H30E type	PJ-H30A type	PJ-H30B type	PJ-H30D type
Type of screen	Fixed screen	Protractor screen	Protractor screen	Protractor screen
Focus operation	Manual	Manual	Manual	Power drive
Edge detection system	—	—	OPTOEYE (built-in)	OPTOEYE (built-in)

Technical Data

- Projected image: Erect image
- Protractor screen
- Effective diameter: 306mm (12")
 - Screen material: Fine ground glass
 - Screen rotation: $\pm 360^\circ$, fine feed and clamp
 - Angle display: Digital counter (LED)
- Resolution: 1' or 0.01° (switchable)
Range: $\pm 370^\circ$
ABS/INC mode switching, Zero Set
- Reference line: Cross hair line
- Projection lens: 10X (**172-472**)
Optional: 2X, 20X, 50X, 100X
- Lens mount: 3-lens mounting turret
- Magnification accuracy
- Contour illumination: $\pm 0.1\%$ or less
 - Surface illumination: $\pm 0.15\%$ or less
- Maximum workpiece height: 105mm
- Contour illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Zoom Telecentric system
 - Functions: Brightness adjustment, Heat-absorbing filter, Cooling fan
- Surface illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Vertical / oblique illumination with an adjustable condenser lens
 - Functions: Non-stepped brightness adjustment, Heat-absorbing filter, Cooling fan
- Manual focus or Power drive
- Resolution: 0.001mm or .0001"/0.001mm
- Power supply: 100 - 240V AC, 50/60Hz
- Mass: 176kg - 212kg

Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	$\phi 61.2$	$\phi 30.6$	$\phi 15.3$	$\phi 6.12$	$\phi 3.06$
H	100	100	100	100	100
W	66	70.5	56.5	50	50
D	148	197	167	114	123

Optional Accessory

- 172-271:** 5X projection lens
- 172-473:** 20X projection lens
- 172-474:** 50X projection lens
- 172-475:** 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
- 12AAG981:** Green filter
- 172-259:** Polarizing unit
- 965014:** SPC cable (2m)
- 12AAD196:** QM-Data 200 connecting kit (for Type T4 only)
- 990744:** Hood (lager type)
- 172-269:** Machine stand
- 990600:** External counter zero switch
- 515530:** Halogen bulb (24V, 150W)

Fixture and Stage accessory

- 172-198:** Rotary table (Effective diameter: 84mm)
- 176-305:** Rotary table (Effective diameter: 183mm)
- 176-306:** Rotary table (Effective diameter: 240mm)
- 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)
- 176-317:** Fixture mount adapter
- 176-304:** Fixture mount adapter

Availability	Size of XY stage		
	505 1010	505 1010 2010	2017 3017
172-198	✓	✓**	✓***
176-305	—	✓**	—
176-306	—	—	✓
176-105	✓*	✓**	✓***
172-197	✓*	✓**	✓***
176-107	✓*	✓**	✓***
176-378	✓*	✓**	✓***

- * Need to use with Rotary table **172-198**.
- ** Fixture mount adapter (**176-317**) is required.
- *** Fixture mount adapter (**176-304**) is required.



QM-Data200

2-D data processing unit
(Refer to the page 384 for more details.)



Optoeye

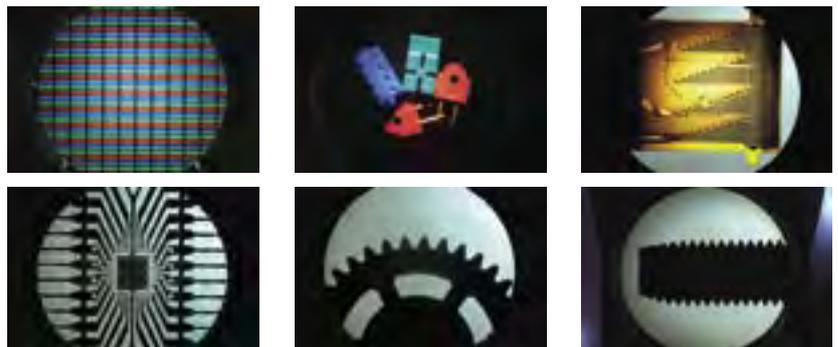
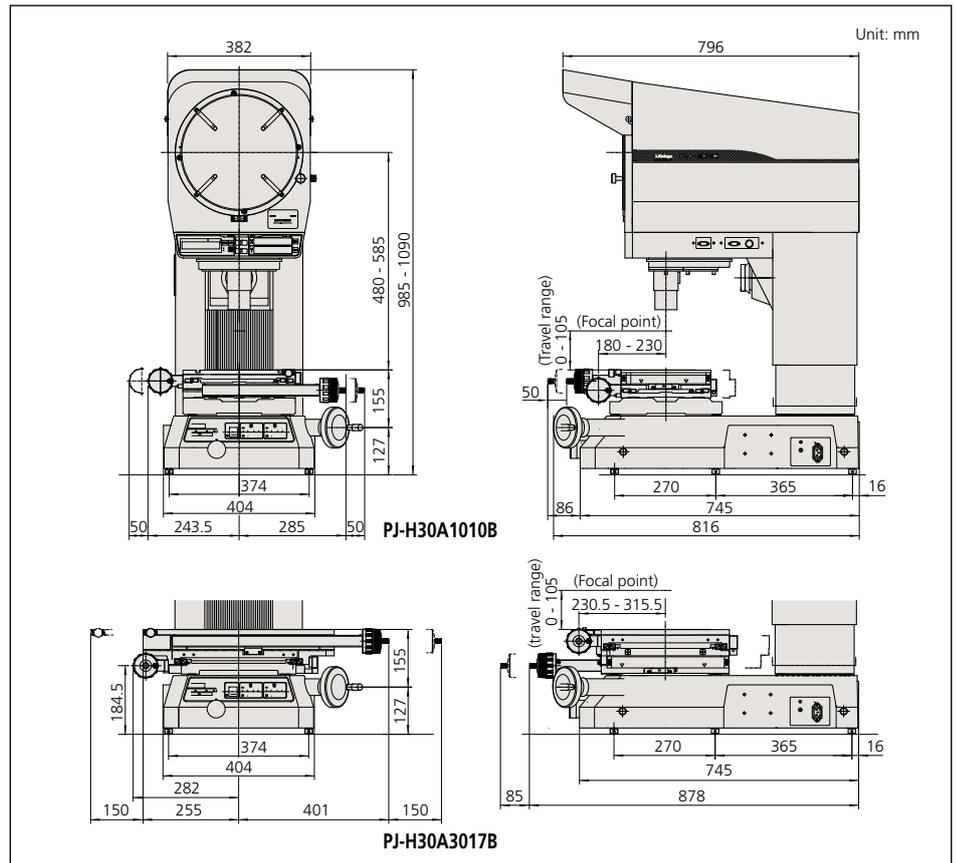
Edge detection system for QM-Data 200
(Refer to the page 385 for more details.)

SPECIFICATIONS

Model No.	PJ-H30_505B	PJ-H30_1010B	PJ-H30_2010B	PJ-H30_2017B	PJ-H30_3017B
Order No.	PJ-H30E type	303-701*	303-702*	303-703*	303-705*
	PJ-H30A type	303-711*	303-712*	303-713*	303-715*
	PJ-H30B type	303-721*	303-722*	303-723*	303-724*
	PJ-H30D type	303-731*	303-732*	303-733*	303-735*
XY stage travel range	50 x 50mm	100 x 100mm	200 x 100mm	200 x 170mm	300 x 170mm
Accuracy (at 20°C)	(3+0.02L)μm, L = Measured length (mm)				
Measurement method	Linear encoder	Linear encoder	Linear encoder	Linear encoder	Linear encoder
Floating function	X and Y axes	X and Y axes	X and Y axes	X and Y axes	X and Y axes
XY stage table top size	300 x 240mm	300 x 240mm	350 x 280mm	410 x 342mm	510 x 342mm
XY stage effective area	180 x 150mm	180 x 150mm	250 x 150mm	270 x 240mm	370 x 240mm
Stage glass No.	384111	381952	381952	381952	384261
Swiveling function	±3°	±3°	±3°	±5°	±5°
Max workpiece loading	10kg	10kg	10kg	15kg	15kg
Remarks	E-type: with fixed screen A-type: with protractor screen B-type: with protractor screen and built-in Optoeye edge sensor D-type: with protractor screen, built-in Optoeye edge sensor and Power focus				

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **302-701A**):
A for UL/CSA, D for CEE, E for BS, DC for China, K for EK, No suffix is required for JIS/100V

DIMENSION



PJ-500

SERIES 303 — Profile Projectors

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.



PJ-500



PJ-500

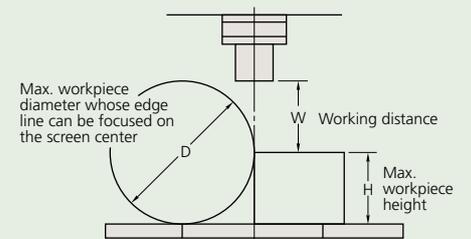


PJ-500L

Technical Data

- Projected image: Inverted image
- Protractor screen
- Effective diameter: 508mm (20")
 - Screen material: Fine ground glass
 - Screen rotation: $\pm 360^\circ$, fine feed and clamp
 - Angle reading: Digital counter (LED)
Resolution: 1' or 0.01° (switchable)
Range: $\pm 370^\circ$
ABS/INC mode switching, Zero Set
- Reference line: Cross hair line
- Projection lens: 10X (**172-281**), 20X (**172-282**)
Optional: 5X, 50X, 100X
- Magnification accuracy
- Contour illumination: $\pm 0.1\%$ or less
 - Surface illumination: $\pm 0.15\%$ or less
- Maximum workpiece height: 205mm (98.2mm: for 5X lens)
- Contour illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Zoom Telecentric system
 - Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Surface illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Vertical illumination
 - Functions: Heat-absorbing filter, Cooling fan
- Focusing: Power drive
- Resolution: 0.001mm or .0001"/0.001mm
- Power supply: 100 - 240V AC, 50/60Hz
- Mass: 660kg (PJ-500), 700kg (PJ-500L)

Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	$\phi 101.6$	$\phi 50.8$	$\phi 25.4$	$\phi 10.16$	$\phi 5.08$
H	156.8	101	90	82	69
W	98.2	205	205	205	205
D	196.4	287	308	260	193

Optional Accessory

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
965014:	SPC cable (2m)
172-285:	Polaroid Photographic Attachment
172-288:	Controller stand
515530:	Halogen bulb (24V, 150W)

Fixture and Stage accessory

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)
999678:	Fixture mount adapter for PJ-500
999904:	Fixture mount adapter for PJ-500L

Availability	PJ-500	PJ-500L
172-196	✓*	—
172-289	✓	✓**
172-197	✓*	—
176-107	✓*	—
176-378	✓*	—

*Fixture mount adapter (999678) is required.
**Fixture mount adapter (999904) is required.



QM-Data200
2-D data processing unit.
(Refer to the page 384 for more details.)



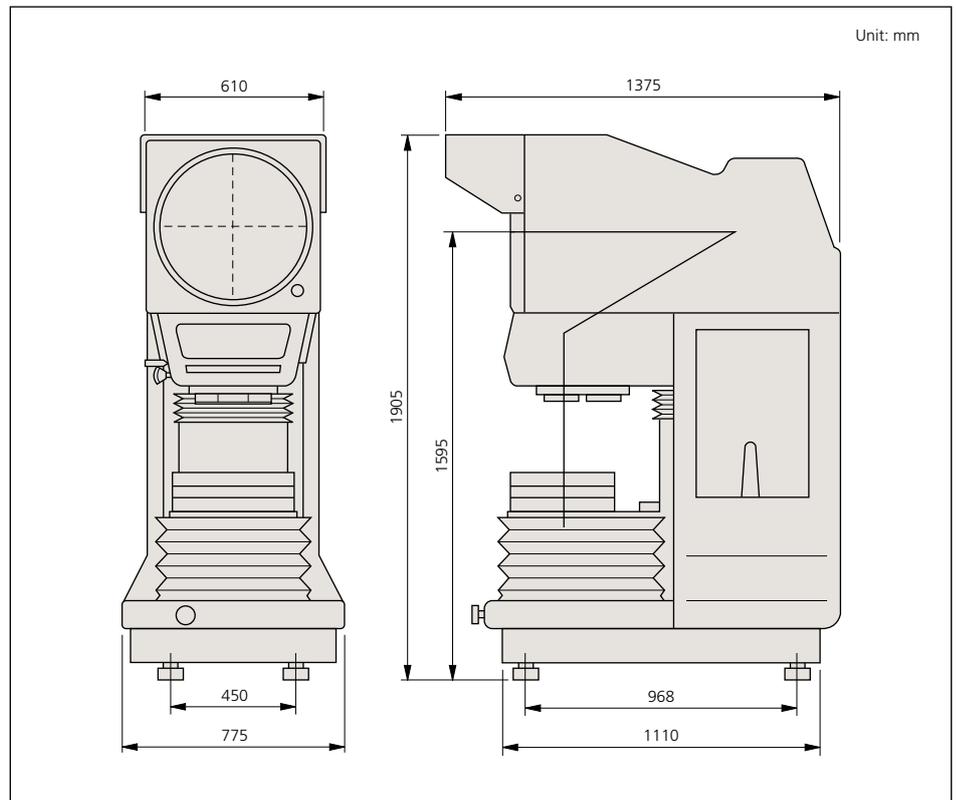
Optoeye
Edge detection system for QM-Data 200
(Refer to the page 385 for more details.)

SPECIFICATIONS

Model No.	PJ-500	PJ-500L
Order No. (metric)	303-801*	303-802*
Order No. (inch/metric)	303-811*	—
XY stage travel range	200 x 100mm	350 x 200mm
Accuracy (at 20°C)	(3+0.04L)μm, L = Measured length (mm)	
Measurement method	Linear encoder	Linear encoder
XY stage table top size	430 x 254mm	620 x 420mm
XY stage effective area	270 x 170mm	470 x 320mm
Stage glass No.	381952	382255
Swiveling function	±3°	±3°
Max workpiece loading	20kg	10kg
Remarks	Joystick control	Joystick control

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **302-700A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



PV-5110

SERIES 304 — Profile Projectors

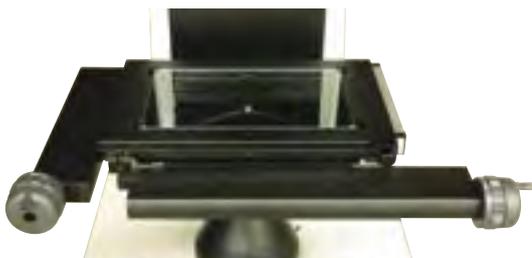
FEATURES

- 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.



PV-5110
with optional KA counter

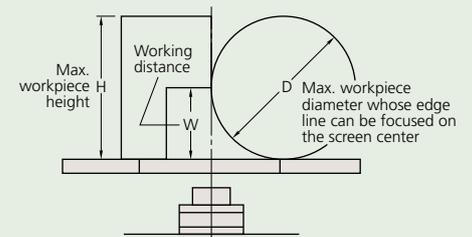


PV-5110

Technical Data

- Projected image: Inverted image
 Protractor screen
- Effective diameter: 508mm (20")
 - Screen material: Fine ground glass
 - Screen rotation: $\pm 360^\circ$, fine feed and clamp
 - Angle reading: Digital counter (LED)
Resolution: 1' or 0.01° (switchable)
Range: $\pm 370^\circ$
ABS/INC mode switching, Zero Set
 - Reference line: Cross hair line
- Projection lens: 10X (172-402)
Optional: 5X, 20X, 50X, 100X
- Magnification accuracy
- Contour illumination: $\pm 0.1\%$ or less
 - Surface illumination: $\pm 0.15\%$ or less
- Maximum workpiece height: Refer to the projection capacity (H) below.
- Contour illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Zoom Telecentric system
 - Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Surface illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Vertical illumination
 - Functions: Adjustable condenser lens, Oblique illumination (for 5X, 10X and 20X), Heat-absorbing filter, Cooling fan
- Focusing: Manual focus
 Resolution: 0.001mm or .0001"/0.001mm (using optional KA counter)
- Power supply: 100 - 240V AC, 50/60Hz
 Mass: 210kg

Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	$\phi 101.6$	$\phi 50.8$	$\phi 25.4$	$\phi 10.16$	$\phi 5.08$
H	125	181	206	87	87
W	60 (27)	60	60	32.4	22.5
D	120	120	120	64.8	45

() : When using surface illumination

Optional Accessory

- 172-280: 5X projection lens
- 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
- 965014: SPC cable (2m)
- 515530: Halogen bulb (24V, 150W)

Fixture and Stage accessory

- 172-196: Rotary table*
(Effective diameter: 100mm)
- 172-198: Rotary table with fine feed wheel*
(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)

*Fixture mount adapter (999678) is required.



KA Counter

(Refer to the page 354 for more details.)
12AAF182: Counter stand



QM-Data200

2-D data processing unit.
(Refer to the page 384 for more details.)



Optoeye

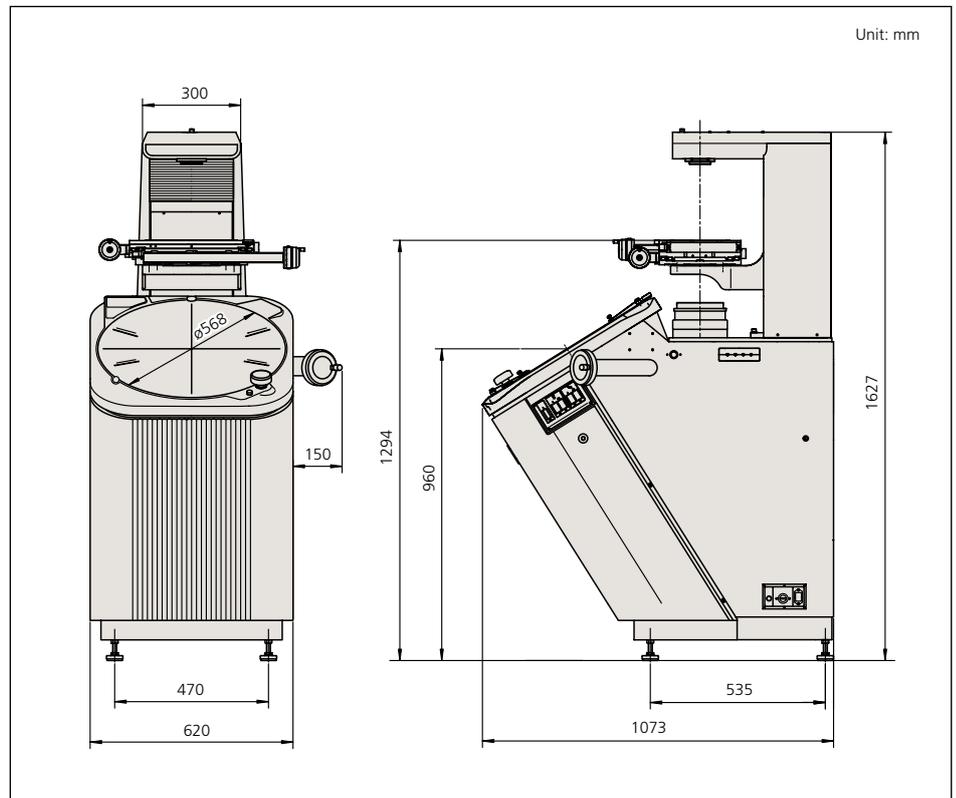
Edge detection system for QM-Data 200
(Refer to the page 385 for more details.)

SPECIFICATIONS

Model No.	PV-5110
Order No.	304-909*
XY stage travel range	200 x 100mm
Floating function	X and Y axes
Measurement method	Linear encoder
XY stage table top size	380 x 250mm
XY stage effective area	266 x 170mm
Stage glass No.	382762
Swiveling function	±3°
Max workpiece loading	15kg
Remarks	—

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **302-700A**):
A for U/USA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



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.



PV-600A with optional accessories (projection screen, projection lens, XY stage and counter)

PV-600A

Order No.: 305-103*

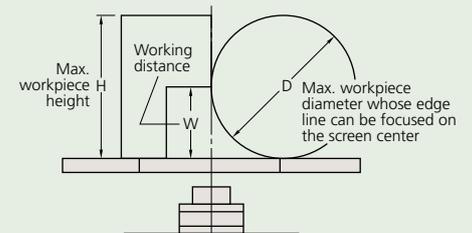
* To denote your AC line voltage add the following suffixes to the order No. (e.g.: 305-103A):

A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Technical Data

- Projected image: Inverted image
 Projector screen (optional)
- Effective diameter: 600mm (23.6")
 - Screen material: Fine ground glass
 - Screen rotation: $\pm 360^\circ$, fine feed and clamp
 - Angle reading: Vernier (graduation: 1')
 - Reference line: Cross hair line
- Projection lens (optional): 5X, 10X, 20X, 50X, 100X
 Magnification accuracy
- Contour illumination: $\pm 0.1\%$ or less
 - Surface illumination: $\pm 0.15\%$ or less
- Maximum workpiece height: Refer to the projection capacity (H) below.
- Contour illumination (optional)
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Telecentric system
 - Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Surface illumination (optional)
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Vertical illumination
 - Functions: Adjustable condenser lens, Oblique illumination (5X, 10X, 20X), 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Focusing: Manual focus
 Resolution: 0.001mm or .0001"/0.001mm (using optional KA counter)
- Power supply: 100 - 240V AC, 50/60Hz
 Mass: 250kg

Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	120	60	30	12	6
H	37 (12)	37 (37)	37 (37)	—	—
W	140	182	257	76	76
D	94	94	94	14	6

() : When using surface illumination

Optional Accessory

- 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
- 172-330:** Standard scale (80mm)
- 172-117:** Standard scale (2")
- 172-329:** Reading scale (600mm)
- 172-162:** Reading scale (12")
- 172-160-2:** Green filter
- 512305:** Halogen bulb (24V, 150W)
- 172-319:** Canopy

Fixture and Stage accessory

- 172-196:** Rotary table*
(Effective diameter: 100mm)
- 172-197:** Swivel center support*
(Max. workpiece dia.: 80mm)
- 176-107:** Rotary table*
- 172-378:** V-block with clamp*
(Max. workpiece dia.: 25mm)

*Fixture mount adapter (999678) is required.

Optional Surface Illumination Unit

- Order No.:** 172-418
 - Method:** Twin-bulb type oblique illumination
 - Light source:** Halogen bulbs (24V, 150W)
- Note: Vertical illumination when using 50X, 100X magnifications.



KA Counter
(Refer to the page 354 for more details.)
12AAF182: Counter stand



QM-Data200
2-D data processing unit.
(Refer to the page 384 for more details.)



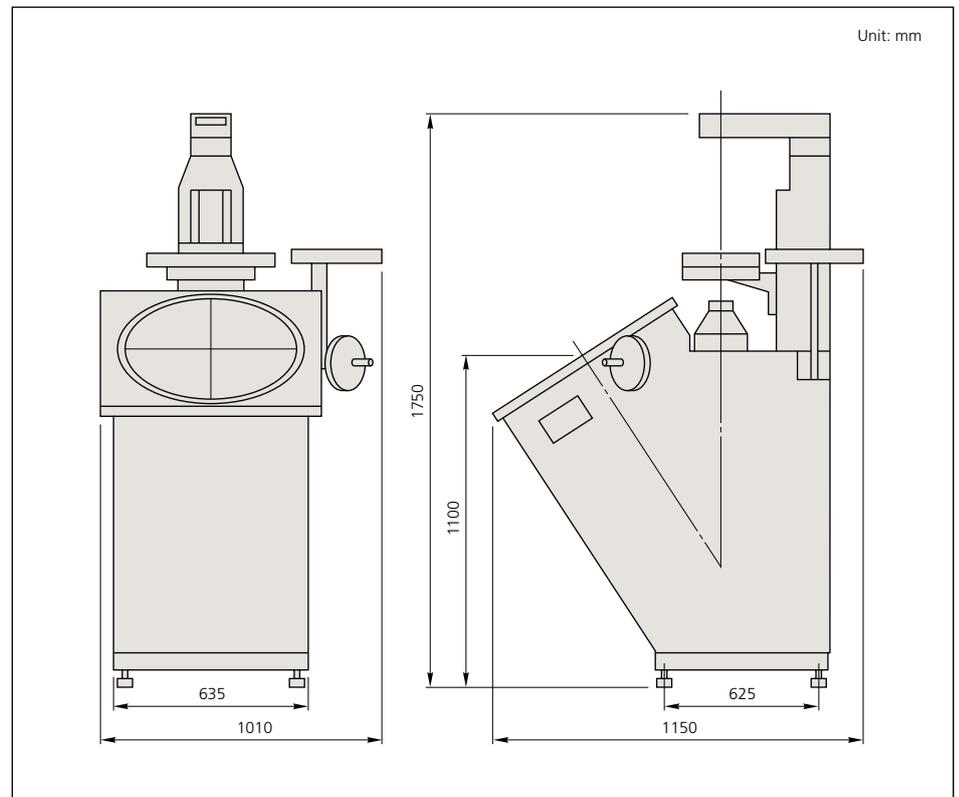
Optoeye
Edge detection system for QM-Data 200
(Refer to the page 385 for more details.)

Optional XY Stage

- Order No.:** 319-225-1
- XY travel range:** 200 x 100mm
- Measurement method:** Linear encoder
- Floating function:** X and Y axes
- Table top size:** 380 x 250mm
- Effective area:** 266 x 170mm
- Stage glass No.:** 382762
- Swiveling function: $\pm 3^\circ$
- Max workpiece loading: 5kg



DIMENSION



PH-3515F, PH-14A

SERIES 172 — Profile Projector

FEATURES

- Bench-top model that uses horizontal optical system.
- Suitable for thread pitch measurements—blurred or distorted images will not be produced when workpiece is angled.
- Erect image* on the day-bright screen (*inverted image: PH-14A).
- 356mm diameter protractor screen with cross-hairs and staggered lines for easy alignment.
- Digital angle measurement to 1' or 0.01° (PH-3515F).
- Heavy-duty workpiece table incorporates linear scales for fast, accurate measurement.
- Built-in XY counter (PH-3515F).



PH-3515F

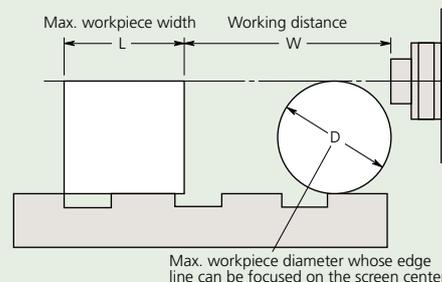


PH-14A

Technical Data

- Projected image: Erect image (inverted image: PH-14A)
 Protractor screen (optional)
- Effective diameter: 356mm (14")
 - Screen material: Fine ground glass
 - Screen rotation: $\pm 360^\circ$, fine feed and clamp
 - Angle reading: Digital counter (LED)*
 Resolution: 1' or 0.01° (switchable)
 Range: $\pm 370^\circ$
 ABS/INC mode switching, Zero Set
 [*Vernier (graduation: 1'): PH-14A]
- Reference line: Cross hair line
- Projection lens: 10X (172-184) (172-011: PH-14A)
 Optional: 5X, 20X, 50X, 100X (20X, 50X, 100X: PH-14A)
- Magnification accuracy
- Contour illumination: $\pm 0.1\%$ or less
 - Surface illumination: $\pm 0.15\%$ or less
- Maximum workpiece height: Refer to the projection capacity (H) below.
- Contour illumination
- Light source: Halogen bulb (24V, 150W)
 - Optical system: Telecentric system
 - Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Surface illumination
- Light source: Halogen bulb (24V, 150W) (24V, 150W: PH-14A)
 - Optical system: Vertical illumination
 - Functions: Adjustable condenser lens, 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Focusing: Manual focus
- Resolution: 0.001mm or .0001"/0.001mm (using optional KA counter: PH-14A)
- Power supply: 100 - 240V AC, 50/60Hz
- Mass: 152kg (140kg: PH-14A)

Projection Capacity



PH-3515F

Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	70.6	35.3	17.65	7.06	3.5
L	175	235	235	80	109
W	160 (64)	93 (35)	40	14.6	9.5
D	152.4	152.4	116	30.4	19

() : When using surface illumination

PH-14A

Unit: mm

	Magnification			
	10X	20X	50X	100X
View field	70.6	17.3	7.12	3.56
L	235	235	80	109
W	93	40	14.6	11
D	105	105	30.4	19

Optional Accessory

- 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*
- 172-012: 20X projection lens set**
- 172-013: 50X projection lens set**
- 172-014: 100X projection lens set**
- 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")
- 932105: Overlay chart set
- 172-286: Green filter
- 512305: Halogen bulb (24V, 150W)
- 12BAA637: Halogen bulb (24V, 200W)*
- 172-269: Machine stand*
- 172-108: Machine stand**

Fixture and Stage accessory

- 172-142: Center support
- 172-143: Center support riser
- 172-144: Rotary vise (Max. workpiece dia.: 60mm)
- 172-234: V-block with clamp (Max. workpiece dia.: 50mm)
- 172-132: Vertical holder
- 172-001: Tipped-saw support stand
- 172-002: Cutter support stand

*only for PH-3515F
**only for PH-14A



KA Counter

(Refer to the page 354 for more details.)

- 12AAF182: Counter stand



QM-Data200

2-D data processing unit.
(Refer to the page 384 for more details.)



Optoeye

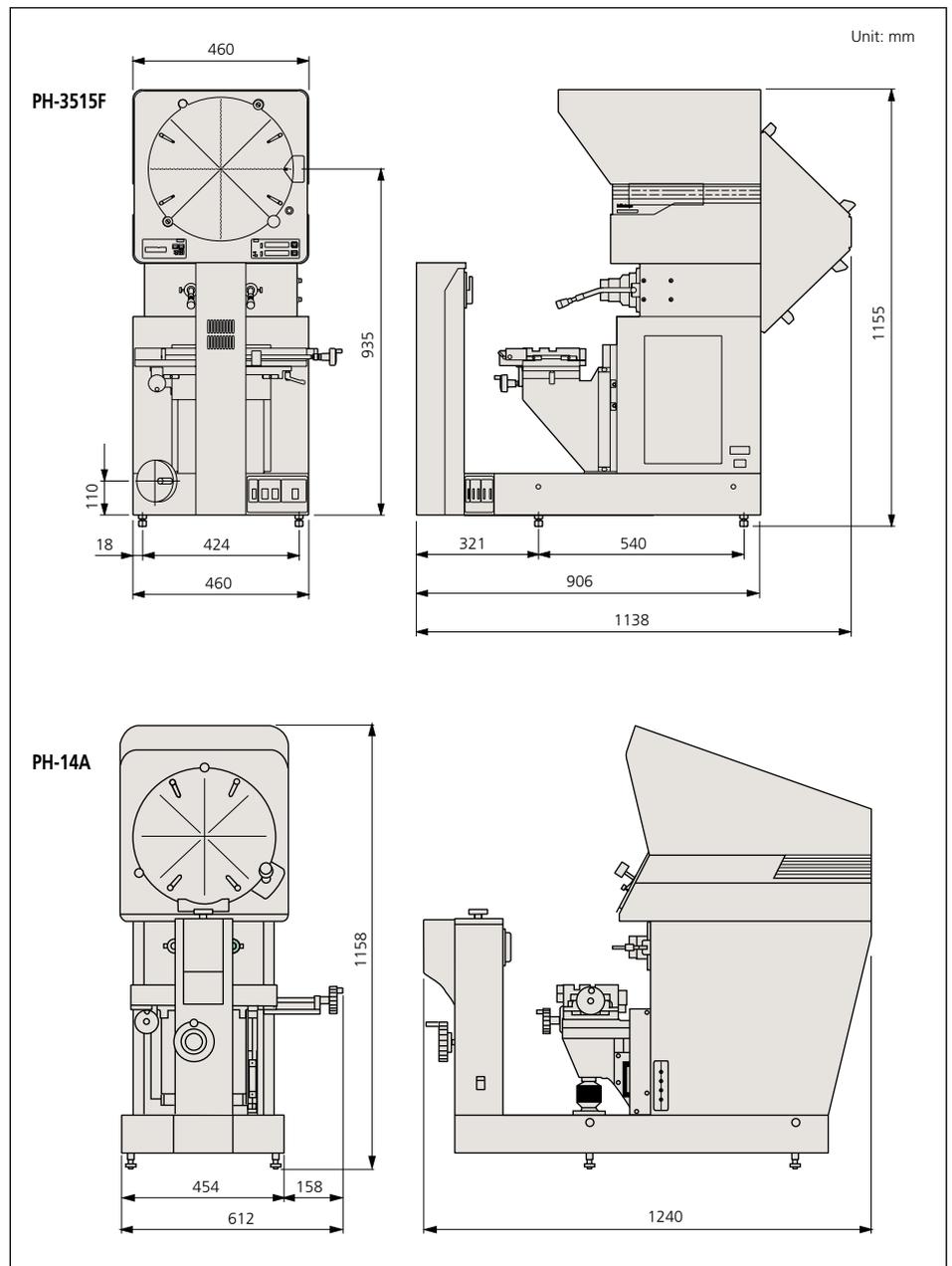
Edge detection system for QM-Data 200
(Refer to the page 385 for more details.)

SPECIFICATIONS

Model No.	PH-3515F	PH-14A
Order No.	172-847*	172-810*
XY stage travel range	254 x 152mm	200 x 100mm
Measurement method	Linear encoder	Linear encoder
Floating function	X axis	—
XY stage table top size	450 x 146mm	407 x 153mm
Swiveling function	±10°	±10°
Max workpiece loading	45kg	45kg
Remarks	—	—

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: 302-700A):
A for UL/CSA, D for CEE, E for BS, DC for China, K for EK, No suffix is required for JIS/100V

DIMENSION



Accessories for Profile Projectors

SERIES 172 — Profile Projector

Standard Scales



172-116

- Used for checking magnification accuracy.

Reading Scales



172-118

172-161

- Specially designed for inspecting the magnified image of a standard scale on the projection screen.

SPECIFICATIONS

Metric			
Graduation	Range	Order No.	Accuracy (20°C)*
0.1mm	50mm	172-116	(3+15L/1000)μm
0.1mm	80mm	172-330	(3+15L/1000)μm

*L = Measured length (mm)

SPECIFICATIONS

Metric			
Graduation	Range	Order No.	Accuracy
0.5mm	200mm	172-118	18μm
0.5mm	300mm	172-161	19.5μm
0.5mm	600mm	172-329	24μm

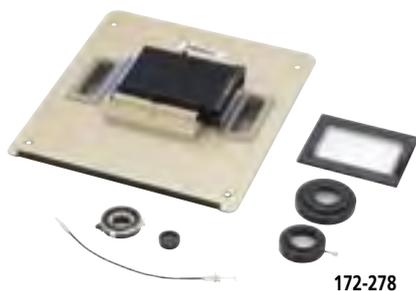
Inch			
Graduation	Range	Order No.	Accuracy (20C)
.01"	2"	172-117	.00013"

Inch			
Graduation	Range	Order No.	Accuracy
.02"	8"	172-119	.00071"
.02"	2"	172-162	.00077"

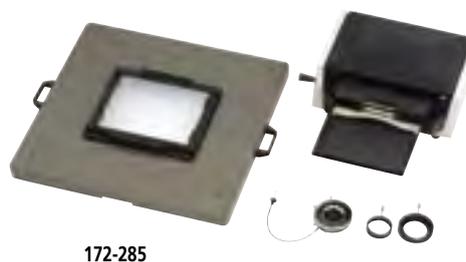
Polaroid Photographic Attachments

FEATURES

- 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.



172-278

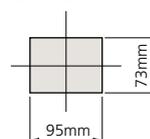


172-285

SPECIFICATIONS

Order No.	Applicable model	Applicable film
172-278	PJ-H3000 series	Polaroid #669 (color), #665 (monochrome)
172-285	PJ-500 series	Polaroid #809 (color), #804 (monochrome)

Photography area



Overlay Chart Set

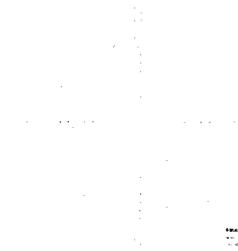
FEATURES

- 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.

Overlay chart set (12 sheets)
Order No.: 932105



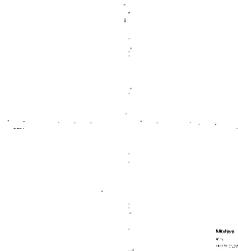
512066
Protractor (1°-grad. radial index)
and radius (1mm-radius increment
concentric semicircles)



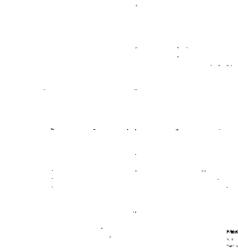
512067
Radius (0.1cm-reading scales and 5mm-
radius increment concentric circles)



512068
Radius (1X, 10X, 20X, 50X)



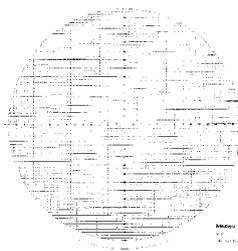
512069
1mm-reading scales (20X, 50X)



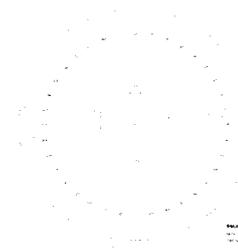
512070
10x10mm sections



512071
0.5mm-reading scales



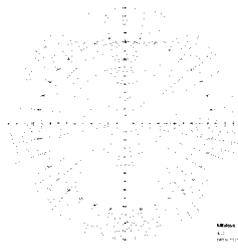
512072
1x1mm sections



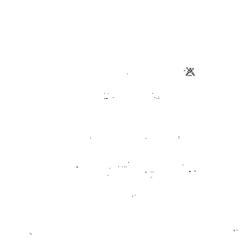
512073
Protractor (1°-grad. diametrical index)



512074
1mm-reading vertical scale



512075
Protractor (1°-grad. diametrical index)
and radius (1mm-radius increment
concentric circles)



512076
Metric, Unified, and Whitworth screw
threads (20X)



512077
Metric screw thread (100X) and 20°
and 14.5° gear teeth (20X)

Micrometer Heads

for Profile Projectors and Toolmaker's Microscopes

Micrometer Heads for XY Stage

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

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



152-390

SPECIFICATIONS

Metric				
Graduation	Range	Order No.	Accuracy	Remarks
0.005mm	25mm	152-390	±2µm	for X-axis
0.005mm	25mm	152-389	±2µm	for Y-axis

Inch

Graduation	Range	Order No.	Accuracy	Remarks
.0001"	1"	152-391	±.0001"	for X-axis
.0001"	1"	152-392	±.0001"	for Y-axis

SPECIFICATIONS

Metric				
Graduation	Range	Order No.	Accuracy	Remarks
0.001mm*	25mm	152-402	±2µm	for X-axis
0.001mm*	25mm	152-401	±2µm	for Y-axis

*Obtained by using vernier.

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.



164-161

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

Graduations: 0.005mm, 0.001mm* or .0001"

*vernier reading

Spindle pitch: 1mm

Spindle face: Flat (hardened) or spherical with carbide tip (more than HRA90), lapped surface

Scale surface: White anodized aluminum



Technical Data

Resolution: 0.001mm or .00005"/0.001mm

Display: LCD

Battery: SR44 (1 pc./2 pcs.*), 938882

Battery life: Approx. 3 years under normal use

(1.8 years: 164-161 and 164-162, 1.2 years:

164-171 and 164-172)

Dust/Water protection level: IP65 (series 350)**

* 164-161 and 164-162

** 350-271, 350-273, 350-261, 350-381, 350-382, 350-383, 350-384, 350-361

Function

Zero-setting, Data hold, Data output (series 164), Preset, inch/mm conversion (inch/mm models)

Alarm: Low voltage, Counting value composition error

Optional Accessory

05CZA662: SPC cable with data switch (1m)*

05CZA663: SPC cable with data switch (2m)*

937387: SPC cable for series 164 (1m)

965013: SPC cable for series 164 (2m)

*for series 350

Workpiece Fixtures

for Profile Projectors and Measuring Microscopes

Rotary Tables



Order No.	176-106	172-198	172-289
Effective glass dia.	66mm	100mm	200mm
Angle reading	6'	2' (w/ fine adjustment)	—
Mass	1.7kg	2.5kg	14kg

Note: Holder with clamp (176-107) can be mounted.

Holder with Clamp



Order No.	176-107
Max. workpiece height	35mm
Mass	0.42kg

Swivel Center Supports



Order No.	176-105	172-197
Max. workpiece dia.	70mm (45mm)*	80mm(65mm)*
Max. workpiece length	140mm	140mm
Swivel range	±10°	±10°
Mass	2.4kg	2.5kg

*When swiveled 10°

Center Support

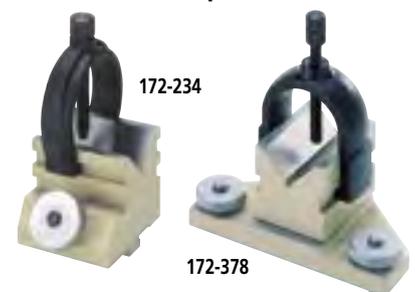


SPECIFICATIONS

Order No.	172-142
Max. workpiece height	120mm (240mm)*
Mass	3.3kg

*When using a center support riser (172-143)

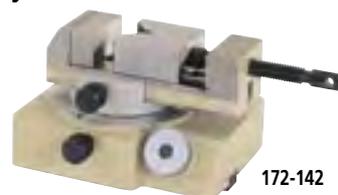
V-Block with Clamp



SPECIFICATIONS

Order No.	172-234	172-378
Max. workpiece dia.	50mm	25mm
Width of block	60mm	41mm
Mass	1.24kg	0.8kg

Rotary Vise



SPECIFICATIONS

Order No.	172-144
Max. workpiece height	60mm
Width of jaw	40mm
Angle reading	5°
Mass	2.5kg

Vertical Holder



SPECIFICATIONS

Order No.	172-132
Mass	1.3kg

TM-500

SERIES 176 — Toolmaker's Microscopes

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.



TM-505



TM-510

Technical Data

Observation image:	Erect image
Optical tube:	Monocular (diopter adjustable) Depression angle: 30°
Angle reading:	Reticle: 90° broken cross-hair (176-126) Range: 360° Minimum reading: 6' (by vernier)
Eyepiece:	15X (176-116), View field dia.: 13mm Optional: 10X, 20X
Objective:	2X (176-138), Working distance: 67mm Optional: 5X, 10X, 30X
Total magnification:	30X
Contour illumination	
• Light source:	Tungsten bulb (24V, 2W)
• Functions:	With green filter, Light intensity adjustable
Surface illumination:	
• Light source:	Tungsten bulb (24V, 2W)
• Functions:	Light intensity adjustable
Power supply:	100/110/120/220/240V AC, 50/60Hz
Mass	13.5g (14.5kg: TM-510)

Angle reading



Optional Accessory

- 172-145:** 5X projection lens set*
- 176-115:** 10X eyepiece (view field dia.: 13mm)
- 176-117:** 20X eyepiece (view field dia.: 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
(range: 50mm, reading: 0.001mm)
- 164-162:** Digimatic micrometer head
(range: 2"/50mm, reading: .0005"/0.001mm)
- 152-390:** Micrometer head for X-axis
(range: 50mm, reading: 0.005mm)
- 152-389:** Micrometer head for Y-axis
(range: 50mm, reading: 0.005mm)
- 152-391:** Micrometer head for X-axis
(range: 2", reading: .0001")
- 152-392:** Micrometer head for Y-axis
(range: 2", reading: .0001")
- 611635-041:** Rectangular gauge block (25mm)
- 611675-041:** Rectangular gauge block (50mm)
- 611201-241:** Rectangular gauge block (1")
- 611202-241:** Rectangular gauge block (2")
- 383038:** Halogen bulb (24V, 2W)
- 175-204:** Dial indicator attachment for Z-axis measurement
- 965013:** SPC cable (2m) for Digimatic micrometer head

Fixture and Stage accessory

- 990561:** Workpiece clip (2pcs./set)
- 176-106:** Rotary table for TM-505 (effective dia.: 66mm)
- 172-196:** Rotary table for TM-510 (effective dia.: 100mm)
- 176-105:** Swivel center support for TM-505
(max. workpiece dia.: 70mm)
- 172-197:** Swivel center support for TM-510
(max. workpiece dia.: 80mm)
- 172-378:** V-block with clamp
(max. workpiece dia.: 25mm)
- 176-107:** Holder with clamp

Illumination unit

- 377-090-1:** Fiber-optic ring light
- 176-203:** Twin-bulb reflected illumination unit
- 176-343:** Bifurcated fiber illuminator

Reticle

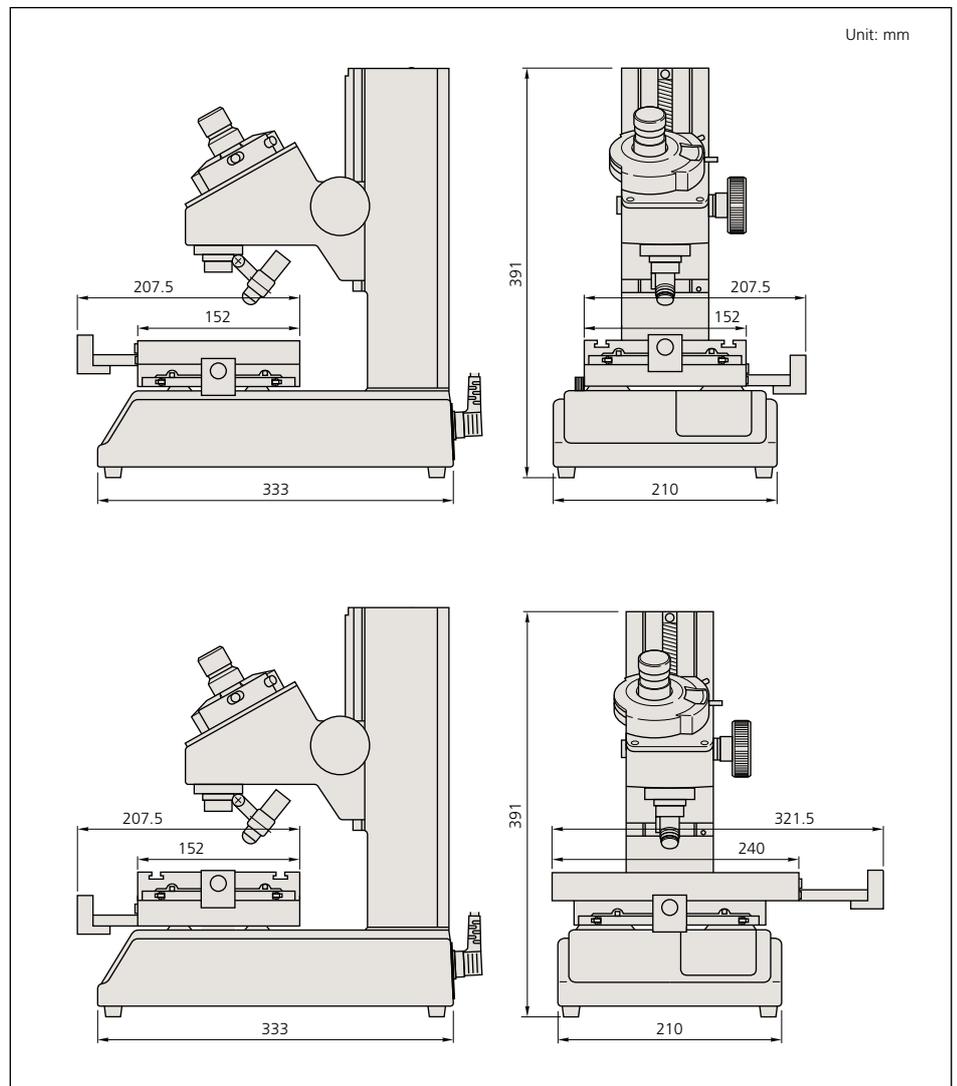
- 176-111:** Concentric circles
(up to $\phi 4$ mm, 0.05mm increment)
- 176-135:** Concentric circle
(up to $\phi .2$ " , .01" increment)
- 176-113:** 55° angle
- 176-114:** 60° angle
- 176-109:** Metric screw threads (pitch = 0.25 - 1mm)
- 176-110:** Metric screw threads (pitch = 1.25 - 2mm)
- 176-140:** ISO metric screw threads
(pitch = 0.075 - 0.7mm)
- 176-141:** ISO metric screw threads
(pitch = 0.75 - 2mm)
- 176-142:** ISO unified screw threads (80 - 28TPI)
- 176-143:** ISO unified screw threads (24 - 14TPI)
- 176-144:** ISO unified screw threads (13 - 10TPI)
- 176-123:** Unified screw threads (80 - 28TPI)
- 176-124:** Unified screw threads (24 - 14TPI)
- 176-125:** Unified screw threads (13 - 10TPI)
- 176-120:** Whitworth screw threads (60 - 26TPI)
- 176-121:** Whitworth screw threads (24 - 18TPI)
- 176-122:** Whitworth screw threads (16 - 11TPI)
- 176-127:** NF screw threads (80 - 28TPI)
- 176-128:** NF screw threads (24 - 14TPI)
- 176-129:** NF screw threads (13 - 10TPI)
- 176-130:** 14.5° involute gear teeth (normal rack type)
- 176-112:** 20° involute gear teeth (normal rack type)

SPECIFICATIONS

Model No.	TM-505	TM-510
Order No.	176-811*	176-812*
XY stage travel range	50 x 50mm	100 x 50mm
Measurement method	Micrometer head (optional)	Micrometer head (optional)
Floating function	—	—
XY stage table top size	152 x 152mm	240 x 152mm
Effective area of table	96 x 96mm	154 x 96mm
Max. workpiece height	115mm	107mm
Max. workpiece weight	5kg	5kg
Remarks	—	—

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-811A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



MF

SERIES 176 — Measuring Microscopes

The MF 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.
- Zero-set switches (X- and Y-axis) are also located near the stage feed handles.
- Available with the Vision Unit for upgrading to a vision measuring system.



Using optional slide type nosepiece with 2-lens mount (factory set option)

MF-B2017B
XY stage travel range: 200 x 170mm (w/ optional binocular tube)

Selection of XY stage (travel range)

MF-B505B: 50 x 50mm



MF-B1010B: 100 x 100mm



MF-B2010B: 200 x 100mm



MF-B3017B: 300 x 170mm



MF-B4020B: 400 x 200mm



Technical Data

Observation image:	Erect image
Optical tube (optional):	Monocular or binocular tube (depression: 25°), Reticle projection method, w/ TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece lens (optional):	10X, 15X, 20X
Objective:	3X (375-037), W.D.: 72.5mm Optional: 1X, 5X 10X, 20X, 50X, 100X
Contour illumination	
• Light source:	Halogen bulb (12V, 50W)
• Optical system:	Telecentric illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, Non-stepped brightness adjustment
Surface illumination	
• Light source:	Halogen bulb (12V, 100W or 12V, 150W)
• Optical system:	Koehler illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, Non-stepped brightness adjustment
Display unit:	
• No. of axis:	2 axes (MF-A type) or 3 axes (MF-B type)
• Resolution:	0.001mm / 0.0005mm / 0.0001mm / .0001" / .00005" / .00001"
• Functions:	Zero-setting, Direction switching, Data output (via RS-232C interface)
Power supply:	100/110/120/220/240V AC, 50/60Hz
Mass	65.5kg (MF- 505B, MF- 1010B), 69.5kg (MF- 2010B), 130kg (MF- 2017B), 138kg (MF- 3017B), 144kg (MF- 4020B)

Optional Reticles for 3X Eyepiece

- 12AAG838 (12AAG878):** Cross-hair (7 μ m width)
 - 12AAG836 (12AAG877):** Cross-hair (5 μ m width)
 - 12AAG873 (12AAG876):** Cross-hair (3 μ m width)
 - 12AAG839 (12AAG879):** Broken cross-hair
 - 12AAG840 (12AAG880):** Broken cross-hair and 60° angle
 - 12AAG841 (12AAG881):** Zeiss type chart
 - 12AAG842*:** 20mm scale (0.1mm reading)
 - 12AAG843*:** Concentric circle (ϕ 1.2 - ϕ 18mm)
 - 12AAG844*:** 10mm scale (0.1mm reading)
 - 12AAG845*:** 5mm scale (0.05mm reading)
 - 12AAG846*:** 10x10mm section (1mm min.)
 - 12AAG847*:** Metric screw thread (P = 0.25-1.0)
 - 12AAG848*:** Metric screw thread (P = 1.25-2.0)
 - 12AAG849*:** Involute gear tooth (14.5°), module = 0.1 - 1.0
 - 12AAG850*:** Involute gear tooth (20°), module = 0.1 - 1.0
 - 12AAG851*:** Unified screw thread (80 - 28TPI)
 - 12AAG852*:** Unified screw thread (24 - 14TPI)
 - 12AAG853*:** Unified screw thread (13 - 10TPI)
 - 12AAG854*:** Concentric circle (ϕ .01" - ϕ .2")
- () : for MF-UB models, * : MF-B / MF-UB compatible
Reticle mount is provided.

Reticle mount (standard accessory)

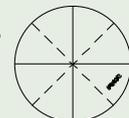


for MF-UB models



for MF-B models

Cross-hair and 45° angle (standard accessory)



12AAG840

Optional Accessory

- 176-302:** Monocular tube with 10X eyepiece
- 176-303-1:** Binocular tube with 10X eyepiece set
- 378-856:** 10X eyepiece set (view field dia.: 24mm)
- 378-857:** 15X eyepiece set (view field dia.: 16mm)
- 378-858:** 20X eyepiece set (view field dia.: 12mm)
- 375-043:** Protractor eyepiece (10X)
- 176-313:** Digital protractor eyepiece (10X)
- 375-036-1:** 1X objective (W.D.: 61mm, N.A.: 0.03)
- 375-034-1:** 5X objective (W.D.: 61mm, N.A.: 0.13)
- 375-039:** 10X objective (W.D.: 51mm, N.A.: 0.21)
- 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)
- 176-314:** Slide type nosepiece with 2-lens mount
- 12AAA643:** ND2 color filter (contour / surface)
- 12AAA644:** ND8 color filter (contour / surface)
- 12AAA645:** GIF filter (contour / surface)
- 12AAA646:** LB80 color filter (contour / surface)
- 375-054:** 0.5X camera adapter (w/ C-mount adapter)
- 970441:** C-mount adapter
- 513667:** Halogen bulb (24V, 50W)
- 12BAB345:** Halogen bulb (long life type, 24V, 50W)
- 176-308:** Vibration damping stand
- 176-309:** Mounting stand
- 375-056:** Stage micrometer
- 12AAA165:** Lens cleaning kit
- 12AAA846:** Foot switch

Illumination unit

- 176-351-6:** Oblique surface illumination unit
- 176-367-1:** LED ring illuminator
- 176-343:** Twin fiber optics illuminator
- 176-366:** Ring fiber optics illuminator
- 12AAG806:** GIF color filter (for fiber optics illuminator)
- 12AAG807:** LB80 color filter (for fiber optics illuminator)

Fixture and Stage accessory

- 176-107:** Holder with clamp*
- 172-378:** V-block with clamp*
(max. workpiece dia.: 25mm)
- 172-197:** Swivel center support*
(max. workpiece dia.: 80mm)
- 176-305:** Rotary stage with fine feed knob for 505/1010/2010 models
- 176-306:** Rotary stage with fine feed knob for 2017/3017/4020 models

*Fixture mount adapter (**176-310**) is required for 2010 models.
Fixture mount adapter (**176-304**) is required for 2017/3017/4020 models.



QM-Data200

2-D data processing unit
(Refer to the page 384 for more details.)

12AAA807: Connecting cable set

Focus pilot FP-05
Focus assisting system
(Refer to the page 382 for more details.)



Vision Unit

PC base vision measuring system
(Refer to the page 386 for more details.)

SPECIFICATIONS

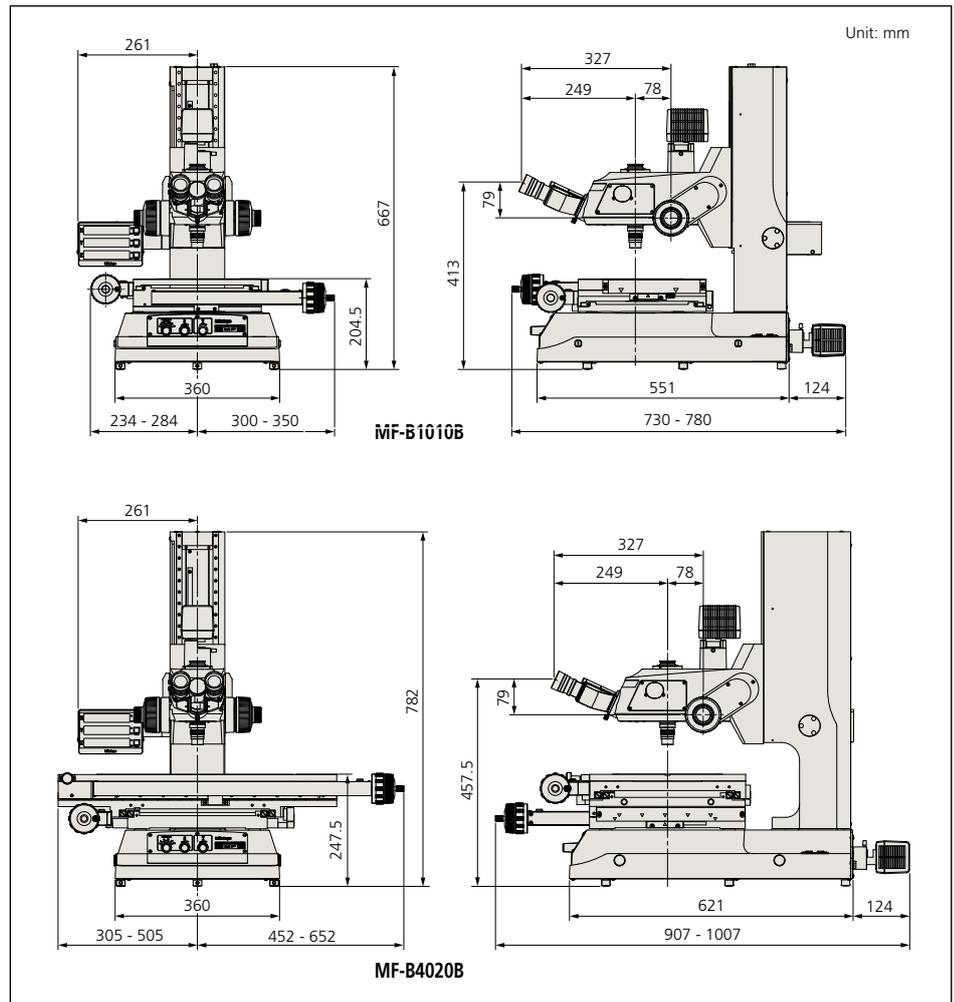
Model No.	MF-_505B	MF-_1010B	MF-_2010B	MF-_2017B	MF-_3017B	MF-_4020B	
Order No.	MF-A type	176-561*	176-562*	176-563*	176-564*	176-565*	176-566*
	MF-B type	176-581*	176-582*	176-583*	176-584*	176-585*	176-586*
XY stage travel range	50 x 50mm	100 x 100mm	200 x 100mm	200 x 170mm	300 x 170mm	400 x 200mm	
Z-axis travel range	150mm	150mm	150mm	220mm	220mm	220mm	
Focusing method	Manual focusing (coarse focusing: 10mm/rev., fine focusing: 0.1mm/rev.)						
Measurement method	Linear encoder (2-axis model: X / Y-axis, 3-axis model: X / Y / Z-axis)						
Resolution (switchable)	0.001mm / 0.0005mm / 0.0001mm / .0001" / .00005" / .00001"						
Measuring accuracy (at20°C)	XY-axes: (2.5+0.02L) μ m, L = Measuring length (mm) when not loaded, JIS B 7153						
Indication accuracy (at20°C)	Z-axis: (5+0.04L) μ m, L = Measuring length (mm)						
Floating function	X and Y axes with Quick-release mechanism						
XY stage top size	280 x 280mm	280 x 280mm	350 x 280mm	410 x 342mm	510 x 342mm	610 x 342mm	
Effective glass size	180 x 180mm	180 x 180mm	250 x 150mm	270 x 240mm	370 x 240mm	440 x 240mm	
Swiveling function	—	—	—	\pm 5° (left)	\pm 5° (left)	\pm 3° (left)	
Max. workpiece weight	10kg	10kg	10kg	20kg	20kg	15kg	
Max. workpiece height	150mm	150mm	150mm	220mm	220mm	220mm	

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-561A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Machine type

	MF-A type	MF-B type
Measurement system	X and Y-axis (2-axes type)	X, Y and Z-axis (3-axis type)

DIMENSION



MF-U

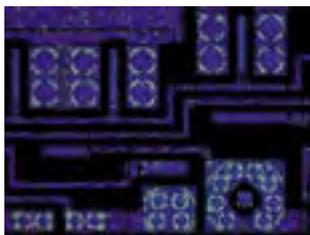
SERIES 176 — High-power Multi-function Measuring Microscopes

FEATURES

- Clear and flare less erect image, wide field of view.
- Long working distance objectives, up to 20X 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.
- Zero-set switches (X- and Y-axis) are also located near the stage feed handles.
- Inward type revolver with 4 lens mount.
- Improved eye level lens for fatigue free use.



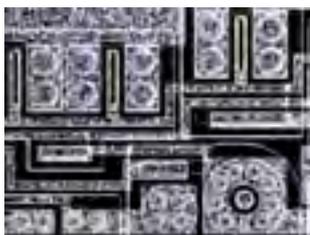
MF-UB3017B
XY stage travel range: 300 x 170mm
(w/ optional revolver, objective and fiber illumination)



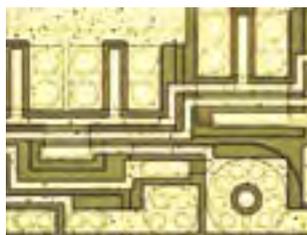
Polarized light observation:
Observing only the filtered light that vibrates in one direction. Used for observing materials with special optical characteristics, such as mineral and liquid crystal.



Differential interference contrast (DIC) observation:
Effective in detecting fine scratches and steps on the surface of metal, liquid crystal, and semiconductors.



Dark field (DF) 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.



Bright field (BF) observation:
Most common method of observation. Observing directly the light reflected on the surface of workpiece.

Technical Data

Observation image:	Erect image
Optical tube:	Siedentoph type (pupil distance adjustment: 51 - 76mm), 1X tube lens, Binocular tube (depression: 30°), Reticle projection method, w/ TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece lens:	10X (field No.: 24mm), Optional: 15X, 20X
Revolver (optional):	Manual or power turret
Objective (optional):	M / BD Plan Apo objective from 1X to 100X (Refer to the page 394 for more details.)
Contour illumination	
• Light source:	Halogen bulb (12V, 50W)
• Optical system:	Telecentric illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, Non-stepped brightness adjustment
Surface illumination	
• Light source:	Optional halogen illumination unit (fiber optic cold light illumination)
• Optical system:	Koehler illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, Non-stepped brightness adjustment
Display unit:	
• No. of axis:	2 axes or 3 axes
• Resolution:	0.001mm / 0.0005mm / 0.0001mm / .0001" / .00005" / .00001"
• Functions:	Zero-setting, Direction switching, Data output (via RS-232C interface)
Power supply:	100/110/120/220/240V AC, 50/60Hz
Mass	65.5kg (MF-U_505B, MF-U_1010B), 69.5kg (MF-U_2010B), 130kg (MF-U_2017B), 138kg (MF-U_3017B), 144kg (MF-U_4020B)

Selection of XY stage (travel range)



Optional Accessory

- 378-857:** 15X eyepiece set (view field dia.: 16mm)
378-858: 20X eyepiece set (view field dia.: 12mm)
(See page 394.) Objective
378-018: Adjustable manual BF revolver
378-116: Adjustable power BF revolver
176-211: Adjustable manual BF/DF revolver
378-210: Adjustable power BF/DF revolver
(See page 376.) Reticles
178-092: Polarization unit
378-076: DIC unit for 100X, SL80X, SL50X objective
378-078: DIC unit for 50X, SL20X objective
378-079: DIC unit for 20X objective
378-080: DIC unit for 10X, 5X objective
12AAA643: ND2 color filter
12AAA644: ND8 color filter
12AAA645: GIF filter
12AAA646: LB80 color filter
375-054: 0.5X camera adapter (w/ C-mount adapter)
970441: C-mount adapter
513667: Halogen bulb (24V, 50W)
12BAB345: Halogen bulb (long life type, 24V, 50W)
517181: Halogen bulb (24V, 100W)
12BAD602: Halogen bulb (high intensity type, 24V, 100W)
176-308: Vibration damping stand
176-309: Mounting stand
375-056: Stage micrometer
12AAA165: Lens cleaning kit
12AAA846: Foot switch

Illumination unit

- 176-315:** Halogen illumination unit (12V, 100W)
176-316: Halogen illumination unit (12V, 150W)
176-343: Twin fiber optics illuminator
12AAG806: GIF color filter (for **176-315**)
12AAG807: LB80 color filter (for **176-315**)

Fixture and Stage accessory

- 176-107:** Holder with clamp*
172-378: V-block with clamp*
 (max. workpiece dia.: 25mm)
172-197: Swivel center support*
 (max. workpiece dia.: 80mm)
176-305: Rotary stage with fine feed knob for
 505/1010/1020 models
176-306: Rotary stage with fine feed knob for
 1720/1730 models

*Fixture mount adapter (**176-310**) is required for 1020 models.
 Fixture mount adapter (**176-304**) is required for 1720/1730 models.



QM-Data200

2-D data processing unit
 (Refer to the page 384 for more details.)

12AAA807: Connecting cable set

Focus pilot FP-05
 Focus assisting system
 (Refer to the page 382 for more details.)



Vision Unit

PC base vision measuring system
 (Refer to the page 386 for more details.)

SPECIFICATIONS

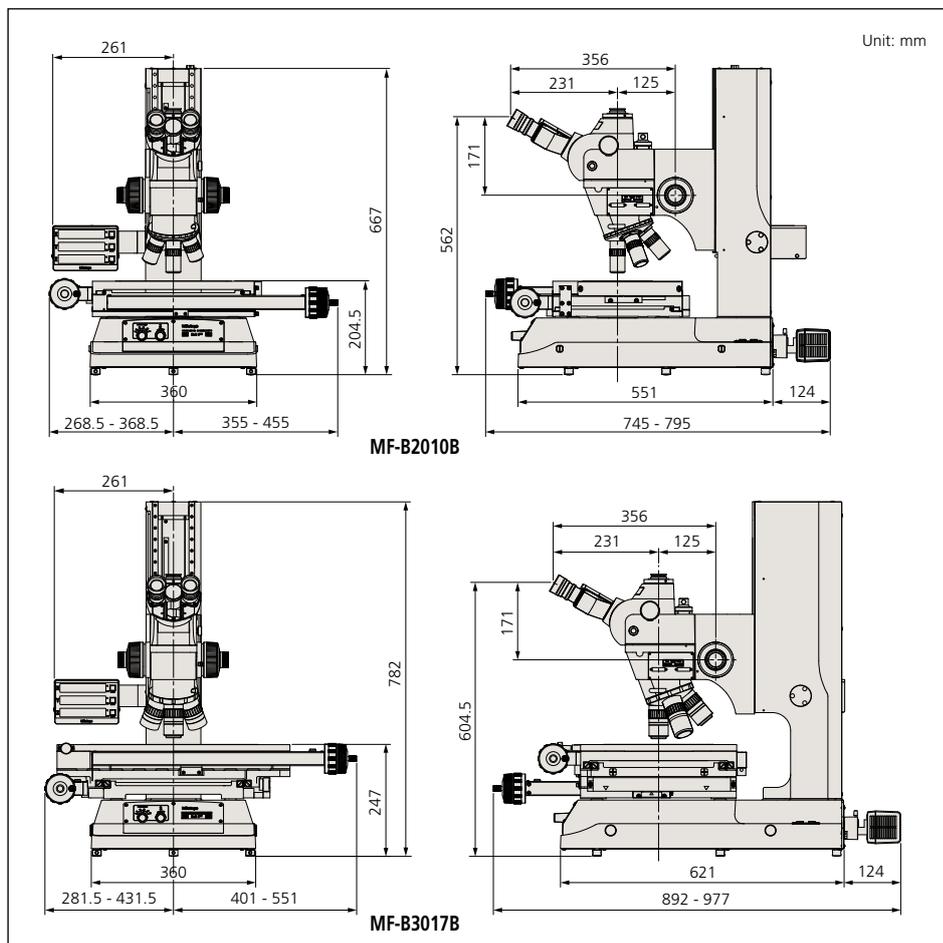
Model No.	MF-U_505B	MF-U_1010B	MF-U_2010B	MF-U_2017B	MF-U_3017B	MF-U_4020B	
Order No.	MF-A type	176-567*	176-568*	176-569*	176-570*	176-571*	176-572*
	MF-B type	176-587*	176-588*	176-589*	176-590*	176-591*	176-592*
	MF-C type	176-573*	176-574*	176-575*	176-576*	176-577*	176-578*
	MF-D type	176-593*	176-594*	176-595*	176-596*	176-597*	176-598*
XY stage travel range	50 x 50mm	100 x 100mm	200 x 100mm	200 x 170mm	300 x 170mm	400 x 200mm	
Z-axis travel range	150mm	150mm	150mm	220mm	220mm	220mm	
Focusing method	Manual focusing (coarse focusing: 10mm/rev., fine focusing: 0.1mm/rev.)						
Measurement method	Linear encoder (2-axis model: X / Y-axis, 3-axis model: X / Y / Z-axis)						
Resolution (switchable)	0.001mm / 0.0005mm / 0.0001mm / .0001" / .00005" / .00001"						
Measuring accuracy (at20°C)	XY-axis: (2.5+0.02L)μm, L = Measuring length (mm) when not loaded, JIS B 7153						
Indication accuracy (at20°C)	Z-axis: (5+0.04L)μm, L = Measuring length (mm)						
Floating function	X and Y axes with Quick-release mechanism						
XY stage top size	280 x 280mm	280 x 280mm	350 x 280mm	410 x 342mm	510 x 342mm	610 x 342mm	
Effective glass size	180 x 180mm	180 x 180mm	250 x 150mm	270 x 240mm	370 x 240mm	440 x 240mm	
Swiveling function	—	—	—	±5° (left)	±5° (left)	±3° (left)	
Max. workpiece weight	10kg	10kg	10kg	20kg	20kg	15kg	
Max. workpiece height	150mm	150mm	150mm	220mm	220mm	220mm	

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-567A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Machine type

	MF-A type	MF-B type	MF-C type	MF-D type
Observation type	Bright field (BF)	Bright field (BF)	Bright / Dark field (BF/DF)	Bright / Dark field (BF/DF)
Measurement system	X and Y-axis (2 axes)	X, Y and Z-axis (3 axes)	X and Y-axis (2 axes)	X, Y and Z-axis (3 axes)

DIMENSION



Hyper MF / MF-U

SERIES 176 — High-Accuracy Measuring Microscopes

FEATURES

- The world highest accuracy XY measuring accuracy of $(0.9+3L/1000)\mu\text{m}$
- Selectable LAF function
- High operatability and repeatability
- Three axes motorized control
Power-drive auto focus unit is a standard feature.

Hyper MF-U
(w/ optional optical tube, revolver and objective)



SPECIFICATIONS

Model No.	Hyper MF	Hyper MF-U
Order No. (mm)	176-401*	176-402*
Observation type	BF	BF or BF/BD
Digital counter	—	—
XY stage travel range	250 x 150mm	250 x 150mm
Measuring unit	Linear encoder	Linear encoder
Resolution	0.01 μm	0.01 μm
Measuring accuracy (at 20°C)	$\pm(0.9+3L/1000)\mu\text{m}$, L = XY axis measuring length (mm) when not loaded	
Drive system (X, Y, Z-axis)	Motor-driver control with the joystick	
XY stage top size	460 x 350mm	460 x 350mm
Effective glass size	300 x 200mm	300 x 200mm
Swiveling function	$\pm 3^\circ$	$\pm 3^\circ$
Max. workpiece weight	30kg	30kg
Max. workpiece height	150mm	150mm

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-401A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Technical Data: Hyper MF

Observation image:	Erect image
Optical tube:	Monocular or binocular tube (optional, depression: 25°), Reticle projection method, w/ TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece lens (optional):	10X, 15X, 20X
Objective:	3X (375-037), W.D.: 72.5mm Optional: 1X, 5X 10X, 20X, 50X, 100X
Contour illumination	
• Light source:	Halogen bulb (12V, 100W) (fiber optic cold light illumination)
• Optical system:	Telecentric illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, 100 steps brightness adjustment
Surface illumination	
• Light source:	Halogen bulb (12V, 50W)
• Optical system:	Koehler illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, 100 steps brightness adjustment
Data output	Via RS-232C interface
Power supply:	100/110/120/220/240V AC, 50/60Hz
Mass	250kg (main unit), 14kg (power unit)

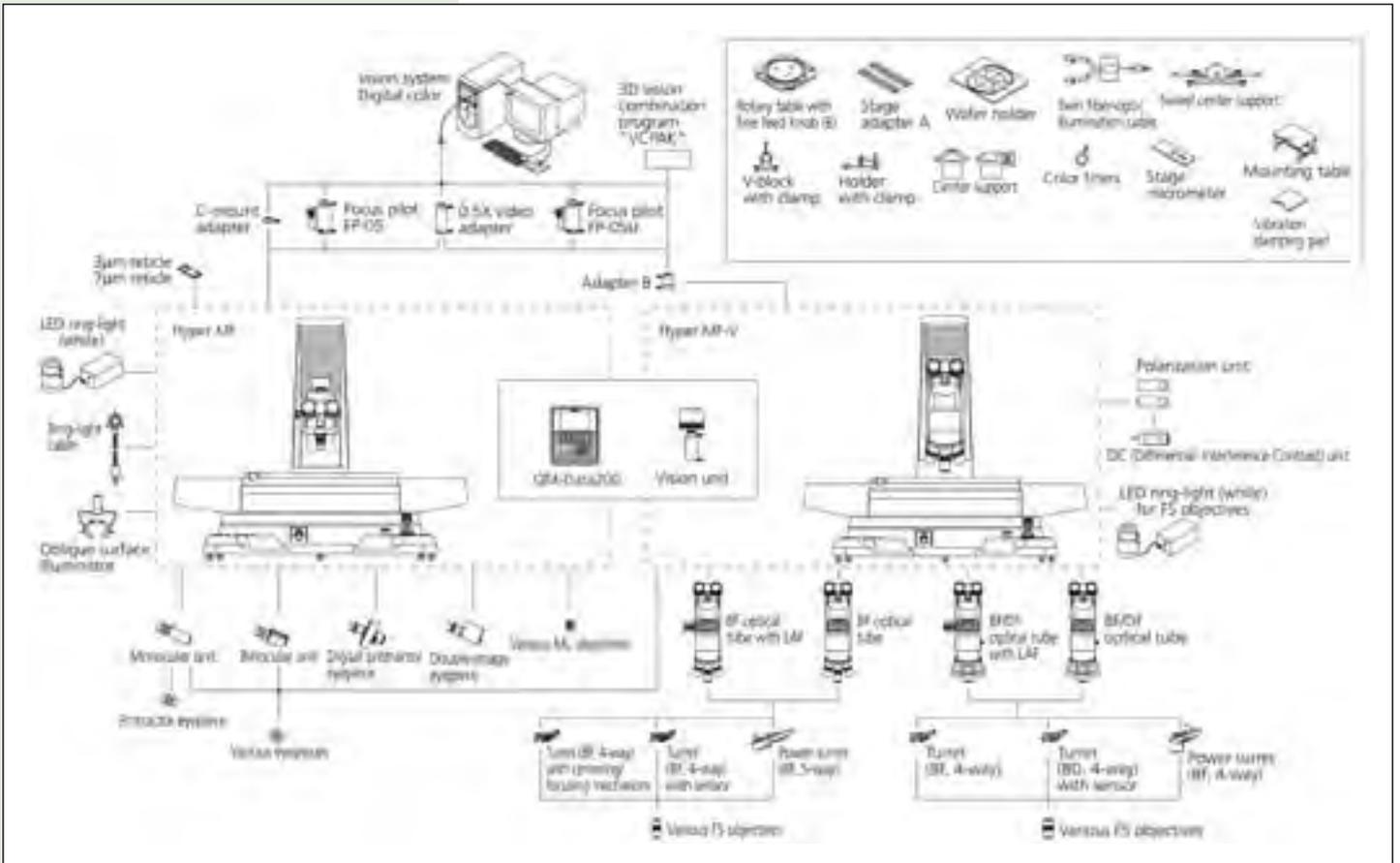
Technical Data: Hyper MF-U

Observation image:	Erect image
Optical tube:	Siedentoph type (pupil distance adjustment: 51 - 76mm), 1X tube lens, Binocular tube (depression: 25°), Reticle projection method, w/ TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece lens:	10X (field No.: 24mm), Optional: 15X, 20X
Revolver (optional):	M / BD Plan Apo objective from 1X to 100X
Objective (optional):	M / BD Plan Apo objective from 1X to 100X (Refer to the page 394 for more details.)
Contour illumination	
• Light source:	Halogen bulb (12V, 100W)
• Optical system:	Telecentric illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, 100 steps brightness adjustment
Surface illumination	
• Light source:	Halogen bulb (12V, 50W)
• Optical system:	Koehler illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, 100 steps brightness adjustment
Data output	Via RS-232C interface
Power supply:	100/110/120/220/240V AC, 50/60Hz
Mass	255kg (main unit), 14kg (power unit)

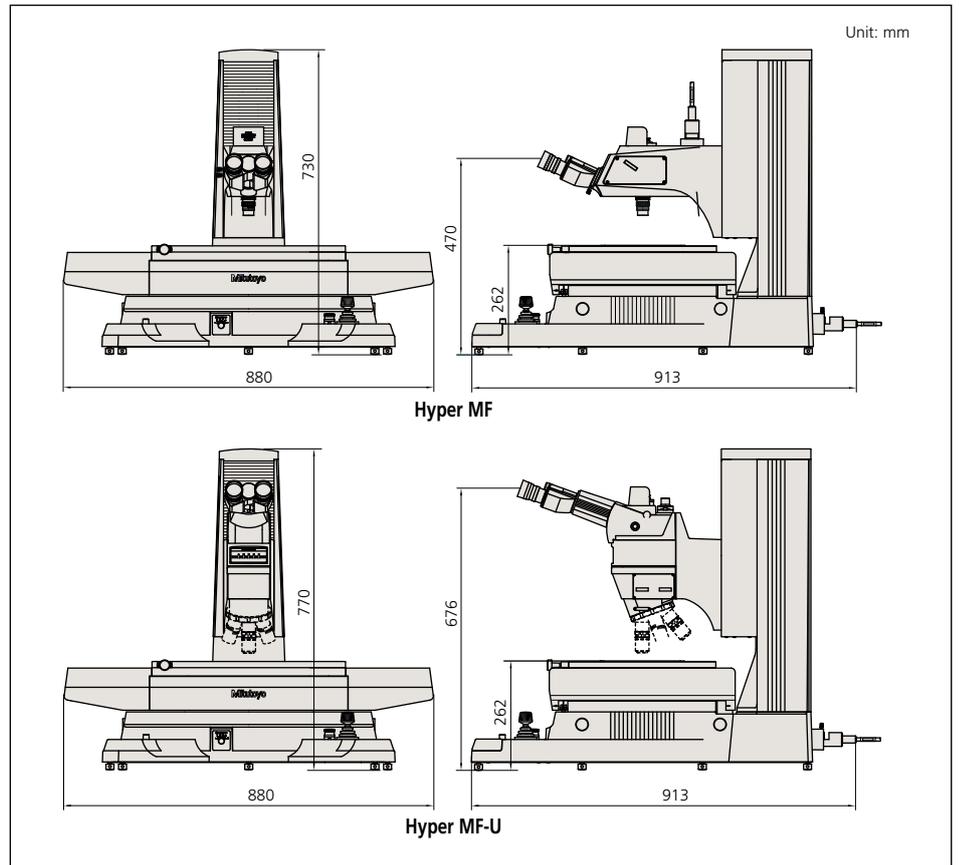


Refer to the Hyper MF / MF-U leaflet (E4267)
for more details.

SYSTEM DIAGRAM



DIMENSION



Accessory for Measuring Microscope

Focus Pilot FP-05

FEATURES

- 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.	375-055*	375-065*
Applicable microscopes	MF models	MF-U models
Magnification	0.5X, Accuracy: 0.1%**	
Camera adapter	C-mount (provided)	
Applicable CCD camera	Up to 2/3-inch	
Mass	1.8kg	1.8kg

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **375-055A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V
 **within 2/3 area from the center of view field

Focusing charts

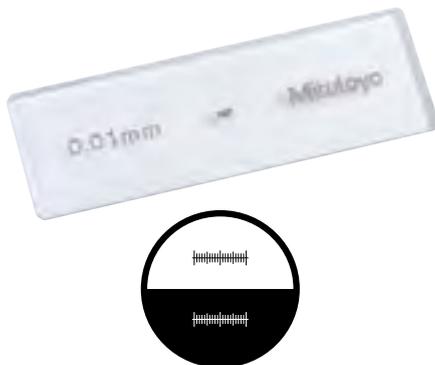


375-055: Concentric circle



375-065: Slit

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)	76 x 26 x mm
Mass	16g

Power Focus Unit



SPECIFICATIONS

Order No.	378-307*
Applicable microscopes	MF-A models, MF-UA models
Resolution	0.4μm
Drive speed	3.2mm/s
Power supply	100 - 240V AC, 50/60Hz
Dimensions (WxDxH)	Control box: 108 x 72 x 193mm

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **378-307A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

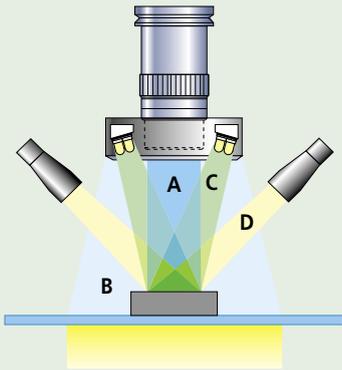
Power Turret



SPECIFICATIONS

Order No.	378-016*	378-210*
Observation type	BF	BF/DF
Applicable microscopes	MF-UB models	
No. of objective mounts	5-mount	4-mount
View field adjustment range	±0.5mm	
Power supply	100 - 240V AC, 50/60Hz	
Dimensions (W x D x H)	Control box: 108 x 72 x 193mm	

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **378-016A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V



A: Vertical surface illumination (Halogen)



PCB



HDD suspension



IC circuit

B: Ring fiber optics illumination



Flexible PCB



PCB



Electric parts

C: LED ring illumination



HDD suspension

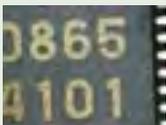


PCB



Black resin molded parts

D: Twin fiber optics illumination



IC package



Garnet



PCB

Twin fiber optics illuminator



SPECIFICATIONS

Order No.	176-343*
Applicable microscopes	MF-B, MF-UB models
Length of fiber cable	1800mm
Light source	Halogen bulb (12V, 100W) (517181: halogen bulb)
Dimensions (W x D x H)	Light unit: 235 x 76 x 120mm

Color filters (GIF: **12AAG806**, LB80: **12AAG807**) are available.
 *To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-343A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Ring fiber optics illuminator



SPECIFICATIONS

Order No.	176-366*
Applicable microscopes	MF-B models
Length of fiber cable	1000mm
Light source	Halogen bulb (12V, 100W) (517181: halogen bulb)
Dimensions (W x D x H)	Light unit: 235 x 76 x 120mm

Color filters (GIF: **12AAG806**, LB80: **12AAG807**) are available.
 *To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-366A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

LED ring illuminator



SPECIFICATIONS

Order No.	176-367-1*
Applicable microscopes	MF-B models with 1X/3X/5X objective
Light source	White LED (12V, 100W)
Length of LED cable	1500mm

Color filters (ND2: **12AAA643**, ND8: **12AAA644**, GIF: **12AAA645**, LB80: **12AAA646**) are available.
 *To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-367-1A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Oblique surface illumination unit



SPECIFICATIONS

Order No.	176-351-6*
Applicable microscopes	MF-B models with 1X/3X/5X objective
Light source	Supplied from microscope (surface illumination)

Color filters (ND2: **12AAA643**, ND8: **12AAA644**, GIF: **12AAA645**, LB80: **12AAA646**) are available.
 *To denote your AC line voltage add the following suffixes to the order No. (e.g.: **176-351-6A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

QM-Data200

SERIES 264 — 2-D Data Processing Unit

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.

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" 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.

Technical Data

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-10F format)
Display language:	Japanese/English/German/French/Italian/Spanish/Portuguese
Data input:	RS-232C, X/Y/Z-axis signal, Footswitch
Data output:	RS-232C, Printer, Floppy disk drive unit
Power supply:	100V AC to 240V AC
Mass:	2.2kg (stand-mount type) 2.1kg (arm-mount type)

QM-Data200

Order No.: 264-145* (stand-mount type)

Order No.: 264-146* (arm-mount type)

Order No.: 264-149* (for Hyper MF/MF-U)

* To denote your AC line voltage add the following suffixes to the order No. (e.g.:

264-140A):

A for UL/CSA, D for CEE, E for BS, DC for China, K for EK, No suffix is required for JIS/100V



QM-Data 200
Stand-mount type

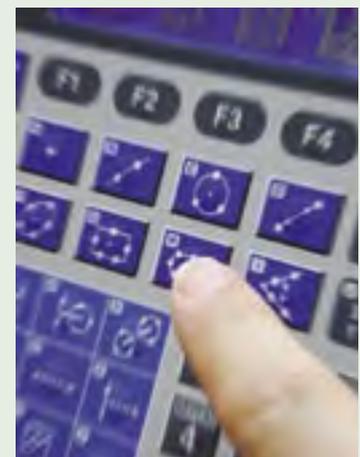
• Graphic display

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

The QM-Data200 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.



Optional Accessory

- 12AAH035:** Floppy disk drive unit (USB type)
- 12AAH034:** Stick memory (512MB, USB type)
- 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)
- 12AAA920:** RS-232C cable (3m)

Technical Data

Image detection

- Directivity: Non-direction
- Min. diameter: $\varnothing 2\text{mm}$ on the screen
- Min. width: 1mm on the screen
- Max. moving speed: 1000mm/s

Applicable illumination

- Type: Surface / Contour illumination
- Range: 30Lx to 1500Lx on the screen
Bright-Dark field difference: 20Lx

Repeatability:

1 μm in contour illumination

Function:

Error in detection of illumination change
Supporting a contour illumination
brightness selector switch of projector

Optional Accessory

12AAE671:

Detector attachment (A)

PJ-A3000, PJ-H30, PH-3515, PH-A14 series
(Adaptation diameter of a screen: $\varnothing 250$ to $\varnothing 350\text{mm}$)

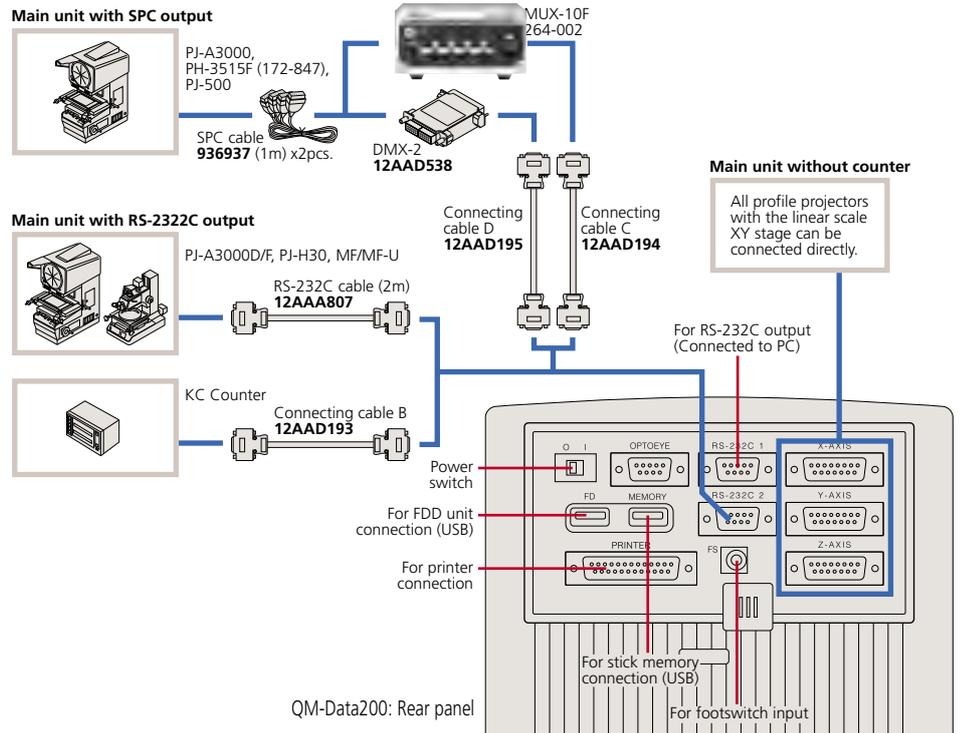
12AAE672:

Detector attachment (B)

PJ-500, PV-5110, PV-600A series
(Adaptation diameter of a screen: $\varnothing 500$ to $\varnothing 600\text{mm}$)



SYSTEM DIAGRAM



OPTOEYE-200

The OPTOEYE-200 Image Edge Sensor eliminates human errors which may be involved in visual alignment, ensuring speedy, accurate, and consistent measurements, regardless of operator's skill.

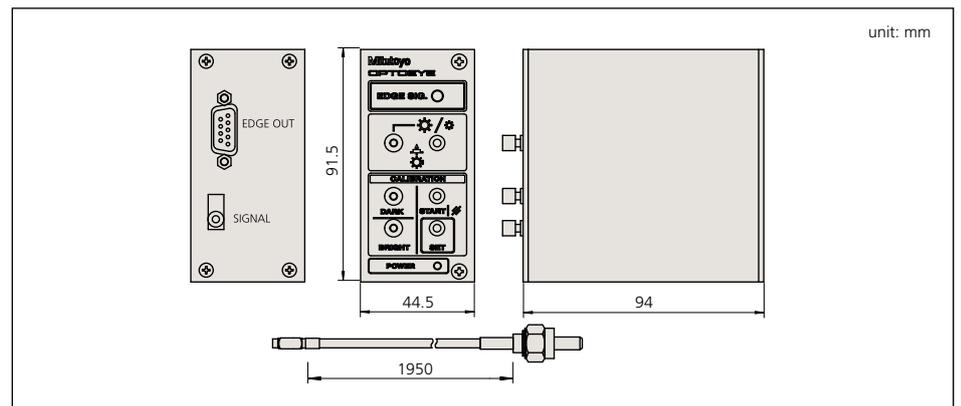
FEATURES

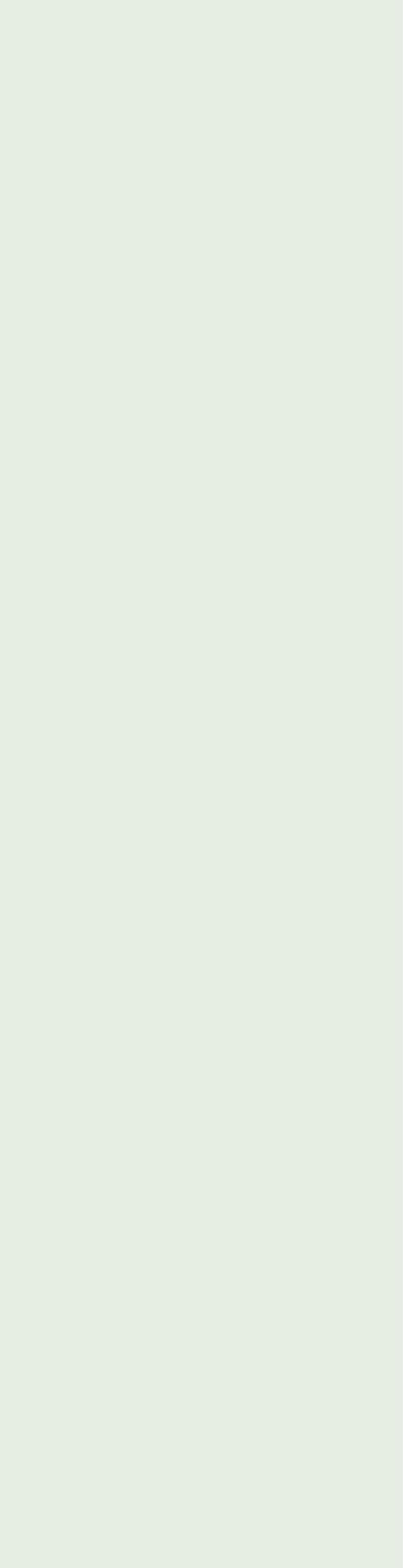
- OPTOEYE-200 adopts a thin fiber-optic cable for detector connection to offer easy set-up and smart operation without obstructing your vies.

- Bright and dark buttons allow easy calibration.
- OPTOEYE can be powered by QM-Data200 via the connecting cable. It means that no AC adapter is required. type of the workpiece surface texture.
- The brightness of the chart can be adjusted.



DIMENSION





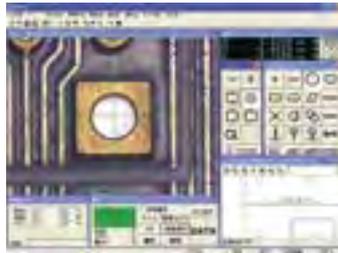
Vision Unit

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/MF-U series.)

QSPAK Measurement Window



Technical Data

- Projected image: Inverted image
 CCD camera unit
- Image sensor: 1/3" color CCD camera
 - Resolution: 0.0001mm
 - Dimensions: 100 x 58 x 89mm (W x D x H)
 - Mass: 0.4kg
- Adapter unit
- Operating software: QSPAK (optional)
 - Dimensions: 45 x 123mm
 - Magnification: 0.5X
 - Mass: 0.3kg
- Magnifications: 21X - 210X on 17" monitor
 Standard accessory: Foot switch (937179T)

QSPAK, optional software

For observation/comparison of a form

- Template matching function
- Manual pattern matching function

For simple measurement

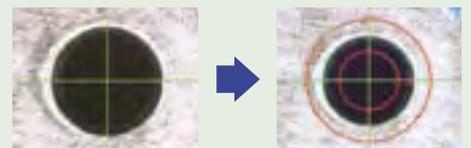
- One-click edge detection tool function
- Smart tool function
- User macro function

For repeated measurement/auto-measurement

- Quick navigation function
- Playback function
- Graphic function
- External data output function
- Statistical calculation function

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.

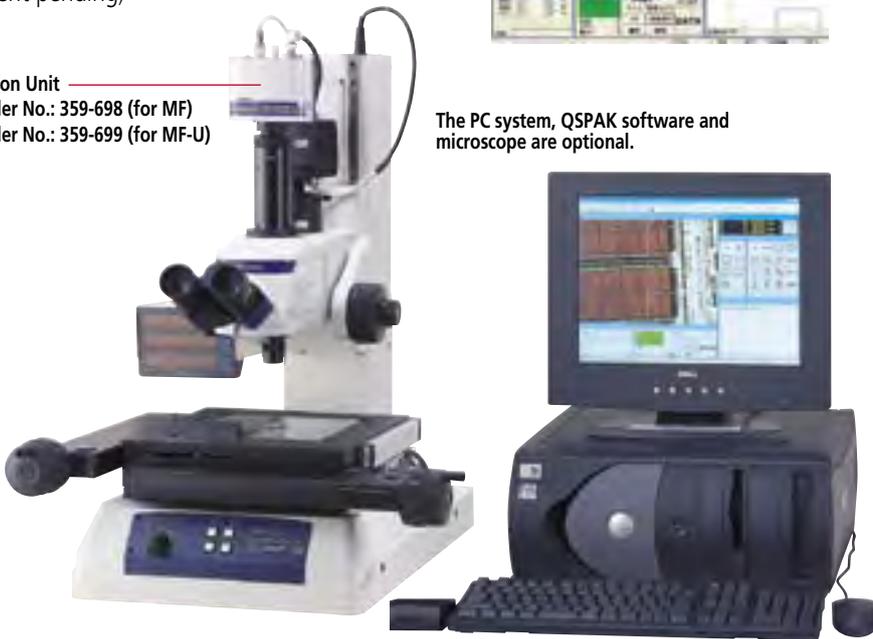


Graphic Window

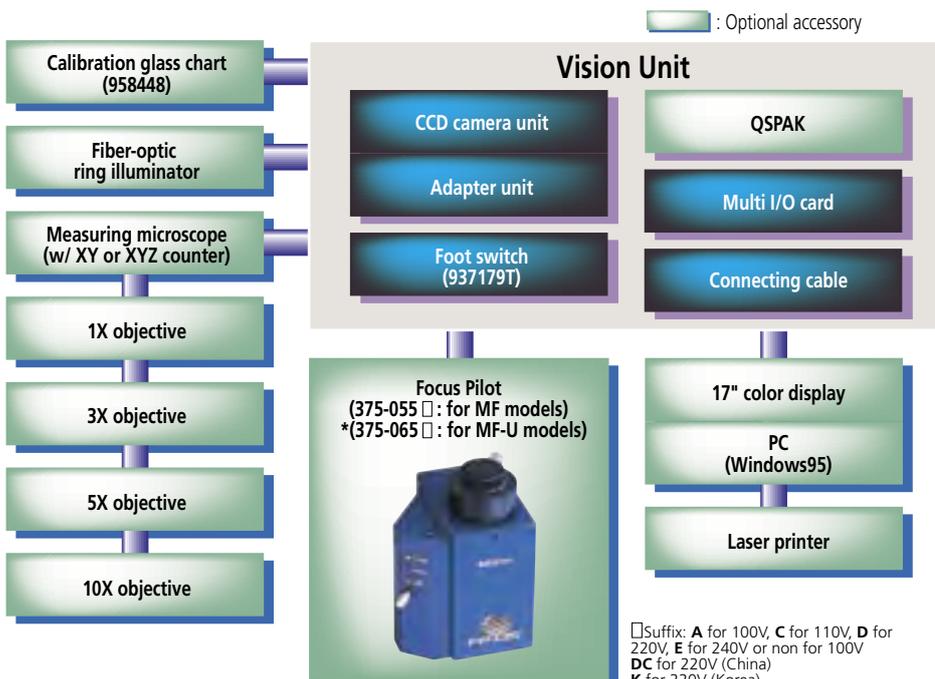
The measurement results and measured elements are plotted in the graphic window in real-time. By using this function the user can check the current measuring position at a glance. The graphic window can be used for geometrical calculation.



Vision Unit
 Order No.: 359-698 (for MF)
 Order No.: 359-699 (for MF-U)



The PC system, QSPAK software and microscope are optional.



Ball Endmill Measuring Unit

SERIES 359 — Checking R-contour of ball endmill

FEATURES

With the Ball Endmill measuring unit the operator can check for abrasion wear while checking the R-contour after re-grinding or during grinding the ball-end. Periodically checking for abrasion wears in the ball endmill's R-contour helps the user forecast when to replace or re-grind the ball-end, thus ensuring a stable processing accuracy. This also helps to reduce the running cost of the ball endmill while increasing work efficiency.

- Periodically check R-contour, in order to improve processing accuracy
- Access the condition of R-contour after re-grinding the tool end
- Generate a report of the R-contour measurement result
- Save clear images of the tool end in file
- Increase accuracy better than you normally do with use of profile projector

From setting a reference point to measuring R-contour, the operation is made simple

All you have to do to carry out the entire measurement procedure is to simply enter measuring conditions in the menu of the ball endmill measuring program.



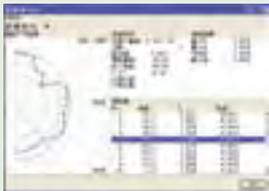
Digital rotary heads providing high-accuracy indexing

Equipped with digital micrometer heads that can switch displays between 0.1 and 1 degrees, thus providing high-accuracy indexing of angles.



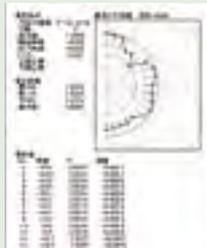
Allows graphic display of R-contour measurement result

Measurement result of R-contour is graphically displayed to allow the assessment of contour accuracy at a glance.



Report generation function for easily generating reports

Measurement result can be easily made into a report, which can later be used as a shopfloor setting data sheet after re-grinding or an abrasion status data sheet.



Saving image files

Images of the tool edge conditions, such as the state of finish and wear, can be saved in digital file.



R-contour measurement with high-accuracy by the use of image processing

A CCD camera is used in image processing for position detection, in order to avoid focus error and to thereby ensure high-accuracy R-contour measurements. This also increases measuring efficiency and helps reduce labor.



Setting a reference point on shank

Measuring R-contour of blade edge

Measuring R-contour at a different position

The PC system, microscope and vision unit are optional.



QSPAK and ball endmill extension program

Angle counter

Digital rotary head

System configuration

- Ball endmill measuring unit (359-655*)
- Digital rotary head
- Ball endmill extension program
- *Suffix: **A** for 100V, **D** for 220V, **E** for 240V
- MF series measuring microscope
- Vision Unit
- QSPAK (measuring program)
- Collet chuck set
- Set A (12AAG241):
ø2.5 to ø5.0mm 5 pcs./set
- Set B (12AAG242):
ø5.5 to ø10.0mm 5 pcs./set
- Set C (12AAG243):
ø10.5 to ø15.0mm 5 pcs./set
- Set D (12AAG244):
ø15.5 to ø20.0mm 5 pcs./set



Digital rotary head



Collet chuck

FS-110

SERIES 378 — Metallurgical Microscope

The FS-110 is designed for inspecting micro-components such as IC chips and video head parts. The optical system features ultra-long working distance objectives, wide view field eye-pieces, and independent correction for lateral chromatic aberration.

FEATURES

- The complete system of FS-110 can be composed of a variety of parts for meeting diverse applications.
- Available without or 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.

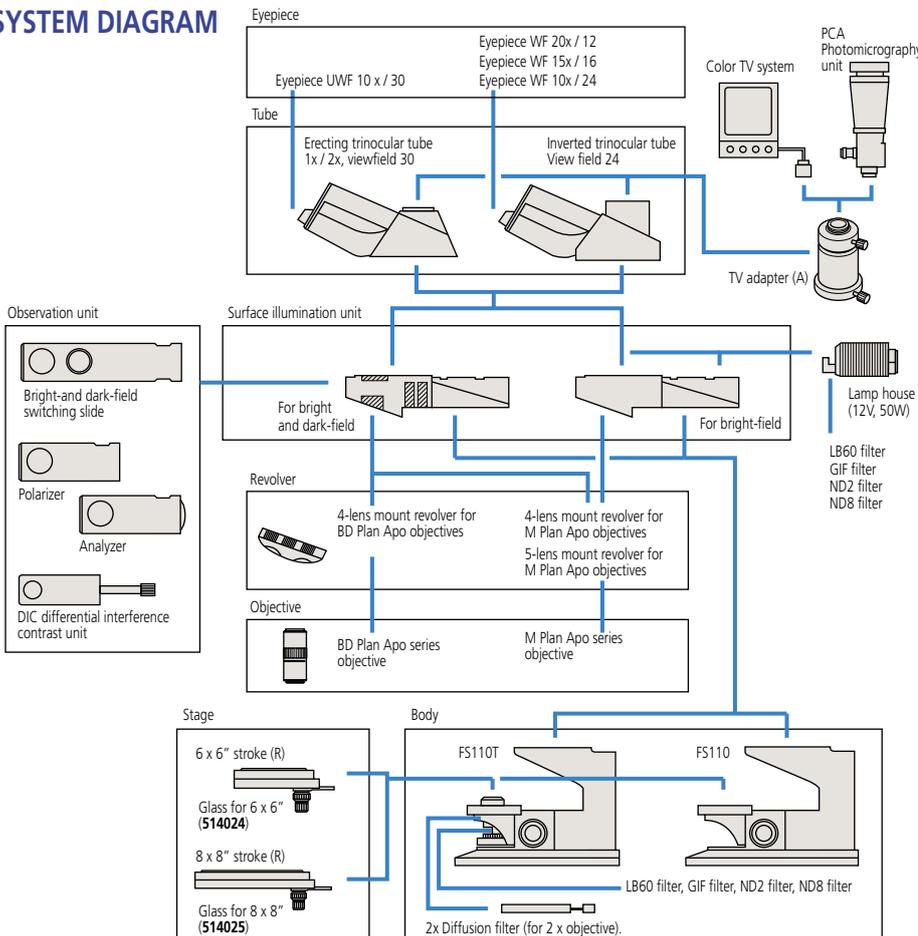


FS-110T with optional accessories



FS-110IR with optional accessories

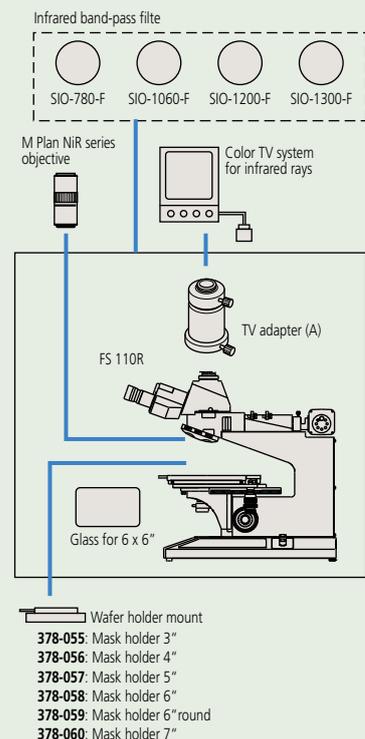
SYSTEM DIAGRAM



Optional Accessory

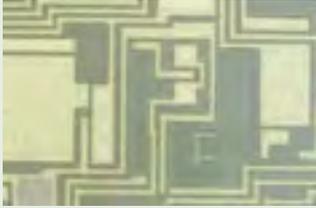
- 378-856:** 10X eyepiece (Field number: 24), 2 pcs. /set
 - 378-857:** 15X eyepiece (Field number: 16), 2 pcs. /set
 - 378-858:** 20X eyepiece (Field number: 12), 2 pcs. /set
 - 378-851:** Extra-wide 10X eyepiece (Field number: 30)*
 - 378-003:** Trinocular tube, 1X (Erect image)
 - 378-004:** Trinocular tube, 1X (Inverted image)
 - 378-001:** Trinocular tube, 1X / 2X switchable (Erect image)
 - 12AAA646:** Color filter (LB80)
 - 12AAA643:** Color filter (ND2)
 - 12AAA646:** Color filter (ND8)
 - 12AAA645:** Color filter (Green)
 - 378-031:** Reflected illumination unit (Bright/dark field)
 - 378-032:** Reflected illumination unit (Bright field)
 - 378-085:** Light source unit**
 - 378-013:** Revolving nosepiece w/ 4 lens mounts (B/D field)
 - 378-014:** Revolving nosepiece w/ 4 lens mounts (Bright field)
 - 378-015:** Revolving nosepiece w/ 5 lens mounts (Bright field)
 - 378-074:** Polarizing unit
 - 378-075:** Bright/dark field switching unit
 - 378-021:** Workstage (6" x 6"), Right-handed type
 - 378-022:** Workstage (6" x 6"), Left-handed type
 - 378-023:** Workstage (8" x 8"), Right-handed type
 - 378-024:** Workstage (6" x 6"), Left-handed type
 - 514024:** Stage glass for 6" x 6" workstage
 - 514025:** Stage glass for 8" x 8" workstage
 - 378-051:** Wafer holder (3" DIA. - 6" DIA.)
 - 378-055:** Mask holder (3" x 3")
 - 378-056:** Mask holder (4" x 4")
 - 378-057:** Mask holder (5" x 5")
 - 378-058:** Mask holder (6" x 6")
 - 378-059:** Mask holder (7" x 7")
 - 378-060:** Mask holder (6" DIA.)
 - 378-076:** Differential interference contrast unit (100X, SL80, SL50X)
 - 378-078:** Differential interference contrast unit (50X, SL20X)
 - 378-079:** Differential interference contrast unit (20X)
 - 378-080:** Differential interference contrast unit (10X, 5X)
 - 378-041:** CCD camera mount adapter
- (See page 394.) Objectives**
 * Can be used with the special trinocular tube (378-001).
 ** Light source: Halogen bulb (12V, 50W)

SYSTEM DIAGRAM: FS110-IR

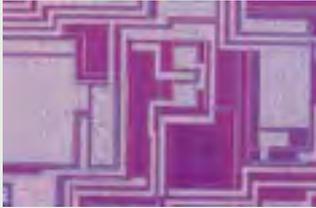


FS-300

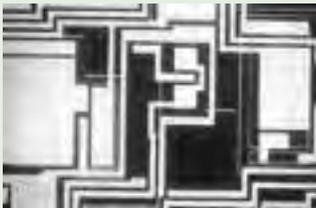
SERIES 378 — High Power Inspection Microscope



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.



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.



Bright field observation:
Most common method of observation. Observing directly the light reflected on the surface of workpiece.



Refer to the FS-300 leaflet (E4197) for more details.

The FS-300 is designed for inspecting micro-components 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.



FS-300 with optional accessories

SPECIFICATIONS

Main unit	Observation system	Bright field (BF): 378-320, 378-322, 378-324, 378-326 Bright/dark field (BF/DF): 378-321, 378-323, 378-325, 378-327	
	Reflected illumination	Koehler illumination With aperture diaphragm (centering mechanism) and field stop 12V/100W halogen lamp (non-stepped brightness adjustment) With filter mounting slot (2-slot) With BF/DF switching slide (378-321, 378-323, 378-325, 378-327 only)	
	Transmitted illumination	12V/100W fiber illumination (non-stepped brightness adjustment) With aperture diaphragm (378-321, 378-323, 378-325, 378-327 only)	
	Focus adjustment	With concentric coarse and fine focusing wheels (right and left) Fine adjustment: 0.1mm/rev. for 32mm travel range 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	24	
	Depression angle	Fixed 20°: 378-320, 378-321, 378-322, 378-323 Adjustable 0° to 20°: 378-324, 378-325, 378-326, 378-327	
	Intermediate image mag.	1X	
	Optical pass ratio	Siedentopf type, adjustment range: 51 - 76mm	
	Pupil distance	Siedentopf type, adjustment range: 51 - 76mm	
Eyepiece	Field of view	10X/ø30: 378-320, 378-321, 378-322, 378-323	
		10X/ø24: 378-324, 378-325, 378-326, 378-327	
Applicable objective (optional)	M Plan Apo, M Plan Apo SL, G Plan Apo: 378-320, 378-322, 378-324, 378-326 BD Plan Apo, BD Plan Apo SL: 378-321, 378-323, 378-325, 378-327		
Dimensions	Main unit	360 x 803 x 568.5mm	
	Workstage	700 x 400mm	
Power supply	100 to 240VAC, 50/60Hz		
Power consumption	Approx. 150W: 378-320, 378-321, 378-324, 378-325		
	Approx. 300W: 378-322, 378-323, 378-326, 378-327		
Mass	Approx. 50kg including workstage		

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. Order No.	FS70 378-184-1	FS70-TH 378-184-3	FS70Z 378-185-1	FS70Z-TH 378-185-3	FS70L 378-186-1	FS70L-TH 378-186-3	FS70L4 378-187-1	FS70L4-TH 378-187-3
Short base model No. Order No.	FS70-S 378-184-2	FS70-THS 378-184-4	FS70Z-S 378-185-2	FS70Z-THS 378-185-4	FS70L-S 378-186-2	FS70L-THS 378-186-4	FS70L4-S 378-187-2	FS70L4-THS 378-187-4
Focus adjustment	50mm travel range with concentric coarse (3.8mm/rev) and fine (0.1mm/rev) focusing wheels (right / left)							
Image	Erect image							
Pupil distance	Siedentopf type, adjustment range: 51 - 76mm							
Field number	24							
Tilt angle	—	0° - 20°	—	0° - 20°	—	0° - 20°	—	0° - 20°
Optical pass ratio	50/50	100/0 or 0/100	50/50	100/0 or 0/100	100/0 or 0/100		100/0 or 0/100	
Protective filter	—		—		Built-in laser beam filter		Built-in laser beam filter	
Tube lens	1X		1X - 2X zoom		1X		1X	
Applicable laser	—		—		1064/532/355nm		532/355nm	
Camera mount	C-mount (using optional adapter B)				Use a laser with TV port.		C-mount receptacle (with green filter switch)	
Illumination system, optional	Reflective illumination for bright field (Koehler illumination, with aperture diaphragm) 12V 100W fiber optics, non-stepped adjustment, light guide length: 1.5m, power consumption 150W							
Objective, optional (for observation)	M Plan Apo, M Plan Apo SL, G Plan Apo							
Objective, optional (for laser-cutting)	—				M/LCD Plan NIR, M/LCD Plan NUV		M Plan UV	
Loading weight*	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

*Loading weight on optical tube excluding weight of objective lenses and eyepieces

Technical Data

Focus adjustment	
• Method:	With concentric coarse and fine focusing wheels (right and left) 50mm travel range
• 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)
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 (optional):	M Plan Apo-4, M Plan Apo SL, G Plan Apo



Refer to the Microscope Units leaflet (E4191) for more details.

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.



SPECIFICATIONS

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"> 1/2-inch CCD camera (optional): 2.56x1.92mm - 0.064x0.048mm Binocular: ø3.2mm - ø0.08mm
Reflected illumination	<ul style="list-style-type: none"> Koehler system (with aperture stop) Fiber-optic illuminator (378-088) is required for the manual zoom type.
Light source	Halogen bulb (21V, 150W)
Focusing unit	Concentric coarse and fine wheels
Power supply	20Lx (min.) on the screen
Mass	Main unit: Approx. 7kg Binocular unit: 1kg Remote controller unit: Approx. 7kg

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.

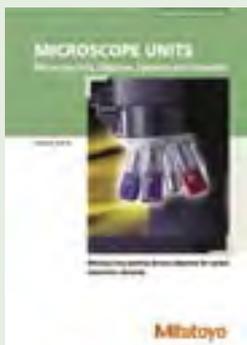
Selection Guide of System Configuration

Order No. (Depends on each system configuration)	378-171*	378-172*	378-173*	378-174*	378-175*	378-176*	378-177*	378-178*	378-181*	378-182*	Remarks
Manual zoom function	●	●	●	●							
Power zoom function					●	●	●	●	●	●	Fiber-optic illumination controller is also provided.
Single-objective mount	●				●						
Double-objective mount		●	●	●		●	●	●	●	●	The objective can be switched due to the sliding mechanism.
Binocular unit		●	●	●							10X eyepieces (378-856) are provided.
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.

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: 378-171A):

A for UL/CSA, D for CEE, E for BS, DC for China, K for EK, No suffix is required for JIS/100V



Refer to the Microscope Units leaflet (E4191) for more details.

VMU

SERIES 378 — Video Microscope Unit

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).



SPECIFICATIONS

Magnification of tube	1X
Applicable wavelength	378-505, 378-506: Near-infrared and visible radiation 378-507: Near-infrared—visible—near-ultraviolet radiation 378-508: Visible and ultraviolet radiation
Objective (Optional)	
Reflected illumination	<ul style="list-style-type: none"> • Teracentric system with aperture stop system • Fiber-optic illuminator (optional) is required.
Light source	Halogen bulb (21V, 150W) (optional)
Mass	378-505: 570g 378-506: 590g 378-507: 980g 378-508: 1010g

Selection Guide of System Configuration

Order No. (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 Apo NIR, LCD Plan Apo NIR, M Plan Apo NUV and LCD Plan Apo NUV objectives for laser cutting				▲
M Plan UV objectives for laser machining				▲

●: Provided, ▲: Available as optional accessory



Refer to the Microscope Units leaflet (E4191) for more details.

Eyepiece

SERIES 378

FEATURES

- The field of view is extra wide.
- Optional reticles are available.

Reticles (optional)

- 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)



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

Objectives

SERIES 378

The Mitutoyo 378 Series objectives have the world's longest working distance and an infinity correction optical system. These objectives provide flexible observation at high magnifications and independent correction of 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 throughout the field of view, making it is 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.



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



Near-infrared radiation corrected M Plan Apo NIR objective



Near-ultraviolet radiation corrected M Plan Apo NUV objectives



Ultraviolet radiation corrected M Plan UV objectives



Refer to the Microscope Units leaflet (E4191) for more details.

M Plan Apo for Bright Field Observation

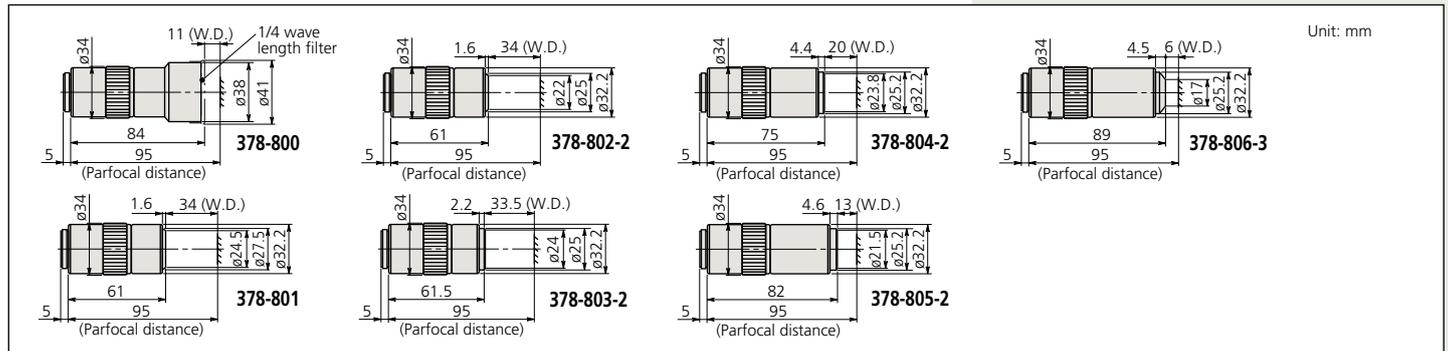
Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-800	1X	0.025	11.0mm	200mm	11.0 μ m	440 μ m	ϕ 24mm	4.8x6.4mm	300g
378-801	2X	0.055	34.0mm	100mm	5.0 μ m	91 μ m	ϕ 12mm	2.4x3.2mm	220g
378-802-2	5X	0.14	34.0mm	40mm	2.0 μ m	14.0 μ m	ϕ 4.8mm	0.96x1.28mm	230g
378-803-2	10X	0.28	33.5mm	20mm	1.0 μ m	3.5 μ m	ϕ 2.4mm	0.48x0.64mm	230g
378-804-2	20X	0.42	20.0mm	10mm	0.7 μ m	1.6 μ m	ϕ 1.2mm	0.24x0.32mm	270g
378-805-2	50X	0.55	13.0mm	4mm	0.5 μ m	0.9 μ m	ϕ 0.48mm	0.10x0.13mm	290g
378-806-3	100X	0.70	6.0mm	2mm	0.4 μ m	0.6 μ m	ϕ 0.24mm	0.05x0.06mm	320g

Note:

Polarizing unit (378-074) is required when using 1X objective.

Mag.: Magnification
 N.A.: Numerical aperture
 W.D.: Working distance
 f: Focal distance
 R: Resolving power
 D.F.: Focal depth
 View field 1: Field of view when using ϕ 24mm eyepiece
 View field 2: Field of view when using 1/2" CCD camera

DIMENSION



M Plan Apo SL for Bright Field Observation

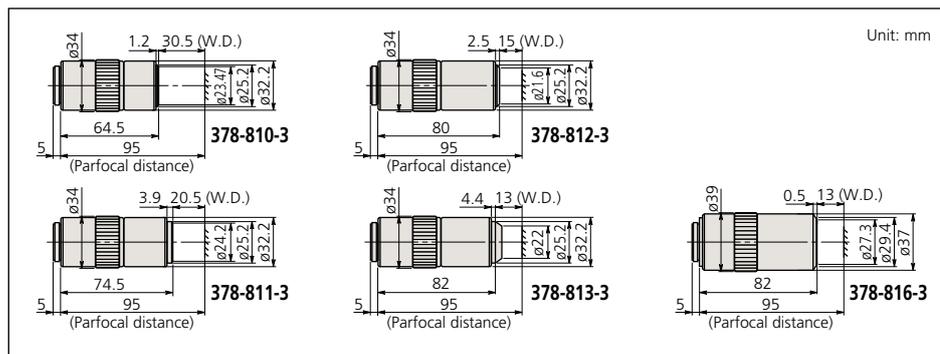
Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-810-3	20X	0.28	30.5mm	10mm	1.0 μ m	3.5 μ m	ϕ 1.2mm	0.24x0.32mm	240g
378-811-3	50X	0.42	20.5mm	4mm	0.7 μ m	1.6 μ m	ϕ 0.48mm	0.10x0.13mm	280g
378-812-3	80X	0.50	15.0mm	2.5mm	0.6 μ m	1.1 μ m	ϕ 0.3mm	0.06x0.08mm	280g
378-813-3	100X	0.55	13.0mm	2mm	0.5 μ m	0.9 μ m	ϕ 0.24mm	0.05x0.06mm	290g
378-816-3	200X	0.62	13.0mm	1mm	0.4 μ m	0.7 μ m	ϕ 0.12mm	0.025x0.03mm	490g

Note:

These objectives offer extra-long working distance.

Mag.: Magnification
 N.A.: Numerical aperture
 W.D.: Working distance
 f: Focal distance
 R: Resolving power
 D.F.: Focal depth
 View field 1: Field of view when using ϕ 24mm eyepiece
 View field 2: Field of view when using 1/2" CCD camera

DIMENSION



M Plan Apo HR for Bright Field Observation

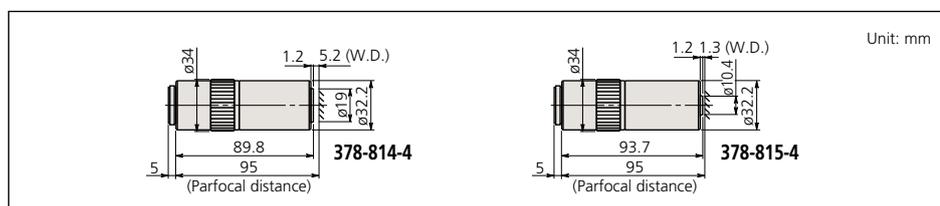
Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-788-4	10X	0.42	15mm	20mm	0.8 μ m	1.1.55 μ m	ϕ 1.2mm	0.24x0.32mm	240g
378-814-4	50X	0.75	5.2mm	4mm	0.4 μ m	0.48 μ m	ϕ 0.48mm	0.10x0.13mm	275g
378-815-4	100X	0.90	1.3mm	2mm	0.3 μ m	0.34 μ m	ϕ 0.24mm	0.05x0.06mm	275g

Note:

These objectives offer extra-high resolving power.

Mag.: Magnification
 N.A.: Numerical aperture
 W.D.: Working distance
 f: Focal distance
 R: Resolving power
 D.F.: Focal depth
 View field 1: Field of view when using ϕ 24mm eyepiece
 View field 2: Field of view when using 1/2" CCD camera

DIMENSION



Note:
The LCD Plan Apo Series are designed for observing a workpiece through LCD glass (thickness = 3.5mm).

Mag.: Magnification
N.A.: Numerical aperture
W.D.: Working distance
f: Focal distance
R: Resolving power
D.F.: Focal depth
View field 1: Field of view when using $\phi 24$ mm eyepiece
View field 2: Field of view when using 1/2" CCD camera

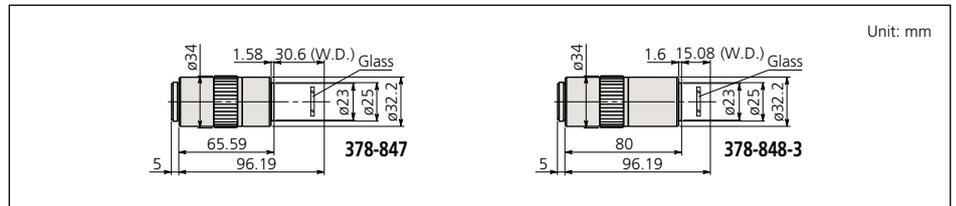
Mag.: Magnification
N.A.: Numerical aperture
W.D.: Working distance
f: Focal distance
R: Resolving power
D.F.: Focal depth
View field 1: Field of view when using $\phi 24$ mm eyepiece
View field 2: Field of view when using 1/2" CCD camera

Glass Thickness (t = 3.5mm) Corrected G Plan Apo for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-847	20X	0.28	29.42mm*	10mm	1.0 μ m	3.5 μ m	$\phi 1.2$ mm	0.24x0.32mm	270g
378-848-3	50X	0.50	13.89mm*	4mm	0.6 μ m	1.1 μ m	$\phi 0.48$ mm	0.10x0.13mm	320g

*In air

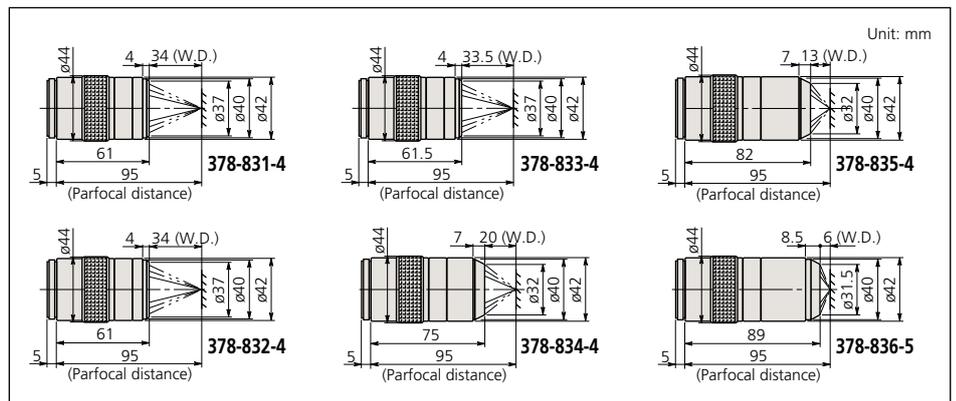
DIMENSION



BD Plan Apo for Bright / Dark Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-831-4	2X	0.055	34.0mm	100mm	5.0 μ m	91 μ m	$\phi 12$ mm	2.4x3.2mm	230g
378-832-4	5X	0.14	34.0mm	40mm	2.0 μ m	14.0 μ m	$\phi 4.8$ mm	0.96x1.28mm	240g
378-833-4	10X	0.28	33.5mm	20mm	1.0 μ m	3.5 μ m	$\phi 2.4$ mm	0.48x0.64mm	240g
378-788-4	20X	0.42	20.0mm	10mm	0.7 μ m	1.6 μ m	$\phi 1.2$ mm	0.24x0.32mm	300g
378-814-4	50X	0.55	13.0mm	4mm	0.5 μ m	0.9 μ m	$\phi 0.48$ mm	0.10x0.13mm	320g
378-815-4	100X	0.70	6.0mm	2mm	0.4 μ m	0.6 μ m	$\phi 0.24$ mm	0.05x0.06mm	320g

DIMENSION



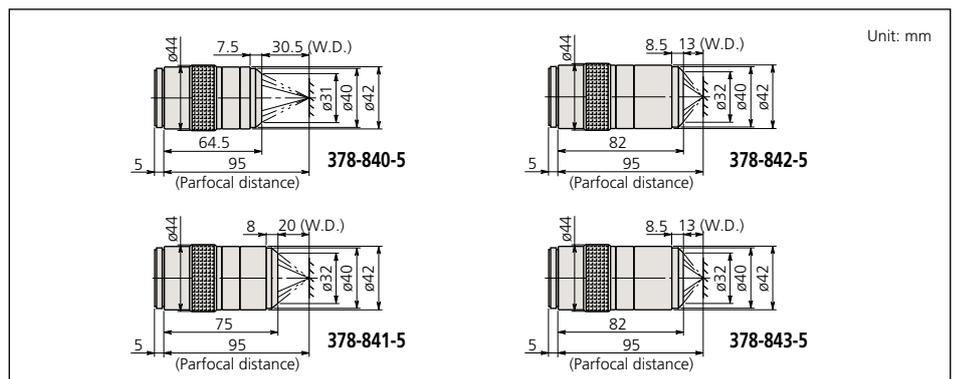
Note:
These objectives offer extra-long working distance.

Mag.: Magnification
N.A.: Numerical aperture
W.D.: Working distance
f: Focal distance
R: Resolving power
D.F.: Focal depth
View field 1: Field of view when using $\phi 24$ mm eyepiece
View field 2: Field of view when using 1/2" CCD camera

BD Plan Apo SL for Bright / Dark Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-840-5	20X	0.28	30.5mm	10mm	1.0 μ m	3.5 μ m	$\phi 1.2$ mm	0.24x0.32mm	240g
378-841-5	50X	0.42	20.0mm	4mm	0.7 μ m	1.6 μ m	$\phi 0.48$ mm	0.10x0.13mm	310g
378-842-5	80X	0.50	15.0mm	2mm	0.6 μ m	1.1 μ m	$\phi 0.3$ mm	0.06x0.08mm	320g
378-843-5	100X	0.55	13.0mm	2mm	0.5 μ m	0.9 μ m	$\phi 0.24$ mm	0.05x0.06mm	320g

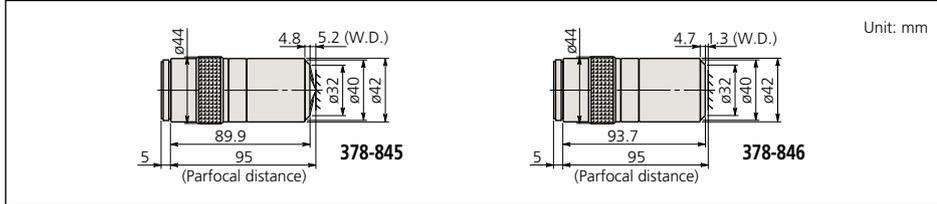
DIMENSION



BD Plan Apo HR for Bright / Dark Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-845	50X	0.75	5.2mm	4mm	0.4 μ m	0.48 μ m	ϕ 0.48mm	0.10x0.13mm	420g
378-846	100X	0.90	1.3mm	2mm	0.3 μ m	0.24 μ m	ϕ 0.24mm	0.05x0.06mm	435g

DIMENSION



Note:

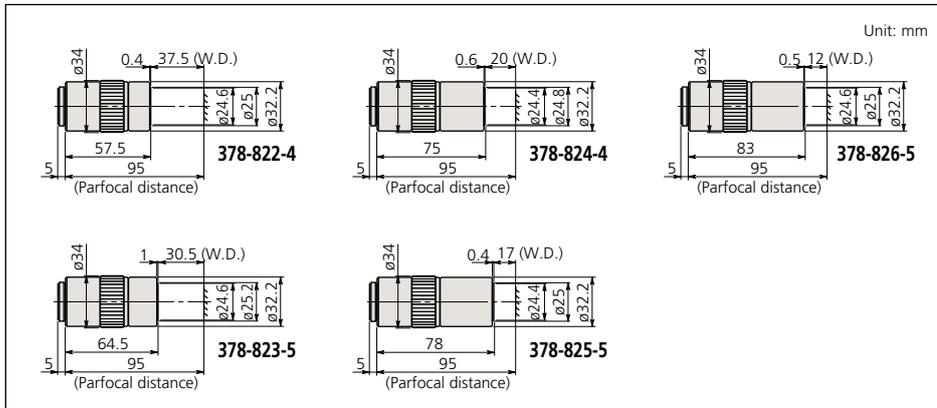
These objectives offer extra-high resolving power.

- Mag.: Magnification
- N.A.: Numerical aperture
- W.D.: Working distance
- f: Focal distance
- R: Resolving power
- D.F.: Focal depth
- View field 1: Field of view when using ϕ 24mm eyepiece
- View field 2: Field of view when using 1/2" CCD camera

Near-infrared Radiation Corrected M Plan Apo NIR for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-822-4	5X	0.14	37.5mm	40mm	2.0 μ m	14.0 μ m	ϕ 4.8mm	0.96x1.28mm	220g
378-823-5	10X	0.26	30.5mm	20mm	1.1 μ m	4.1 μ m	ϕ 2.4mm	0.48x0.64mm	250g
378-824-4	20X	0.40	20.0mm	10mm	0.7 μ m	1.7 μ m	ϕ 1.2mm	0.24x0.32mm	300g
378-825-5	50X	0.42	17.0mm	4mm	0.7 μ m	1.6 μ m	ϕ 0.48mm	0.10x0.13mm	315g
378-826-5	100X	0.50	12.0mm	2mm	0.6 μ m	1.1 μ m	ϕ 0.24mm	0.05x0.06mm	335g
378-863-5	50X	0.65	10mm	4mm	0.42 μ m	0.65 μ m	ϕ 0.48mm	0.10x0.17mm	450g
378-864-5	100X	0.70	10mm	2mm	0.74 μ m	0.56 μ m	ϕ 0.24mm	0.05x0.06mm	450g

DIMENSION



Note:

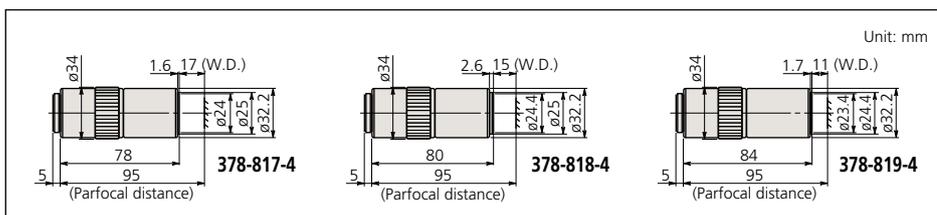
These objectives are designed that a workpiece's image can be focused within the focal depth even when the wavelength used is changed anywhere from the visible range ($\lambda = 480\text{nm}$) up to near-infrared range ($\lambda = 1800\text{nm}$). Therefore the M Plan NIR Series are suitable for laser 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.

- Mag.: Magnification
- N.A.: Numerical aperture
- W.D.: Working distance
- f: Focal distance
- R: Resolving power
- D.F.: Focal depth
- View field 1: Field of view when using ϕ 24mm eyepiece
- View field 2: Field of view when using 1/2" CCD camera

Near-infrared Radiation Corrected M Plan Apo NIR for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-817-4	20X	0.40	17.0mm	10mm	0.7 μ m	1.7 μ m	ϕ 1.2mm	0.24x0.32mm	340g
378-818-4	50X	0.42	15.0mm	4mm	0.7 μ m	1.6 μ m	ϕ 0.48mm	0.10x0.13mm	350g
378-819-4	100X	0.50	11.0mm	2mm	0.6 μ m	1.1 μ m	ϕ 0.24mm	0.05x0.06mm	380g

DIMENSION



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 ($\lambda = 620\text{nm}$) 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.

- Mag.: Magnification
- N.A.: Numerical aperture
- W.D.: Working distance
- f: Focal distance
- R: Resolving power
- D.F.: Focal depth
- View field 1: Field of view when using ϕ 24mm eyepiece
- View field 2: Field of view when using 1/2" CCD camera

Note:
These near-infrared ($\lambda = 1800\text{nm}$) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1mm (378-827-4, 378-828-5) or 0.7mm (378-829-5, 378-754-5)) and for laser repair.

Mag.: Magnification
N.A.: Numerical aperture
W.D.: Working distance
f: Focal distance
R: Resolving power
D.F.: Focal depth

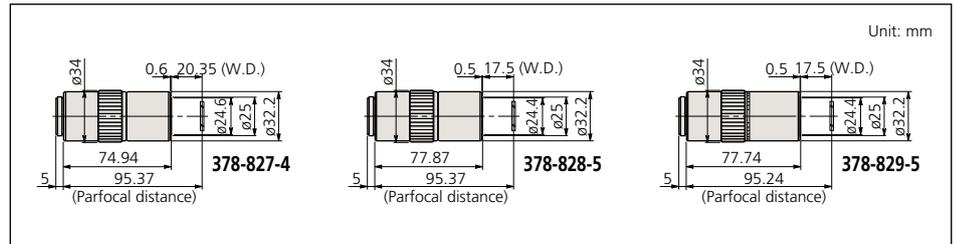
View field 1: Field of view when using $\varnothing 24\text{mm}$ eyepiece
View field 2: Field of view when using 1/2" CCD camera

Near-Infrared Radiation and LCD Glass Thickness ($t = 1.1\text{mm}$ or 0.7mm) Corrected LCD Plan Apo NIR for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-827-4	20X	0.40	19.98mm*	10mm	0.7 μm	1.7 μm	$\varnothing 1.2\text{mm}$	0.24x0.32mm	305g
378-828-5	50X	0.42	17.13mm*	3.9mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	320g
378-829-5	50X	0.42	17.26mm*	3.9mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	320g
378-752-5	100X	0.50	12.13mm*	2mm	0.6 μm	1.1 μm	$\varnothing 0.24\text{mm}$	0.05x0.06mm	335g
378-754-5	100X	0.50	11.76mm*	2mm	0.6 μm	1.1 μm	$\varnothing 0.24\text{mm}$	0.05x0.06mm	335g

*In air

DIMENSION



Note:
These near-infrared ($\lambda = 1800\text{nm}$) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1mm (378-827-4, 378-828-5) or 0.7mm (378-829-5, 378-754-5)) and for laser repair.

Mag.: Magnification
N.A.: Numerical aperture
W.D.: Working distance
f: Focal distance
R: Resolving power
D.F.: Focal depth

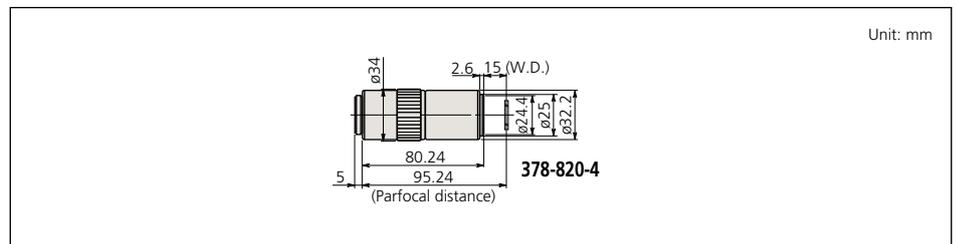
View field 1: Field of view when using $\varnothing 24\text{mm}$ eyepiece
View field 2: Field of view when using 1/2" CCD camera

Near-ultraviolet Radiation and LCD Glass Thickness ($t = 0.7\text{mm}$) Corrected LCD Plan NUV for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-820-4	50X	0.42	14.76mm*	4mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	310g
378-753-4	50X	0.42	14.53mm	4mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	310g
378-751-4	100X	0.50	11.03mm	2mm	0.6 μm	1.1 μm	$\varnothing 0.24\text{mm}$	0.05x0.06mm	380g

*In air

DIMENSION



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.

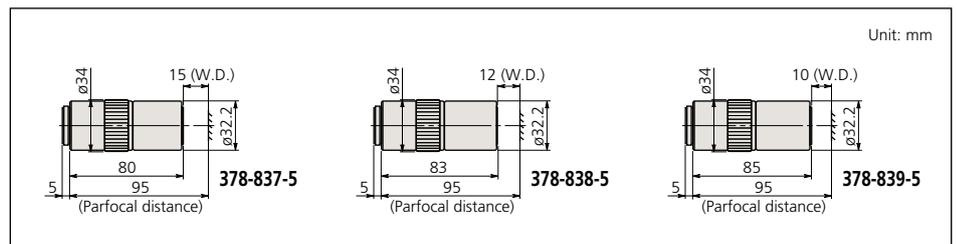
Mag.: Magnification
N.A.: Numerical aperture
W.D.: Working distance
f: Focal distance
R: Resolving power
D.F.: Focal depth

View field 1: Field of view when using $\varnothing 24\text{mm}$ eyepiece
View field 2: Field of view when using 1/2" CCD camera

Ultraviolet Radiation Corrected M Plan UV for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-837-5	20X	0.36	15.0mm	10mm	0.8 μm	2.1 μm	$\varnothing 1.2\text{mm}$	0.24x0.32mm	330g
378-838-5	50X	0.40	12.0mm	4mm	0.7 μm	1.7 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	400g
378-839-5	80X	0.55	10.0mm	2.5mm	0.5 μm	0.9 μm	$\varnothing 0.3\text{mm}$	0.06x0.08mm	380g

DIMENSION



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-465) and a zoom type (MSM-Z414) are available.
- Continuous zooming, a standard feature, allows you to enlarge the object by 10 to 40 times in total magnification.
- MSM series 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.



MSM-412



MSM-Z414



MSM-465

SPECIFICATIONS

Model No.	MSM-412	MSM-Z414	MSM-465
Order No.	377-925*	377-945*	375-065*
Optical system	Greenough's type		Galilean type
Total magnification	10X, 20X	10X to 40X	6X, 12X, 25X, 50X
Optical tub	Binocular	Binocular	Binocular
Pupil distance	54 - 76mm (adjustable)	54 - 76mm (adjustable)	54 - 76mm (adjustable)
Eyepiece	WF10X, WF5X, WF15X, WF20X	WF10X, WF5X, WF15X, WF20X	WF10X, WF5X, WF15X, WF20X
Objective	1X, 2X	1X to 4X	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 (377-925B) 4.7kg	5.3kg (377-945B) 5.1kg	4.8kg (377-965B) 6.3kg

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **377-925A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

OPTIONAL LENSES

For MSM-412, Z414



5X eyepiece:
377-026



15X eyepiece:
377-028



20X eyepiece:
377-029



0.5X Auxiliary
objective
377-045



0.75X Auxiliary
objective
377-046



1.5X Auxiliary
objective
377-047

For MSM-465



6.25X eyepiece:
377-066



15X eyepiece:
377-067



20X eyepiece:
377-068



32X eyepiece:
377-069



0.5X Auxiliary
objective
377-076

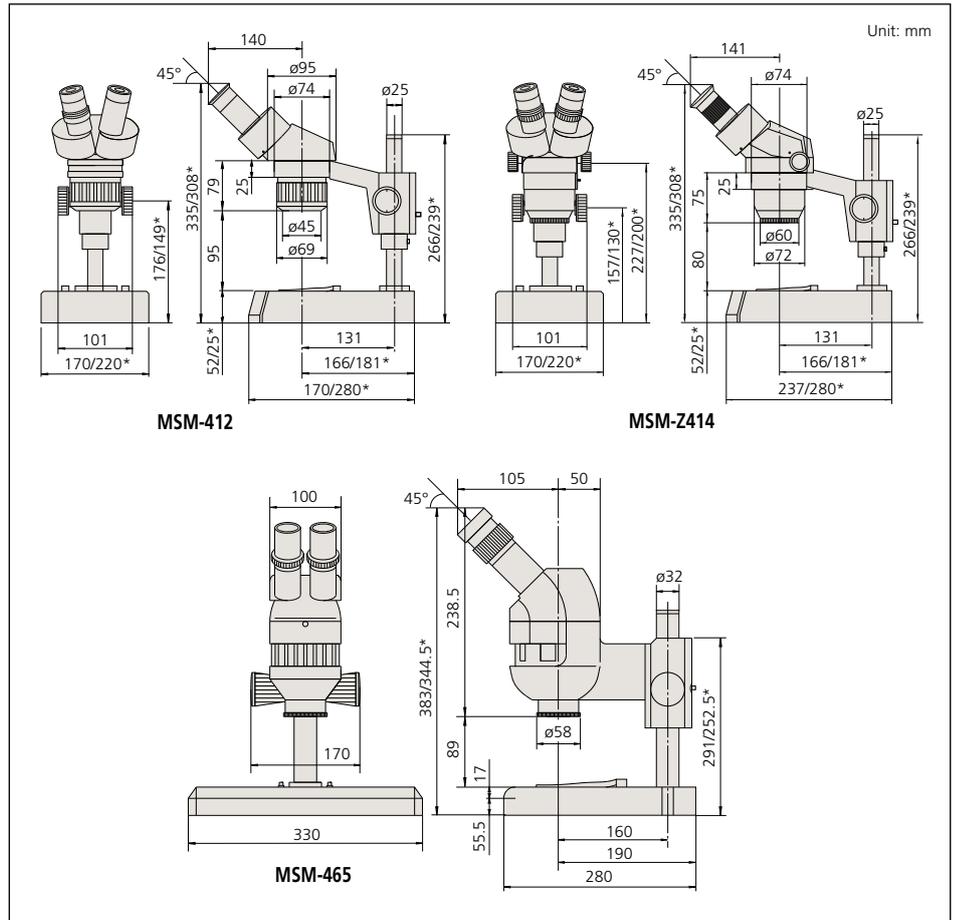


1.5X Auxiliary
objective
377-077



2X Auxiliary
objective
377-078

DIMENSION



MSM-465



MSM-Z414



Pocket Magnifiers

SERIES 183

FEATURES

- Suitable for inspecting metal surfaces.

SPECIFICATIONS

Magnification	Order No.	Remarks
25X	183-201	Pen type
	283-202	With stand
50X	183-203	With stand



Pocket Comparators

SERIES 183

FEATURES

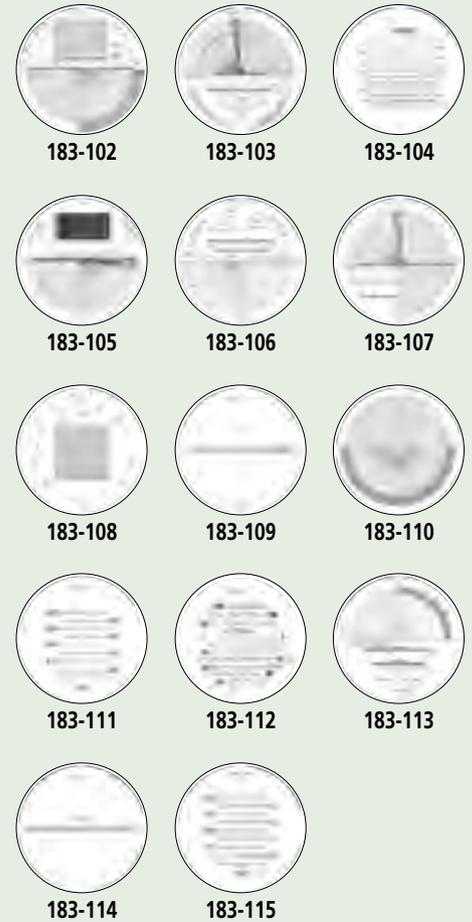
- By replacing optional reticles, dimensional, angle, and other types of measurements can be performed.
- Illuminator (950757) is available.

SPECIFICATIONS

Magnification	Order No.	Remarks
8X	183-101	Optional reticles available
9X	183-102	Optional reticles available
10X	183-131	Optional reticles available



Optional Reticles for pocket comparators

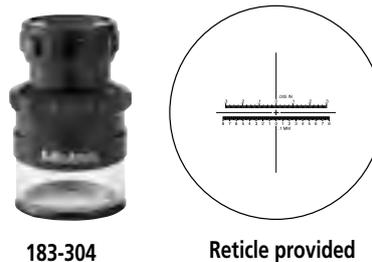


Zoom loupe

SERIES 183

FEATURES

- Allows the user 8X - 16X zoom 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	183-304	With reticle (Scale graduation: 0.1mm, .0005")

Clear Loupe

SERIES 183



SPECIFICATIONS

Magnification	Order No.	Remarks
7X	183-301	Drawtube removable
10X	183-302	Drawtube removable
15X	183-303	Drawtube removable

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Surftest



Formtracer



Contracer



Roundtest

New Products



SV-M3000CNC



RA-H5100CNC



SV-3100



CV-3100



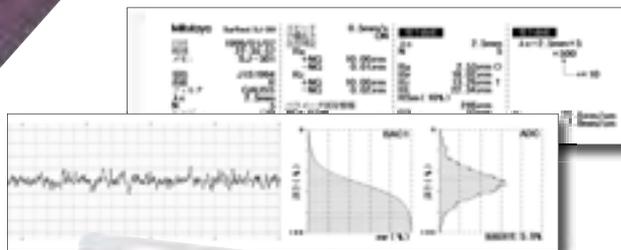
CS-3100

Surftest SJ-301 / SJ-201

SERIES 178 — Portable Surface Roughness Tester



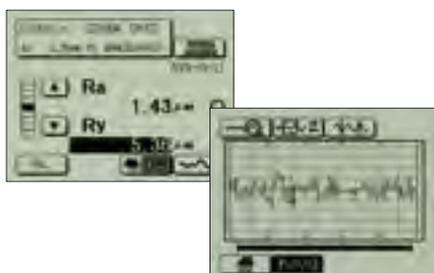
Surftest SJ-201



Surftest SJ-301

FEATURES: SJ-301

- Large characters are displayed on the large easy-to-view LCD.
- Simple operations performed with the large LCD touch-panel
- The Measure-Start button and others frequently used are hard wearing and resistant to workshop contaminants
- Equipped with a large capacity battery that, when fully charged, allows approximately 600 measurements to be made.
- A convenient carrying case is supplied as standard for protecting the instrument in the field.
- A high-resolution, high-speed printer is built in the main unit.
- Five sets of measurement set-ups can be saved in the measurement unit and the optional memory card (compact flash memory) allows saving of set-ups and measurements.
- Measurement data also can be saved in the memory card in CSV format and then loaded onto a personal computer for data handling with spreadsheet software.



FEATURES: SJ-201

- The display unit demonstrates IP53 protection level and is proof against dripping water and dust.
- The built-in battery, if fully charged, allows approximately 500 measurements to be taken even on a site with no access to mains power.
- A convenient carrying case is supplied as standard for protecting the instrument in the field.
- Up to 10 measurement results can be saved in the built-in memory.
- Measurement results appear in large characters on the large LCD screen. Results can be confirmed at a glance.
- Detailed set-ups, such as change of standards and cutoff lengths, can be made by pressing the relevant buttons after sliding back the top cover.
- The SPC connector for Digimatic output and the RS-232C output connector are provided on the rear panel of the display unit for data output to external devices.
- Printout of recorded profiles is also possible if the tester is connected to the dedicated hand-held, built-in battery operated compact SJ-printer (optional).



Technical Data

X-axis (drive unit)	
Measuring range:	12.5mm
Measuring speed:	0.25, 0.5mm/s (0.25mm/s: S-type)
Traversing direction:	Backward
Detector	
Range:	350µm (-200µm to +150µm)
Detecting method:	Skid measurement
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90°/5µmR (60°/2µmR: low force type)
Skid radius of curvature:	40mm
Skid force:	less than 400mN
Detecting method:	Differential inductance
Power supply:	Via AC adapter / rechargeable battery
Battery life:	Max. 600 measurements (w/o printing) Recharge time: 15 hours
Data output:	Via RS-232C interface / SPC output
Dimensions (WxDxH)	
Control unit:	307 x 165 x 94mm (SJ-301) 156.5 x 62 x 52mm (SJ-201)
Drive unit:	115 x 23 x 26mm
Mass	
Control unit:	Approx. 1.2kg (SJ-301) Approx. 0.3kg (SJ-201)
Drive unit:	0.2kg

Evaluation Capability: SJ-301

Applicable standard:	
JIS'82, JIS'94, JIS'01, DIN, ISO, ANSI	
Assessed profile:	
Primary profile (P), Roughness profile (R), DIN4776, MOTIF (R, W)	
Evaluation parameters:	
Ra, Ry, Rz, Rt, Rp, Rq, Rv, Sm, S, Pc, R3z, mr (c), Rpk, Rvk, δc, Rk, Mr1, Mr2, Lo, Ppi, R, AR, Rx, A1, A2, Vo, HSC, mr, SK, Ku, Δa, Δq, Wte, Wx, W, AW (can be customized)	
Analysis graphs:	
Bearing Area Curve (BAC1/ 2), Amplitude Distribution Curve (ADC)	
Digital filter	2CR, PC75, Gaussian
Cut-off length	λc: 0.08, 0.25, 0.8, 2.5, 8mm λs: 2.5, 8, 25mm
Number of sampling length: X1, X3, X5, XL	
Arbitrary length: 0.3 to 12.5mm, 0.1mm increments	
Sampling length (L):	0.08, 0.25, 0.8, 2.5, 8mm
Printer	Thermal printer
Printing width	48mm (paper width: 58mm)
Recording magnification	
Vertical magnification: 10X to 100,000X, Auto	
Horizontal magnification: 1X to 1,000X, Auto	

Function

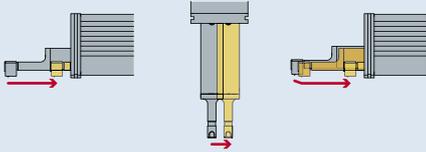
- Customization: Desired parameters can be selected for calculation and display.
- Statistical processing: Maximum value, minimum value, mean value, standard deviation, pass rate, frequency distribution chart of each parameter
- GO/NG judgment:
 - Upper/lower limits setting: 3 parameters
 - GO/NG judgment rule: mean value, 16% rule, maximum value rule
- Measurement conditions saving: Maximum 5 sets
- Data saving: Save/retrieval of measurement conditions (up to 20 sets), evaluation data, sampling data, and statistical data with a memory card (option).
- Calibration: Auto-calibration with the entry of numerical value.
- Power saving function: If the auto-power-off function ON: Power turns off if not operated for 5 minutes

Detector + Drive unit + Display unit Combination

Detector: 0.75mN measuring force, 2 μ m stylus tip radius
4mN measuring force, 5 μ m stylus tip radius

Drive unit:

Standard-type Transverse tracing-type Retractable-type



Display unit:



Evaluation Capability: SJ-201

Applicable standard:

JIS'82, JIS'94, JIS'01, DIN, ISO, ANSI

Assessed profile:

Primary profile (P), Roughness profile (R), DIN4776
(Primary profile (P), Roughness profile (R), MOTIF (R):
M-type)

Evaluation parameters:

Ra, Ry, Rz, Rq, S, Sm, Pc, R3z, mr (c), Rt, Rp, Rk, Rpk, Rvk,
Mr1, Mr2, A1, A2, Vo (can be customized) (R, AR, Rx: M-type)

Digital filter 2CR, PC75, Gaussian

Cut-off length λ_c : 0.25, 0.8, 2.5mm

λ_s : 2.5, 8mm

Number of sampling length: X1, X3, X5

Arbitrary length: 0.3 to 12.5mm, 0.1mm increments

Sampling length (L): 0.25, 0.8, 2.5mm

Function

Customization: Desired parameters can be selected for calculation and display.

GO/NG judgment:

Upper / lower limit setting: 2 parameters

Measurement conditions saving: Saves the conditions at the power OFF

Data saving: A maximum of 10 measurement results can be saved.

Calibration: Auto-calibration with the entry of numerical value

Power saving function: If the auto-power-off function is ON then power turns off if no operation for 30 seconds.



Refer to the Surftest SJ-400 leaflet (E4185) for more details.

SPECIFICATIONS

Model No.	SJ-201P		SJ-201R		SJ-201S		SJ-201M	
Order No. (mm)	178-920-2*	178-930-2*	178-985*	178-995*	178-889-2*	178-899-2*	178-920-2F*	178-930-2F*
Order No. (inch)	178-923-2*	178-933-2*	178-986*	178-996*	178-912-2*	178-913-2*	—	—
Drive unit	Standard type		Retractable type		Transverse tracing type		Standard type	
Detector	4mN type	0.75mN type	4mN type	0.75mN type	4mN type	0.75mN type	4mN type	0.75mN type

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: 178-952-3A):

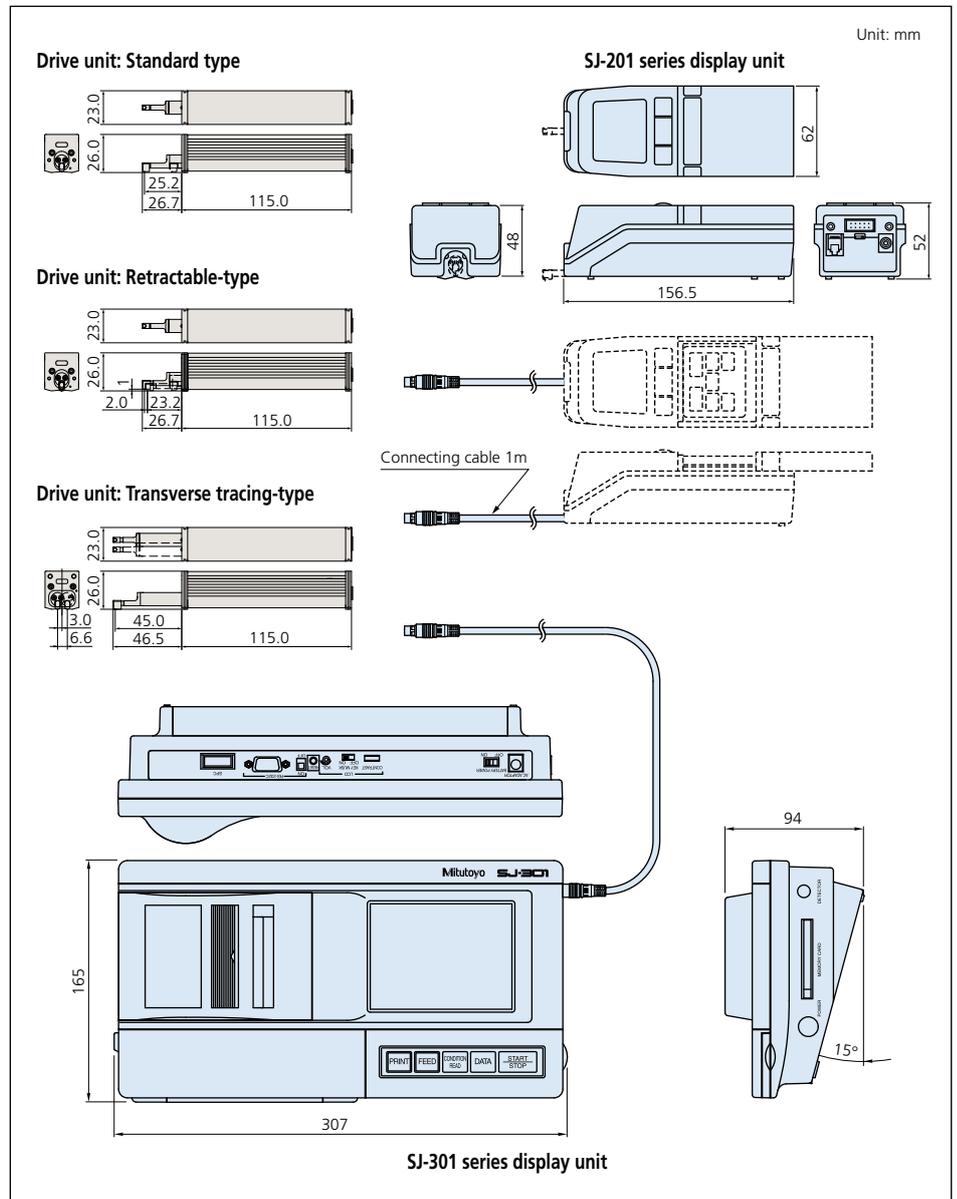
A for UL/CSA, D for CEE, E for BS, F for SAA, DC for China, K for EK, No suffix is required for JIS/100V

Model No.	SJ-301		SJ-301R		SJ-301S	
Order No. (mm)	178-953-3*	178-952-3*	178-980*	178-990*	178-929-2*	178-939-2*
Order No. (inch)	178-954-3*	178-955-3*	178-987*	178-997*	178-901-2*	178-902-2*
Drive unit	Standard type		Retractable type		Transverse tracing type	
Detector	4mN type	0.75mN type	4mN type	0.75mN type	4mN type	0.75mN type

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: 178-952-3A):

A for UL/CSA, D for CEE, E for BS, DC for China, K for EK, No suffix is required for JIS/100V

DIMENSION



Surftest SJ-301 / SJ-201

SERIES 178 — Optional Accessories

Drive unit, Display unit

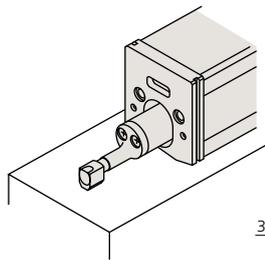
Drive unit	Display unit	Model No.
Standard drive unit Order No. 178-230-2	Standard display unit Order No. 178-243-2* (mm), 178-248-2* (inch)	SJ-201M
Transverse tracing Order No. 178-233-2		SJ-201P
Detector retracting type Order No. 178-235		SJ-201R

Drive unit	Display unit	Model No.
Standard drive unit Order No. 178-230-2	Order No. 178-241-3*	SJ-301
Transverse tracing Order No. 178-233-2		SJ-301S
Detector retracting type Order No. 178-235		SJ-301R

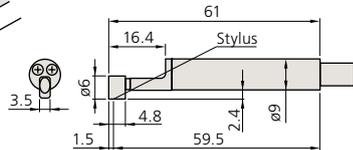
*To denote your AC line voltage add the following suffixes (e.g. **178-243-2A**). **A** for 120V, **C** for 110V (for Taiwan), **D** for 220V, **E** for 240V, **K** for 220V (for Korea), **DC** for 220V (for China)

Detector

Standard detector

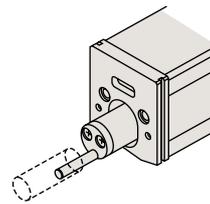


4mN type **178-390**
 0.75mN type **178-296**
 (Stylus tip radius 2µm, 60°)
178-395
 (Stylus tip radius 2µm, 90°)
 Stylus tip radius 10µm type **178-391**

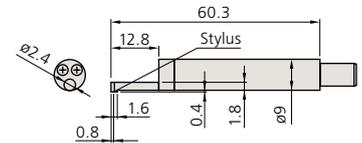


Extra-small hole detector

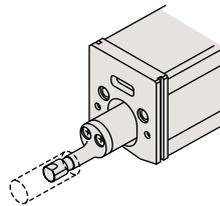
Unit: mm



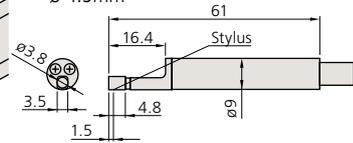
178-393
 Minimum measurable hole diameter:
 ø 2.8mm



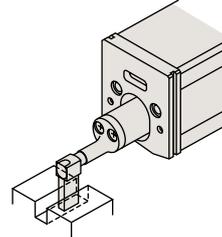
Small hole detector



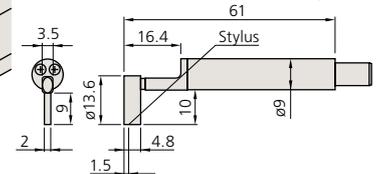
178-392
 Minimum measurable hole diameter:
 ø 4.5mm



Deep groove detector



178-394
 Maximum accessible groove depth: 8mm
 * Not available for the transverse tracing drive unit.



SJ-Printer for SJ-201

Printout of recorded profiles is also possible if the tester is connected to the dedicated hand-held, built-in battery operated compact SJ-printer (optional).

- Can be operated with two-way power supply (AC adapter/battery pack)
- Printing items: Measurement conditions, calculation results, surface profiles, bearing area curve (BAC)
- Supplied with connection cable and 20 rolls of printer paper



178-420*

*To denote your AC line voltage add the following suffixes (e.g. **178-420A**). -A for 120V, D for 220V, E for 240V

Printer paper (20 rolls): **12AAC243**

DP-1VR

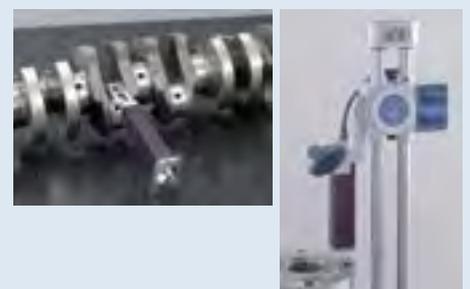
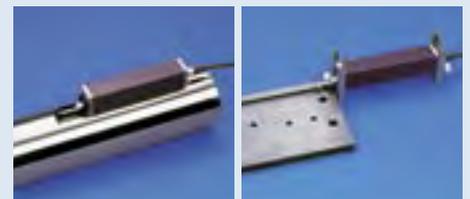
Powerful data management capabilities make it possible to process the Digimatic data output from the Surftest SJ series for measurement data printout, various statistical analyses for plotting a histogram and D-chart, and calculation of X-R control charts. Also, it is equipped with the RS-232C GONG judgment output for connection to a personal computer.



264-504*

*To denote your AC line voltage add the following suffixes (e.g. **264-504-5A**). -5A for 120V, -5D for 220V (for Europe), -5E for 240V (for UK), -1K for Korea without AC adapter, -5F for 240V (for Oceania)

Connecting cable: **936937** (1m)
 Connecting cable: **965014** (2m)



Evaluation Capability: SURFPAK-SJ

Industrial standards met: ISO 4287:1997, ANSI / ASME B46.1-1995, JIS B0601 1994, etc.

Assessed profiles: P (primary profile), R (roughness profile), WC, WCA, WE WEA DIN4776 profile, E (envelope residual profile), R - motif (roughness/waviness motif)

Evaluation parameters: Ra, Rq, Rz, Rz (JIS), Ry, Ry (DIN), Rc, Rpi, Rp, Rpm, Rv, Rvmax, Rti, Rt, R3zi, R3z, R3y, 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, Rx, RAR, SR, SAR, NR, NCRX, CPM, 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% (phase corrected)

Cutoff length:

λc : 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25mm or arbitrary value

fl: 0.25, 0.8, 2.5, 8mm or arbitrary value

fh: 0.25, 0.8, 2.5, 8mm or arbitrary value

Sampling length (L):

0.025, 0.08, 0.25, 0.8, 2.5, 8, 25mm or arbitrary value

Data compensation: Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, Conic automatic compensation, polynomial compensation, polynomial automatic compensation

Data deletion function

- Data deletion to avoid an over-range error
- Data deletion in a specific range to perform recalculation
- Automatic data deletion

Recording magnifications

Vertical: 100X - 500,000X, Horizontal: 1X - 10,000X

Special functions for report generation

- Bit-map image paste-up function
- Multiple data layout function

An RS-232C cable is required.

12AAA208: RS-232C cable for SJ-201 series

12AAA882: RS-232C cable for SJ-301 series

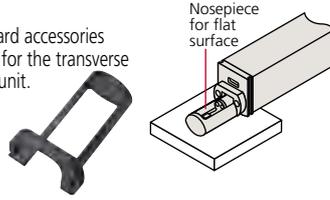


Drive unit, Display unit

Nosepiece for flat surfaces

12AAA217

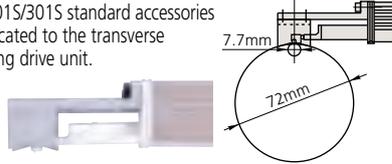
- SJ-301 standard accessories
- Not available for the transverse tracing drive unit.



V-type adapter

12AAE644

- SJ-201S/301S standard accessories
- Dedicated to the transverse tracing drive unit.

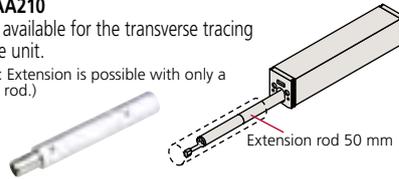


Extension rod (50mm)

12AAA210

- Not available for the transverse tracing drive unit.

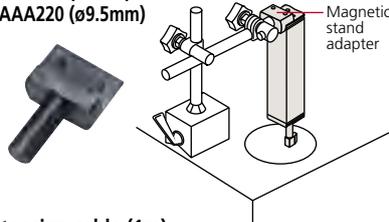
(Note: Extension is possible with only a single rod.)



Magnetic stand adapter

12AAA221 (ø8mm)

12AAA220 (ø9.5mm)



Extension cable (1m)

12BAA303

(Note: Extension is possible with only a single cable.)

Nosepiece for cylindrical surfaces

12AAA218

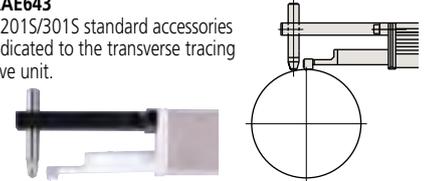
- SJ-301 standard accessories
- Not available for the transverse tracing drive unit.



Point-contact adapter

12AAE643

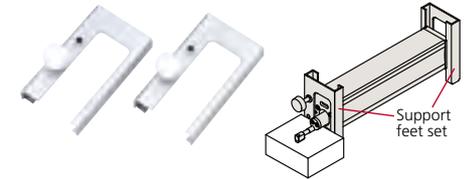
- SJ-201S/301S standard accessories
- Dedicated to the transverse tracing drive unit.



Support feet set

12AAA216

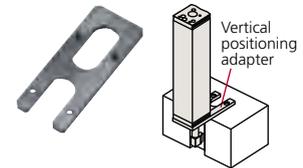
- SJ-301 standard accessory.
- Not available for the transverse tracing drive unit.



Vertical positioning adapter

12AAA219

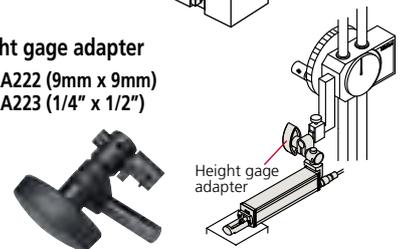
- Not available for the transverse tracing drive unit



Height gage adapter

12AAA222 (9mm x 9mm)

12AAA223 (1/4" x 1/2")



* Not available for the transverse tracing drive unit

Setting attachments

Enhances measurement efficiency by facilitating the measurement setup of multiple workpieces of the same type and of the hard-to-access sections of a workpiece.

Setting attachment: V type for measuring in the cylinder axis direction



178-033

The V-width is adjustable to the cylinder diameter facilitating axial measurement of a wide range of cylinder diameters.

- Adjustable range: ϕ 5 ~ 150mm

Setting attachment: Magnetic slider type



178-034

The magnet attached to the frame bottom surface allows taking hands-free measurement on the wall.

Setting attachment: Inside diameter type



178-035

Greatly facilitates measurement of internal wall surfaces of, for example, a cylinder block.

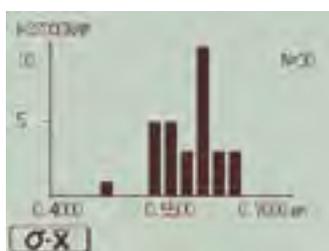
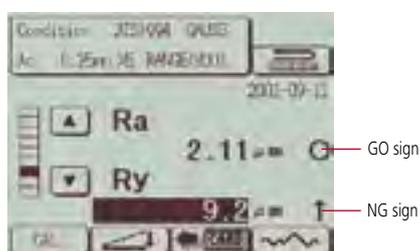
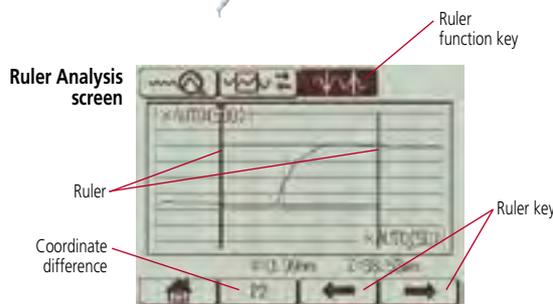
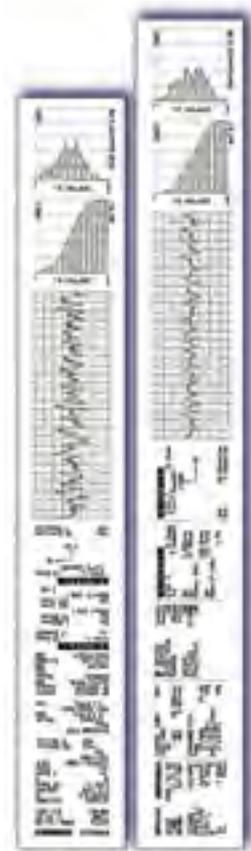
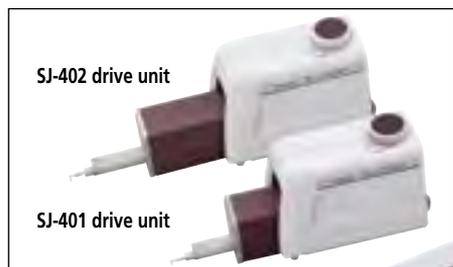
- Applicable diameter: ϕ 75 ~ ϕ 95mm
- Accessible depth: 30 ~ 135 mm

Surftest SJ-400

SERIES 178 — Portable Surface Roughness Tester

FEATURES

- Equipped with 36 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 μ m
 - Resolution: 0.000125 μ m (at 8 μ m range)
 - <Drive unit>
 - Straightness/traverse length
 - SJ-401: 0.3 μ m/25mm
 - SJ-402: 0.5 μ m/50mm
- 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.



Technical Data

X-axis (drive unit)	
Measuring range:	25mm (SJ-401), 50mm (SJ-402)
Measuring speed:	0.05, 0.1, 0.5, 1.0mm/s
Return speed:	0.5, 1.0, 2.0mm/s
Traversing direction:	Backward
Traverse linearity:	0.3 μ m/25mm (SJ-401), 0.5 μ m/50mm (SJ-402)
Positioning:	\pm 1.5° (tilting), 10mm (up/down)
Detector	
Range / resolution:	800 μ m / 0.01 μ m, 80 μ m / 0.001 μ m, 8 μ m / 0.0001 μ m (up to 2400 μ m with an optional stylus)
Detecting method:	Skidless / skid measurement
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90°/5 μ mR (60°/2 μ mR: low force type)
Skid radius of curvature:	40mm
Detecting method:	Differential inductance
Power supply:	Via AC adapter / rechargeable battery
Battery life:	Max. 600 measurements (w/o printing)
	Recharge time: 15 hours
Data output	Via RS-232C interface / SPC output
Dimensions (WxDxH)	
Control unit:	307 x 165 x 94mm
Height-tilt adjustment unit:	131 x 63 x 99mm
Drive unit:	128 x 36 x 47mm (SJ-401), 155 x 36 x 47mm (SJ-402)
Mass	
Control unit:	Approx. 1.2kg
Height-tilt adjustment unit:	Approx. 0.4kg
Drive unit:	0.6kg (SJ-401), 0.7kg (SJ-402)

Evaluation Capability

- Assessed profile:
- Primary profile (P), Roughness profile (R), Filtered waviness profile (W), DIN4776, MOTIF (R, W)
- Evaluation parameters:
- Ra, Ry, Rz, Rq, Pc, R3z, mr, Rt, Rp, Rv, Sm, S, δ c, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Lo, Ppi, R, AR, Rx, Da, Dq, Ku, HSC, mrd, Sk, W, AW, Wte, Wx, Vo
- Analysis graphs:
- Bearing Area Curve (BAC1/ 2), Amplitude Distribution Curve (ADC)
- Digital filter
- 2CR, PC75, Gaussian
- Cut-off length
- 0.08, 0.25, 0.8, 2.5, 8mm
- Number of sampling length: X1, X3, X5, XL
- Arbitrary length (XL): 0.1 to 25mm (0.1 to 50mm: SJ-402), 0.1mm increments
- Sampling length (L): 0.08, 0.25, 0.8, 2.5, 8mm
- Printer
- Thermal printer
- Printing width
- 48mm (paper width: 58mm)
- Recording magnification
- Vertical magnification: 20X to 100,000X, Auto
 - Horizontal magnification: 1X to 1,000X, Auto
- Function
- Customize: Selection of display/evaluation parameter
 - Data compensation: R-surface, Tilt compensation
 - Ruler function:
 - Displays the coordinate difference of any two points
 - D.A.T. function:
 - Helps to adjust leveling during skidless measurement
 - Displacement detection mode
 - Enables the stylus displacement to be input while the drive unit is stopped.
 - Statistical processing: Max. value, Min. value, Mean value, Standard deviation (s), Pass ratio, Histogram
 - Tolerance judgment: Upper and lower limit values for three parameters can be specified.
 - Measuring condition storage: Five sets of measuring conditions (control unit)

Optional Accessory

- 178-611:** Reference step specimen (mm)
178-612: Reference step specimen (inch)
178-610: Step gage (step: 1µm, 2µm, 5µm, 10µm)
178-009: Manual column stand (vertical travel: 200mm)
178-039: Manual column stand (granite base)
 (vertical travel: 250mm)
12AAB358: Cylinder attachment (workpiece dia.: 15 - 60mm)
178-016: Leveling table (tilting: ±1.5°, max. loading: 15kg)
178-048: Leveling table with D.A.T function (mm)
 (tilting: ±1.5°, max. loading: 15kg)
178-058: Leveling table with D.A.T function (inch)
 (tilting: ±1.5°, max. loading: 15kg)
178-043-1: XY leveling table (25 x 25mm)
 (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-053-1: XY leveling table (1" x 1")
 (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-042-1: Digital XY leveling table (25 x 25mm)
 (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-052-1: Digital XY leveling table (1" x 1")
 (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-049: Digital XY leveling table (25 x 25mm)
 (tilting: ±1.5°, max. loading: 15kg)
178-059: Digimatic XY leveling table (1" x 1")
 (tilting: ±1.5°, max. loading: 15kg)
178-019: Precision vise for XY leveling table
 (jaw opening: 36mm)
181-902: V-block set with clamp (workpiece dia.: max. 25mm)
181-901: V-block set with clamp (workpiece dia.: max. 1")
998291: Precision V-block for XY leveling table
 (workpiece dia.: 1 - 160mm)
12BAA781: Carrying case
12AAA841: Memory card (8MB)
12AAA882: PC connecting cable (RS-232C cable)
965014: SPC cable (2m)
264-012-10: Input tool (USB type)
264-504*: DP-1VR
 *Suffix: **A** for 120V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V
 —: Detectors, Styli, and nosepieces (See page 426.)

Consumable Parts

- 12AAA896:** LCD protective sheet (10 sheets/set)
270732: Standard printer paper (25m, 5 rolls/set)
12AAA876: Durable printer paper (25m, 5 rolls/set)

MiCAT

Mitutoyo Intelligent Computer Aided Technology
 the standard in world
 metrology software
FORM

Evaluation Capability: SURFPAK-SJ

Industrial standards met: ISO 4287:1997, ANSI / ASME B46.1-1995, JIS B0601 1994, etc.

Assessed profiles: P (primary profile), R (roughness profile), WC, WCA, WE WEA DIN4776 profile, E (envelope residual profile), R - motif (roughness/waviness motif)

Evaluation parameters: Ra, Rq, Rz, Rz (JIS), Ry, Ry (DIN), Rc, Rpi, Rp, Rpmax Rvi, Rv, Rvmax, Rti, Rt, R3zi, R3z, R3y, 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, Rx, R AR, SR, SAR, NR, NCRX, CPM, 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% (phase corrected)

Cutoff length:

λc: 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25mm or arbitrary value
 fl: 0.25, 0.8, 2.5, 8mm or arbitrary value
 fh: 0.25, 0.8, 2.5, 8mm or arbitrary value

Sampling length (L):

0.025, 0.08, 0.25, 0.8, 2.5, 8, 25mm or arbitrary value

Data compensation: Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, Conic automatic compensation, polynomial compensation, polynomial automatic compensation

Data deletion function

- Data deletion to avoid an over-range error
- Data deletion in a specific range to perform recalculation
- Automatic data deletion

Recording magnifications Vertical: 100X - 500,000X, Horizontal: 1X - 10,000X

Special functions for report generation

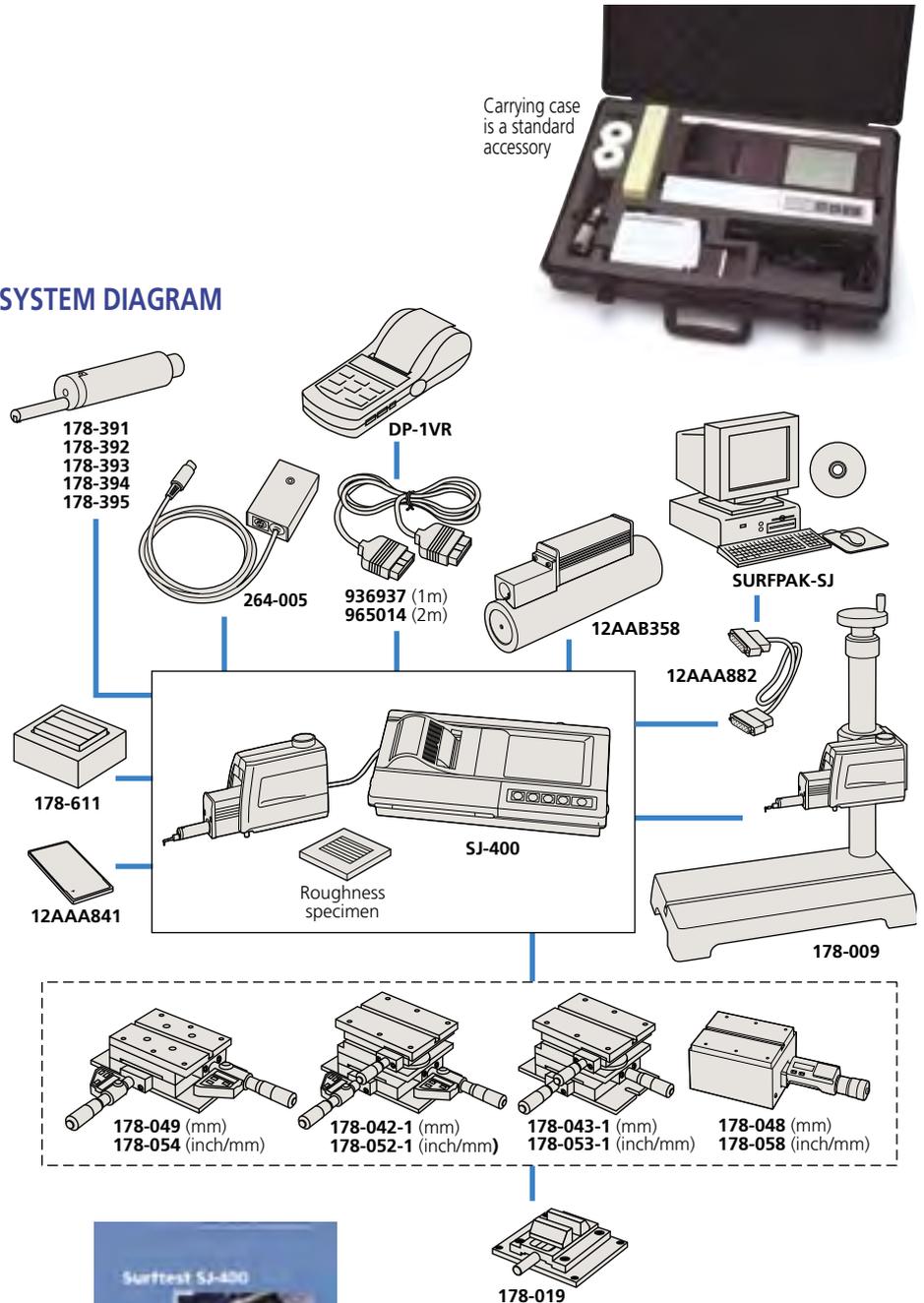
- Bit-map image paste-up function
- Multiple data layout function

SPECIFICATIONS

Model No.	SJ-401	SJ-401	SJ-402	SJ-402
Order No. (mm)	178-956-3*	178-946-3*	178-958-3*	178-940-3*
Order No. (inch)	178-957-3*	178-947-3*	178-959-3*	178-945-3*
Measuring range	0.75mN	4mN	0.75mN	4mN
Evaluation range	25mm	25mm	50mm	50mm

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **178-956-3A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

SYSTEM DIAGRAM



Mitutoyo

Refer to the SurfTest SJ-400 leaflet (E4185) for more details.

Surftest SV-3000 / SV-2000

SERIES 178 — Surface Roughness Testers



SV-2000N2 with TCON



SV-2000S2 with TCON



SV-3000M4
with personal computer system and software
(SURFPAK-SV)

MiCAT
Mitutoyo Intelligent Computer Aided Technology

the standard in world
metrology software
FORM

Technical Data

X-axis (drive unit)	
Measuring range:	50mm or 100mm
Resolution:	0.05 μ m
Measurement method:	Linear encoder
Drive speed:	0.5, 5.0mm/s
Measuring speed:	0.1, 0.2, 0.5, 1.0, 2.0mm/s
Traversing direction:	Backward
Traverse linearity:	(0.05+1.5L/1000) μ m* (0.5 μ m/200mm: 200mm range model)
Z-axis (column)	
Vertical travel:	300mm
Base size (W x H):	613 x 450mm (SV-2000S4) 760 x 450mm (SV-3000M4)
Base material:	Granite
Detector	
Range / resolution:	800 μ m / 0.01 μ m, 80 μ m / 0.001 μ m, 8 μ m / 0.0001 μ m (up to 2400 μ m with an optional stylus)
Detecting method:	Skidless / skid measurement
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90°/5 μ mR (60°/2 μ mR: low force type)
Skid radius of curvature:	40mm
Detecting method:	Differential inductance
Dimension (W x D x H):	613 x 450 x 905mm (SV-2000S2) 263 x 82 x 140mm (SV-2000N2) 760 x 450 x 711mm (SV-3000M4)
Mass	130kg (SV-2000S2) 2.8kg (SV-2000N2) 140kg (SV-3000M4)

*L = Measured length (mm)

Evaluation Capability: SURFPAK-SV & TCON

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, R3z, R3zi, R3y, S, Pc (Pqi), Sm, HSC, mr, δ c, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Δ a, Δ q, λ a, λ q, Sk, Ku, Lo, Lr, A1, A2
Roughness motif parameters: Rx, R, AR, SR, SAR, NR, NCRX, CPM

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*

λ c: 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm

fl: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm

fh: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm

Sampling length (L)*

0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm

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

*Arbitrary length can be specified in the range from 0.025mm to the maximum traverse length.

Optional Accessory

- 178-611:** Reference step specimen (mm)
- 178-612:** Reference step specimen (inch)
- 178-610:** Step gage (step: 1µm, 2µm, 5µm, 10µm)
- 997843:** Cylinder attachment for SV-2000N2
- 178-006:** Granite column stand for SV-2000N2 (vertical travel: 330mm)
- 178-008:** Column stand for SV-2000N2 (workpiece dia.: 50 - 625mm)
- 178-016:** Leveling table (tilting: ±1.5°, max. loading: 15kg)
- 178-048:** Leveling table with D.A.T function (mm) (tilting: ±1.5°, max. loading: 15kg)
- 178-058:** Leveling table with D.A.T function (inch) (tilting: ±1.5°, max. loading: 15kg)
- 178-043-1:** XY leveling table (25 x 25mm) (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
- 178-053-1:** XY leveling table (1" x 1") (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
- 178-042-1:** Digital XY leveling table (25 x 25mm) (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
- 178-052-1:** Digital XY leveling table (1" x 1") (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
- 178-049:** Digital XY leveling table (25 x 25mm) (tilting: ±1.5°, max. loading: 15kg)
- 178-059:** Digimatic XY leveling table (1" x 1") (tilting: ±1.5°, max. loading: 15kg)
- 178-047:** Three-axis adjustment table (including **998291** precision V-block)
- 178-019:** Precision vise for XY leveling table (jaw opening: 36mm)
- 181-902:** V-block set with clamp (workpiece dia.: max. 25mm)
- 181-901:** V-block set with clamp (workpiece dia.: max. 1")
- 998291:** V-block for XY leveling table (workpiece dia.: 1 - 160mm)
- 178-023:** Vibration isolator
- 178-024:** Stand for vibration isolator
- 178-027:** Auto-leveling Table (table size: 130 x 100mm)
- 178-028:** Auto-leveling Table (table size: 280 x 250mm)
- 178-044:** Y-axis Traverse Table (traverse range: 160mm)
- 178-054:** Y-axis Traverse Table (traverse range: 6.3")
- 178-036:** Rolling Unit
- 998054:** Extension unit*
- 998055:** Add-on Unit**
- : Detectors, Styli, and nosepieces

(See page 426.)

*The Extension unit is required to connect up to two kinds of motor-driven options, such as the Auto-leveling Table, Y-axis Traverse Table, and Rolling Unit.

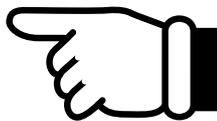
**The Add-on Unit is required to connect two more kinds of motor-driven options.

SPECIFICATIONS

Model No.	SV-2000N2	SV-2000N2	SV-2000S2	SV-2000HS2	SV-3000M4	SV-3000M4
Order No. (mm)	178-660*	178-640*	178-661*	178-641*	178-662*	178-642*
Order No. (inch)	178-670*	178-650*	178-671*	178-651*	178-672*	178-652*
Measuring force of detector	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
Traverse range	50mm		50mm		100mm	
Vertical travel	—		300mm Power column		300mm Manual column	
Granite base size (WxD)	—		613 x 450mm		760 x 450mm	
Dimensions (main unit, WxDxH)	263 x 82 x 40mm		613 x 450 x 905mm		760 x 450 x 711mm	
Mass (main unit)	2.8kg		130kg		140kg	

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **178-660A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

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.



Measuring condition window

Indicator of Z-axis (stylus position)

Assessed profile window

Measurement result window

X and Y-axis counter

Main window

Surftest SV-3100

SERIES 178 — Surface Roughness Testers



SV-3100H4 with personal computer system

The Surftest SV-3100 Series provide high-accuracy, high-level analysis, and multi-functionality in measurement of surface roughness.

FEATURES

- Mitutoyo's Surftest SV-3100 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 are available to enhance operability and to enable automatic measurement.
- SURFPAK-SV, a dedicated data-analyzing software is installed. This software allows data management in a consistent format, from the work site to the laboratory.
- 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 are built-in on X-axis (resolution: $0.05\mu\text{m}$) and Z2-axis (column, resolution: $1\mu\text{m}$) to insure high-accuracy positioning. The SV-3100 series manifest high-reliability especially in the horizontal roughness parameters (S, Sm), 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. 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.

MiCAT

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FORM

Technical Data

X-axis
Measuring range: 100mm or 200mm
Resolution: $0.05\mu\text{m}$
Measurement method: Linear encoder
Drive speed: 0 - 80mm/s
Measuring speed: 0.02 - 5mm/s
Traversing direction: Backward
Traverse linearity: $(0.05+1L/1000)\mu\text{m}^*$
($0.5\mu\text{m}/200\text{mm}$: 200mm range model)
Inclining range: $\pm 45^\circ$

Z2-axis (column)
Vertical travel: 300mm or 500mm, power drive
Resolution: $1\mu\text{m}$
Measurement method: ABSOLUTE linear encoder
Drive speed: 0 - 20mm/s

Detector
Range / resolution: $800\mu\text{m} / 0.01\mu\text{m}$, $80\mu\text{m} / 0.001\mu\text{m}$,
 $8\mu\text{m} / 0.0001\mu\text{m}$ (up to $2400\mu\text{m}$ with
an optional stylus)
Detecting method: Skidless / skid measurement
Measuring force: 4mN or 0.75mN (low force type)
Stylus tip: Diamond, $90^\circ/5\mu\text{mR}$
($60^\circ/2\mu\text{mR}$: low force type)
Skid radius of curvature: 40mm
Detecting method: Differential inductance
Base size (W x H): 600 x 450mm or 1000 x 450mm
Base material: Granite
Dimension (W x D x H): 756 x 482 x 966mm (S4-type)
756 x 482 x 1166mm (H4-type)
1156 x 482 x 1176mm (W4-type)
766 x 482 x 966mm (S8-type)
766 x 482 x 1166mm (H8-type)
1166 x 482 x 1176mm (W8-type)

Mass
140kg (S4-type, S8-type)
150kg (H4-type, H8-type)
220kg (W4-type, W8-type)

*L = Measured length (mm)

Evaluation Capability: 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, R3z, R3zi, R3y, S, Pc (Pci), Sm, HSC, mr, δ c, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Δ a, Δ q, λ a, λ q, Sk, Ku, Lo, Lr, A1, A2
Roughness motif parameters: Rx, R, AR, SR, SAR, NR, NCRX, CPM
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*
 λ c: 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm
fl: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm
fh: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm

Sampling length (L)*
0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm

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

*Arbitrary length can be specified in the range from 0.025mm to the maximum traverse length.

Optional Accessory

- 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 (25 x 25mm)
178-052-1: Digimatic XY leveling table (1" x 1")
178-043-1: XY leveling table (25 x 25mm)
178-053-1: XY leveling table (1" x 1")
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
 (See page 426.) Detectors, styli, and nosepieces
 *Use with an XY leveling table

Simplified CNC Function

With the support for a wide range of optional peripherals designed for use with the CNC models enables automatic measurement.



Using Y-axis Table



Using Rotary Table θ1



Using Rotary Table θ2

(See page 424 for more details.)



Refer to the Surftest SV-3100 Series leaflet (E4301) for more details.

SPECIFICATIONS

Model No.	SV-3100S4	SV-3100S4	SV-3100H4	SV-3100H4	SV-3100W4	SV-3100W4
Order No. (mm)	178-471-1*	178-471-2*	178-472-1*	178-472-2*	178-473-1*	178-473-2*
Order No. (inch)	178-481-1*	178-481-2*	178-482-1*	178-482-2*	178-483-1*	178-483-2*
Order No. (mm)	178-451-1*	178-451-2*	178-452-1*	178-452-2*	178-453-1*	178-453-2*
Order No. (inch)	178-461-1*	178-461-2*	178-462-1*	178-462-2*	178-463-1*	178-463-2*
Measuring force of detector	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
X-axis measuring range	100mm		100mm		100mm	
Vertical travel	300mm power column		500mm power column		500mm manual column	
Granite base size (WxD)	600 x 450mm		600 x 450mm		1000 x 450mm	
Dimensions (main unit, WxDxH)	756 x 782 x 966mm		756 x 482 x 1166mm		1156 x 482 x 1176mm	
Mass (main unit)	140kg		150kg		220kg	

Model No.	SV-3100S8	SV-3100S8	SV-3100H8	SV-3100H8	SV-3100W8	SV-3100W8
Order No. (mm)	178-476-1*	178-476-2*	178-477-1*	178-477-2*	178-478-1*	178-478-2*
Order No. (inch)	178-486-1*	178-486-2*	178-487-1*	178-487-2*	178-488-1*	178-488-2*
Order No. (mm)	178-456-1*	178-456-2*	178-457-1*	178-457-2*	178-458-1*	178-458-2*
Order No. (inch)	178-466-1*	178-466-2*	178-467-1*	178-467-2*	178-468-1*	178-468-2*
Measuring force of detector	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
X-axis measuring range	200mm		200mm		200mm	
Vertical travel	300mm power column		500mm power column		500mm manual column	
Granite base size (WxD)	600 x 450mm		600 x 450mm		1000 x 450mm	
Dimensions (main unit, WxDxH)	766 x 482 x 966mm		766 x 482 x 1166mm		1166 x 482 x 1176mm	
Mass (main unit)	140kg		150kg		220kg	

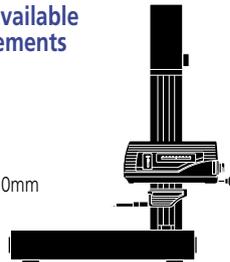
* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **178-663A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

 Models without X-axis inclination function

A variety of models available for measuring requirements

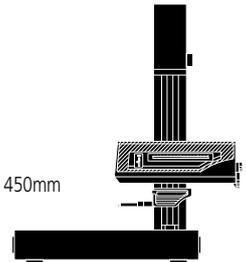
SV-3100S4

Traverse range: 100mm
 Vertical travel: 300mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



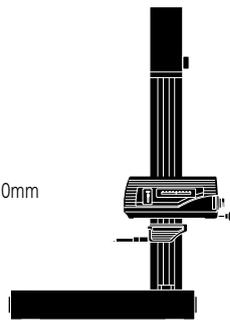
SV-3100S8

Traverse range: 200mm
 Vertical travel: 300mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



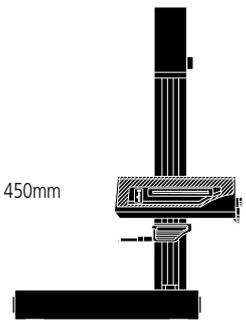
SV-3100H4

Traverse range: 100mm
 Vertical travel: 500mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



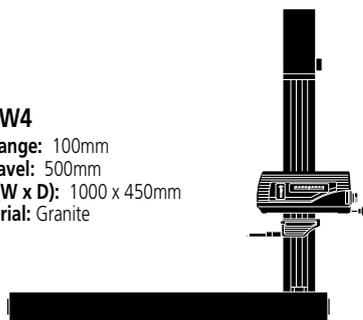
SV-3100H8

Traverse range: 200mm
 Vertical travel: 500mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



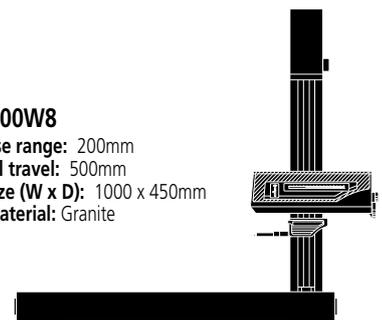
SV-3100W4

Traverse range: 100mm
 Vertical travel: 500mm
 Base size (W x D): 1000 x 450mm
 Base material: Granite



SV-3100W8

Traverse range: 200mm
 Vertical travel: 500mm
 Base size (W x D): 1000 x 450mm
 Base material: Granite



Surftest Extreme SV-3000CNC / SV-M3000CNC

SERIES 178 — CNC Surface Measuring Instruments

FEATURES

- High-accuracy CNC Surface Roughness Measuring Instrument that allows both measurement of surface roughness.
- Each axes has the maximum drive speed of 200 mm/s, which permits high-speed positioning that may result in a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- For models with the α axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the drive unit.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- With the support for optional rotary table $\theta 1$ and $\theta 2$ designed for use with the CNC models enables to expand the CNC measurement application range.
- Enables inclined plane measurements through 2-axis simultaneous control in the X- and Y-axis directions.
- Since the detector unit incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis section is via USB.



SV-3000CNC with personal computer system and software

SPECIFICATIONS

Model No.	SV-3000CNC		SV-3000CNC		SV-3000CNC		SV-3000CNC	
Order No. (100V - 120V)	178-521-1	178-541-1	178-522-1	178-542-1	178-523-1	178-543-1	178-524-1	178-544-1
Order No. (200V - 240V)	178-521-2	178-541-2	178-522-2	178-542-2	178-523-2	178-543-2	178-524-2	178-544-2
X1-axis measuring range	200mm	200mm	200mm	200mm	200mm	200mm	200mm	200mm
Z2-axis vertical travel	300mm	500mm	300mm	500mm	300mm	500mm	300mm	500mm
Y-axis table unit	—	—	—	—	Installed	Installed	Installed	Installed
α -axis unit	—	—	Installed	Installed	—	—	Installed	Installed

Technical Data: SV-C3000CNC

X1-axis	
Measuring range:	200mm
Resolution:	0.05 μ m
Measurement method:	Reflective-type linear encoder
Drive speed:	200mm/s (CNC, max.) 0 - 60mm/s (joystick)
Measuring speed:	0.02 - 2mm/s
Traversing direction:	Backward
Traverse linearity:	0.5 μ m/200mm
α -axis	
Inclination angle:	-45° to +10°
Resolution:	0.000225°
Rotating speed:	1rpm
Z2-axis (column)	
Vertical travel:	300mm (500mm)*
Resolution:	0.05 μ m
Measurement method:	Reflective-type linear encoder
Drive speed:	200mm/s (max., CNC) 0 - 60mm/s (joystick)
Base size (W x H):	750 x 600mm
Base material:	Granite
Detector	
Range / resolution:	800 μ m / 0.01 μ m, 80 μ m / 0.001 μ m, 8 μ m / 0.0001 μ m
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90°/5 μ mR (60°/2 μ mR: low force type)
Dimension (W x D x H):	800 x 620 x 1000mm (800 x 620 x 1200mm)*
Mass:	240kg (250kg)*
*High column model	

Optional Accessory

Vibration insulating stand	
Vibration insulating mechanism: Diaphragm air spring	
Natural frequency :	2.5 - 3.5Hz
Damping mechanism:	Orifice
Leveling mechanism:	Automatic control with mechanical valves
Air supply pressure:	0.4MPa
Allowable loading capacity:	350kg
Dimensions (W x D x H):	1000 x 895 x 715mm
Mass:	280kg
Y-axis table unit	
Measuring range:	200mm
Minimum reading :	0.05 μ m
Scale unit:	Reflective-type Linear Encoder
Drive speed:	200mm/s (max., CNC) 0 - 60mm/s (joystick)
Maximum loading capacity:	20 kg
Traverse linearity	0.5 μ m/200mm
Linear displacement accuracy (at 20°C):	$\pm (2+2L/100)$ μ m, L: Dimension between two measured points (mm)
Table size:	200 x 200mm
Dimensions (W x D x H):	320 x 646 x 105mm
Mass:	35kg



Refer to the CNC Form Measuring Instrument Series leaflet (E4284) for more details.

Technical Data: SV-MC3000CNC

X1-axis	
Measuring range:	200mm
Resolution:	0.05µm
Measurement method:	Reflective-type linear encoder
Drive speed:	200mm/s (max., CNC) 0 - 50mm/s (joystick)
Measuring speed:	0.02 - 2mm/s
Traverse linearity:	0.5µm/200mm 0.7µm/200mm (long-type detector) 0.5µm/200mm (rotary-type detector, up/down direction) 0.7µm/200mm (long-type detector, forward/backward direction)
α-axis	
Inclination angle:	-45° to +10°
Resolution:	0.000225°
Rotating speed:	1rpm
Z2-axis (column)	
Vertical travel:	500mm
Resolution:	0.05µm
Measurement method:	Reflective-type linear encoder
Drive speed:	200mm/s (CNC, max.) 0 - 50mm/s (joystick)
Y-axis	
Measuring range:	810mm
Resolution:	0.05µm
Measurement method:	Reflective-type linear encoder
Drive speed:	200mm/s (max., CNC) 0 - 50mm/s (joystick)
Measuring speed:	0.02 - 2mm/s
Traverse linearity:	0.5µm/50mm, 2µm/800mm (long-type detector) 0.7µm/50mm, 3µm/800mm (rotary-type detector, up/down direction)
Base unit	
Size (W x H):	600 x 1500mm
Material:	Steel
Loading capacity:	300kg
Detector	
Range / resolution:	800µm / 0.01µm, 80µm / 0.001µm, 8µm / 0.0001µm (up to 2400µm with an optional stylus)
Detecting method:	Skidless / skid measurement
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90°/5µmR (60°/2µmR: low force type)
Skid radius of curvature:	40mm
Detecting method:	Differential inductance
Dimension (W x D x H):	1085 x 1695 x 1922mm
Mass:	1600Kg (including vibration isolating unit)

MICAT
Mitutoyo Intelligent Computer Aided Technology

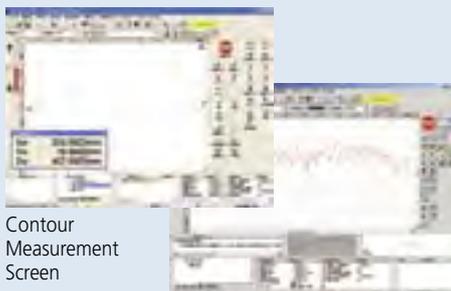
the standard in world metrology software

FORM

Optional Software

FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. You can also perform contour evaluation that allows free analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, you can create an original inspection certificate by setting the print format to suit your particular requirements.



Contour Measurement Screen

Surface Roughness Measurement Screen



SV-M3000CNC with personal computer system and software

FEATURES

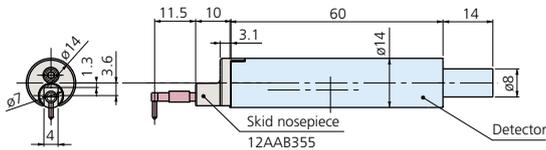
- CNC Surface Roughness Tester that covers measurement of large/heavy workpieces such as engine blocks, crankshafts, etc.
- In combination with the surface roughness detector rotating unit, S-3000AR (optional), covers continuous measurement over the bottom, top and side surfaces of a workpiece.
- Compatible with the optional large table for supporting a load of 100 kg or a large Ø2 table. Enables continuous automatic measurement of large-size workpiece
- Suitable for automatic surface roughness measurement on large and heavy workpieces.
- Employs the column-moving type configuration that is not restricted by workpiece size. This is advantageous for measuring heavy workpieces such as engine blocks, crankshafts, etc.
- Provides 800 mm of Y-axis stroke. This makes it possible to measure multiple profiles on large workpieces.
- Load table has a self-contained structure to ensure that various size workpieces, jigs, auto-feed devices, etc., are easily accommodated and can be specified, if required, by special order.

SPECIFICATIONS

Model No.	SV-M3000CNC
Order No. (100V - 120V)	178-549-1
Order No. (200V - 240V)	178-549-2
X1-axis measuring range	200mm
Z2-axis column travel range	500mm
Y-axis travel range	800mm
α-axis inclination angle	-45° (CCW), ±10° (CW)

Optional Styli for Surface Roughness Measurement

Compatible with SJ-400, SV-2000, SV-3000, SV-3100, SV-3000CNC, SV-M3000CNC, SV-C3100, SV-C4100, SV-C3100CNC, SV-C4100CNC



Detector (0.75mN): **178-396-2**
 Detector (4mN): **178-397-2**

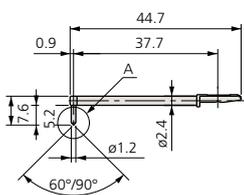
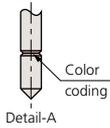


Extension rods
 (12AAG202: 50mm, 12AAG203: 100mm)

Styli

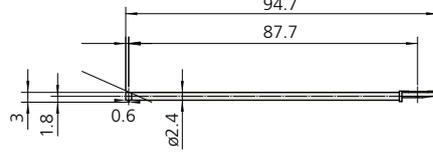
Unit: mm

Standard stylus



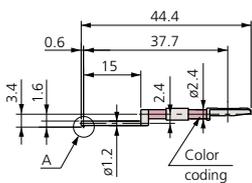
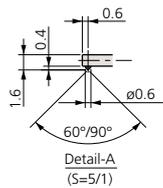
12AAE882 (1 μ m)*
12AAE924 (1 μ m)**
12AAC731 (2 μ m)*
12AAB403 (5 μ m)**
12AAB415 (10 μ m)**
12AAE883 (250 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

Double-length for deep hole



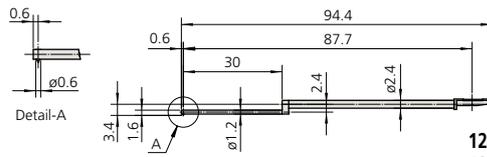
12AAE898 (2 μ m)*
12AAE914 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For small hole



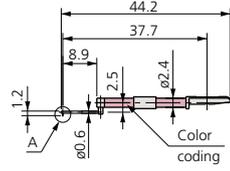
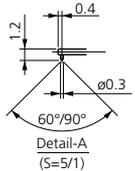
12AAC732 (2 μ m)*
12AAB404 (5 μ m)**
12AAB416 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For small hole/Double-length for deep hole



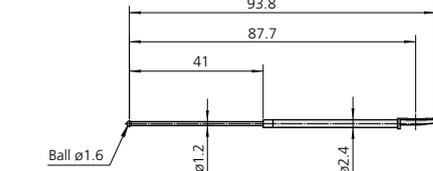
12AAE892 (2 μ m)*
12AAE908 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For extra small hole



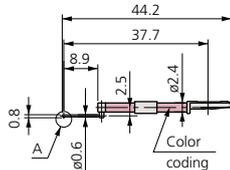
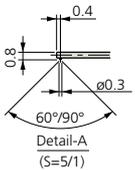
12AAC733 (2 μ m)*
12AAB405 (5 μ m)**
12AAB417 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For small hole



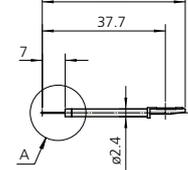
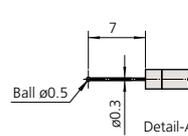
12AAE884 (0.8mm)
 () : Tip radius

For extra minute hole



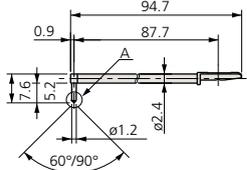
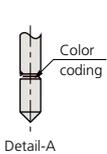
12AAC734 (2 μ m)*
12AAB406 (5 μ m)**
12AAB418 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For ultra small hole

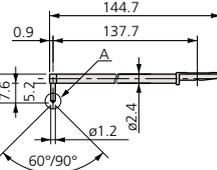
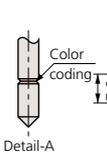


12AAE885 (0.25mm)
 () : Tip radius

For deep hole (double-length and triple-length)

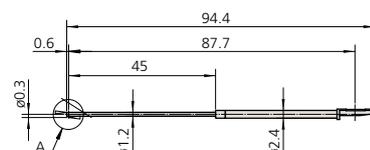
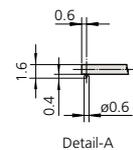


2X stylus
12AAC740 (2 μ m)*
12AAB413 (5 μ m)**
12AAB425 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°



3X stylus
12AAC741 (2 μ m)*
12AAB414 (5 μ m)**
12AAB426 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For small slotted hole

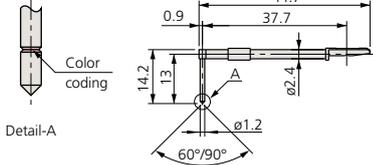


12AAE938 (2 μ m)*
12AAE940 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

Styli

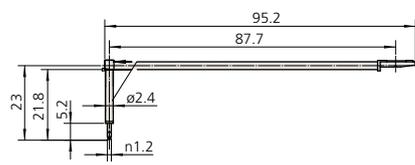
Unit: mm

For deep groove (10mm)



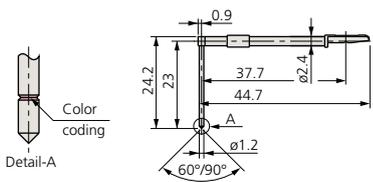
12AAC735 (2 μ m)*
12AAB409 (5 μ m)**
12AAB421 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (20mm)/Double-length for deep hole



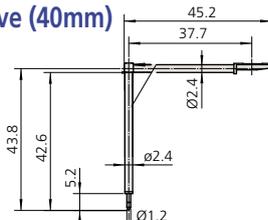
12AAE893 (2 μ m)*
12AAE909 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (20mm)



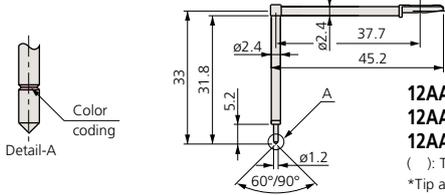
12AAC736 (2 μ m)*
12AAB408 (5 μ m)**
12AAB420 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (40mm)



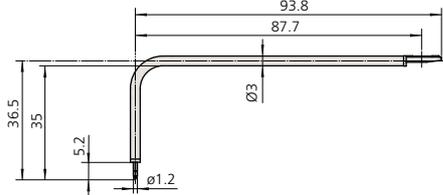
12AAE895 (2 μ m)*
12AAE911 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (30mm)



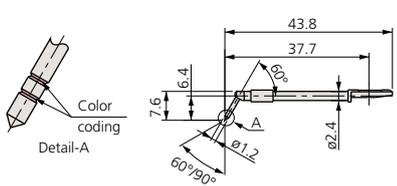
12AAC737 (2 μ m)*
12AAB407 (5 μ m)**
12AAB419 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For deep groove (30mm)/Double-length for deep hole



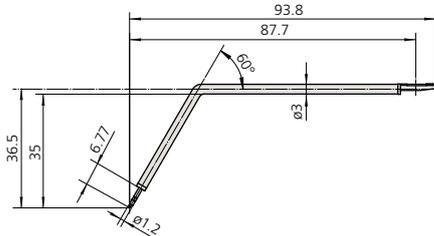
12AAE894 (2 μ m)*
12AAE910 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For gear tooth



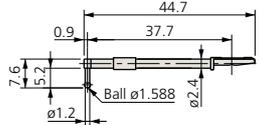
12AAB339 (2 μ m)*
12AAB410 (5 μ m)**
12AAB422 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For gear tooth/Double-length for deep hole



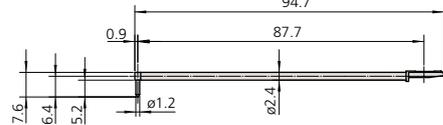
12AAE896 (2 μ m)*
12AAE912 (5 μ m)**
 () : Tip radius

For rolling circle waviness surface



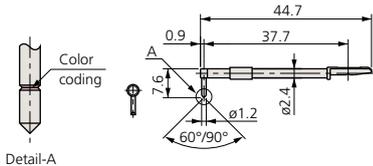
12AAB338 (0.8mm)
 () : Tip radius

For rolling circle waviness/Double-length for deep hole



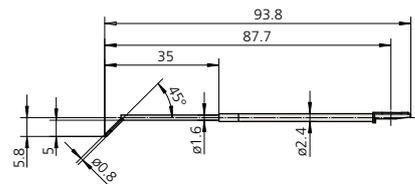
12AAE886 (0.25mm)
 () : Tip radius

For knife-edge detector



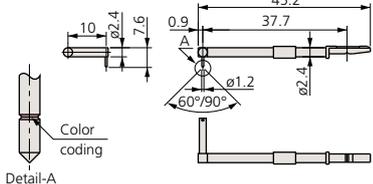
12AAC738 (2 μ m)*
12AAB411 (5 μ m)**
12AAB423 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For corner hole/Double-length for deep hole



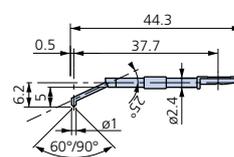
12AAE897 (2 μ m)*
12AAE913 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For eccentric arm



12AAC739 (2 μ m)*
12AAB412 (5 μ m)**
12AAB424 (10 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

For bottom surface



12AAE899 (2 μ m)*
12AAE915 (5 μ m)**
 () : Tip radius
 *Tip angle: 60° **Tip angle: 90°

Optional Accessory for Automatic Measurement

Compatible with SV-3100, SV-C3100, SV-C4100, CS-3100 and CNC Models

Y-axis table*: 178-097

Enables efficient, automatic measurement of multiple aligned workpieces and multiple points on a single measurement surface.

* available as a factory set accessory for CNC model.



Travel range	200mm
Resolution	0.05μm
Positioning accuracy	±3μm
Drive speed	Max. 80mm/s
Maximum load	50kg
Mass	28kg

θ2-axis table: 178-078*

You can measure multiple points on a cylindrical workpiece and automate front/rear-side measurement.

* θ2-axis mounting plate (12AAE718) is required when directly installing on the base of the SV-3100.



Inclination adjustment angle	±2°
Maximum load	7kg
Table dimensions	130 x 100mm
Mass	3.5kg

Quick chuck: 211-032

This chuck is useful when measuring small workpieces. You can easily clamp them with its knurled ring.

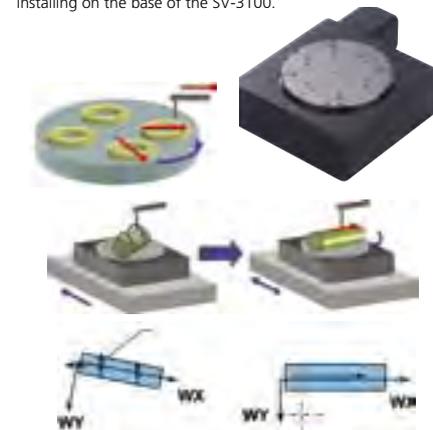


Retention range	Inner latch	OD: ø1 - ø36mm
	Inner latch	ID: ø14 - ø70m
	Outer latch	OD: ø1 - ø75mm
Dimensions	ø118 x 41mm	
Mass	1.2kg	

θ1-axis table: 12AAD975*

For efficient measurement in the axial/transverse directions. When measuring a cylindrical workpiece, automatic alignment can be performed in combination with the Y-axis table.

* θ1-axis mounting plate (12AAE630) is required when directly installing on the base of the SV-3100.



Displacement	360°
Resolution	0.004°
Maximum load	12kg
Rotational speed	Max. 10°/s
Mass	7kg

Auto-leveling table: 178-087

This is a stage that performs fully automatic leveling as measurement starts, freeing the user from this troublesome operation. Fully automatic leveling can be done quickly by anyone. In addition, the operation is easy and reliable.



Displacement	360°
Resolution	0.0072°
Maximum load (loading moment)	4kg (343 N•cm or less)
Rotational speed	Max. 18°/s
Mass	5kg

Micro-chuck: 211-031

This chuck is suitable for clamping extra-small diameter workpieces (ø1mm or less), which cannot be retained with the centering chuck.



Retention range	OD: ø0 - ø1.5mm
Dimensions	ø118 x 48.5mm
Mass	0.6kg

Examples of optimal combinations of accessories for CNC models

Optional accessory \ Function	Y-axis Table	θ1 Table	θ2 Table
Automatic leveling	—	—	—
Automatic alignment (Patent registered: Japan)	●	●	—
Multiple workpiece batch measurement	▲	—	—
Measurement in the Y-axis direction	●	—	—
Oblique measurement of XY plane **	●	—	—
Outside 3D surface roughness measurement/evaluation **	●	—	—
Multiple-piece measurement in the Y-axis direction (Positioning in the Y-axis direction)	●	—	—
Multiple-piece measurement in the radius direction (Positioning in the rotating direction of XY plane)	▲	●	—
Tracking measurement in the Z-axis direction *	—	—	—
Inclined surface measurement in the X-axis direction	▲	—	—
Inclined hole inside measurement in the X-axis direction	▲	—	—
Multiple cylinder generatrix line measurement	▲	—	●
Measurement of both top and bottom surfaces	▲	—	●
Rotary positioning of large workpiece ***	—	—	—
Upward/downward and frontward/backward measurement of large workpiece ***	—	—	—

* : Applicable only to form/contour measurement

** : Applicable only to surface roughness measurement

*** : Applicable only for SV-M3000CNC



Optional Accessory for Surftest / Formtracer

Compatible with Desktop Models of Surftest and Formtracer

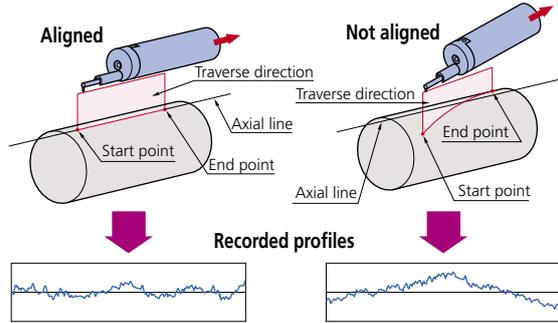
Drive unit tilting function (Patent pending: Japan)	Large θ Table	Rotary-type detector holder
●	—	—
▲	—	—
—	—	—
—	—	—
—	—	—
▲	—	—
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—
—	●	—
—	—	●

●: Essential ▲: Better to provide with
—: Not necessary



3-axis adjustment table

This table helps make the alignment adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the Digimatic micrometers are adjusted accordingly. A flat-surfaced workpiece can also be leveled with this table.



Leveling table

- 178-043-1** (mm),
178-053-1 (inch)
- Table top: 130 x 100mm
 - Leveling range: $\pm 1.5^\circ$
 - XY travel: ± 12.5 mm



Digital leveling table

- 178-042-1** (mm)
- Table top: 130 x 100mm
 - Leveling range: $\pm 1.5^\circ$
 - XY travel: ± 12.5 mm



Leveling table

- 178-016**
- Table top: 130 x 100mm
 - Leveling range: $\pm 1.5^\circ$
 - Height: 40mm



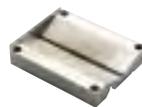
Calibration stand

- 12AAG175**
- For mounting a roughness specimen or step gage during calibration.



V-block

- 998291**
- Workpiece diameter: 1mm to 160mm
 - Can be mounted on a leveling table



Precision vise

- 178-019**
- Max. workpiece size: 36mm
 - Can be mounted on a leveling table.



Cross-travel table

- 218-001** (mm),
218-011 (inch)
- Table top: 280 x 180mm
 - XY travel: 100 x 50mm



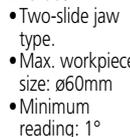
Cross-travel table

- 218-041** (mm),
218-051 (inch)
- Table top: 280 x 152mm
 - XY travel: 50 x 25mm



Rotary vise

- 218-003**
- Two-slide jaw type.
 - Max. workpiece size: $\phi 60$ mm
 - Minimum reading: 1°



Center support

- 172-142**
- Max. workpiece dia.: 120mm
 - 60mm riser is optional



Center support riser

- 172-143**
- Used with a center support.
 - Max. workpiece dia.: 240mm



Swivel center support

- 172-197**
- Max. workpiece dia.: 80mm*
* 65mm when swiveled 10°
 - Max. workpiece length: 140mm



Holder with clamp

- 176-107**
- Used with a cross-travel table or rugged table.
 - Max. workpiece height: 35mm



V-block with clamp

- 172-234**,
172-378
- Used with a cross-travel table or rugged table.
 - Max. workpiece dia.: 50mm (**172-234**), 25mm (**172-378**)



Contracer CV-1000 / CV-2000

SERIES 218 — Contour Measuring Instruments

FEATURES

- The digital arc scale is equipped in the Z-axis detecting unit. This gives you a wider range of measurement with higher resolution. No more reliance on measurement magnifications.
- A data analysis system (personal computer system and software of Formpak-1000) and an XY plotter are available.

CV-2000S4 with personal computer system and software

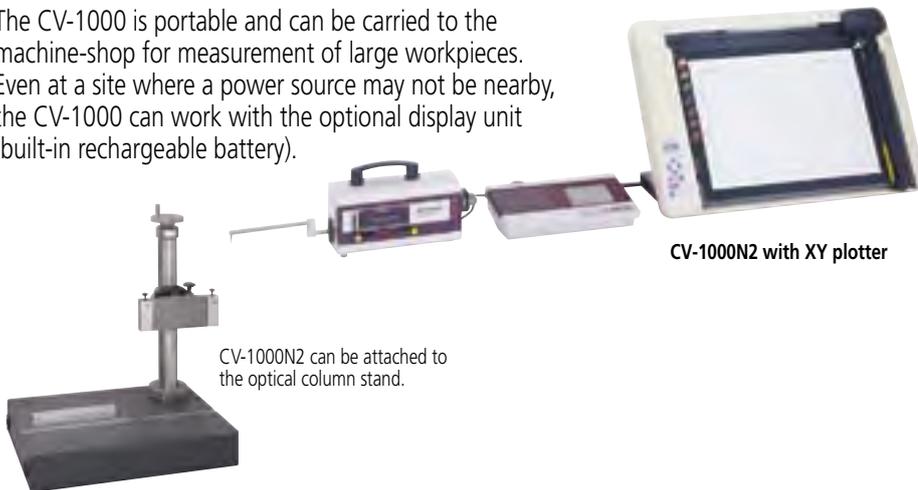


CV-2000M4 with personal computer system and software

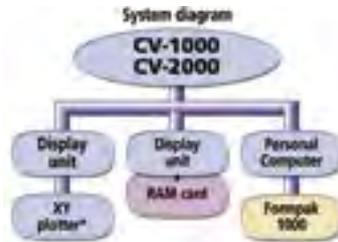


Connected to a personal computer, the FORMPAK-1000 contour analysis program provides various modes of measurement and analysis. When connected to an XY plotter, the contour profile can be checked with the display unit prior to output.

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).



CV-1000N2 can be attached to the optical column stand.



Technical Data

X1-axis	
Measuring range:	50mm (CV-1000) or 100mm (CV-2000)
Resolution:	0.2μm
Measurement method:	Reflective-type linear encoder
Drive speed:	0.2, 1mm/s and manual
Measuring speed:	0.2, 0.5mm/s
Measuring direction:	Backward
Traverse linearity:	3.5μm/50mm (CV-1000), 3.5μm/100mm (CV-2000) *with the X axis in horizontal orientation
Linear displacement:	±(3.5+2L/100)μm * L = Drive length (mm)
Inclining range:	±45° (CV-2000)
Z2-axis (column, CV-2000 only)	
Column type:	Power drive (S4 type) or Manual (M4 type)
Vertical travel:	250mm (S4 type), 320mm (M4 type)
Resolution:	0.2μm (S4 type)
Measurement method:	ABSOLUTE linear encoder (S4 type)
Drive speed:	0 - 5mm/s and manual

Z1-axis (detector unit)

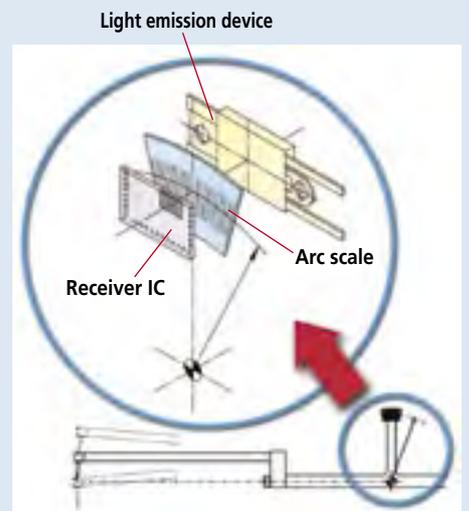
Measuring range:	25mm (CV-1000) or 40mm (CV-2000)
Resolution:	0.4μm (CV-1000) or 0.5μm (CV-2000)
Measurement method:	Arc encoder
Linear displacement:	±(3.5+14H/25)μm
accuracy (at 20°C)	*H: Measurement height from the horizontal position (mm)

Stylus up/down operation:	Arc movement
Face of stylus:	Downward
Measuring force:	10 - 30mN
Traceable angle:	Ascent: 77°, descent: 87° (using the standard stylus provided and depending on the surface roughness)

Stylus tip:	Radius: 25μm, carbide tip
Base size (W x H):	750 x 600mm (CV-2000)
Base material:	Granite (CV-2000)
Mass:	5kg (CV-1000N2), 115.8kg (CV-2000M4), 124kg (CV-2000S4)

Power supply:	100 - 240VAC ±10%, 50/60Hz
Power consumption:	150W (main unit only)

Arc scale on the Z-axis



Optional Accessory

- 12AAA841:** RAM card
- 218-341*:** Display unit
- 218-024:** Column stand for CV-1000
(vertical travel: 250mm, inclination: $\pm 45^\circ$)
- 218-001:** Cross-travel table (XY range: 100 x 50mm)
- 218-011:** Cross-travel table (XY range: 4" x 2")
- 218-041:** Cross-travel table (XY range: 50 x 25mm)
- 218-051:** Cross-travel table (XY range: 2" x 1")
- 218-002:** Rugged 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 for calibration (mm)
- 998861:** Pin gage unit for calibration (inch)
- _____: Arms and styli (See page 410.)

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **218-611A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Display Unit and XY Plotter



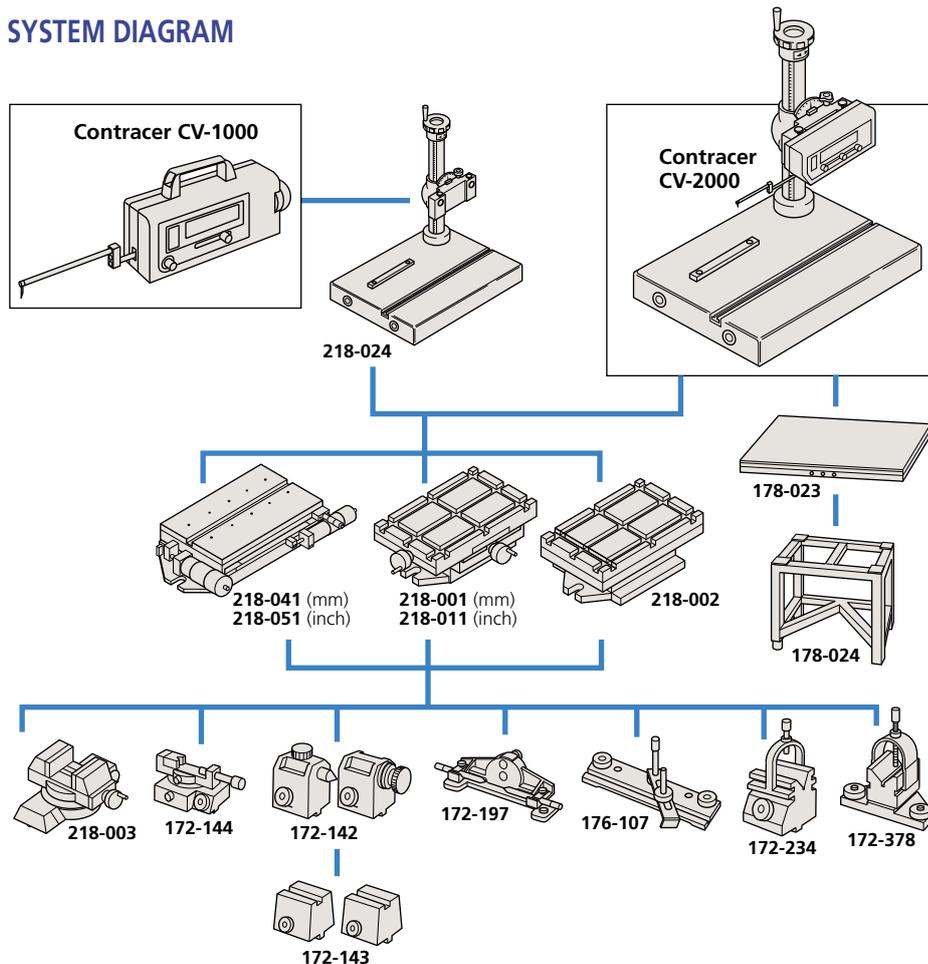
Icons and graphics on the LCD and touch panel make it easy for anyone — even a novice — to perform key analysis operations. The contour profile can be confirmed with the display unit prior to output to an XY plotter. Contour measurement data can be stored on optional RAM cards and read into the personal computer.

SPECIFICATIONS

Model No.	CV-1000N2	CV-2000M4	CV-2000S4
Order No. (mm)	218-611*	218-631*	525-724-1*
Order No. (inch)	218-621*	218-641*	525-724-2*
X1-axis measuring range	50mm	100mm	100mm
Z1-axis measuring range	25mm	40mm	40mm
Z2-axis vertical travel	—	250mm	320mm

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **218-611A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

SYSTEM DIAGRAM



Contracer CV-3100 / CV-4100

SERIES 218 — Contour Measuring Instruments



CV-3100S4 with personal computer system and software

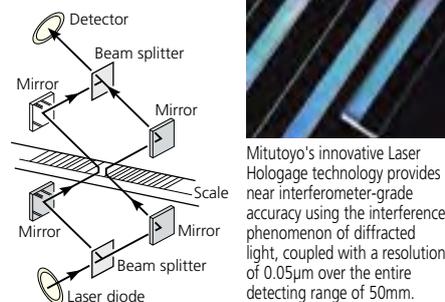
FEATURES

- Dramatically increased drive speed (X axis: 80 mm/s, Z2 axis: 20 mm/s) further reduces total measurement time.
- In order to maintain the traverse linearity specification for an extended period of time, Mitutoyo has adopted highly rigid ceramic guides that combine the characteristics of smallest secular change and remarkable resistance to abrasion.
- With the support for a wide range of optional peripherals designed for use with the CNC models enables simplified CNC measurement.
- The drive unit (X-axis) and column (Z2-axis) are equipped with a high-accuracy linear encoders (ABS type on Z2-axis). This improves reproducibility of continuous automatic measurement of small holes in the vertical direction and repeated measurement of parts which are difficult to position.
- X axis accuracy: $\pm(0.8+0.01L)\mu\text{m}$
Z1 axis accuracy: $\pm(0.8+10.5H/25)\mu\text{m}^*$
Designed to handle workpieces calling for high accuracy.

*CV-4100S4, H4, W4 types,
L = Drive length, H = Measurement height (mm)

- The drive unit of CV-4100 series is equipped with a Laser Hologage detector giving excellent narrow/wide range accuracy and resolution in the Z axis (vertical).

Principle of Operation



Automatic Measuring Function

- With the support for a wide range of optional peripherals designed for use with the CNC models enables automatic measurement.



Using Y-axis Table

Using Rotary Table $\theta 1$



Using Rotary Table $\theta 2$

Technical Data

X-axis

Measuring range:	100mm or 200mm
Resolution:	0.05 μm
Measurement method:	Reflective-type linear encoder
Drive speed:	80mm/s and manual
Measuring speed:	0.02 - 5mm/s
Measuring direction:	Forward/backward
Traverse linearity:	0.8 $\mu\text{m}/100\text{mm}$, 2 $\mu\text{m}/200\text{mm}$ *with the X axis in horizontal orientation
Linear displacement accuracy (at 20°C)	$\pm(1+0.01L)\mu\text{m}$ (CV-3100S4, H4, W4) $\pm(0.8+0.01L)\mu\text{m}$ (CV-4100S4, H4, W4) $\pm(1+0.02L)\mu\text{m}$ (CV-3100S8, H8, W8) $\pm(0.8+0.02L)\mu\text{m}$ (CV-4100S8, H8, W8) * L = Drive length (mm)
Inclining range:	$\pm 45^\circ$

Z2-axis (column)

Vertical travel:	300mm or 500mm
Resolution:	1 μm
Measurement method:	ABSOLUTE linear encoder
Drive speed:	0 - 20mm/s and manual

Z1-axis (detector unit)

Measuring range:	$\pm 25\text{mm}$
Resolution:	0.2 μm (CV-3100 series), 0.05 μm (CV-4100 series)
Measurement method:	Linear encoder (CV-3100 series), laser hologage (CV-4100 series)
Linear displacement accuracy (at 20°C)	$\pm(3+18H/100)\mu\text{m}$ (CV-3100 series) $\pm(0.8+12H/100)\mu\text{m}$ (CV-4100 series) *H: Measurement height from the horizontal position (mm)
Stylus up/down operation:	Arc movement
Face of stylus:	Upward/downward
Measuring force:	30mN
Traceable angle:	Ascent: 77° , descent: 87° (using the standard stylus provided and depending on the surface roughness)

Stylus tip

Base size (W x H):	750 x 600mm or 1000 x 450mm
Base material:	Granite or cast iron
Mass	
Main unit:	140kg (S4), 150kg (H4), 155kg (W4) 145kg (S8), 155kg (H8), 160kg (W8)
Controller Unit:	14kg
Remote Control Box:	0.9kg
Power supply:	100 - 240VAC $\pm 10\%$, 50/60Hz
Power consumption:	400W (main unit only)

Collective Calibration Function

- A dedicated calibration gage enables the user to calibrate the instrument for Z-axis gain, symmetry, stylus-tip radius, etc, in a single procedure.

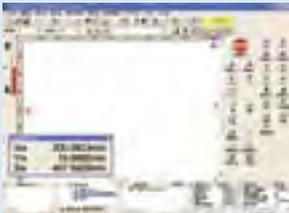


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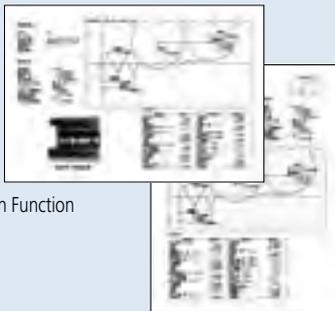
Optional Software FORMPAK-1000



Measurement Control Screen



Profile Analysis Screen

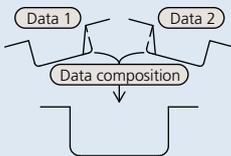


Report Creation Function

Automatic Circle/Line Application Function



Data Composition Function



Refer to the Contracer CV-3100 / 4100 Series leaflet (E4293) for more details.

SPECIFICATIONS

Model No.	CV-3100S4	CV-3100H4	CV-3100W4
Order No. (mm)	218-421*	218-422*	218-423*
Order No. (inch)	218-431*	218-432*	218-433*
Model No.	CV-4100S4	CV-4100H4	CV-4100W4
Order No. (mm)	218-461*	218-462*	218-463*
Order No. (inch)	218-471*	218-472*	218-473*
X1-axis measuring range	100mm	100mm	100mm
Vertical travel	300mm power column	500mm power column	500mm power column
Granite base size (WxD)	600 x 450mm	600 x 450mm	1000 x 450mm
Dimensions (main unit, WxDxH)	741 x 450 x 905mm	741 x 450 x 1105mm	1118 x 450 x 1111mm
Mass (main unit)	140kg	150kg	155kg

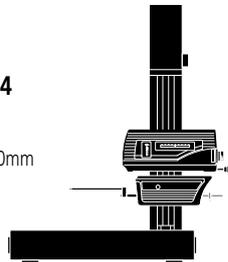
Model No.	CV-3100S8	CV-3100H8	CV-3100W8
Order No. (mm)	218-426-1*	218-427-1*	218-428-1*
Order No. (inch)	218-436-1*	218-437-1*	218-438-1*
Model No.	CV-4100S8	CV-4100H8	CV-4100W8
Order No. (mm)	218-466-1*	218-467-1*	218-468-1*
Order No. (inch)	218-476-1*	218-477-1*	218-478-1*
X1-axis measuring range	200mm	200mm	200mm
Vertical travel	300mm power column	500mm power column	500mm power column
Granite base size (WxD)	600 x 450mm	600 x 450mm	1000 x 450mm
Dimensions (main unit, WxDxH)	741 x 450 x 905mm	767 x 450 x 1105mm	1144 x 450 x 1111mm
Mass (main unit)	145kg	155kg	160kg

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **218-421A**):
A for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

A variety of models available for measuring requirements

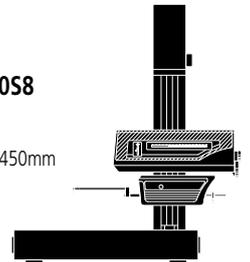
CV-3100S4 / CV-4100S4

Traverse range: 100mm
 Vertical travel: 300mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



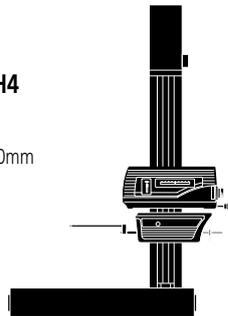
CV-3100S8 / CV-4100S8

Traverse range: 200mm
 Vertical travel: 300mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



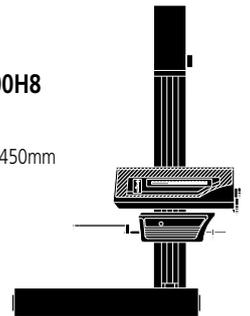
CV-3100H4 / CV-4100H4

Traverse range: 100mm
 Vertical travel: 500mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



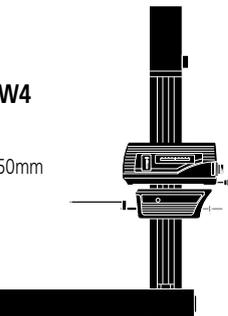
CV-3100H8 / CV-4100H8

Traverse range: 200mm
 Vertical travel: 500mm
 Base size (W x D): 600 x 450mm
 Base material: Granite



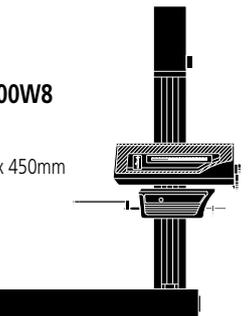
CV-3100W4 / CV-4100W4

Traverse range: 100mm
 Vertical travel: 500mm
 Base size (W x D): 1000 x 450mm
 Base material: Granite



CV-3100W8 / CV-4100W8

Traverse range: 200mm
 Vertical travel: 500mm
 Base size (W x D): 1000 x 450mm
 Base material: Granite



Contracer Extreme CV-3000CNC / CV-4000CNC

SERIES 218 — CNC Contour Measuring Instruments

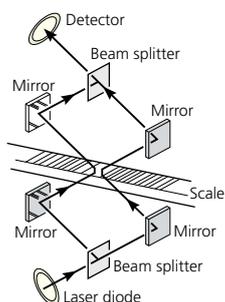


CV-3000CNC with personal computer system and software

FEATURES

- High-accuracy CNC contour / form measuring instrument.
- X1, (Y), and Z2 axes have a maximum drive speed of 200 mm/s, which permits high-speed positioning that may result in a large increase in the throughput of multiple-profile / multiple-workpiece measurement tasks.
- For models with the α axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the X1 axis.
- The drive unit of CV-4000CNC series is equipped with a Laser Hologage detector giving excellent narrow/wide range accuracy and resolution in the Z axis (vertical).
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- Enables inclined plane measurements through 2-axis simultaneous control in the X- and Y-axis directions.
- Since the Z1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing / Analysis section is via USB.

Principle of Operation



Mitutoyo's innovative Laser Hologage technology provides near interferometer-grade accuracy using the interference phenomenon of diffracted light, coupled with a resolution of $0.05\mu\text{m}$ over the entire detecting range of 50mm.

Technical Data

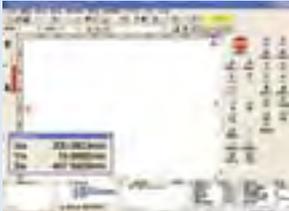
X1-axis	
Measuring range:	200mm
Resolution:	$0.05\mu\text{m}$
Measurement method:	Reflective-type linear encoder
Drive speed:	Max. 200mm/s (CNC) 0 - 50mm/s (joystick)
Measuring speed:	0.02 - 2mm/s
Measuring direction:	Forward/backward
Traverse linearity:	$2\mu\text{m}/200\text{mm}$ *with the X axis in horizontal orientation
Linear displacement accuracy (at 20°C):	$\pm(1+4L/200)\mu\text{m}$, * L = Drive length (mm)
α-axis	
Inclination angle:	-45° to $+10^\circ$
Resolution:	0.000225°
Rotating speed:	1rpm
Z2-axis (column)	
Vertical travel:	300mm or 500mm
Resolution:	$0.05\mu\text{m}$
Measurement method:	Reflective-type linear encoder
Drive speed:	Max. 200mm/s (CNC) 0 - 50mm/s (joystick)
Z1-axis (detector unit)	
Measuring range:	$\pm 25\text{mm}$
Resolution:	$0.2\mu\text{m}$ (CV-3000CNC), $0.05\mu\text{m}$ (CV-4000CNC)
Measurement method:	Linear encoder (CV-3000CNC), laser hologage (CV-4000CNC)
Linear displacement accuracy (at 20°C):	$\pm(3+12H/25)\mu\text{m}$ (CV-3000CNC) $\pm(0.8+10.5H/25)\mu\text{m}$ (CV-4000CNC) *H: Measurement height from the horizontal position (mm)
Stylus up/down operation:	Arc movement
Face of stylus:	Upward/downward
Measuring force:	30mN
Traceable angle:	Ascent: 70° , descent: 70° (using the standard stylus provided and depending on the surface roughness)
Stylus tip:	Radius: $25\mu\text{m}$, carbide tip
Base size (W x H):	750 x 600mm
Base material:	Granite
Mass:	240kg, 250kg (high column type)
Power supply:	100 - 240VAC $\pm 10\%$, 50/60Hz
Power consumption:	400W (main unit only)



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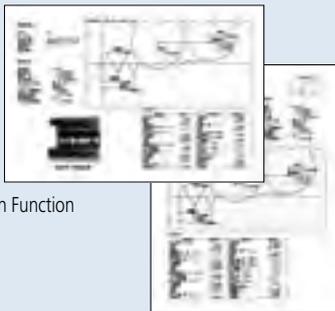
Optional Software FORMPAK-1000



Measurement Control Screen

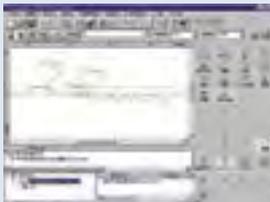


Profile Analysis Screen

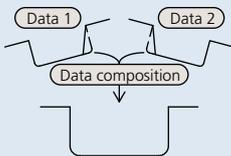


Report Creation Function

Automatic Circle/Line Application Function



Data Composition Function



Refer to the CNC Form Measuring Instrument Series leaflet (E4284) for more details.

SPECIFICATIONS

Model No.	CV-3000CNC	CV-3000CNC	CV-3000CNC	CV-3000CNC
Order No. (100V - 120V)	218-521-1	218-522-1	218-523-1	218-524-1
Order No. (200V - 240V)	218-521-2	218-522-2	218-523-2	218-524-2
X1-axis measuring range	200mm	200mm	200mm	200mm
Z2-axis vertical travel	300mm	300mm	300mm	300mm
Y-axis table unit	—	—	Installed	Installed
α-axis unit	—	Installed	—	Installed
Granite base size (WxD)	750 x 600mm	750 x 600mm	750 x 600mm	750 x 600mm
Dimensions (main unit, WxDxH)	800 x 620 x 1000mm	800 x 620 x 1000mm	800 x 620 x 1000mm	800 x 620 x 1000mm
Mass (main unit)	240kg	240kg	240kg	240kg

Model No.	CV-3000CNC	CV-3000CNC	CV-3000CNC	CV-3000CNC
Order No. (100V - 120V)	218-541-1	218-542-1	218-543-1	218-544-1
Order No. (200V - 240V)	218-541-2	218-542-2	218-543-2	218-544-2
X1-axis measuring range	200mm	200mm	200mm	200mm
Z2-axis vertical travel	500mm	500mm	500mm	500mm
Y-axis table unit	—	—	Installed	Installed
α-axis unit	—	Installed	—	Installed
Granite base size (WxD)	750 x 600mm	750 x 600mm	750 x 600mm	750 x 600mm
Dimensions (main unit, WxDxH)	800 x 620 x 1200mm			
Mass (main unit)	250kg	250kg	250kg	250kg

Model No.	CV-4000CNC	CV-4000CNC	CV-4000CNC	CV-4000CNC
Order No. (100V - 120V)	218-561-1	218-562-1	218-563-1	218-564-1
Order No. (200V - 240V)	218-561-2	218-562-2	218-563-2	218-564-2
X1-axis measuring range	200mm	200mm	200mm	200mm
Z2-axis vertical travel	300mm	300mm	300mm	300mm
Y-axis table unit	—	—	Installed	Installed
α-axis unit	—	Installed	—	Installed
Granite base size (WxD)	750 x 600mm	750 x 600mm	750 x 600mm	750 x 600mm
Dimensions (main unit, WxDxH)	800 x 620 x 1000mm	800 x 620 x 1000mm	800 x 620 x 1000mm	800 x 620 x 1000mm
Mass (main unit)	240kg	240kg	240kg	240kg

Model No.	CV-4000CNC	CV-4000CNC	CV-4000CNC	CV-4000CNC
Order No. (100V - 120V)	218-581-1	218-582-1	218-583-1	218-584-1
Order No. (200V - 240V)	218-581-2	218-582-2	218-583-2	218-584-2
X1-axis measuring range	200mm	200mm	200mm	200mm
Z2-axis vertical travel	500mm	500mm	500mm	500mm
Y-axis table unit	—	—	Installed	Installed
α-axis unit	—	Installed	—	Installed
Granite base size (WxD)	750 x 600mm	750 x 600mm	750 x 600mm	750 x 600mm
Dimensions (main unit, WxDxH)	800 x 620 x 1200mm	800 x 620 x 1200mm	800 x 620 x 1200mm	800 x 620 x 1200mm
Mass (main unit)	250kg	250kg	250kg	250kg

Optional Accessory

Vibration insulating stand

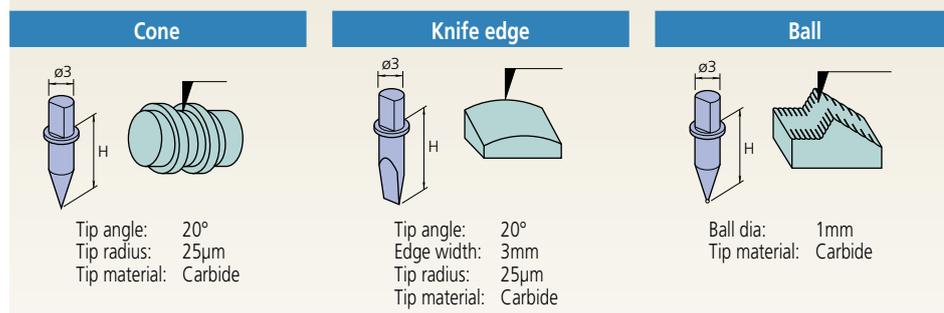
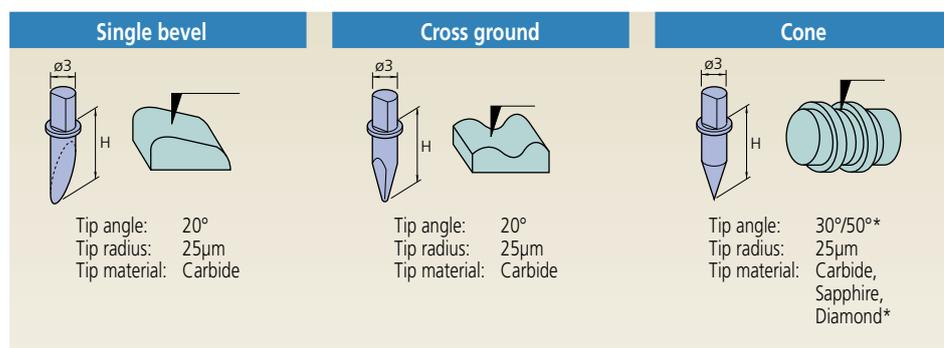
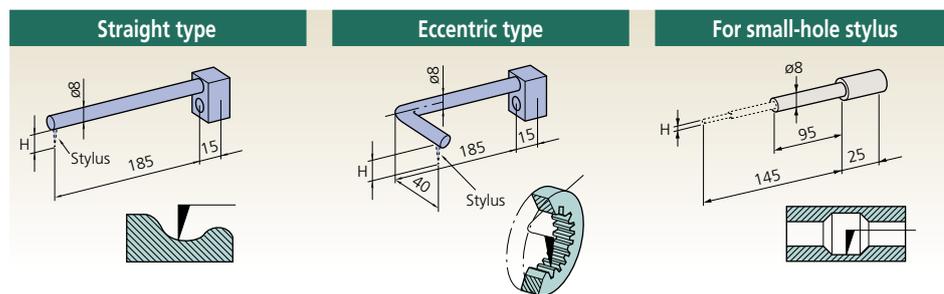
Vibration insulating mechanism: Diaphragm air spring
 Natural frequency : 2.5 - 3.5Hz
 Damping mechanism: Orifice
 Leveling mechanism: Automatic control with mechanical valves
 Air supply pressure: 390kPa
 Allowable loading capacity: 350kg
 Dimensions (W x D x H): 1000 x 895 x 715mm
 Mass: 280kg

Y-axis table unit

Measuring range: 200mm
 Minimum reading : 0.05μm
 Scale unit: Reflective-type Linear Encoder
 Drive speed: Max. 200mm/s (CNC)
 0 - 50mm/s (joystick)
 Maximum loading capacity: 20 kg
 Traverse linearity: 0.5μm/200mm (surface roughness)
 2μm/200mm (contour)
 Linear displacement accuracy (at 20°C):
 ± (2+2L/100) μm, contour mode
 L: Dimension between two measured points (mm)
 Table size: 200 x 200mm
 Dimensions (W x D x H): 320 x 646 x 105mm
 Mass: 35kg

Optional Arms and Styli for Contour Measurement

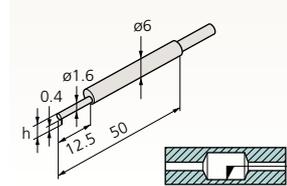
For CV-1000 and CV-2000



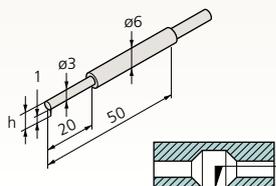
Small hole: 932693 / 12AAE873

Small hole: 932694 / 12AAE874

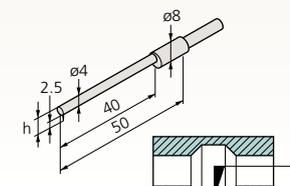
Small hole: 932695 / 12AAE875



932693 **12AAE873**
 Tip shape: Single bevel Cone
 Tip angle: 20° 30°
 Tip radius: 25µm 25µm
 Tip material: Carbide Carbide



932694 **12AAE874**
 Tip shape: Single bevel Cone
 Tip angle: 20° 30°
 Tip radius: 25µm 25µm
 Tip material: Carbide Carbide



932695 **12AAE875**
 Tip shape: Single bevel Cone
 Tip angle: 20° 30°
 Tip radius: 25µm 25µm
 Tip material: Carbide Carbide

List of Applicable Arms

Arm name	Order No.	Compatible stylus height
Straight type	935111	H = 6mm
	935112	H = 12mm
	935113	H = 20mm
	935114	H = 30mm
Eccentric type	935115	H = 42mm
	935116	H = 6mm
	935117	H = 12mm
	935118	H = 20mm
Small hole	935119	H = 30mm
	935120	H = 42mm
Small hole	935110	H = 0.4, 1, 2.5mm

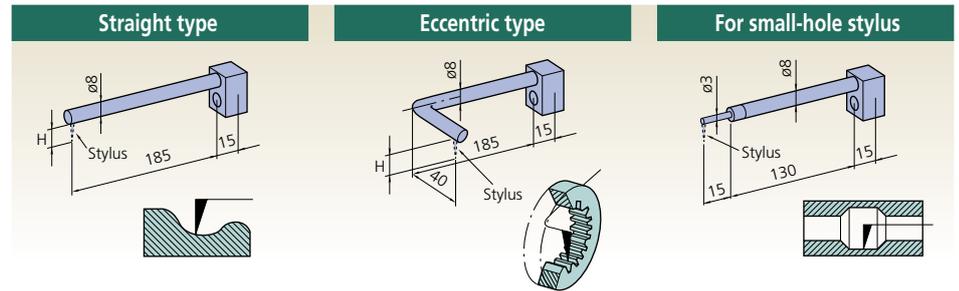
List of Applicable Styli

Stylus name	Order No.	Stylus height
Single-bevel stylus carbide-tipped	354882	H = 6mm
	354883	H = 12mm
	354884	H = 20mm
	345885	H = 30mm
Cross-ground stylus carbide-tipped	354886	H = 42mm
	354887	H = 6mm
	354888	H = 12mm
	354889	H = 20mm
Cone stylus carbide-tipped tip angle 20°	354890	H = 30mm
	354891	H = 42mm
	12AAE865	H = 6mm
	12AAE866	H = 12mm
Cone stylus sapphire tipped tip angle 30° *Diamond tipped *tip angle 50°	12AAE867	H = 20mm
	12AAE868	H = 30mm
	12AAE869	H = 42mm
	354892	H = 6mm
Cone stylus carbide-tipped tip angle 30°	354893	H = 12mm
	354894	H = 20mm
	355129*	H = 20mm
	354895	H = 30mm
Cone stylus carbide-tipped tip angle 30°	354896	H = 42mm
	12AAA566	H = 6mm
	12AAA567	H = 12mm
	12AAA568	H = 20mm
Knife-edge stylus carbide-tipped	12AAA569	H = 30mm
	12AAA570	H = 42mm
	354897	H = 6mm
	354898	H = 12mm
Ball stylus carbide-tipped	354899	H = 20mm
	354900	H = 30mm
	354901	H = 42mm
	354902	H = 6mm
Small-hole stylus carbide-tipped one-sided cut	354903	H = 12mm
	354904	H = 20mm
	354905	H = 30mm
	354906	H = 42mm
Small-hole stylus carbide-tipped cone	932693	H = 2mm
	932694	H = 4mm
	932695	H = 6.5mm
	12AAE873	H = 2mm
12AAE874	H = 4mm	
12AAE875	H = 6.5mm	

List of Applicable Arms

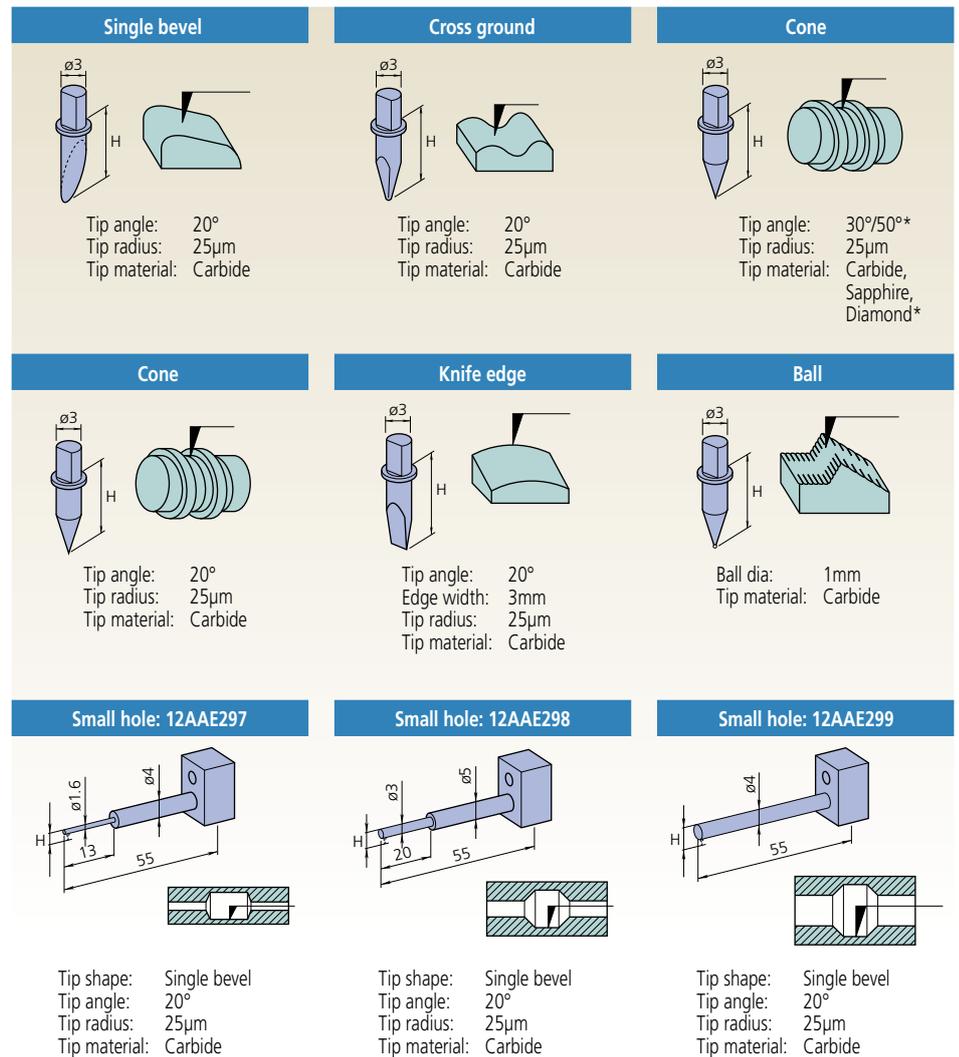
Arm name	Order No.	Compatible stylus height
Straight type	12AAE294	H = 6mm
	12AAE295	H = 12mm
	996506	H = 20mm
	996507	H = 30mm
	996508	H = 42mm
Eccentric type	996509	H = 6mm
	996510	H = 12mm
	996511	H = 20mm
	996512	H = 30mm
	996513	H = 42mm
Small hole	12AAE296	Small-hole stylus

For CV-3100, CV-4100, CV-3000CNC, CV-4000CNC, SV-C3100, SV-C4100, SV-C3000CNC and SV-C4000CNC



List of Applicable Styli

Stylus name	Order No.	Stylus height
Single-bevel stylus carbide-tipped	354882	H = 6mm
	354883	H = 12mm
	354884	H = 20mm
	345885	H = 30mm
	354886	H = 42mm
Cross-ground stylus carbide-tipped	354887	H = 6mm
	354888	H = 12mm
	354889	H = 20mm
	354890	H = 30mm
	354891	H = 42mm
Cone stylus carbide-tipped tip angle 20°	12AAE865	H = 6mm
	12AAE866	H = 12mm
	12AAE867	H = 20mm
	12AAE868	H = 30mm
	12AAE869	H = 42mm
Cone stylus sapphire tipped tip angle 30° *Diamond tipped *tip angle 50°	354892	H = 6mm
	354893	H = 12mm
	354894	H = 20mm
	355129*	H = 20mm
	354895	H = 30mm
354896	H = 42mm	
Cone stylus carbide-tipped tip angle 30°	12AAA566	H = 6mm
	12AAA567	H = 12mm
	12AAA568	H = 20mm
	12AAA569	H = 30mm
	12AAA570	H = 42mm
Knife-edge stylus carbide-tipped	354897	H = 6mm
	354898	H = 12mm
	354899	H = 20mm
	354900	H = 30mm
	354901	H = 42mm
Ball stylus carbide-tipped	354902	H = 6mm
	354903	H = 12mm
	354904	H = 20mm
	354905	H = 30mm
	354906	H = 42mm
Small-hole stylus carbide-tipped one-sided cut	12AAE297	H = 2mm
	12AAE298	H = 4mm
	12AAE299	H = 6.5mm



• Any specified arm and stylus other than above listed can be custom-made to special order.

Optional Accessory for Automatic Measurement

Compatible with CV-3100, CV-4100 and CNC Models

Y-axis table*: 178-097

Enables efficient, automatic measurement of multiple aligned workpieces and multiple points on a single measurement surface.

* available as a factory set accessory for CNC model.



Travel range	200mm
Resolution	0.05μm
Positioning accuracy	±3μm
Drive speed	Max. 80mm/s
Maximum load	50kg
Mass	28kg

θ2-axis table: 178-078*

You can measure multiple points on a cylindrical workpiece and automate front/rear-side measurement.

*θ2-axis mounting plate (12AAE718) is required when directly installing on the base of the SV-3100.

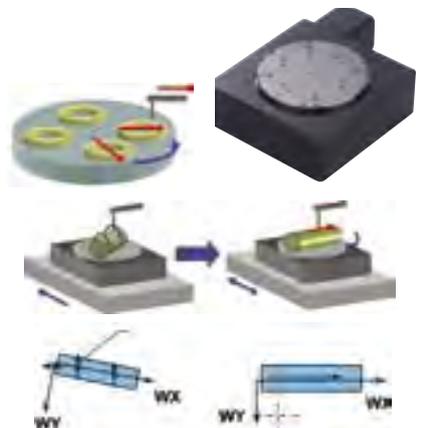


Inclination adjustment angle	±2°
Maximum load	7kg
Table dimensions	130 x 100mm
Mass	3.5kg

θ1-axis table: 12AAD975*

For efficient measurement in the axial/transverse directions. When measuring a cylindrical workpiece, automatic alignment can be performed in combination with the Y-axis table.

*θ1-axis mounting plate (12AAE630) is required when directly installing on the base of the SV-3100.



Displacement	360°
Resolution	0.004°
Maximum load	12kg
Rotational speed	Max. 10°/s
Mass	7kg

Quick chuck: 211-032

This chuck is useful when measuring small workpieces. You can easily clamp them with its knurled ring.



Retention range	Inner latch	OD: ø1 - ø36mm
	Inner latch	ID: ø14 - ø70mm
	Outer latch	OD: ø1 - ø75mm
Dimensions	ø118 x 41mm	
Mass	1.2kg	

Micro-chuck: 211-031

This chuck is suitable for clamping extra-small diameter workpieces (ø1 mm or less), which cannot be retained with the centering chuck.

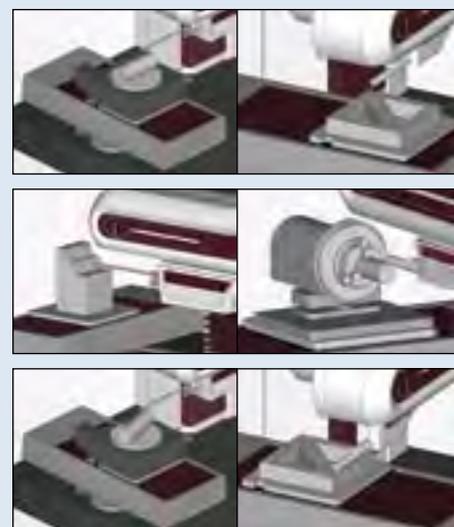


Retention range	OD: ø0 - ø1.5mm
Dimensions	ø118 x 48.5mm
Mass	0.6kg

Examples of optimal combinations of accessories for CNC models

Optional accessory	Y-axis Table	θ1 Table	θ2 Table
Function			
Automatic alignment (Patented : Japan)	●	●	—
Multiple workpiece batch measurement	▲	—	—
Multiple-piece measurement in the Y-axis direction (Positioning in the Y-axis direction)	●	—	—
Multiple-piece measurement in the radius direction (Positioning in the rotating direction of XY plane)	▲	●	—
Tracking measurement in the Z-axis direction *	—	—	—
Inclined surface measurement in the X-axis direction	▲	—	—
Inclined hole inside measurement in the X-axis direction	▲	—	—
Multiple cylinder generatrix line measurement	▲	—	●
Measurement of both top and bottom surfaces	▲	—	●
Rotary positioning of large workpiece **	—	—	—
Upward/downward and forward/backward measurement of large workpiece **	—	—	—

* : Applicable only to form/contour measurement
 ** : Applicable only for SV-M3000CNC



Optional Accessory for Contracer / Formtracer

Compatible with Desktop Models of Contracer and Formtracer

Drive unit tilting function (Patent pending: Japan)	Large θ Table	Rotary-type detector holder
		
▲	—	—
—	—	—
—	—	—
—	—	—
—	—	—
●	—	—
●	—	—
—	—	—
—	●	—
—	—	●

●: Essential ▲: Better to provide with
—: Not necessary



Cross-travel table

- Table top: 280 x 180mm
- XY travel: 100 x 50mm



218-001 (mm)
218-011 (inch)

- Table top: 280 x 152mm
- XY travel: 50 x 25mm



218-041 (mm)
218-051 (inch)

Rotary vise

- Two-slide jaw type.
- Max. workpiece size: ϕ 60mm
- Minimum reading: 1°



218-003

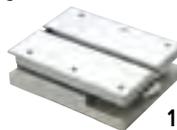
- One-slide jaw type.
- Max. workpiece size: ϕ 60mm
- Minimum reading: 5°



172-144

Leveling table

- Table top: 130 x 100mm
- Leveling range: $\pm 1.5^\circ$
- Height: 40mm



178-016

V-block with clamp

- Used with a cross-travel table or rugged table.
- Max. workpiece diameter: 50mm
- Max. workpiece diameter: 25mm



172-378
172-234

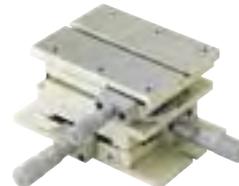
- Workpiece diameter: 1mm to 160mm
- Can be mounted on a leveling table



998291

Leveling table

- Table top: 130 x 100mm
- Leveling range: $\pm 1.5^\circ$
- XY travel: ± 12.5 mm



178-043-1 (mm)
178-053-1 (inch)

Digital Leveling table

- Table top: 130 x 100mm
- Leveling range: $\pm 1.5^\circ$
- XY travel: ± 12.5 mm



178-042-1 (mm)

Three-axis adjustment table



178-047

Precision vise

- Max. workpiece size: 36mm
- Can be mounted on a leveling table.



178-019

Holder with clamp

- Used with a cross-travel table or rugged table.
- Max. workpiece height: 35mm



176-107

Swivel center support

- Max. workpiece diameter: 80mm*
*65mm when swiveled 10°
- Max. workpiece length: 140mm



172-197

Center support

- Max. workpiece diameter: 120mm
- 60mm riser is optional (172-143)



172-142

Center support riser

- Used with a center support.
- Max. workpiece diameter: 240mm



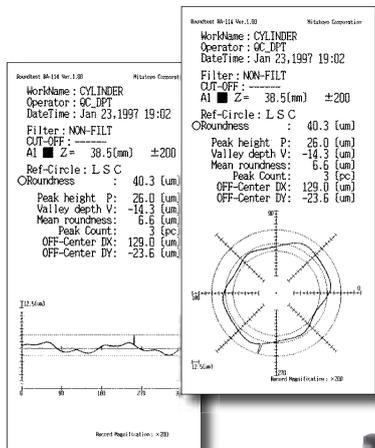
172-143

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 a $\pm 1000\mu\text{m}$ wide range detector and precision turn table with excellent 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.



RA-114D



RA-114
(without D.A.T. function)

The RA-116/116D is a PC based model which controls all operations via ROUNDPAK software.



RA-116D

Technical Data

Turntable

Rotational accuracy: $(0.07+6H/10000)\mu\text{m}$
H: Probing height (mm)
 Rotating speed: 6rpm
 Table top diameter: $\phi 150\text{mm}$
 Centering range: $\pm 3\text{mm}$
 Leveling range: $\pm 1^\circ$
 Maximum probing diameter: $\phi 280\text{mm}$
 Maximum workpiece diameter: $\phi 280\text{mm}$
 Maximum workpiece weight: 20kg
 Vertical column (Z-axis)
 Vertical travel: 280mm
 Feeding: 30mm/rev. (coarse), 1mm/rev. (fine)
 Maximum probing height: 280mm (OD), 280mm (ID)
 Maximum probing depth: 100mm
 Horizontal arm (X-axis)
 Horizontal travel: 165mm (Including a protrusion of 25mm the turntable rotation center)

Probe and stylus

Measuring range: $\pm 1000\mu\text{m}$
 Measuring force: 7 to 10mN
 Standard stylus: **12AAB681**, carbide ball, $\phi 1.6\text{mm}$
 Measuring direction: Two directional
 Stylus angle adjustment: $\pm 45^\circ$ (with graduations)

Data analysis unit:

Processing unit: Built-in (PC with Roundpak-100)*
 Data sampling dots: Max. 1,800dots/rotation

Data analysis items:

Roundness, Concentricity, Coaxiality*, Circular run-out (radial), Circular run-out (axial), Squareness (against axis), Squareness (against plane), Thickness deviation, Flatness, Parallelism

Reference circles for roundness evaluation:

LSC, MZC, MIC, MCC

Variation of analysis views*:

Top view, Opened view, Side view, Inclined view, Overlooked view

Recording device:

Built-in thermal line printer (optional external printer)*

Recording magnification:

X5 to X50000, Auto (X100 to X200000, Auto)*

Roughness component reduction:

Low pass filter, band pass filter

Filter type:

2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian, filter OFF

Cutoff value:

15 μm , 50 μm , 150 μm , 500 μm , 15-150 μm , 15-500 μm , 50-500 μm , Manual setting*

Functions

- Total analysis of multiple items
- Recalculation of datum/measured data
- Tolerancing (GO/NG judgment)
- Rotation of 3D display*
- Real-time display*
- Simplified layout (divided layout)*
- Hair line, auxiliary line, hidden line, fill line*
- Color setting of measured data*
- Offsetting of recorded profile generation*
- Zooming of recorded profile*
- Data deletion*
- Graph analysis (displacement/angle between measured points)*
- Power spectrum analysis*
- Gear tooth analysis*
- Harmonic analysis*
- Text data output (via CSV format)*

Air supply

Air pressure: 390kPa (4kgf/cm²)

Air consumption: 45L/min.

Power supply: 100V AC – 240V AC, 50/60Hz

Dimensions (W x D x H): 660 x 415 x 620mm

(610 x 380 x 620mm: RA-114 / 116)

Mass: 40kg

*RA-116 / 116D

Optional Accessory

- 211-032:** Quick chuck (OD: 1 - 75mm, ID: 14 - 70mm)
 - 211-014:** Chuck (OD: 1 - 85mm, ID: 33 - 85mm)
 - 211-031:** Micro-chuck (OD: 1.5mm max.)
 - 356038*:** Auxiliary stage for a low-height workpiece
 - 211-045:** Magnification checking gage
 - 997090:** Gauge block set for calibration
 - 211-016*:** Reference hemisphere
 - _____: Interchangeable styli (See page 461.)
- *Standard accessory for RA-114D/116D



211-032



211-014



211-031



356038



211-045



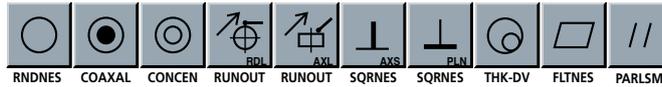
997090



211-016

CONSUMABLE PARTS

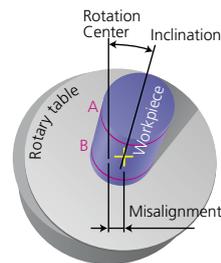
- 998698:** Printer paper (25m) 10 rolls/set
- 358592:** Element for air filter 1 pc./set
- 358593:** Element for air regulator 10 pcs./set



DAT (Digital Adjustment Table) function

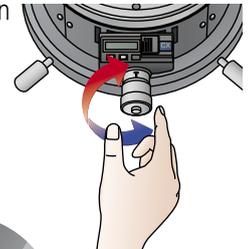
The turntable digitally displays the centering and leveling adjustments, turning what used to be a difficult and finicky task into one that is simple enough for even untrained operator to perform.

1. Preliminary measurement of two cross sections "A" and "B"



2. Following preliminary measurement, the centering and leveling adjustment values are displayed on the monitor.

3. Manipulate the digital micrometer heads of the rotary table so that the adjustment values displayed on the monitor are realized.



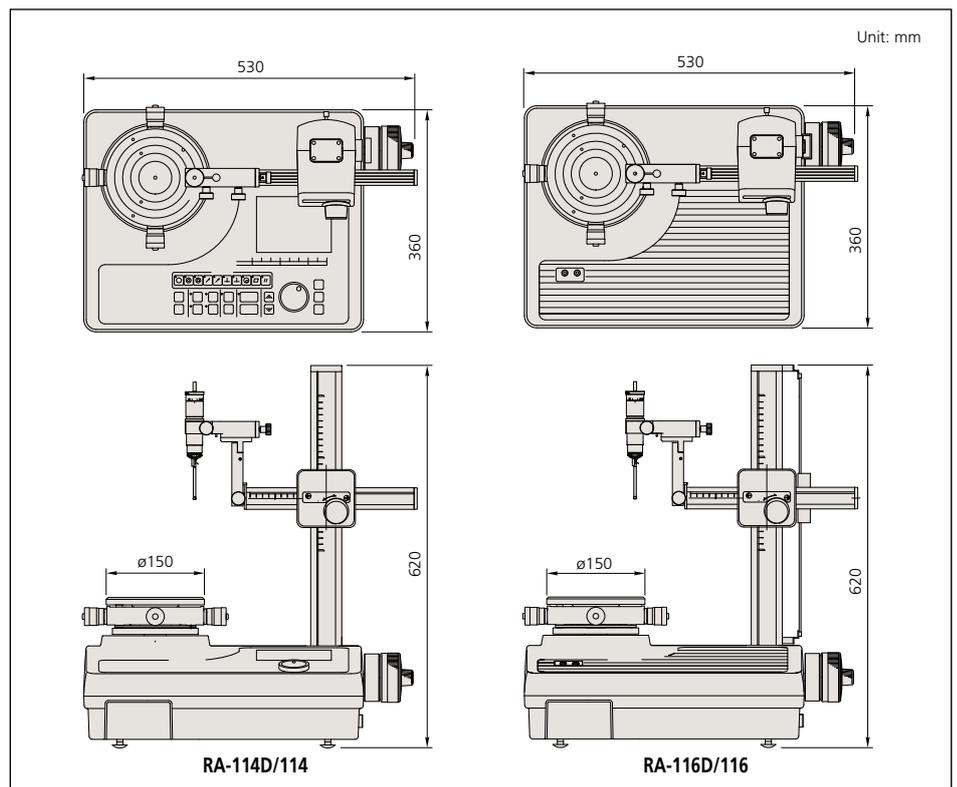
4. Centering and leveling are complete
Centering range: $\pm 3\text{mm}$
Leveling (inclination) range: $\pm 1^\circ$

SPECIFICATIONS

Model No.	RA-114	RA-114D	RA-116	RA-116D
Order No. (mm)	211-703*	211-704*	211-707*	211-708*
Order No. (inch)	211-713*	211-714*	211-717*	211-718*

*To denote your AC line voltage add the following suffixes to the order No.
(e.g.: **211-703A**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Roundtest RA-1400 / RA-1500

SERIES 211 — Roundness / Cylindricity Measuring System

The RA-1400 / 1500 Series Roundtest is a roundness measuring system equipped with state-of-the-art technologies including an



RA-1400
with personal computer system and software

automatic measurement function, an arc measuring function, and a D.A.T. (Digital Adjustment Table) mechanism which makes workpiece centering and leveling simple and speedy.

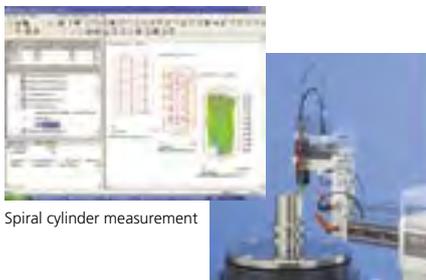


RA-1500
with personal computer system and software

Especially the RA-1500 is provided with a high-precision power column unit, which has a guaranteed accuracy (straightness) of 0.3 μ m/150mm, for cylindricity/straightness measurement.

Spiral Measurement/Analysis (RA-1500 only)

A spiral measurement function that combines table rotation and rectilinear action is provided, allowing cylindricity, coaxiality, and other data to be loaded as continuous data.



Spiral cylinder measurement

Measurement through X-axis tracking

Measurement while tracing the surface form of the measured object through the X-axis with a built-in linear scale is possible. This type of measurement is useful, for example, when the roundness/cylindrical form displacement amount, and the taper obtained from rectilinear action are large, exceeding the measuring range of sensors.



Tracing measurement
range: ± 5 mm

Positioning function of rotary table (RA-1500 only)

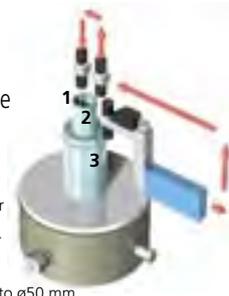
Automatic measurement that combines rectilinear action is possible at any position (angle) in relation to table rotation.



Roundness measurement
column rectilinear action

Continuous internal/external diameter measurement

Continuous internal/external diameter measurement is possible without changing the detector position.



- 1), 2) : External diameter measurement
- 3) : Internal diameter measurement
- ➔ : Displacement
- 3) = inner diameter: Up to $\phi 50$ mm

Technical Data

- Turntable
 Rotational accuracy (radial): (0.02+6H/10000) μ m
 Rotational accuracy (axial): (0.02+6R/10000) μ m
H: Probing height (mm), R: Probing radius (mm)
 Rotating speed: 4, 6, 10rpm
 Table top diameter: $\phi 150$ mm
 Centering range: ± 3 mm (w/ D.A.T. function)
 Leveling range: $\pm 1^\circ$ (w/ D.A.T. function)
 Maximum probing diameter: $\phi 100$ mm
 Maximum workpiece diameter: $\phi 400$ mm*
 Maximum workpiece weight: 10kg
 Vertical column (Z-axis)
 Vertical travel: 150mm
 Straightness (in narrow range): 0.15 μ m / 50mm
 Straightness (in entire range): 0.3 μ m / 150mm
 Parallelism with rotating axis: 0.3 μ m / 150mm
 Positioning speed: Max. 15mm/s with joystick operation (Manual feed available)
 Measuring speed: 0.5, 1, 2, 5mm/s
 Maximum probing height: 150mm (OD), 150mm (ID)
 Maximum probing depth: 90mm
 Horizontal arm (X-axis)
 Horizontal travel: 75mm (Including a protrusion of 25mm the turntable rotation center)
 Positioning speed: Max. 8mm/s with joystick operation (Manual feed available)
 Probe and stylus
 Measuring range: ± 400 μ m
 Measuring force: 7 to 10mN
 Standard stylus: **12AAB681**, carbide ball, $\phi 1.6$ mm
 Measuring direction: Two directional
 Stylus angle adjustment: $\pm 45^\circ$ (with graduations)
 Data analysis system
 Analysis software: Roundpak
 Filter type:
 2CRPC-75%, 2CRPC-50%, 2CR-75% (phase corrected),
 2CR-50% (phase corrected), Gaussian, filter OFF
 Cutoff value;
 15upr, 50upr, 150upr, 500upr, 1500upr,
 15-150upr, 15-500upr, 15-1500upr, 50-500upr,
 50-1500upr, 150-1500upr, Manual setting
 Reference circles for roundness evaluation:
 LSC, MZC, MIC, MCC
 Air supply
 Air pressure: 390kPa (4kgf/cm²)
 Air consumption: 30L/min.
 Power supply: 100V AC – 240V AC, 50/60Hz
 Dimensions (W x D x H): 635 x 430 x 620mm
 Mass: 95kg
 * When using an optional auxiliary probe holder (**12AAB597**), the possible measuring range is between $\phi 70$ mm and $\phi 220$ mm.
 An optional auxiliary stage (**356038**) is required for measurements 20 mm or less in the radial direction from the table center and 20 mm or less from the table top.

ROUNDPAK

The latest roundness/cylindrical form analysis program

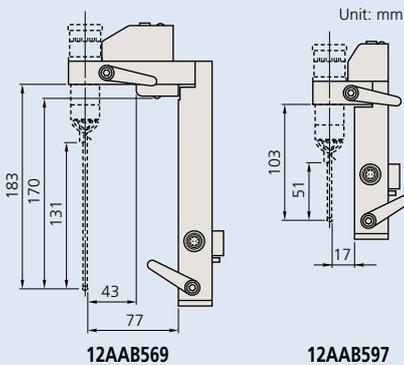


MiCAT
Mitsutoyo Intelligent Computer Aided Technology

the standard in world
metrology software
FORM

Optional Accessory

- 350850:** Cylindrical square
- 356038:** Auxiliary stage for a low-height workpiece
- 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
- _____ : Interchangeable styli (See page 461.)

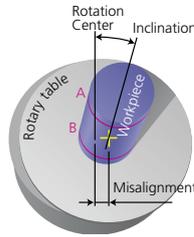


Refer to the RA-1400/1500 leaflet (E4258) for more details.

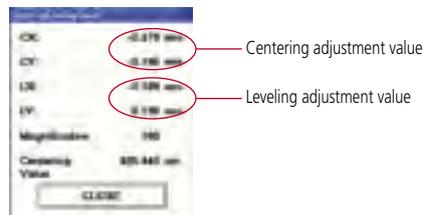
DAT (Digital Adjustment Table) function

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.

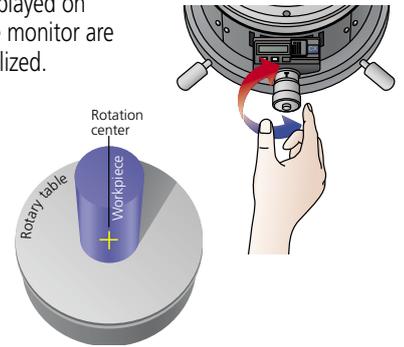
1. Preliminary measurement of two cross sections "A" and "B"



2. Following preliminary measurement, the centering and leveling adjustment values are displayed on the monitor.



3. Manipulate the digital micrometer heads of the rotary table so that the adjustment values displayed on the monitor are realized.



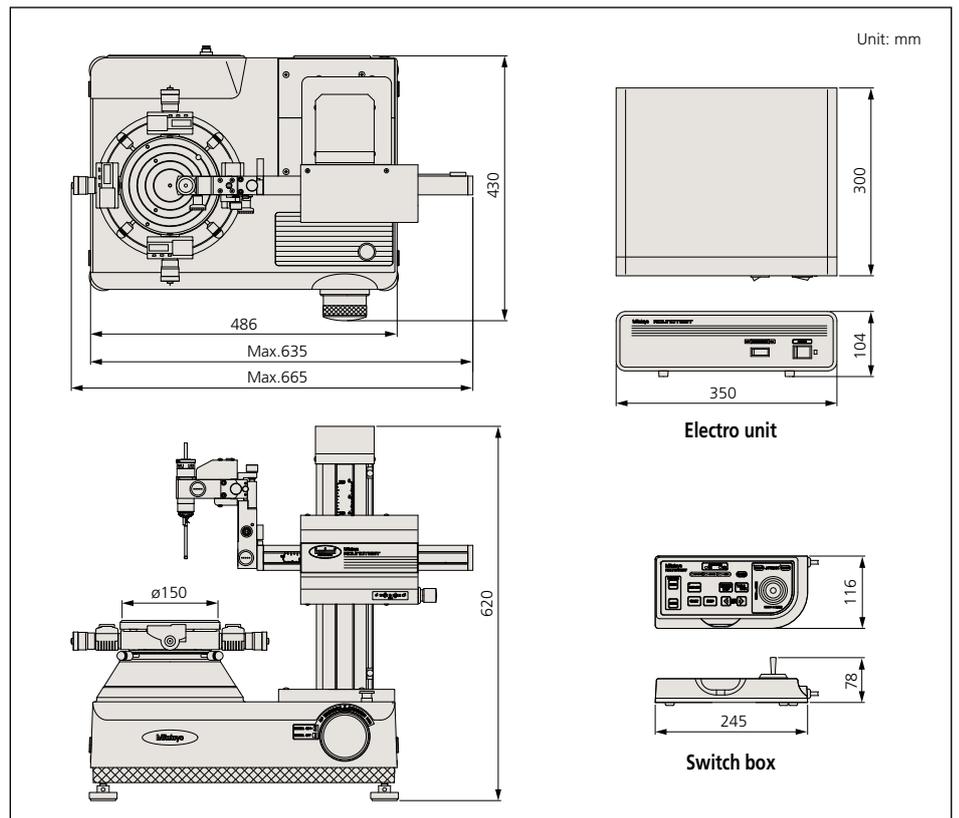
4. Centering and leveling are complete
Centering range: ± 3 mm
Leveling (inclination) range: $\pm 1^\circ$

SPECIFICATIONS

Model No.	RA-1400	RA-1500
Order No. (mm)	211-722*	211-721*
Order No. (inch)	211-732*	211-731*

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **211-722A**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Roundtest RA-2100AS / DS / AH / DH

SERIES 211 — Roundness / Cylindricity Measuring System



RA-2100AS
with personal computer system and software

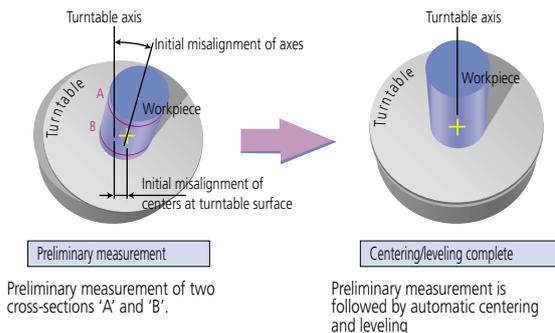
The RA-2100 provides a high accuracy, high speed and high performance in roundness measurement. The fully-automatic or a DAT (Digital Adjustment Table) function aided manual workpiece centering and leveling turns what used to be a difficult and finicky task into one that is simple enough for even untrained users to perform. This facilitates substantial reductions in overall measurement time. The RA-2100 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 easy of operation.

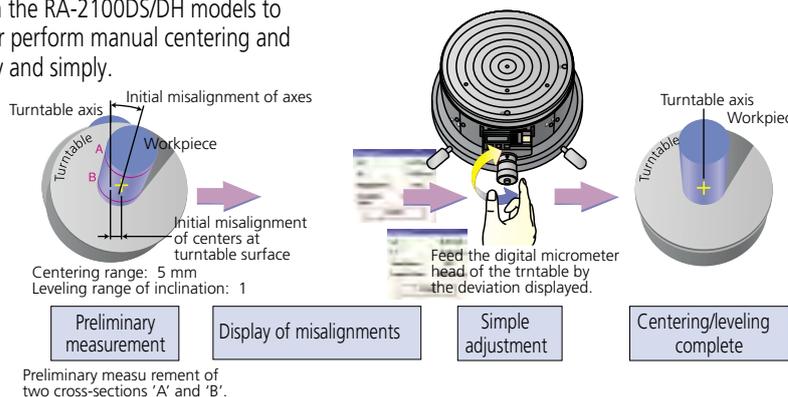
Highly accurate and easy-to-use turntable

With extremely high rotational accuracy, both in the radial and axial directions, the turntable allows high accuracy flatness testing to be performed in addition to roundness and cylindricity measurements.

Incorporating an automatic centering/leveling turntable (A.A.T.), the top-of-the-line RA-2100AS/AH models relieve the operator of the bothersome task of workpiece centering and leveling.



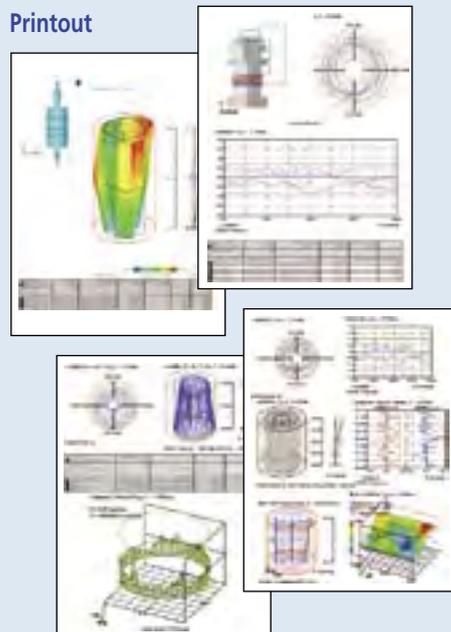
A guidance system (D.A.T.) is incorporated into the turntables on the RA-2100DS/DH models to help the operator perform manual centering and leveling smoothly and simply.



Technical Data

Turntable	
Rotational accuracy (radial):	$(0.02+3.8H/10000)\mu\text{m}$
Rotational accuracy (axial):	$(0.02+3.8R/10000)\mu\text{m}$
	H: Probing height (mm), R: Probing radius (mm)
Rotating speed:	2, 4, 6, 10rpm
Table top diameter:	$\varnothing 235\text{mm}$ ($\varnothing 200\text{mm}$: DS / DH models)
Centering range:	$\pm 3\text{mm}$ ($\pm 5\text{mm}$: DS / DH models)
Leveling range:	$\pm 1^\circ$
Maximum probing diameter:	$\varnothing 300\text{mm}$
Maximum workpiece diameter:	$\varnothing 580\text{mm}$
Maximum workpiece weight:	30kg
Vertical column (Z-axis)	
Vertical travel:	300mm (500mm: AH / DH models)
Straightness ($\lambda, c.2.5$):	$0.12\mu\text{m} / 100\text{mm}$, $0.18\mu\text{m} / 300\text{mm}^*$ (* $0.3\mu\text{m} / 500\text{mm}$: AH / DH models)
Parallelism with rotating axis:	$0.7\mu\text{m} / 300\text{mm}$ ($1.2\mu\text{m} / 500\text{mm}$: AH / DH models)
Positioning speed:	Max. 35mm/s
Measuring speed:	0.5, 1, 2, 5mm/s
Maximum probing height:	300mm (OD), 300mm (ID) [500mm: AH / DH models]
Maximum probing depth:	100mm
Horizontal arm (X-axis)	
Horizontal travel:	175mm (Including a protrusion of 25mm the turntable rotation center)
Straightness ($\lambda, c.2.5$):	$0.7\mu\text{m} / 150\text{mm}$
Squareness with rotating axis:	$1.0\mu\text{m} / 150\text{mm}$
Positioning speed:	Max. 20mm/s with joystick operation
Measuring speed:	0.5, 1, 5mm/s
Probe and stylus	
Measuring range:	$\pm 400\mu\text{m}$ ($\pm 5\text{mm}$: tracking range)
Measuring force:	7 to 10mN (in 5 steps)
Standard stylus:	12AAB681 , carbide ball, $\varnothing 1.6\text{mm}$
Measuring direction:	Two directional
Stylus angle adjustment:	$\pm 45^\circ$ (with graduations)
Data analysis system	
Analysis software:	Roundpak
Filter type:	2CRPC-75%, 2CRPC-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian, filter OFF
Cutoff value:	15 μm , 50 μm , 150 μm , 500 μm , 1500 μm , 15-150 μm , 15-500 μm , 15-1500 μm , 50-500 μm , 50-1500 μm , 150-1500 μm , Manual setting
Reference circles for roundness evaluation:	LSC, MZC, MIC, MCC
Air supply	
Air pressure:	390kPa (4kgf/cm ²)
Air consumption:	30L/min.
Power supply:	100V AC ~ 240V AC, 50/60Hz
Dimensions (W x D x H):	667 x 475 x 900mm (667 x 475 x 1100mm: AH / DH models)
Mass:	180kg (200kg: AH / DH models)

Printout



Optional Accessory

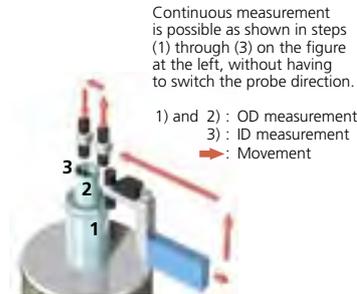
- 350850:** Cylindrical square
- 356038:** Auxiliary stage for a low-height workpiece
- 12AAF203:** Extension probe holder (2X higher)
- 12AAF204:** Auxiliary probe holder for a large diameter workpiece
- 211-045:** Magnification checking gage
- 211-014:** Chuck (OD: 1 - 85mm, ID: 33 - 85mm)
- 211-032:** 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
- 12AAB949:** Protective shield
- : Interchangeable styli (See page 461.)



Greater productivity by continuous measurement

Both the OD and ID of a workpiece* can be measured in succession without the need for changing the traverse direction of the stylus.

*Inside diameter up to 50 mm.



Highly repeatable measurements with high-accuracy scales Mitutoyo linear scales are used in the X/Z drive unit to guarantee the high precision positioning so vital for repetitive measurement.

Unique design allows system upgrading

The system can be upgraded to CNC operation by replacing and adjusting the detector unit. (This task should be performed by a Mitutoyo technician.)

Surface roughness measurement function (Surface roughness unit: option)

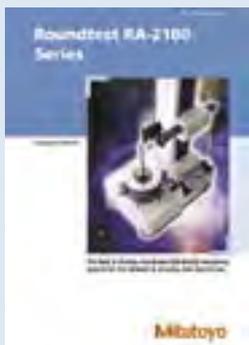
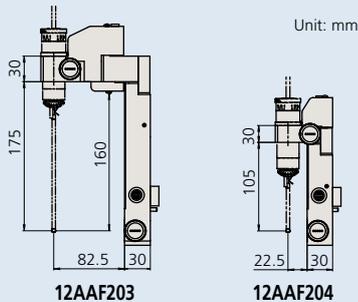
A surface roughness detector, compliant with the relevant International Standards, can be mounted in place of the roundness measuring detector. This creates a multiple sensor system that can not only test the geometrical roundness/cylindricity of a surface but also the roughness of that surface as well.



SPECIFICATIONS

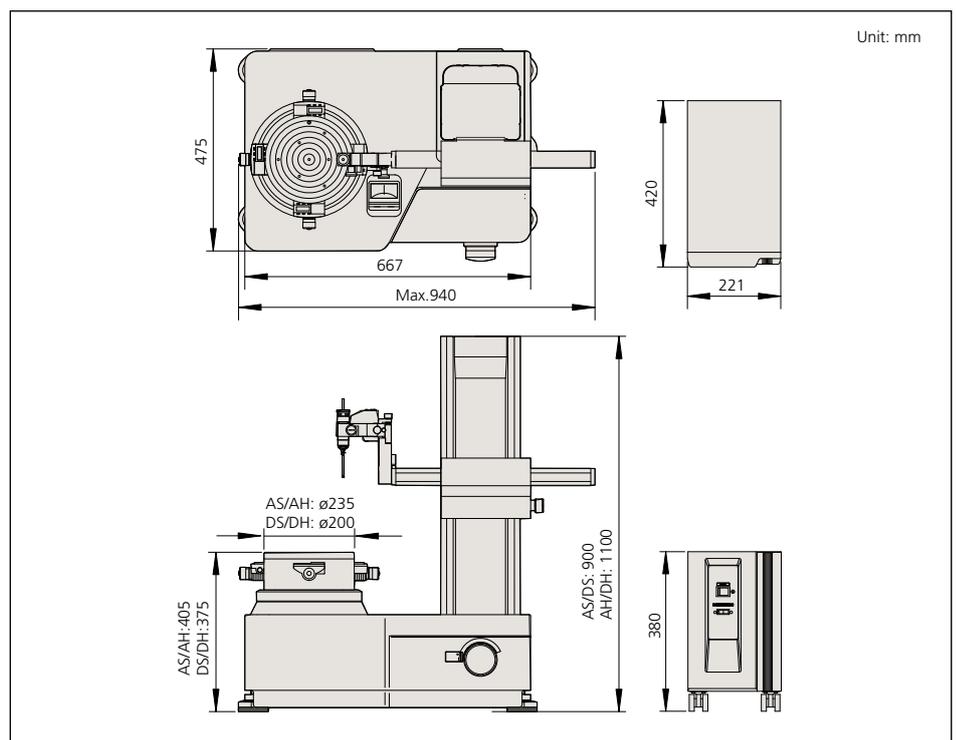
Model No.	RA-2100AS	RA-2100DS	RA-2100AH	RA-2100DH
Order No.	211-843-1 (mm/inch)	211-863-1 (mm) 211-873-1 (inch)	211-844-1 (mm/inch)	211-864-1 (mm) 211-874-1 (inch)
Effective table diameter	235mm	200mm	235mm	200mm
Centering/leveling adjustment	A.A.T.	D.A.T.	A.A.T.	D.A.T.
Centering range	±3mm	±5mm	±3mm	±5mm
Column travel	300mm (standard column)		500mm (high column)	
Basic unit mass	180kg		200kg	

* To denote your AC line voltage add the following suffixes to the order No. (e.g.: **211-843-1A**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V



Refer to the RA-2100 series leaflet (E4278) for more details.

DIMENSION



Roundtest RA-H5100AS / AH

SERIES 211 — Roundness / Cylindricity Measuring System

RA-H5100AS / AH, a roundness/cylindricity measuring system developed to combine world-class accuracy with maneuverability/high analysis capability.

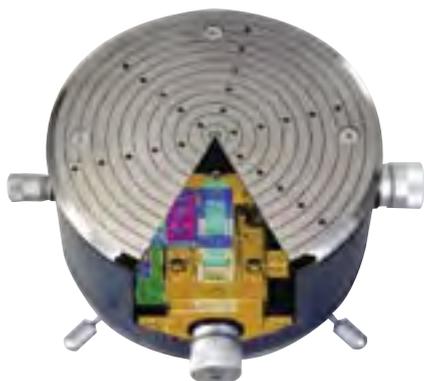
Enhanced measurement functions include tracking measurement and automatic OD/ID measurement capabilities. Also capable of roughness measurement (both in circumferential and axial directions).



RA-H5100AS
with personal computer system and software

High-accuracy automatic centering/leveling turntable

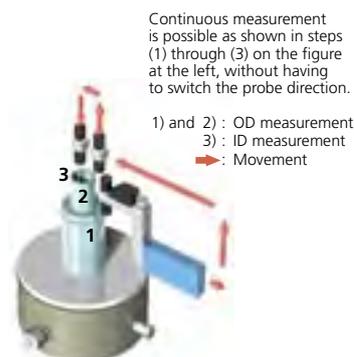
A highly accurate, highly rigid turntable has been achieved through exceptional manufacturing accuracy of the critical components, such as the rotor and stator, in addition to an air-bearing incorporating a complex aperture that provides superior rigidity and uniform pressure distribution. As a result, the rotational accuracy (radial), which is the heart of the roundness/cylindricity measuring system, is a world-class (0.02 +4H/10000)µm.



Automatic continuous OD/ID measurement

Automatic measurement can be performed continuously from external diameter to internal diameter without having to change the probe position. This not only reduces measurement time but eliminates the error factors otherwise involved in changing the probe position, greatly facilitating high-accuracy measurement.

The automatic centering/leveling mechanism incorporates a high-precision glass scale on each axis of the turntable. This allows feedback to be generated that prevents positioning errors from affecting centering/leveling adjustments. The high-speed, automatic, centering/leveling capability achieved greatly contributes to reducing the total measurement time from workpiece setting to workpiece measurement.



Continuous measurement is possible as shown in steps (1) through (3) on the figure at the left, without having to switch the probe direction.

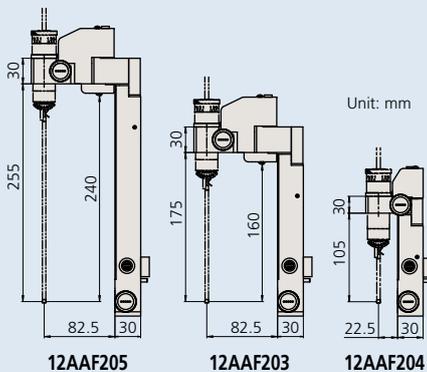
1) and 2) : OD measurement
3) : ID measurement
→ : Movement

Technical Data

Turntable	
Rotational accuracy (radial):	(0.02+4H/10000)µm
Rotational accuracy (axial):	(0.02+6X/10000)µm
	H: Probing height (mm), X: Distance from the turntable axis (mm)
Rotating speed:	2, 4, 6, 10rpm (20rpm: auto-centering)
Table top diameter:	ø300mm
Centering range:	±5mm
Leveling range:	±1°
Maximum probing diameter:	ø400mm
Maximum workpiece diameter:	ø680mm
Maximum workpiece weight:	80kg (65kg: auto-centering)
Vertical column (Z-axis)	
Vertical travel:	350mm (550mm: AH model)
Straightness (λc2.5):	0.05µm / 100mm, 0.14µm / 350mm* (*0.2µm / 550mm: AH model)
Parallelism with rotating axis:	0.2µm / 350mm (0.32µm / 550mm: AH model)
Positioning speed:	Max. 60mm/s
Measuring speed:	0.5, 1, 2, 5mm/s
Maximum probing height:	350mm (OD), 350mm (ID) [550mm (OD / ID): AH model]
Maximum probing depth:	100mm
Horizontal arm (X-axis)	
Horizontal travel:	225mm
Straightness (λc2.5):	0.4µm / 200mm
Squareness with rotating axis:	0.5µm / 200mm
Positioning speed:	Max. 50mm/s
Measuring speed:	0.5, 1, 5mm/s
Probe and stylus	
Measuring range:	±400µm (±5mm: tracking range)
Measuring force:	7 to 10mN (in 5 steps)
Standard stylus:	12AAB681 , carbide ball, ø1.6mm
Measuring direction:	Two directional
Stylus angle adjustment:	±45° (with graduations)
Data analysis system	
Analysis software:	Roundpak
Filter type:	
	2CRPC-75%, 2CRPC-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian, filter OFF
Cutoff value:	
	15upr, 50upr, 150upr, 500upr, 1500upr, 15-150upr, 15-500upr, 15-1500upr, 50-500upr, 50-1500upr, 150-1500upr, Manual setting
Reference circles for roundness evaluation:	
	LSC, MZC, MIC, MCC
Air supply	
Air pressure:	390kPa (4kgf/cm ²)
Air consumption:	45L/min.
Power supply:	100V AC – 240V AC, 50/60Hz
Dimensions (W x D x H):	1260 x 710 x 1700mm (1260 x 710 x 1900mm: AH model)
Mass:	650kg (670kg: AH model)

Optional Accessory

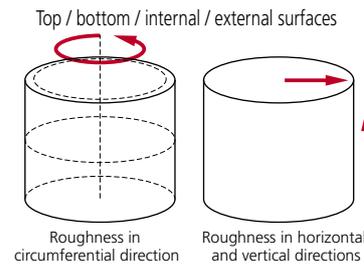
- 350850:** Cylindrical square
- 356038:** Auxiliary stage for a low-height workpiece
- 12AAF203:** Extension probe holder (2X higher)
- 12AAF205:** Extension probe holder (3X higher)
- 12AAF204:** Auxiliary probe holder for a large diameter workpiece
- 211-045:** Magnification calibration gage
- 211-014:** 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.)
- 12AAB949:** Protective shield
- _____ : Interchangeable styli (See page 461.)



Refer to the RA-2100 series leaflet (E4278) for more details.

X-axis tracking measurement

Because of the linear scale incorporated into the X-axis, measurement can be performed by tracking the workpiece surface (tracking range: $\pm 5\text{mm}$). This function is effective for measuring a workpiece with a displacement that exceeds the detection range of the probe in measuring roundness/cylindricity or a taper that is determined with slider/column movement.



Surface roughness measurement function (Surface roughness unit: option)

A surface roughness detector, compliant with the relevant International Standards, can be mounted in place of the roundness measuring detector. This creates a multiple sensor system that can not only test the geometrical roundness/cylindricity of a surface but also the roughness of that surface as well.

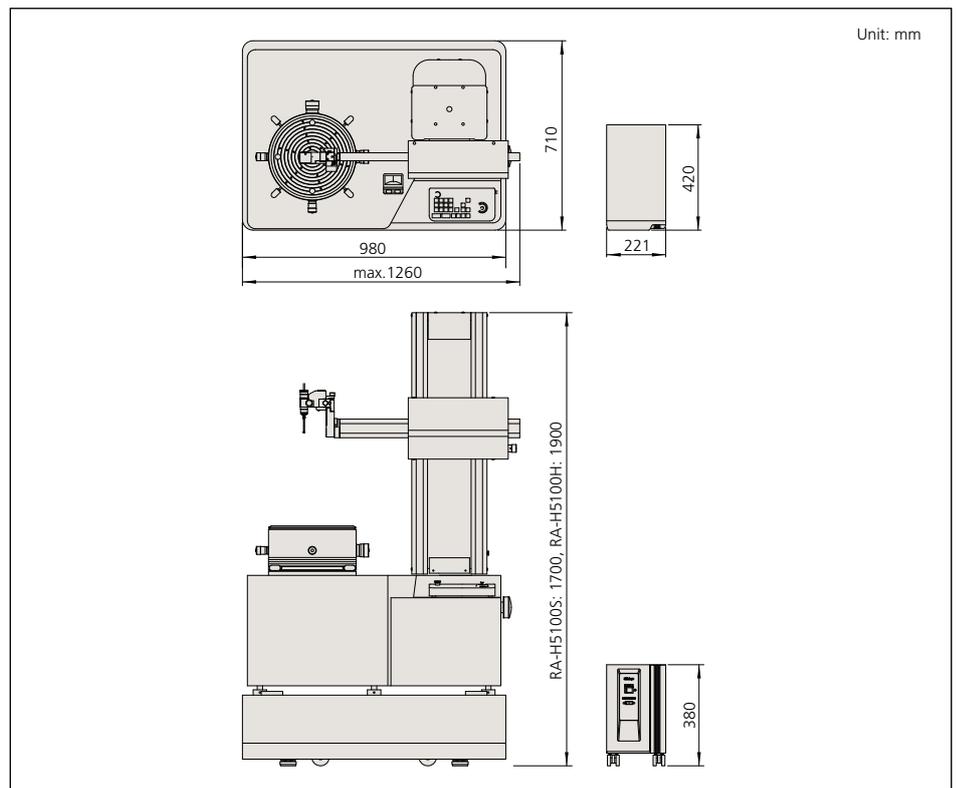


SPECIFICATIONS

Model No.	RA-H5100AS	RA-H5100AH
Order No.*	with machine stand	211-823
	with vibration isolating stand	211-823-2
Column travel	350mm (standard column)	550mm (high column)

*To denote your AC line voltage add the following suffixes to the order No.
(e.g.: **211-843A-2**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Roundtest Extreme RA-H5100CNC / 2100CNC

SERIES 211 — CNC Roundness / Cylindricity Measuring System

Mitutoyo offers innovative roundness/cylindricity measuring systems capable of automated measurement with independent/simultaneous multi-axis CNC control. In addition to high measuring accuracy and reliability, these CNC models provide excellent inspection productivity. Roundness and surface roughness measurements are both available from a single measuring system so workpiece resetting for roughness measurement is not required. Roughness measurement is possible in the axial and circumferential directions.



Holder-arm orientation switching (vertical position - horizontal position)



Detector rotation mechanism (0 to 290°, in increments of 1°)



RA-2100H CNC
with personal computer system and software



RA-H5100H CNC
with personal computer system and software

Technical Data: RA-2100CNC

Turntable	
Rotational accuracy (radial):	(0.02+3.8H/10000)μm
Rotational accuracy (axial):	(0.02+3.8X/10000)μm
	H: Probing height (mm), X: Distance from the turntable axis (mm)
Rotating speed:	2, 4, 6, 10rpm
Table top diameter:	ø235mm
Centering range:	±3mm
Leveling range:	±1°
Maximum probing diameter:	ø256mm
Maximum workpiece diameter:	ø580mm
Maximum workpiece weight:	30kg
Vertical column (Z-axis)	
Vertical travel:	300mm (500mm: 2100H model)
Straightness (λ.c2.5):	0.12μm / 100mm, 0.18μm / 300mm* (*0.3μm / 500mm: 2100H model)
Parallelism with rotating axis:	0.7μm / 300mm (1.2μm / 500mm: 2100H model)
Positioning speed:	Max. 35mm/s
Measuring speed:	0.5, 1, 2, 5mm/s
Maximum probing height:	300mm (OD), 300mm (ID) [500mm (OD / ID): 2100H model]
Maximum probing depth:	100mm
Horizontal arm (X-axis)	
Horizontal travel:	175mm (Including a protrusion of 25mm the turntable rotation center)
Straightness (λ.c2.5):	0.7μm / 150mm
Squareness with rotating axis:	1.0μm / 150mm
Positioning speed:	Max. 20mm/s
Measuring speed:	0.5, 1, 5mm/s
Probe and stylus	
Measuring range:	±400μm (±5mm: tracking range)
Measuring force:	7 to 10mN (in 5 steps)
Standard stylus:	12AAE301 , carbide ball, ø1.6mm
Measuring direction:	Two directional
Stylus angle adjustment:	±45° (with graduations)
Air supply	
Air pressure:	390kPa (4kgf/cm ²)
Air consumption:	30L/min.
Power supply:	100V AC – 240V AC, 50/60Hz
Dimensions (W x D x H):	667 x 475 x 900mm (667 x 475 x 1100mm: 2100H model)
Mass:	180kg (200kg: 2100H model)

Technical Data: RA-H5100CNC

Turntable	
Rotational accuracy (radial):	(0.02+4H/10000)μm
Rotational accuracy (axial):	(0.02+6X/10000)μm
	H: Probing height (mm), X: Distance from the turntable axis (mm)
Rotating speed:	2, 4, 6, 10rpm (20rpm: auto-centering)
Table top diameter:	ø300mm
Centering range:	±5mm
Leveling range:	±1°
Maximum probing diameter:	ø356mm
Maximum workpiece diameter:	ø80mm
Maximum workpiece weight:	80kg (65kg: auto-centering)
Vertical column (Z-axis)	
Vertical travel:	350mm (550mm: H5100H model)
Straightness (λ.c2.5):	0.05μm / 100mm, 0.14μm / 350mm* (*0.2μm / 550mm: H5100H model)
Parallelism with rotating axis:	0.2μm / 350mm (0.32μm / 550mm: H5100H model)
Positioning speed:	Max. 60mm/s
Measuring speed:	0.5, 1, 2, 5mm/s
Maximum probing height:	350mm (OD), 350mm (ID) [550mm (OD / ID): H5100H model]
Maximum probing depth:	ø12.7 x 26mm, ø32 x 79mm
Horizontal arm (X-axis)	
Horizontal travel:	225mm
Straightness (λ.c2.5):	0.4μm / 200mm
Squareness with rotating axis:	0.5μm / 200mm
Positioning speed:	Max. 50mm/s
Measuring speed:	0.5, 1, 5mm/s
Probe and stylus	
Measuring range:	±400μm (±5mm: tracking range)
Measuring force:	7 to 10mN (in 5 steps)
Standard stylus:	12AAE301 , carbide ball, ø1.6mm
Measuring direction:	Two directional
Stylus angle adjustment:	±45° (with graduations)
Air supply	
Air pressure:	390kPa (4kgf/cm ²)
Air consumption:	45L/min.
Power supply:	100V AC – 240V AC, 50/60Hz
Dimensions (W x D x H):	1260 x 710 x 1700mm (1260 x 710 x 1900mm: H5100H model)
Mass:	650kg (670kg: H5100H model)



Optional Accessory

- 350850:** Cylindrical square
- 356038:** Auxiliary stage for a low-height workpiece
- 12AAF203:** Extension probe holder (2X higher)
- 12AAF205:** Extension probe holder (3X higher)*
- 12AAF204:** Auxiliary probe holder for a large diameter workpiece
- 211-045:** Magnification 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**
- 12AAB949:** Protective shield
- : Interchangeable styli (See page 461.)

*Only for RA-H5100S CNC and RA-H5100H CNC
**Only for RA-2100S CNC and RA-2100H CNC

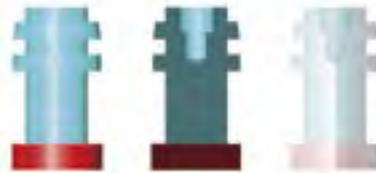


Refer to the RA-2100 series leaflet (E4278) for more details.

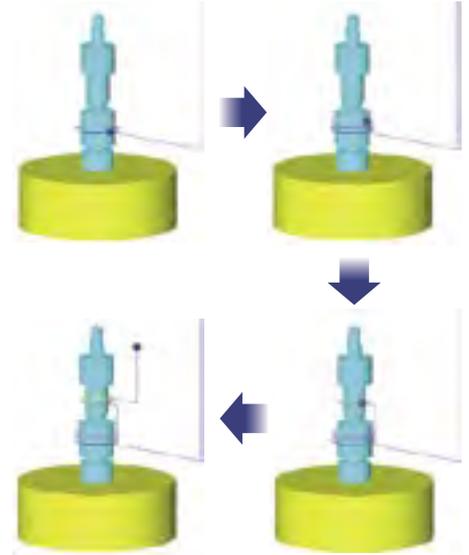
ROUNDPAK

Off-line measurement procedure programming function

On-screen virtual 3D simulation measurements can be performed with the incorporated off-line teaching function that allows a part program (measurement procedure) to be created without an objective workpiece. The probe and the holder unit of the Roundtest Extreme can be precisely represented and an alarm can be raised to indicate that there is a collision risk predicted by the simulation.



3D simulation screens (work-view windows) can be generated after entering CAD data (in IGES, DXF form) and text data.



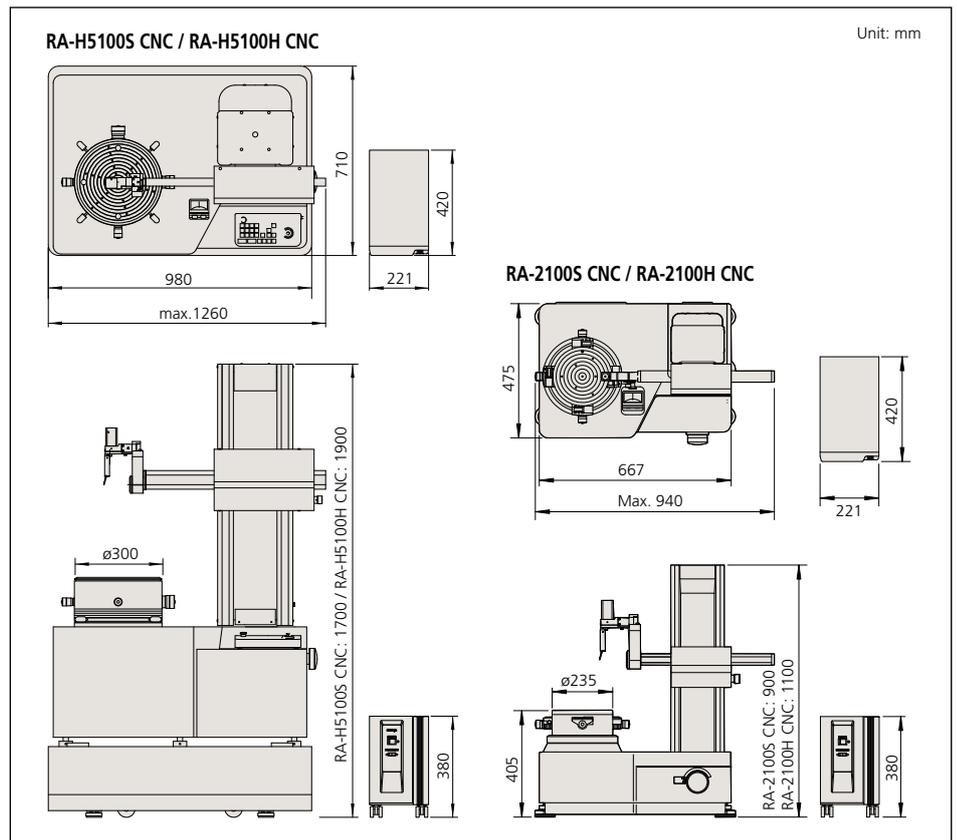
SPECIFICATIONS

Model No.	EXTREME RA-2100S CNC	EXTREME RA-2100H CNC
Order No.*	211-847*-1	211-848*-1
Column travel	300mm (standard column)	500mm (high column)

Model No.	EXTREME RA-H5100S CNC	EXTREME RA-H5100H CNC
Order No.*	with machine stand 211-837*	with machine stand 211-838*
	with vibration isolating stand 211-837*-2	with vibration isolating stand 211-838*-2
Column travel	350mm (standard column)	550mm (high column)

*To denote your AC line voltage add the following suffixes to the order No.
(e.g.: **211-847A-1**: **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Optional Styli for Roundtest

Interchangeable Styli for RA-100, RA-1400 / 1500, RA-2100, RA-H5100

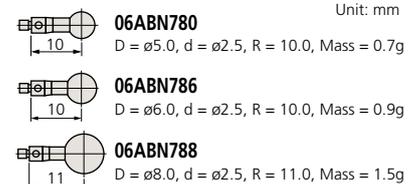
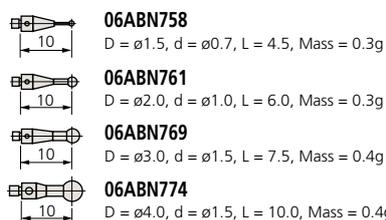
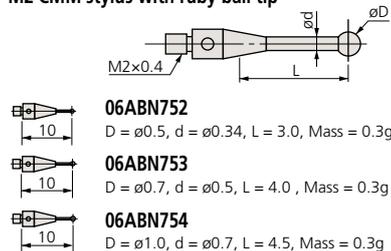
Application/Type	Standard type*	Notch	Deep groove	Corner
Order No.	12AAB681	12AAB682	12AAB683	12AAB684
Stylus tip	ø1.6 mm tungsten carbide	ø3 mm tungsten carbide	0.25 mm radius sapphire	0.25 mm radius sapphire
Dimensions (mm)		 Included in the 5-piece set No. 12AAC134	 Included in the 5-piece set No. 12AAC134	
Application/Type	Cutter mark	Small hole (ø0.8)	Small hole	Small hole (ø1.6)
Order No.	12AAB685	12AAE859	12AAB686	12AAE855
Stylus tip	15 mm radius tungsten carbide	ø0.8 mm tungsten carbide	ø1 mm tungsten carbide	ø1.6 mm tungsten carbide
Dimensions (mm)		 Included in the 5-piece set No. 12AAC134	 Included in the 5-piece set No. 12AAC134	
Application/Type	Extra small hole (Depth: 3mm)	ø1.6 mm ball	Disk	Crank (tip: ø0.5 mm)
Order No.	12AAB687	12AAB674	12AAB694	12AAB696
Stylus tip	ø0.5 mm tungsten carbide	ø1.6 mm tungsten carbide	ø12 mm	ø1.6 mm tungsten carbide Depth: 2.5 mm
Dimensions (mm)	 ø0.5 mm tungsten carbide ball (ø0.3 mm shaft)	 ø1.6 mm tungsten carbide ball Included in the 5-piece set No. 12AAC134	 ø12 mm	 ø1.6 mm tungsten carbide ball Cannot be used for OD / ID measurement.
Application/Type	Crank (tip: ø1 mm)	Flat surface	2X-long type**	2X-long type notch**
Order No.	12AAB695	12AAE856	12AAB688	12AAB689
Stylus tip	ø1 mm tungsten carbide Depth: 5.5 mm	Tungsten carbide	ø1.6 mm tungsten carbide	ø3 mm tungsten carbide
Dimensions (mm)	 ø1 mm tungsten carbide ball Cannot be used for OD / ID measurement.		 Included in the 5-piece set No. 12AAC134	
Application/Type	2X-long type deep groove**	2X-long type corner**	2X-long type cutter mark**	2X-long type small hole**
Order No.	12AAB690	12AAE691	12AAB692	12AAB693
Stylus tip	0.25 mm radius sapphire	ø1 mm tungsten carbide Sapphire	15 mm radius tungsten carbide	ø1 mm tungsten carbide
Dimensions (mm)				
Application/Type	Stylus shank	Stylus shank (standard groove)	Stylus shank (2X-long groove)	
Order No.	12AAB676	12AAE857	12AAE858	
Stylus tip	For mounting CMM stylus (mounting thread M2)			
Dimensions (mm)				

* **12AAB681** is a standard accessory for all Roundtest models.

** Not available for RA-114 / 114D and RA-116 / 116D.

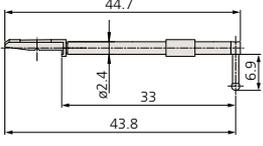
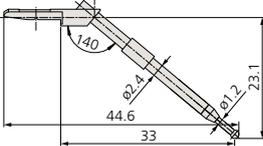
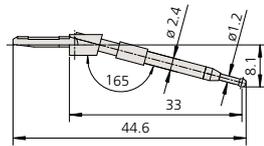
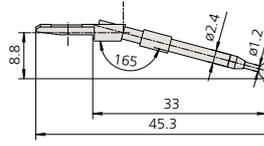
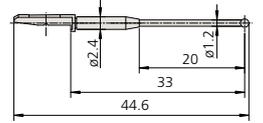
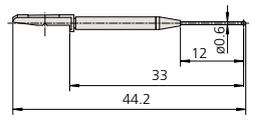
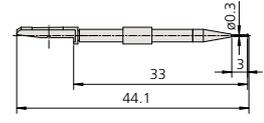
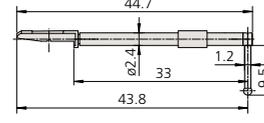
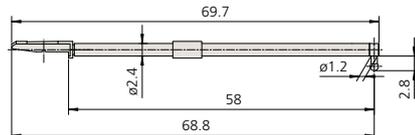
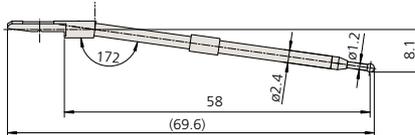
Measuring is only in the vertical direction. Measuring magnification of 20000X is available using the 2X-long stylus. Customized special interchangeable styli are available on request. Please contact any Mitutoyo office for more information.

M2 CMM stylus with ruby ball tip



Unit: mm

Interchangeable Styli for RA-2100 CNC, RA-H5100 CNC

Application/Type	Groove	Flat surface	General purpose	Notch
Order No.	12AAE310	12AAE302	12AAF150	12AAE309
Stylus tip	ø1.6 mm tungsten carbide	ø1.6 mm tungsten carbide	ø1.6 mm tungsten carbide	ø1.6 mm tungsten carbide
Dimensions (mm)		Standard stylus for RA-2100S/H CNC 	Standard stylus for RA-2100S/H CNC 	
Application/Type	ø1.6 mm ball	ø0.8 mm ball	ø0.5 mm ball	Deep groove
Order No.	12AAE303	12AAE304	12AAE305	12AAE308
Stylus tip	ø1.6 mm tungsten carbide	ø0.8 mm tungsten carbide	ø0.5 mm tungsten carbide	ø1.6 mm tungsten carbide
Dimensions (mm)				
Application/Type	Deep hole A		Deep hole B	
Order No.	12AAE306		12AAE307	
Stylus tip	ø1.6 mm tungsten carbide		ø1.6 mm tungsten carbide	
Dimensions (mm)				



Cutter mark



Corner



Small hole



Notched workpiece measurement



Flatness measurement



ID measurement

Optional Accessory for Roundtest



Centering chuck (ring operated)

211-032

Suitable for holding small parts with easy-to-operate knurled-ring clamping.

- Holding capacity:
Internal jaws: OD = 1-36 mm, ID = 14-70 mm.
External jaws: OD = 1-75 mm.
- External dimensions: $\varnothing 118 \times 34$ mm
- Mass: 1.2kg



Micro-chuck

211-031

Used for clamping a workpiece (less than $\varnothing 1$ mm dia.) that the centering chuck cannot handle.

- Holding capacity: up to $\varnothing 1.5$ mm
- External dimensions: $\varnothing 118 \times 48.5$ mm
- Mass: 0.8kg



Centering chuck (key operated)

211-014

Suitable for holding longer parts and those requiring a relatively powerful clamp.

- Holding capacity:
Internal jaws: OD = 1 - 35mm, ID = 33 - 85mm
External jaws: OD = 30-80mm.
- External dimensions: $\varnothing 157 \times 76$ mm
- Mass: 3.8kg



Magnification calibration gage

211-045

Used for normalizing detector magnification by calibrating detector travel against displacement of a micrometer spindle.

- Maximum calibration range: 400 μ m
- Graduation: 0.2 μ m
- Mass: 4kg



Vibration isolator*

178-025

- Vibration isolation method:
Air suspension, diaphragm isolation system.
- External dimensions (W x D x H): 750 x 550 x 57mm

Vibration isolator stand*

178-024

*for RA-2100 and RA-2100CNC



Auxiliary workpiece stand

356038

- Used for measuring a workpiece whose diameter is 20mm or shorter and whose height is 20mm or lower.



Cylindrical square

350850

- Used for checking and aligning table rotation axis parallel to the Z-axis column.
- Squareness: 3 μ m
- Straightness: 1 μ m
- Cylindricity: 2 μ m
- Roundness: 0.5 μ m
- Mass: 7.5kg



Magnification checking kit*

997090

- A combination of gauge blocks and an optical flat.

* Standard accessory for RA-H5100 and RA-H5100CNC



Origin-point gage*

998382

- A gage for zero setting of the R-axis and Z-axis.

* Standard accessory for RA-2100, RA-2100CNC, RA-H5100 and RA-H5100CNC