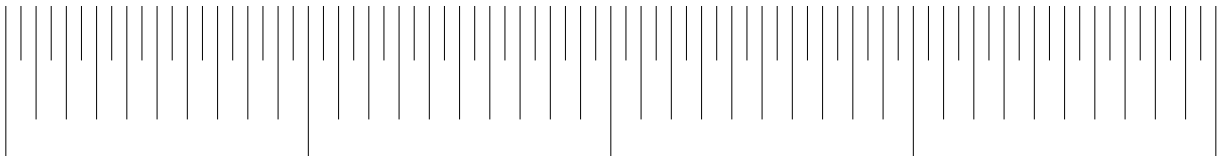


Mitutoyo

Catalogue No. MAP 17-ST



MEASURING INSTRUMENTS CATALOGUE



Mitutoyo Asia Pacific

Notes on Use

Export Control

Export permission by the Japanese government may be required for exporting our products according to the Foreign Exchange and Foreign Trade Law.
Please consult our sales office near you before you export our products or you offer technical information to a nonresident.

Sale of inch-model products

Sale of inch-model products in Japan is regulated by the Japanese laws and ordinances.
If you request to purchase inch-model products, contact your nearest Mitutoyo sales office.

Safety Caution

Carefully read the specifications and functions in this catalog before selecting products.
Safety may be compromised if you use products for purposes other than those stated here.
Feel free to contact your nearest Mitutoyo sales center if you wish to use a product for other purposes or in a special environment.

Appearance and Specifications

Appearance and specifications are subject to change without prior notice for product improvement.
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Mitutoyo Precision Measuring Machines – Trusted Throughout the World

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Examples of data management system design using various Mitutoyo measuring instruments

A Measurement Data Management

A-1 — A-16



Length standards brought to you by Mitutoyo

E Gauge Blocks Reference Gages

E-1 — E-30



The origin of Mitutoyo's trustworthy brand of small tool instruments

B Micrometers Micrometer Heads

B-1 — B-54



Comparison measuring instruments which ensure high quality, high accuracy and reliability.

F Digimatic Indicators Dial Indicators Dial Test Indicators Stands

F-1 — F-64



For easy and accurate measurement of inside diameters

C Holtest Inside Micrometers Bore Gages

C-1 — C-36



To realize simultaneous multi-point measurement and automated measurement

G Linear Gages Laser Scan Micrometers

G-1 — G-2



The standard measuring tool in industry

D Calipers Height Gages Linear Height Depth Gages

D-1 — D-50



To precisely determine the position of slides on machine tools and measuring devices

H Digimatic Scale Units Linear Scales

H-1 — H-2



To inspect and precisely measure angles and lengths on small workpieces

J Profile Projectors Microscopes

J-1 — J-4



The fruits of leading-edge precision measuring technology capturing three dimensions

N Coordinate Measuring Machines Fixture System Styli

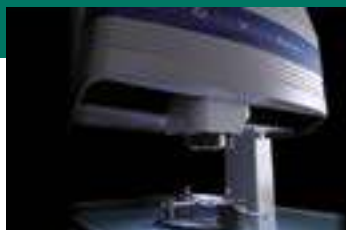
N-1 — N-2



Vision measuring systems for multipurpose use

K Vision Measuring Systems

K-1 — K-2



To measure surface roughness, waviness, profile, roundness and straightness

L Surftest Roundtest

L-1 — L-4



To enhance reliability and quality of products

M Hardness Testing Machines

M-1 — M-4



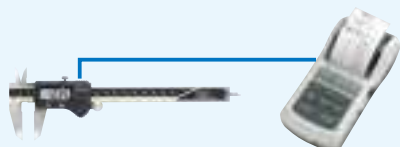
Example of Measurement Data Management System

A system for recording and analyzing measurement results from various Mitutoyo measuring instruments for quality assurance purposes.

Implementation Step 1

Recording measurement results

No more transcribing



DP-1VR A-11

Measurement data can be easily printed. Data can be output to a PC for statistics calculations.

Direct data input to a PC

Connecting cable-integrated USB-ITN



USB Input Tool Series A-3

Lineup of three models with different output specifications IT-012U/IT-016U/IT-007R



Input Tool Series A-4

Connect to a RS-232C interface PC with 4 channels and a sequencer



Multiplexer MUX-10F A-12

Wireless

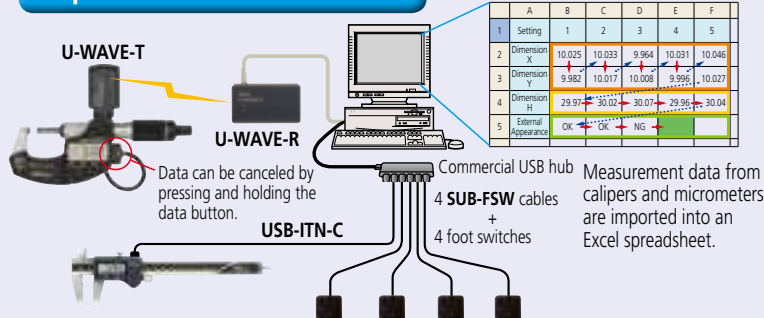


U-WAVE A-5

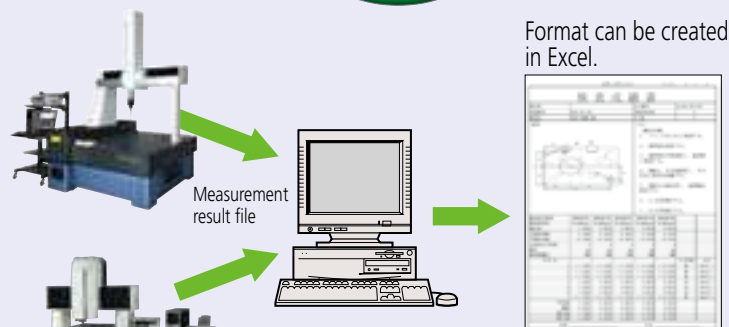
Implementation Step 2

Software dedicated to inspection and quality control

Inspection certificate creation

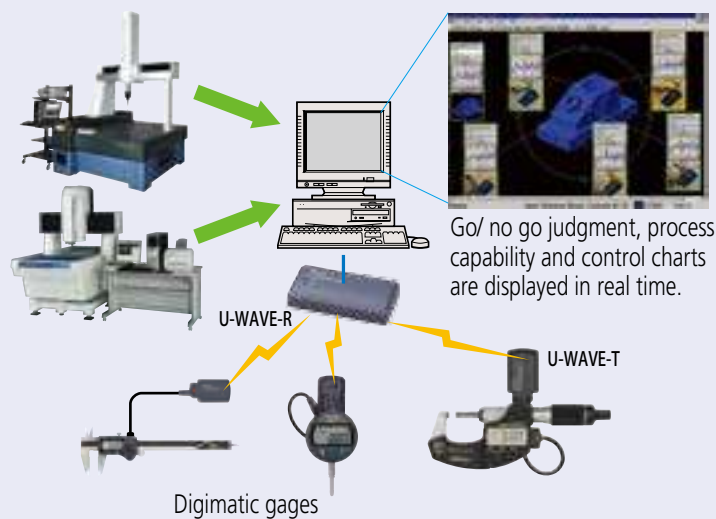


USB-ITPAK A-8



MeasureReport A-16

Statistical Process Control



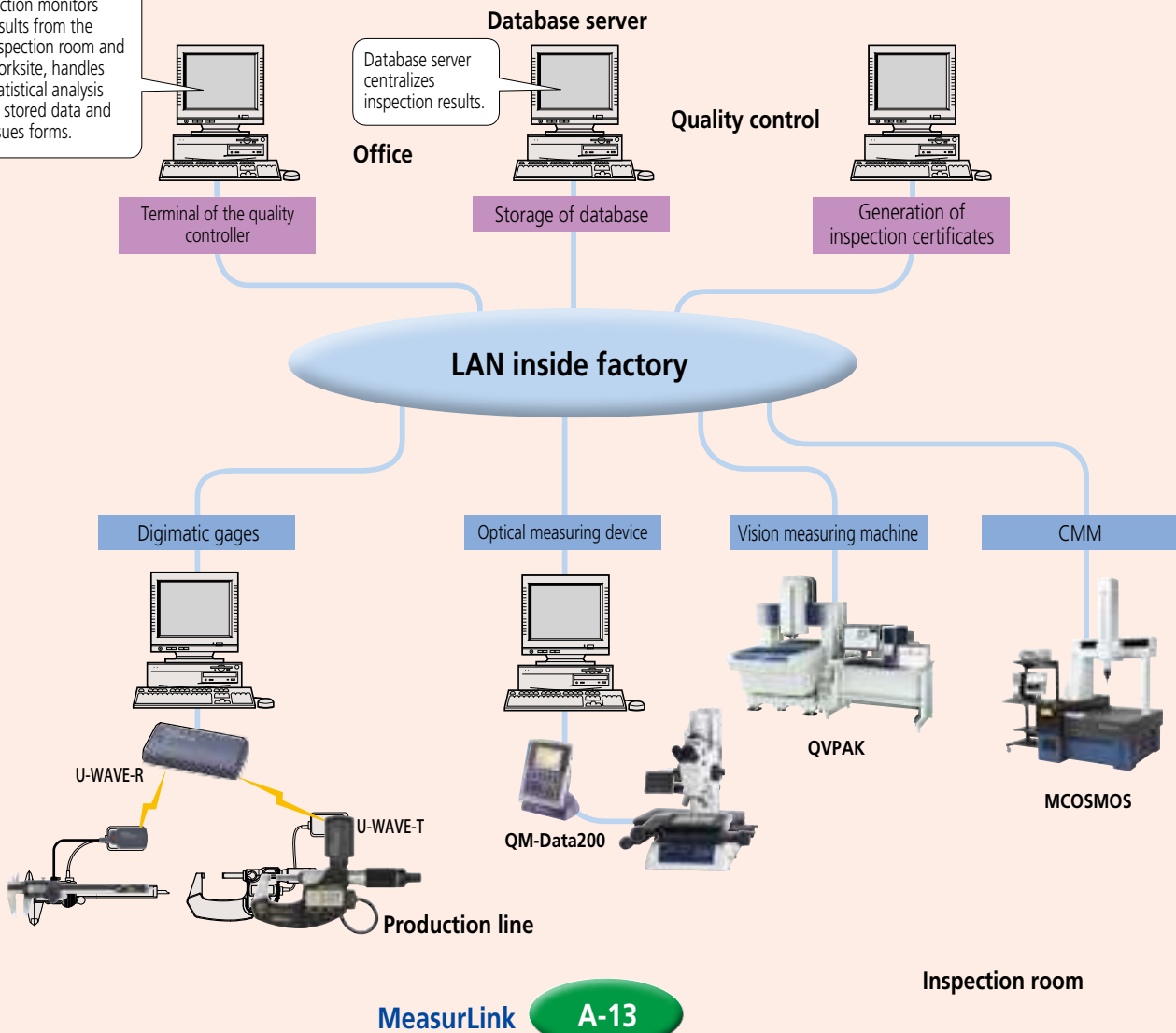
MeasurLink A-13

Implementation Step 3

Creating a quality control network covering a wide area within the factory

Unify management of the quality test using the network in the factory

The quality control section monitors results from the inspection room and worksite, handles statistical analysis of stored data and issues forms.



Measurement Data Management

Convenient data collection tool and quality control software

Digimatic Gage / PC Data Input Device SERIES 264 — USB Input Tool Direct

A data collection tool that offers simple and popular operability (HID connection) and optional software to input data to Microsoft Excel at a reasonable price. A more sophisticated way to improve operational efficiency.

Use USB-ITN standalone as a dedicated interface for digimatic indicators compatible with HID keyboard devices.

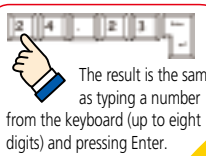
In common with the popular model IT-012U, this device is capable of entering measurement data to Microsoft Excel or a memo pad.
Application example: using USB-ITN standalone to input data while selecting the data entry point flexibly during a measurement whose procedures cannot be determined in advance (such as the inspection of items or trial products with few measurements or without repeated procedures).

Using USB-ITN in combination with dedicated options

Refer to pages A-8 to A-10 for details.

If you need more than just the ability to load the measurement data to Excel, the optional software USB-ITPAK can create a data input procedure to an Excel sheet to improve the operational efficiency of repeated inspections. Application example: using USB-ITN in combination with USB-ITPAK V2.0 to improve the operational efficiency of daily inspections such as sampling tests or complete inspections of mass-produced product.

Input data to the PC with the push of a button.



The result is the same as typing a number from the keyboard (up to eight digits) and pressing Enter.

Just press the data button to send the displayed value to the PC.

Can be connected directly to a USB port on a PC with 1 cable.

USB Input Tool Direct

USB Input Tool Direct is automatically recognized as a HID* keyboard device (standard driver of Windows) by connecting it to a USB port.
* Human Interface Device

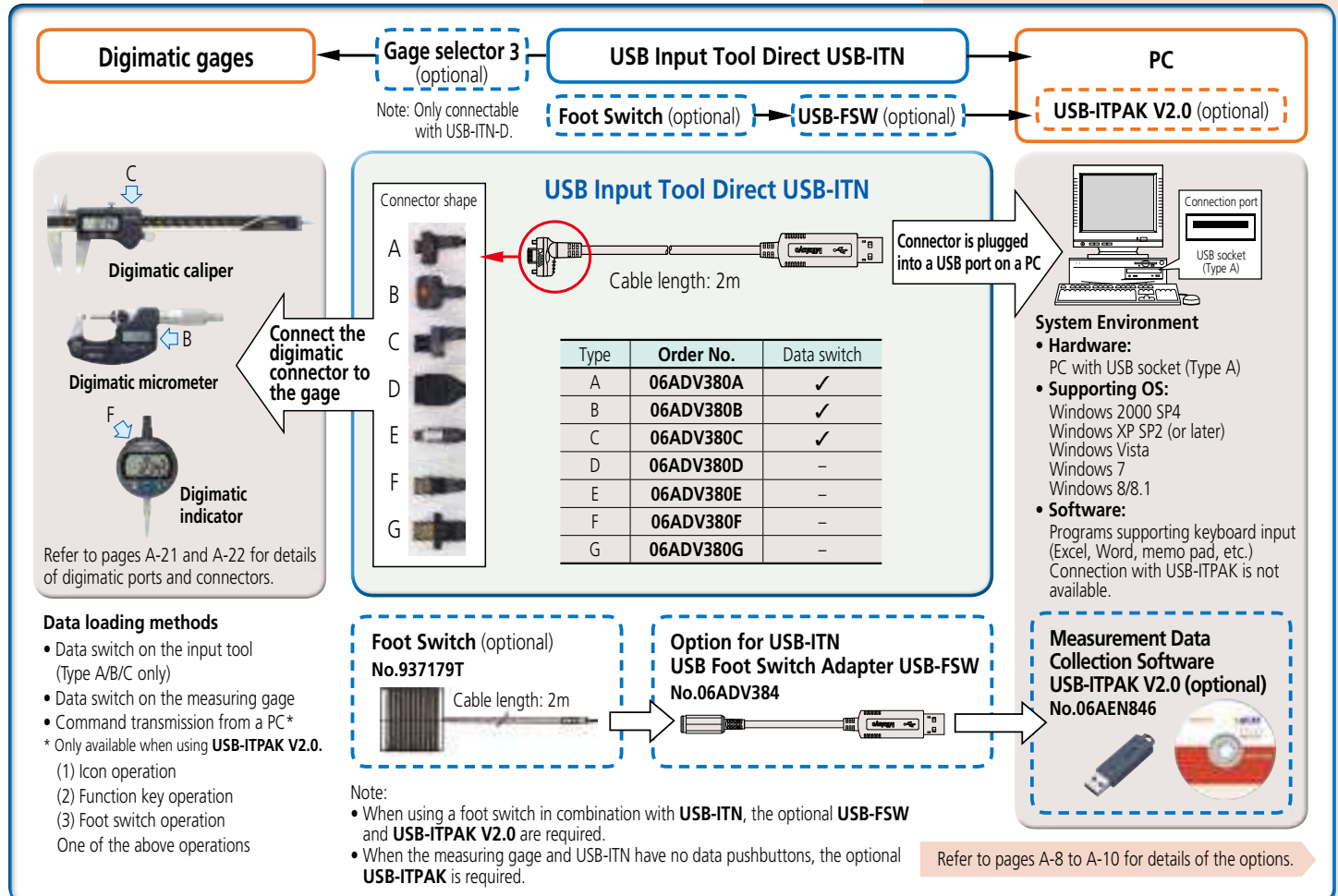


USB-ITN

Main specification

- Output compatibility: USB1.1 and USB2.0
 - Supporting driver software: Switchable between 2 items below
 - (1) When using standalone: HID keyboard device*
 - (2) When using with USB-ITPAK V2.0: Virtual COM port (VCP)
 - Communication speed: 12Mbps (Full Speed)
 - Power supply: USB bus power
 - Mass: 59g
 - USB2.0 certificate
 - Conforms to EMC Directives.
- *Since this device is compatible with Windows standard driver software, dedicated driver software is not required.

System Configuration



Specifications of IT-007R RS-232C Communication

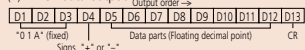
- Output specification: RS-232C compliant
- Communication method: Full duplex
- Communication speed: 2400bps (fixed)
- Bit configuration: Start bit 1
Data length 8
(Most significant bit, 0 (fixed))
Parity, None
Stop bit 1

Flow control: None

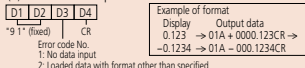
Home position: DCE (modem definition)

• Data format

(1) When data output



(2) Error code output



• Data request signal

Data can be output by transmitting a character from the PC.

• Connector specification and power supply from the PC

This product operates while accumulating the power supplied from the PC. A second or more input interval is required.

Pin No.	Symbol	in/out	Description of functions
1	(N.C.)	—	No connection
2	RXD	OUT	Data output from this product to the PC
3	TXD	IN	Data input from the PC to this product
4	DTR	IN	+12 V power supply from the PC*
5	GND	—	Ground
6	DSR	OUT	Not used
7	RTS	IN	+12 V power supply from the PC*
8	CTS	OUT	Not used
9	(N.C.)	—	No connection

* "4" and "6", "7" and "8" are short-circuited with each other inside this product.

* When connecting to a sequencer, a power supply is required.

Input voltage: Supplied in the range 6 V - 16 V

Power supply terminal: Supplied to pins 4 and 7

Measurement Data Input Unit Input Tool SERIES IT-016U / IT-007R

USB Keyboard Signal Conversion Type IT-016U / IT-007R

The IT-012U, a popular USB input tool that enables easy data recording, has been upgraded. For the same price, usability is improved with extended functionality to help you do inspection work more efficiently.

The IT-016U is equipped with a connector socket for a push-button or switch-foot operation.

Functional improvements include:

- A bigger, easy-to-press data switch. Size increased from ø4mm to ø18mm.
- Durability of the push button increases from 1 million to 10 million operations.
- May be used with optional software USB-ITPAK V2.0.
- Enables efficient routine inspection work, for example, in mass production.

RS-232C Communication Conversion Type IT-007R

Input tool for RS-232C communication best suited for communication control of the software!

Control is available by transmitting data request commands via RS-232C communication.

For example, production engineers can create communication programs to load the measurement data by transmitting a command from the PC.

This product is a compact and low-cost RS-232C communication interface, which is convenient when it is installed in a machine tool or dedicated device to feed back measurement data.

Main Specifications of IT-016U

Supported driver software: Changeable between two types
Output specification: USB2.0 or USB1.0

(1) Stand-alone: HID keyboard device*

(2) Using USB-ITPAK V2.0: Virtual COM port (VCP)

Communication speed: 12Mbps (Full Speed)

Power supply: USB bus power

USB2.0 certificate

Conforms to EMC Directives

* This product is compatible with the standard driver software for Windows. No dedicated driver software is required.



IT-016U



IT-007R

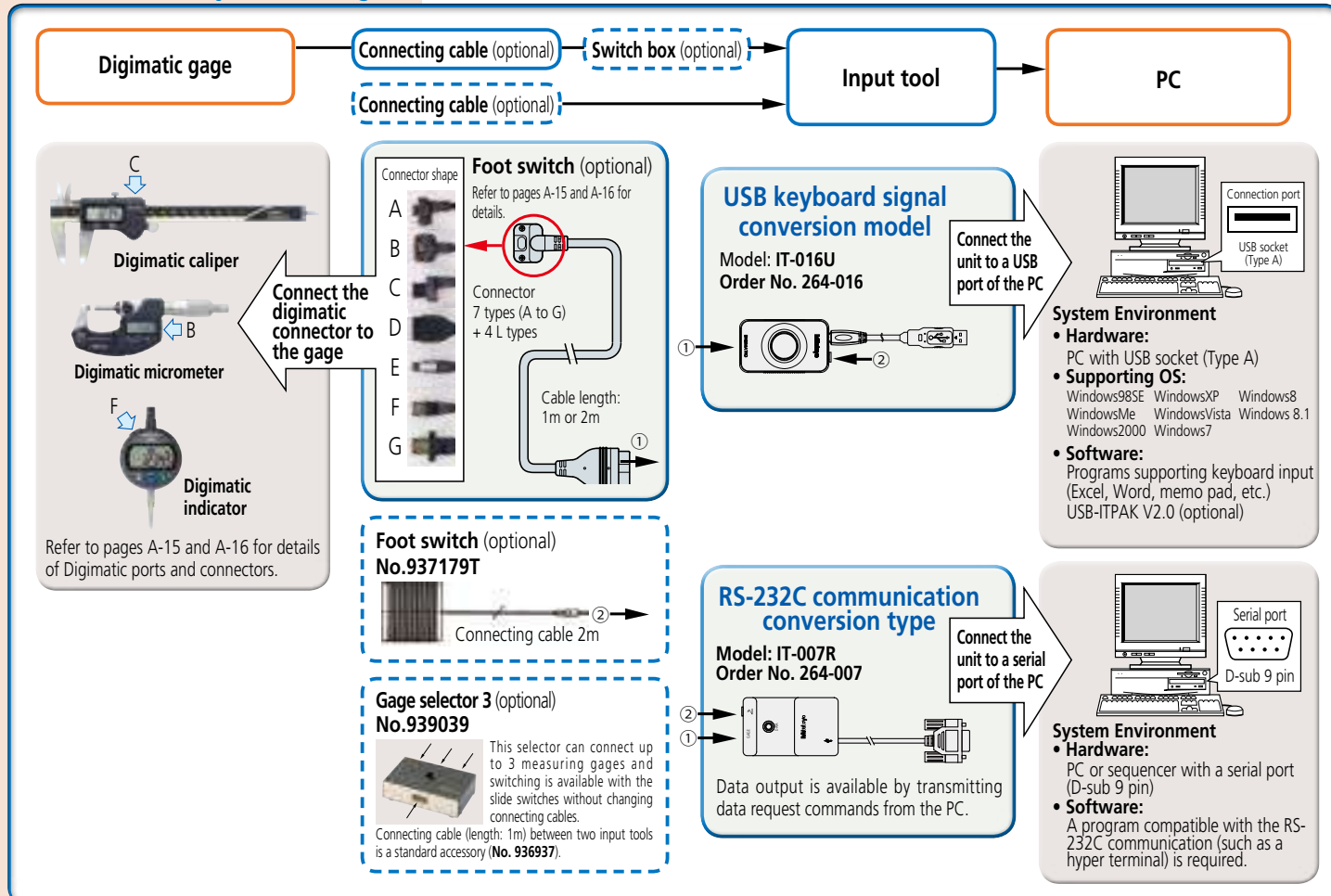


The HID keyboard device (standard driver software for Windows) is automatically recognized when connected to a USB port.

* HID (Human Interface Device)

Foot switch

IT-016U/IT-007R System Configuration



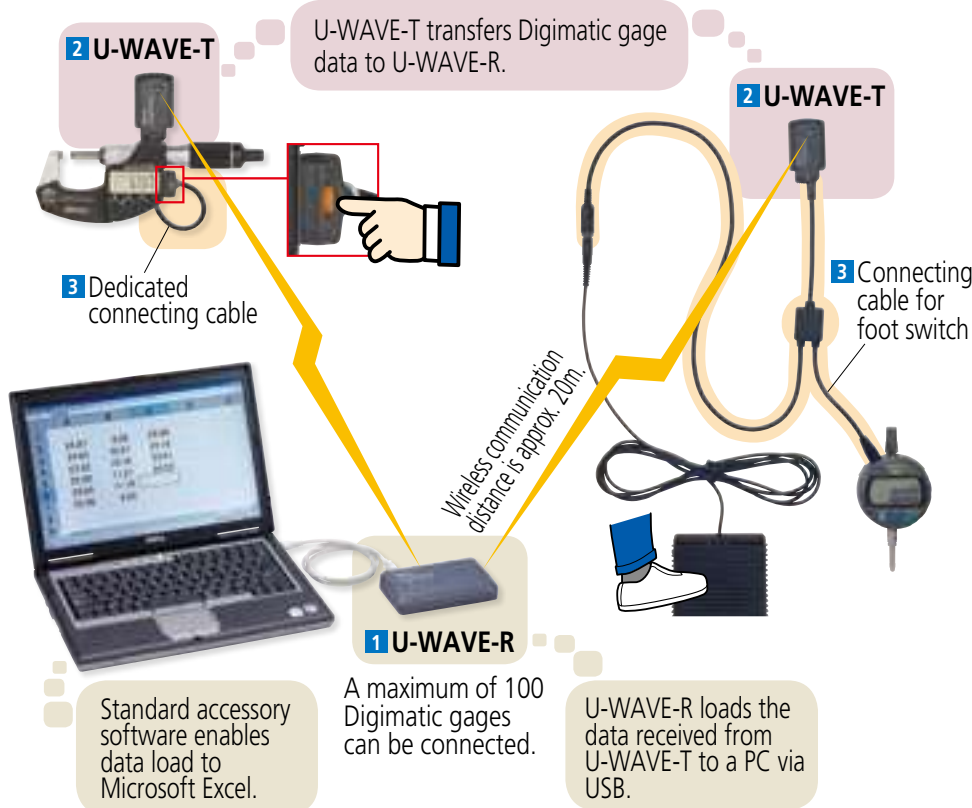
Measurement Data Management

Convenient data collection tool and quality control software

Measurement data wireless communication system U-WAVE

- Data from Digimatic gages can be loaded to a PC easily.
 - Wireless communication eliminates cabling, improving measuring operability.
 - The Data Interface Function of the U-WAVE-R standard accessory software enables data input to commonly available software by keyboard input (Microsoft Excel*, Notepad, etc.).
 - USB-ITPAK V2.0 supports U-WAVE
- Loading multiple measurement data into separate Excel sheets, or simultaneous measurement using the special event drive is now available without the need for macro programming. (Automatic loading in a certain interval is available with the timer function.)

U-WAVE system configuration



Data from Digimatic gages can be loaded to a PC easily by using items **1** to **3** below.

1 U-WAVE-R

Receives data from U-WAVE-T and loads to a PC via USB.

Model	U-WAVE-R
Order No.	02AZD810D
Power supply	USB bus power system
Number of U-WAVE-R units that can be connected to one PC	Up to 16
Number of U-WAVE-T units that can be connected	Up to 100
External dimensions	140×80×31.6mm
Mass	130g

U-WAVEPAK software (standard accessory)

System Environment: Compatible OS

Windows 2000 Professional (SP4 or later)*
Windows XP Home Edition (SP2 or later)*
Windows XP Professional (SP2 or later)*
Windows Vista*, Windows 7*, Windows 8/ 8.1*

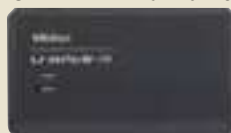
* Revision history (U-WAVEPAK)

Ver1.010 or later is compatible with 32/64-bit OS.
Ver1.020 or later is compatible with Windows 8.
Ver1.021 or later is compatible with Windows 8.1.

Main specifications

- Setup of dedicated driver software (USB and virtual COM port)
- Initial setting of ID number and frequency selection (required only once for first time)
- Load data to Microsoft Excel or Notepad through data interface function
- Note: Cannot be connected to a device other than a PC (such as DP-1VR, PDA, or controller).

U-WAVE-R main unit



USB2.0 cable (1m) attached

U-WAVEPAK



U-WAVE system communication specifications

• Wireless communication

Conformity standards	ARIB STD-T66 (Japan)*
Wireless standards	Conform to IEEE802.15.4
Wireless communication distance	Approx. 20m (within visible range)
Wireless communication speed	250 kbps
Transmission output	1mW (0dBm) or less
Modulation method	DS-SS (Direct Sequence - Spread Spectrum) Resistant to interfering signals and noise
Communication frequency	2.4GHz band (ISM band: Universal frequency)
Used band	15 channels (2.405 to 2.475GHz at intervals of 5MHz) The noise search function avoids interference with other communication devices.

* According to the Radio Regulations, the use of this product is permitted in the countries listed below. This product must not be used in other countries or areas.

Use of U-WAVE is allowed in the following countries:

This product is a radio equipment classified in the 2.4GHz Band Wide-band Low Power Data Communication System. To use this product, conformity to the radio law of each country is required. The use of U-WAVE sold in Japan is permitted in the countries listed below.

Applicable models	• 02AZD810D • 02AZD880D • 02AZD730D
Area	Country
Asia	Japan, Indonesia, Thailand, Vietnam, Malaysia, Philippines, India
North America	US, Canada
Europe	27 EU member nations (UK, France, Germany, Italy, Netherlands, Belgium, Luxembourg, Spain, Portugal, Austria, Sweden, Finland, Denmark, Bulgaria, Cyprus, Czech, Slovakia, Estonia, Greece, Hungary, Ireland, Latvia, Lithuania, Malta, Poland, Romania, Slovenia) 4 EFTA member nations (Norway, Switzerland, Iceland, Liechtenstein) Turkey

Countries, which permit the use of U-WAVE purchased from Mitutoyo Overseas Operations or Agents/Distributors in the intended use destination are listed below.

Area	Country
Asia	Singapore, South Korea
Central and South America	Mexico, Costa Rica, Brazil

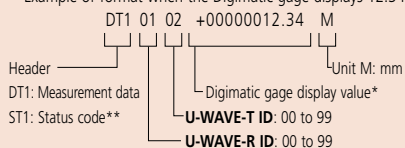
U-WAVE cannot be used in countries other than the above.



Refer to the Measurement Data Wireless Communication System leaflet (MAP1295) for more details.

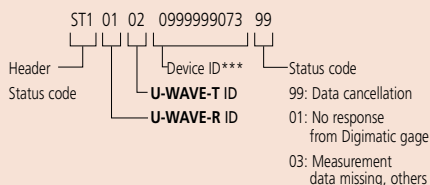
Data format

Example of format when the Digimatic gage displays 12.34



* Data interface function is switchable to "Measurement value only" e.g.) +00000012.34

** Example of status code format



*** Unique number assigned to U-WAVE at shipment

Notes on identification of measurement data and multiple systems operation

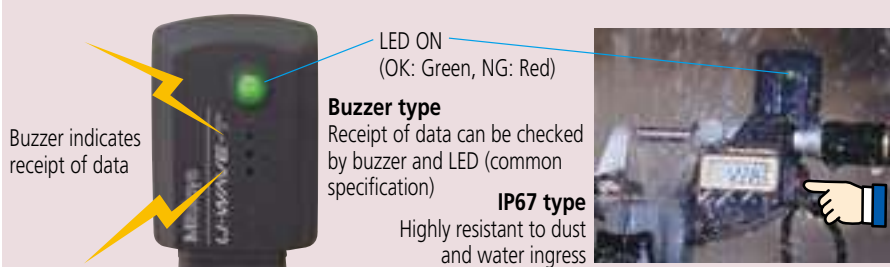
Following the above format, the U-WAVE data format starts with a 4-digit code where the first two digits represent receiver channels and the last two are transmitter channels. The large number of transmitter/receiver combinations possible with this scheme ensures that the receivers in a factory measurement system only accept data from the intended transmitters, even when several receivers are all within communication range of different transmitters using the same channel. Different frequency bands (up to 15 available) may also be used to further ensure that there are no communication problems between adjacent U-WAVE-R units.

Measurement data wireless communication system U-WAVE

2 U-WAVE-T

Transmits measurement data to U-WAVE-R. Select IP67 or buzzer model, according to your application. U-WAVE-R can be connected to Digimatic gages by dedicated cable for U-WAVE-T (option).

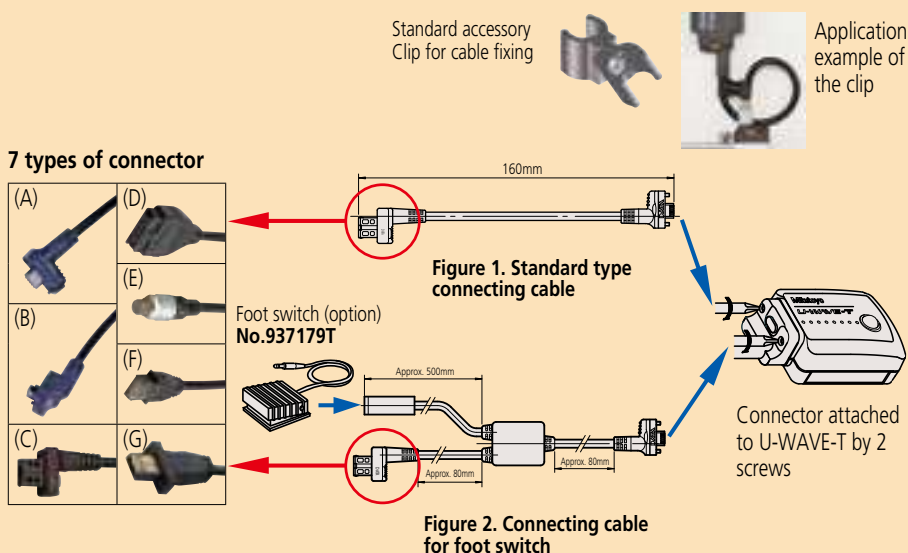
Model	U-WAVE-T (IP67 type)	U-WAVE-T (buzzer type)
Order No.	02AZD730D	02AZD880D
Protection Rating	IP67	None
Data reception indication	LEDs	Buzzer and LEDs
Power supply	Lithium battery CR2032×1	
Battery life	Approx. 400,000 transmissions	
Dimensions	44×29.6×18.5 mm	
Mass	23 g	



3 U-WAVE-T dedicated connection cable

A dedicated cable connects a Digimatic gage to U-WAVE-T. Check the connector (A to G; refer to pages A-15 and A-16 for details) compatible with the Digimatic gage to be used and select either standard type (figure 1) or foot switch type (figure 2) according to your application.

Type	Standard connecting cable Part Nos.	Connecting cable for foot switch Part Nos.
(A) Water-proof model with output button	02AZD790A	02AZE140A
(B) Water-proof model with output button	02AZD790B	02AZE140B
(C) With data-out button	02AZD790C	02AZE140C
(D) 10-pin plain type	02AZD790D	02AZE140D
(E) 6-pin round type	02AZD790E	02AZE140E
(F) Plain type straight	02AZD790F	02AZE140F
(G) Plain type straight water-proof model	02AZD790G	02AZE140G



Measurement Data Management

Convenient data collection tool and quality control software

Measurement Data Management U-WAVE

Optional Accessories for U-WAVE-T

U-WAVE-T mounting plate

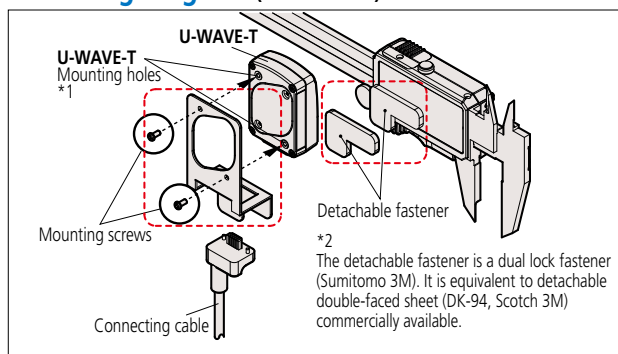
Since the standard cable clip is not sufficient to support the U-WAVE-T on a Digimatic gage, a mounting plate is provided. The mounting plate can be fixed to the gage by the easily detachable hook-and-eye type fasteners provided. Batteries can be replaced without needing to detach the U-WAVE-T from the gage.



U-WAVE-T mounting plate
Part No.02AZE200

- Standard accessories
- Detachable fasteners: 1 set
 - Mounting screw 2pcs.

Mounting diagram (No.02AZE200)



- *1 To avoid damaging the threaded holes in the plastic body of the U-WAVE-T unit, the mounting screws should be tightened only just sufficiently to grip. Repeated removal of these screws should also be avoided for the same reason.
- *2 In order to avoid loss of adhesion, do not allow oil or coolant to come into contact with the bonding surfaces of the detachable fasteners.

Application examples of the mounting plate

Super Caliper CD67-S15PM



QuantuMike MDE-25MJ



Digimatic Indicator ID-C112XB



Application example of the 'event drive' mode

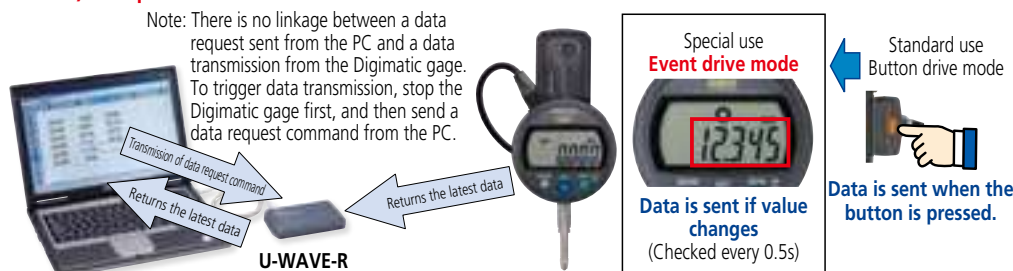
Data request support from PC. Special order U-WAVEPAK (Event drive)

For standard type U-WAVE, the currently displayed data can be sent by pressing the data switch. This is called "button drive mode".

In the "event drive mode", the measurement value is checked every 0.5 seconds and measurement data is automatically sent if there is a change. At this time, the data switch is disabled. The sent data is written in the U-WAVE-R memory, and only the latest data is kept, it is not output to the PC. The data is loaded to the PC from the U-WAVE-R memory when the data request command is sent. The mode switching between "button drive" and "event drive" is enabled by the special order U-WAVEPAK (Event drive).

In the event drive mode, pressing the data switch on the Digimatic gage is not necessary. PC operation enables loading data from multiple gages at once.

To perform simultaneous measurement using USB-ITPAK V2.0, a special order U-WAVEPAK (Event drive) is required.



When using the event drive please note:

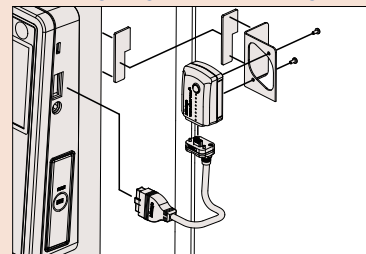
- The battery life is shorter than in normal mode. The battery lasts approximately 20 days with continuous use. Switching to the button mode when the battery is not in use extends the battery life.
- When using several Digimatic gages (U-WAVE-T), communication errors may occur because of radio interference in simultaneous measuring. Therefore, it is required to add U-WAVE-R and set different frequencies (15ch) to avoid radio wave interference.

U-WAVE-T mounting plate for QM-Height Order No.02AZE990

Standard accessories

- Detachable fasteners: 1 set
- Mounting screw: 2 pcs

Mounting diagram for QM-Height (02AZE990)



Refer to the Measurement Data Wireless Communication System leaflet (MAP1295) for more details.

Special order U-WAVEPAK (Event drive)

This is a special order product. For the latest pricing, please contact your dealer or the nearest Mitutoyo Service Center.

Product configuration: Program on CD



For **U-WAVE-R** and **U-WAVE-T**, please purchase the standard model.

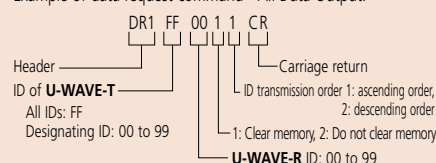
Install this special order **U-WAVEPAK** (Event drive) and gain the ability to perform setups without using the standard accessory **U-WAVEPAK**.

A program to send a data request command is separately required to load data to a PC.

Event drive supporting software:

- **USB-ITPAK V2.0** (timer input enabled)
- **MeasureReport** (function key operation)

Example of data request command - All Data Output:



Order No.

Model No.	USB-ITPAK V2.0
Order No.	06AEN846

Upgrade pricing from V1.0 is not available. Please purchase V2.0.

USB-ITPAK V2.0 USB dongle



A USB dongle must be connected to the PC running the software.

Operating environment

Compatible OS *1	Windows 2000 SP4 Windows XP SP2 or later Windows Vista Windows7 Windows8 Windows8.1 Windows10
Supported Excel versions *2	Excel 2000 Excel 2002 Excel 2003 Excel 2007 Excel 2010 Excel 2013
Hard disk	Free space of more than 10MB
CD-ROM drive	For program installation
USB port *3	2 ports or more
Monitor resolution	800x600, 256 colors or more

*1: 32-bit, 64-bit OS supported

*2: Operation with Excel for MAC OS is not guaranteed.

*3: A commercially available hub can be used.
(USB certified product is recommended)

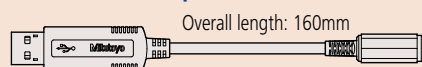
Language support

- Operation language (15 languages)
Japanese, English, German, French, Spanish, Italian, Czech, Swedish, Turkish, Polish, Hungarian, Russian, Korean, Chinese (traditional/simplified), and Simplified Chinese
- Operation manual (PDF file)
Japanese, English, German

Order No. Price

Model No.	USB-FSW
Order No.	06ADV384

Foot Switch Adapter USB-FSW



Overall length: 160mm

Common optional software IT-016U/USB-ITN and U-WAVE

Measurement data collection software USB-ITPAK V2.0 (IT-007R are not supported)

Upgraded USB-ITPAK now supports U-WAVE, a wireless communication system.
Both wired connection (IT-016U/USB-ITN) and wireless system (U-WAVE) are supported.

New functions of USB-ITPAK V2.0

- Supports the U-WAVE wireless communication system
- Timer input function
- Measurement date/time display
- Others: Compatible with Windows 8, 64-bit OS, and Russian included in the operating language selection

USB-ITPAK V2.0 creates a procedure to input data from gages equipped with Digimatic output to Excel sheets via USB-ITN or U-WAVE. This optional software facilitates the daily inspection work for mass-produced products.

The combined use with USB-ITPAK V2.0 will improve the operational efficiency of repetition inspection work. Best suited for keeping track of inspection data of mass-produced products.

- Automatically calls Excel sheet.
- Cursor moves can be specified.
- Input range can be specified per Digimatic gage, which reduces improper input.
- The last data input can be canceled by a single operation (foot switch, function key etc.)
- Data input or cancellation can be performed at once in multiple-point simultaneous measurement.

Main features of USB-ITPAK V2.0

- **Setting of Microsoft Excel input:**
Designation of where to input (workbook, worksheet, cell range), cursor move (right, down), and others.
- **Selection of measuring method (3 modes available)**
(1) Sequential measurement (2) Simultaneous measurement (3) Individual measurement (refer to page A-10 for details).
- **Control item and instruction at data input** (Note 1: Not available during individual measurement, Note 2: Not available during simultaneous measurement in the event drive mode)

Control item	Mouse operation	Function key	Foot switch + USB-FSW	Data switch when using U-WAVE	Data switch other than U-WAVE
Data output request	✓ (Note 1)	✓ (Note 1)	✓	✓ (Note 2)	✓
Data cancel	✓ (Note 1)	✓ (Note 1)	✓	✓ Press and hold (Note 2)	—
Data skip	✓ (Note 1)	✓ (Note 1)	✓	—	—
Character input (example: OK or NG etc.)	—	—	✓ Pre-registered character strings	—	—

- **Number of connectable gages** (Note 3: The actual number can be less depending on the system configuration.)

Available devices	Maximum number of connection (total of (1), (2), and (3))	Others
(1) IT-016U/USB-ITN	For Windows 2000/XP Up to 100 units (Note3)	• Maximum registration (total of (1), (2), and (3)) 400 units
(2) USB-FSW	For Windows Vista/7/8 Up to 20 units (Note3)	• Control/identification of connecting gage VCP (Virtual COM port) Switch from HID to VCP for (1) and (2). The VCP driver software is supplied with USB-ITPAK .
(3) U-WAVE-R (Up to 100 gages can be per one unit of U-WAVE. U-WAVE-T ID: 00 to 99)	(For U-WAVE-R, plus 100 per unit in terms of available gages.)	

- **Data loading time:** when using USB-ITN, 0.2s to 0.3s per gage unit
U-WAVE event drive mode: 0.5s data refresh interval
- **Timer input function** (only in simultaneous measurement)
Input interval (time): 0.1s (Note 4) to 24 hours at maximum
(Note 4: If a shorter time is set, a priority is given to the longer time compared with the actual communication time.)
- **Measurement date/time display function** (available in sequential and simultaneous measurements)
The display format is subject to the setting of the Excel sheet.

USB Foot Switch Adapter USB-FSW

This USB adapter for connecting a PC is required when using the Foot Switch (**No. 937179T**) in **USB-ITN**.
A dedicated VCP driver* for this adapter is included in **USB-ITPAK**.

Main specification

- With **USB-ITPAK**, application of the foot switch can be set.
- Data control: "Data request", "Data cancel", "Data skip"
- Character string input (e.g. GO/NG, etc.)

*USB-FSW is used for installation of the VCP driver.

Foot switch (**No.937179T**)

USB-FSW



Measurement Data Management

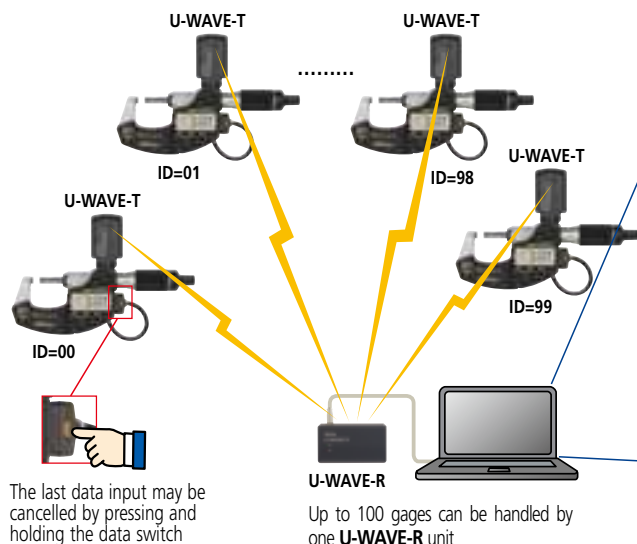
Convenient data collection tool and quality control software

Measurement Data Management USB-ITPAK V2.0 (Not available for IT-007R)

More applications can be handled due to new features (Wireless (U-WAVE) support, Timer input, Measurement date/time display)

Example of measurement using the U-WAVE wireless communication system — data sorting of individual measurements

Data from multiple Digimatic gages sent to separate Excel sheets



Loading data from multiple Digimatic gages (U-WAVE-T) into separate Excel sheets is now available without the need for macro programming.

USB-ITPAK V2.0 (Individual measurement)

ID=98	A	B	C	ID=99
1	2.341	2.274	2.007	2.341
2	2.039	1.963	2.274	2.039
3	1.996	2.152	2.007	1.996

Sheet 98

ID=00	A	B	C	ID=01
1	2.039	1.963	2.152	2.039
2	1.996	2.152	2.007	1.996
3	1.996	2.152	2.007	1.996

Sheet 00

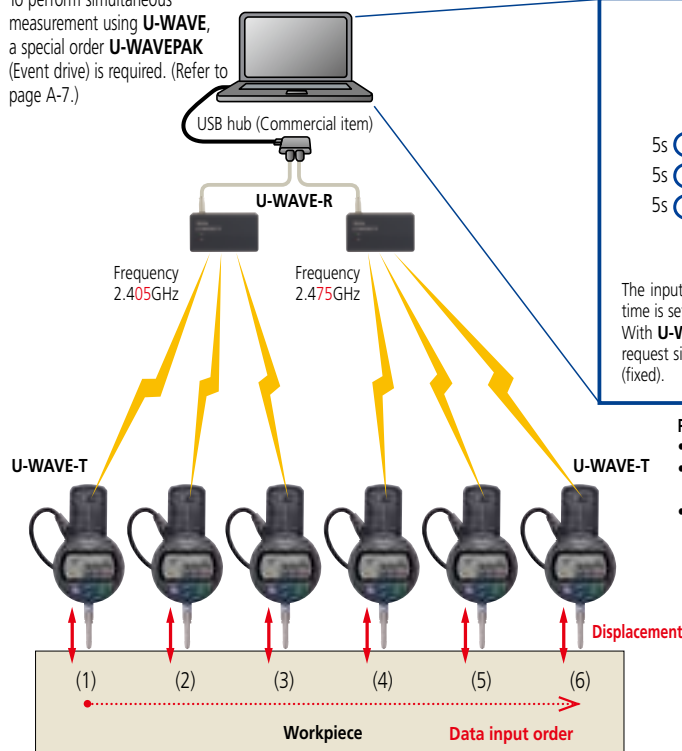
Sheet 01

- Entry point can be specified per gage (by U-WAVE-T ID).
- Specifying an Excel file: Excel Book (full path) + sheet name
 - Specifying data input cells (example: A1:C3)
 - Specifying cursor move (right or down)

Example of measurement using the U-WAVE wireless communication system — timer input + measurement date/time display during simultaneous measurement

Automatically obtains displacement data in a certain input interval

To perform simultaneous measurement using U-WAVE, a special order U-WAVEPAK (Event drive) is required. (Refer to page A-7.)



If using USB-ITPAK V2.0 supporting U-WAVE event drive, arbitrary timer input is allowed without the need for macro programming.

USB-ITPAK V2.0 simultaneous measurement + timer input (example: 5s interval)

	A	B	C	D	E	F	G
1	Displacement (1)	Displacement (2)	Displacement (3)	Displacement (4)	Displacement (5)	Displacement (6)	Measurement date/time
2	0.281	0.162	0.121	0.051	0.011	-0.001	2013/4/1 7 30 00
3	0.279	0.152	0.133	0.064	0.018	-0.003	2013/4/1 7 30 05
4	0.265	0.149	0.142	0.089	0.021	-0.007	2013/4/1 7 30 10
5							
6							

The input interval can be arbitrarily set by 0.1s intervals up to 24 hours. If a smaller value than the data loading time is set, the actual measurement time will be the input interval.

With U-WAVE, an error (no data) may occur if less than 0.5s is set for the input interval. This is because the data request signal is issued before the data comes in, based on the event drive data refresh interval that is set to 0.5s (fixed).

Points to note when performing simultaneous measurement using U-WAVE and USB-ITPAK V2.0

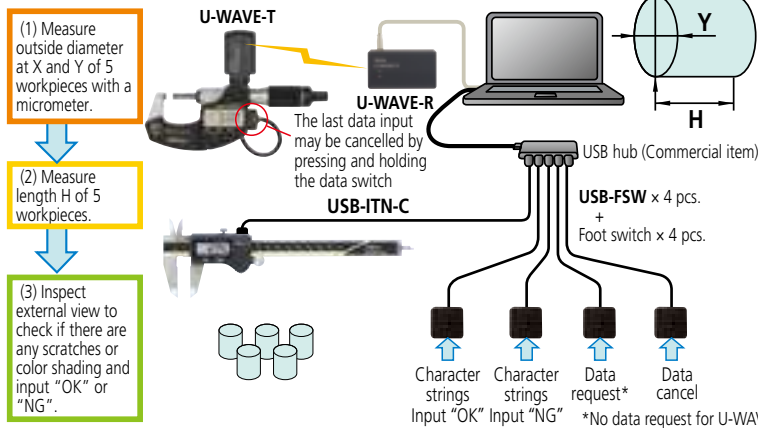
- Besides U-WAVE, a special order U-WAVEPAK (Event drive) is required.
 - The battery life of U-WAVE-T becomes shorter in the event mode, reducing to approximately 20 days for continuous measurement.
 - When using several Digimatic gages, communication errors may occur because simultaneous transmission from all gages may cause radio interference.
- With U-WAVE, radio wave interference can be mostly avoided if data is transmitted after making sure there is no other radio communication.
- CSMA/CA method: this avoids radio interference and enables successful simultaneous data transmission of three U-WAVE-T units per U-WAVE-R.
- To perform simultaneous measurement with more than three units of U-WAVE-T, add U-WAVE-R and set different frequencies (15 ch) to avoid radio interference.

Create Microsoft Excel input procedures with USB-ITPAK V2.0 to handle data from U-WAVE or the USB Input Tool Direct

Measurement applications of USB-ITPAK V2.0 (Three examples of how USB-ITPAK V2.0 can be deployed are shown below)

Sequential measurement

(Measurement example – see figure at right)



When a measuring procedure is executed, a window (as below) is displayed. "Data request*", "Data cancel*", "Data skip*", "Aborting", "Complete" can be specified. * These operations can be allocated to the function key or foot switch (via USB-FSW).

Cell movement direction after inputting data (down and right)

Carriage return (Low, column)

Microsoft Excel sheet previously specified

	A	B	C	D	E	F
1	Setting	1	2	3	4	5
2	Dimension X	10.025	10.033	9.964	10.031	10.046
3	Dimension Y	9.982	10.017	10.008	9.996	10.027
4	Dimension H	29.97	30.02	30.07	29.96	30.04
5	External Appearance	OK	OK	NG		

Input range of micrometer (B2 to F3)

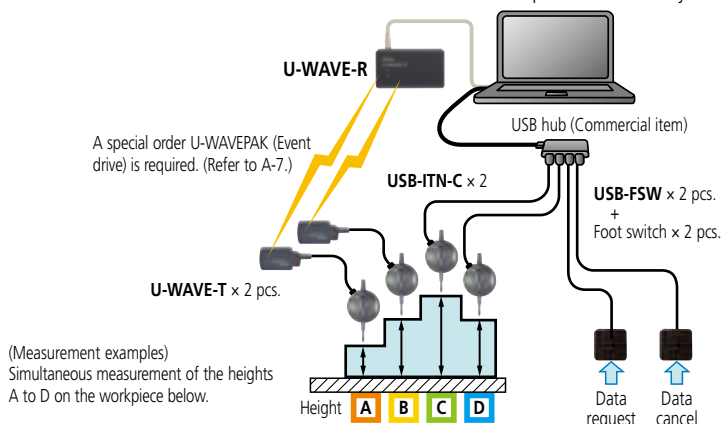
Input range of caliper (B4 to F4)

Input range of visual judgment (B5 to F5)

Cell that will receive next input is highlighted in green

Simultaneous measurement

Measurement values are input simultaneously from several Digimatic gages (via **IT-016U/USB-ITN**, **U-WAVE**)



	A	B	C	D	E
1		Height A	Height B	Height C	Height D
2	1	5.02	8.03	9.96	6.03
3	2	4.98	8.02	10.01	5.99
4	3	4.97	8.04	10.07	5.96
5	4				
6	5				

First measurement (finished)

Second measurement (finished)

Third measurement (finished)

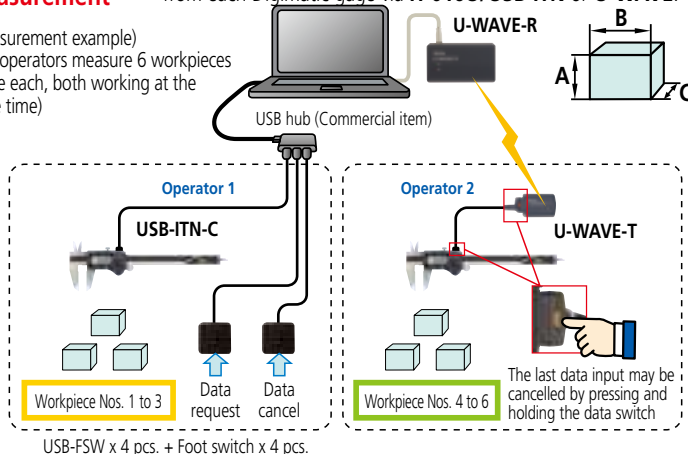
Fourth measurement (Wait for next input)

Individual measurement

(Measurement example)

Two operators measure 6 workpieces (three each, both working at the same time)

Several operators input measurement data asynchronously according to individually defined procedures (where to input, move direction, etc.) from each Digimatic gage via **IT-016U/USB-ITN** or **U-WAVE**.



Since several individual operators perform measurement simultaneously, an operation key and a function key in the window below cannot be used at the same time. The only effective input device in this case is the foot switch (via USB-FSW).

	A	B	C	D	E	F	G
1	Setting	1	2	3	4	5	6
2	Dimension A	10.02	10.03	9.96	10.15	10.23	10.04
3	Dimension B	9.98	10.01	10.07	9.99	9.78	
4	Dimension C	10.15	10.14		9.96	10.27	

Operator 1

Operator 2

Cell that will receive next input

Cell that will receive next input

Notes on using USB-ITPAK:

Do not merge the cells in the specified range as a measurement data input.

During measurement, the Microsoft Excel worksheet cannot be modified in any way apart from entering data. If you need to modify the sheet, it is necessary to abort or finish the measurement.

Measurement Data Management

Convenient data collection tool and quality control software

Data processing printer for quality control SERIES 264 — Digimatic Mini-Processor DP-1VR

- This is a palm-sized printer used to print measurement data from Digimatic gages or to perform statistical analysis.
- The versatile DP-1VR printer not only prints measurement data, but performs a variety of statistical analyses, draws histograms and D-charts and also performs complex operations on X-bar R control charts.
- Equipped with RS-232C output and GO/NG judgment output as standard functions, this processor delivers the high reliability expected from an advanced quality inspection machine.
- This line thermal printer enables fast and quiet printing.



264-504
DP-1VR

Examples of printout

Mitutoyo

* DP-1VR *

* MODE 1 *

DATE: 2002/ 2/27
TIME: 13:43

* LIMIT DATA *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* MEASUREMENT DATA *

N	27.07	mm
1	26.43	mm
2	26.42	mm
3	26.56	mm
4	26.56	mm
5	26.56	mm
6	26.56	mm
7	26.56	mm
8	26.46	mm
9	26.46	mm
10	26.70	mm

PAR. NO.:

DATE: 2002/ 2/27
TIME: 13:43

* HISTOGRAM *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* NG/NG JUDGMENT *

NG	2
NG	1
NG	30.00C
NG	0.56C
NG	0.26C

* HISTOGRAM *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* NG/NG JUDGMENT *

NG	2
NG	1
NG	30.00C
NG	0.56C
NG	0.26C

Mitutoyo

* DP-1VR *

* MODE 2 *

DATE: 2002/ 2/27
TIME: 10:44

* LIMIT MODE *

* LIMIT DATA *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* MEASUREMENT DATA *

N	27.07	mm
1	26.43	mm
2	26.42	mm
3	26.56	mm
4	26.56	mm
5	26.56	mm
6	26.56	mm
7	26.56	mm
8	26.46	mm
9	26.46	mm
10	26.70	mm

PAR. NO.:

DATE: 2002/ 2/27
TIME: 10:44

* HISTOGRAM *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* NG/NG JUDGMENT *

NG	2
NG	1
NG	30.00C
NG	0.56C
NG	0.26C

* HISTOGRAM *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* NG/NG JUDGMENT *

NG	2
NG	1
NG	30.00C
NG	0.56C
NG	0.26C

Mitutoyo

* DP-1VR *

* MODE 3 *

DATE: 2002/ 2/27
TIME: 10:45

* LIMIT MODE *

* LIMIT DATA *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* MEASUREMENT DATA *

N	27.07	mm
1	26.43	mm
2	26.42	mm
3	26.56	mm
4	26.56	mm
5	26.56	mm
6	26.56	mm
7	26.56	mm
8	26.46	mm
9	26.46	mm
10	26.70	mm

PAR. NO.:

DATE: 2002/ 2/27
TIME: 10:45

* HISTOGRAM *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* NG/NG JUDGMENT *

NG	2
NG	1
NG	30.00C
NG	0.56C
NG	0.26C

* HISTOGRAM *

LSL	26.44	mm
USL	27.00	mm
LSL	0.56	mm

* NG/NG JUDGMENT *

NG	2
NG	1
NG	30.00C
NG	0.56C
NG	0.26C

Statistical calculations

Mode 0	Modes 1,2	Mode 3
GO/NG judgment	N: Number of data MAX: Maximum value MIN: Minimum value R: Range X: Average value σn: Standard deviation of the sample (N) σn-1: Sample standard deviation (N-1) -NG: Number of data smaller than lower limit value +NG: Number of data larger than upper limit value P: Fraction defective Cp: Process capability index Cpk: Process capability index (process target centered)	N: Number of data MAX: Maximum value MIN: Minimum value n: Number of subgroup (Max. 10) X: Average value of subgroup R: Range of subgroup X: Mean value X-UCL: Upper control limit R: Mean (R control) R-UCL: Upper control limit (R control) R-LCL: Lower control limit (R control)

Specifications

- Order No.: 264-504
- Model: DP-1VR
- Data processing capacity:
Mode 0: 10000 data items
Modes 1,2: 9999 data items
Mode 3: Sample size (10 x subgroup 9999=99990 data)
Upper/lower limit value 5 pairs can be held in memory
- Output: (1) RS-232C output level (TTL)
function (2) GO/NG judgment output (+NG, GO, -NG)
- Input timer: Input intervals
0.25s, 1s, 5s, 30s, 1min, 30min, 60min
- Printing method: Thermal line printer 384 dots/char
- Character specification: Normal character 24 x 16 dots /
Large character 36 x 24 dots
- Printing speed: 0.5s per line (using AC adapter)
- Printing line: 10000 lines of normal characters per roll
7000 lines of large characters per roll
- Printing paper: High durability thermo-sensitive paper
Width 58mm x length 48m

Note: Printed characters do not fade if a printout is stored in a cool dark place, but if it is to be used for official documents, or stored more than 5 years, it is recommended that a copy be made.

- Power supply: 2 power methods
(1) AC adapter 100V (6VDC, 1000mA) supplied as a standard accessory.
(2) 4pcs. of LR6/AA size (alkaline or Ni-Mh)
- Battery life: 10000 lines (5s/line using a 1600mAh Ni-Mh battery)
Note: This is a typical value and is not guaranteed.
- External dimensions: 94 (W) x 201 (D) x 75.2 (H) mm
- Mass: 390g (main unit)
- Optional Accessories:
(1) RS-232C changing cable
For connection with a PC
Cable length 1m, D-sub 9 pin
(2) RS-232C counter cable
For connection with KA counter
Cable length 1m, D-sub 25 pin
(3) GO/NG judgment cable
Cable length 2m, D-sub 10 pin terminal/separate wires
(4) Foot switch
- Consumable items:
Printing paper (1 roll)

RS-232C communication specification (Output specification)

- Output signal level: TTL
- Communication method: Half-duplex
- Communication speed: 1200/2400/4800/9600/19200
- Bit configuration: Start bit 1 bit
Data length: 7/8 bit
Parity check: Even/odd/none
Stop bit: 2 bit
- Data format

When data output

Number of bytes	1	2	3	4	5	6	7	8	9	10	11	12	13
Data	0	1	A	Model	MSD							LSD	CR

Data parts (Floating decimal point)
Model: + or -
Measurement item
Channel No.
Code No.

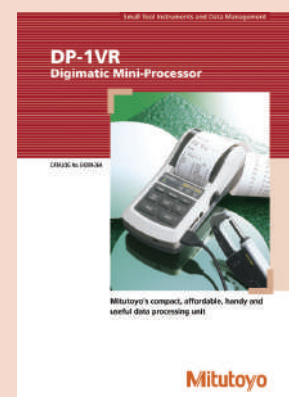
Example of format
Display of a Digimatic gage Output data
0.123 01A+0000.123CR

Error code

Number of bytes	1	2	3	4
Data	9	1	Error code	CR

Error code: 1 (No data input)
2 (Loaded data with the format other than specified)
9 (System error head temperature error, overflow, power supply voltage error, head up, paper error)

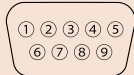
Channel No.
Error format



Refer to the DP-1VR leaflet (E4209) for more details.

Specifications

- Order No.: 264-002
- Model: MUX-10F
- Data input port: 4 channels for Digimatic gages
- Output: (RS-232C)
- Data output Via RS-232C interface:
Data transmission method: Half-duplex
Data transmission code: ASCII/JIS
Data length: 8 bits
Parity check: None
Stop bit: 1
Data transmission speed: 300/600/1200/2400/9600/19200bps
- Connector specification:

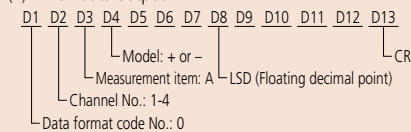


Pin No.	Signal	Function	in/out
1	CD		out
2	RD	Received data	out
3	TD	Communication data	in
4			
5	GND	Ground	
6	DR		out
7			
8	CS		out
9			

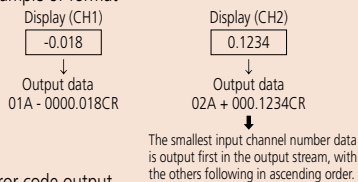
* For connection with a PC, use a commercially available RS-232C straight cable.

Data format

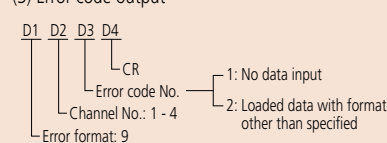
(1) When data output



(2) Example of format



(3) Error code output



- Power supply: AC adapter (9V, 500mA)
- External dimensions: 91.4 (W) x 92.5 (D) x 50.4 (H) mm
- Note: Communication software is not attached.

Digimatic/RS-232C Interface Unit Multiplexer MUX-10F

- Multiplexer MUX 10F is a measurement data transfer device that converts incoming Digimatic output measurement data to RS-232C and outputs it to an external device such as a PC.

Up to four measuring instruments with Digimatic output can be connected.



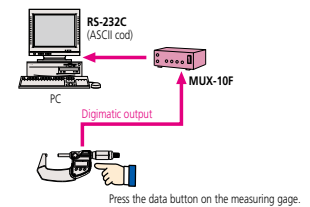
264-002
MUX-10F



Usage Example

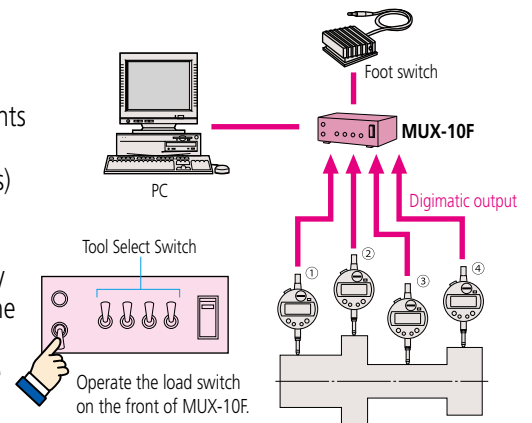
Data input using the data button on the Digimatic gage

- If the Digimatic gage has a data button, data is sent to the MUX-10 from the gage, converted to RS-232C and sent out.



Data input using the load switch

- If the Digimatic gage does not have a data button, or when simultaneous measurements are performed, the MUX-10 load switch is used to poll data from the measuring gage(s) selected by the tool selection switch(es), converted to RS-232C, and sent out.
- 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.

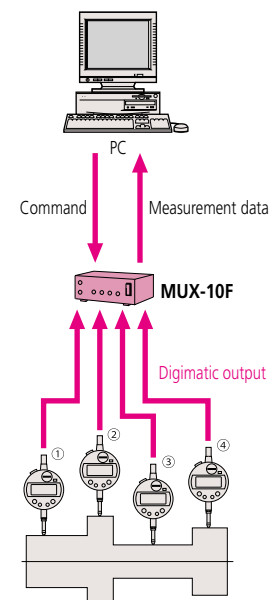


Data input using the external commands

- Data from a specified measuring gage connected to MUX-10F can be polled (ch 1- 4) by inputting a command from the PC.

Commands (ASCII)	Transfer channels
1 (ASCII code31) CR	1
2 (ASCII code32) CR	2
3 (ASCII code33) CR	3
4 (ASCII code34) CR	4
*A (ASCII code41) CR	1, 2, 3, 4
*B (ASCII code42) CR	1, 2, 4
*C (ASCII code43) CR	1, 3, 4
*D (ASCII code44) CR	2, 3, 4
E (ASCII code45) CR	1, 2, 3
F (ASCII code46) CR	1, 2
G (ASCII code47) CR	1, 3
H (ASCII code48) CR	1, 4
I (ASCII code49) CR	2, 3
J (ASCII code50) CR	2, 4
K (ASCII code51) CR	3, 4

* Command will operate the same as previous MUX-10 when 4-channel mode is turned off.



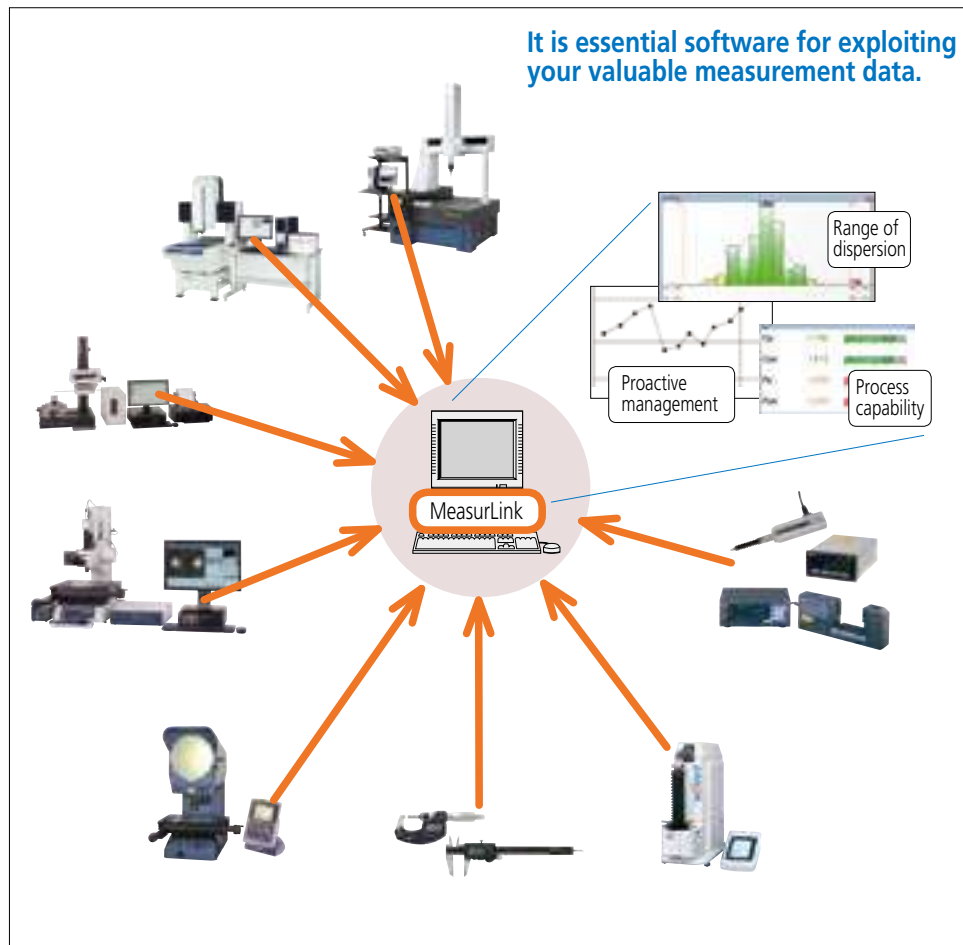
Measurement Data Management

Convenient data collection tool and quality control software

Measurement Data Network System MeasurLink

- MeasurLink is a data management modular software system that enables collecting data from a wide range of Mitutoyo measuring tools and systems including Coordinate Measuring Machines.
- Measurement data storage can be centralized by implementing a network system using a company LAN. Quality information such as checking, monitoring, analysis of the measurement results and creating inspection reports can be shared among separate offices to maximize efficiency.

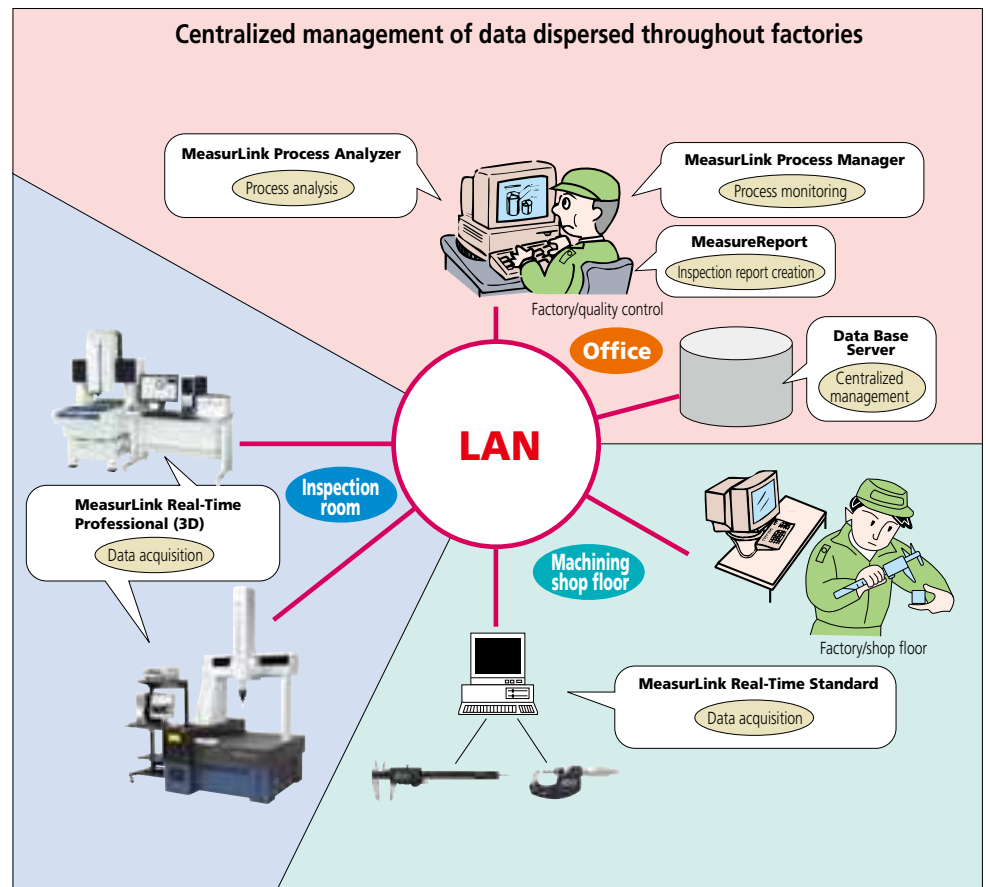
Data from Mitutoyo measuring instruments are visually displayed in real-time in the inspection room or line side



MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world
metrology software
MeasurLink

- MeasurLink supports anything from stand-alone, small-scale systems to large-scale systems utilizing a PC network environment. Expansion from a stand-alone installation to a network system can easily be performed, allowing a gradual upgrade from a single-test operation in one section to a full-scale operation.


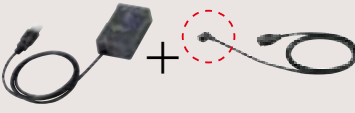

Centralized measurement data management by networking










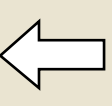
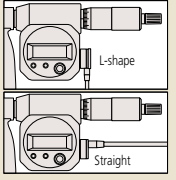
Measurement Data Management

Convenient data collection tool and quality control software

Digimatic Data Cable Selector (including USB Input Tool Direct)

USB Input Tool Direct USB-ITN 	Connector type		(A) Water-proof type with output button	(B) Water-proof type with output button	(C) Straight type with output button	(CR) L type with output switch (cable outlet is right)
	Model No. Order No.		USB-ITN-A 06ADV380A	USB-ITN-B 06ADV380B	USB-ITN-C 06ADV380C	No applicable models USB-ITN-C is available Refer to the following figure.
IT-016U/IT-007R/DP-1VR/MUX-10F/ EC Counter 	Connector type		(A) Water-proof type with output button	(B) Water-proof type with output button	(C) Straight type with output button	(CR) L type with output switch (cable outlet is right)
	Order No.	1m	05CZA624	05CZA662	959149	04AZB512
		2m	05CZA625	05CZA663	959150	04AZB513
U-WAVE-T 	Connector type		(A) Water-proof type with output button	(B) Water-proof type with output button	(C) Straight type with output button	(CR) L type with output switch (cable outlet is right)
	Standard		02AZD790A	02AZD790B	02AZD790C	No applicable models Type C connectors are available, but take care of the cable when using thimbles Refer to the following figure.
	For foot switch		02AZE140A	02AZE140B	02AZE140C	

Select a cable (A to G) whose gage connector fits the digimatic port on your gage (check the red dotted frame in the above pictures).











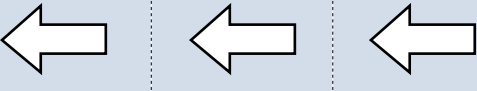

Gage connectors on data cable	Connector type	(A) Water-proof type with output button	(B) Water-proof type with output button	(C) Straight type with output button	(CR) L type with output switch (cable outlet is right)
	Picture of gage connector				
	Data switch	Available	Available	Available	Available
Digimatic ports on gage Please note that some high-precision Digimatic gages are capable of displaying the measurement result to more than 6 digits. However, according to the Digimatic output specification, the result may be output in 6 digits only. Digimatic gages whose display may exceed 6 digits • Laser Scan Micrometers • Litematic • Linear gage counter (EH) • High-Accuracy Digimatic Micrometer (293-100/293-130)	Picture of Digimatic port				
	Applicable models	<ul style="list-style-type: none"> Digimatic caliper 500-776/500-777, etc. 500-712-20/500-713-20, etc. 500-712 etc. 550-301-10/550-331-10, etc. 551-301-10/551-331-10, etc. 552-302-10/552-303-10, etc. 552-150-10/552-151-10, etc. 552-155-10/552-156-10, etc. 552-181-10/552-182-10, etc. Digimatic special application caliper 573-601/573-602, etc. Digimatic depth gage 571-251-10/571-252-10, etc. Digimatic scale unit 572-600, 572-601, etc. 	<ul style="list-style-type: none"> Digimatic micrometer 293-100/293-130 293-140-30/293-141-30, etc. 293-230-30 etc. 340-251-30/340-252-30 Dedicated micrometers for Digimatic 422-230-30/422-231-30, etc. 406-250-30/406-251-30, etc. 343-250-30/343-251-30, etc. 369-250-30/369-251-30, etc. 345-250-30/345-251-30, etc. 314-251-30/314-252-30, etc. Digimatic micrometer head 350-251-30/350-261-30, etc. Digimatic holtest 468-161/468-162, etc. Digimatic depth gage 329-250-30/329-251-30, etc. 	<ul style="list-style-type: none"> Digimatic caliper 500-150-30/500-151-30, etc. 500-500-10/500-501-10, etc. 500-443 etc. Digimatic special application caliper 573-118-10/573-119-10, etc. 573-116-10/573-117-10, etc. 573-191-30/573-291-30 573-181-30/573-182-30, etc. Digimatic depth gage 571-201-30/571-202-30, etc. Digimatic micrometer head 164-163/164-164 Digimatic scale unit 572-203-10/572-213-10 572-300-10/572-301-10, etc. Digital height master 515-374/515-376, etc. 	 Type C straight connectors are available, but may interfere with thimble operation.

(D) Flat 10-pin type	(E) Round 6-pin type	(F) Flat straight type	(FB) Flat L-shape (cable outlet is back)	(FR) Flat L-shape (cable outlet is right)	(FL) Flat L-shape (cable outlet is left)	(G) Flat straight waterproof type
USB-ITN-D 06ADV380D	USB-ITN-E 06ADV380E	USB-ITN-F 06ADV380F	No applicable models USB-ITN-F is available			USB-ITN-G 06ADV380G
(D) Flat 10-pin type	(E) Round 6-pin type	(F) Flat straight type	(FB) Flat L-shape (cable outlet is back)	(FR) Flat L-shape (cable outlet is right)	(FL) Flat L-shape (cable outlet is left)	(G) Flat straight waterproof type
936937	937387	905338	905689	905691	905693	21EAA194
965014	965013	905409	905690	905692	905694	21EAA190
(D) Flat 10-pin type	(E) Round 6-pin type	(F) Flat straight type	(FB) Flat L-shape (cable outlet is back)	(FR) Flat L-shape (cable outlet is right)	(FL) Flat L-shape (cable outlet is left)	(G) Flat straight waterproof type
02AZD790D	02AZD790E	02AZD790F	No applicable models Use 02AZD790F or 02AZD140F.			02AZD790G
02AZE140D	02AZE140E	02AZE140F				02AZE140G



(Note 1) ID-F, EB, EC-101D, ID-U, ID-SS, ID-SX are required to use with the USB-ITN.

(Note 2) USB-ITN, IT-016U, and U-EAVE cannot be used with EF/EH, VL-50-B/50S-B, and SJ-500/SV-2100.

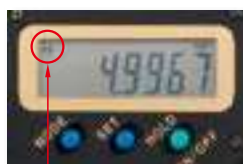
(D) Flat 10-pin type	(E) Round 6-pin type	(F) Flat straight type	(FB) Flat L-shape (cable outlet is back)	(FR) Flat L-shape (cable outlet is right)	(FL) Flat L-shape (cable outlet is left)	(G) Flat straight waterproof type
						
N/A	N/A	N/A	N/A	N/A	N/A	N/A
						
<ul style="list-style-type: none"> • Digimatic indicator ID-H • ID-F (Note1) • High-precision height gage QM-Height • Mu-checker Digital Mu-checker (using a foot switch) • Laser scan micrometer LSM-9506 • Linear gage counter EF/EH (Note 2) • EB (Note 1), EC-101D (Note 1) • Litematic VL-50-B/50S-B (Note 2) • Contour measuring system SJ-210/310/410 • SJ-500/SV-2100 (Note 2) • Hardness testing machines HM-210/220 	<ul style="list-style-type: none"> • Digimatic micrometer 293-666/293-667, etc. 227-201 etc. 369-411/369-412, etc.. • Hardness testing machines HM-100 HM-200 HV-100 HR-300/400/500 HH-411 	<ul style="list-style-type: none"> • Digimatic indicator ID-CX, ID-C (Peak-Value Hold Type) (Note1), ID-C (Calculation type), ID-C (Bore Gage Type), ID-U (Note2), ID-SS (Note1), ID-SX (Note1) • Digimatic height gage 192-663-10/192-613-10/570-322/570-227, etc. (Flat L-shape, cable outlet is right) • ABS borematic 568-361/568-362, etc. • Scale unit 572-460/572-560/572-480-10/572-580-10, etc. • Digimatic bore gage 511-501/511-502, etc. • Hardness testing machines HH-300 • Digimatic depth gage Digimatic type (ID-CX) 				<ul style="list-style-type: none"> • Digimatic indicator ID-N ID-B

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

High-Accuracy Digimatic Micrometer SERIES 293

- Enabling 0.1μm resolution measurement, this micrometer is ideal for customers who need to make highly accurate measurements with a hand-held tool.
- The High-Accuracy Digimatic Micrometer utilizes Mitutoyo's innovative 0.1μm resolution ABS (absolute) rotary sensor*1 and high-accuracy screw machining technology to reduce the instrumental error to ±0.5μm, delivering higher accuracy without sacrificing operability.
 - *1. Patent pending in Japan, the United States of America, the European Union, and China.
- A highly rigid frame and high-performance constant-force mechanism*2 enable more stable measurement, while the clicks emitted while the workpiece is being measured assure the operator that measurement is proceeding normally.
 - *2. Patent pending in Japan, the United States of America, the European Union, and China.
- Body heat transferred to the instrument is reduced by a (removable) heat shield, minimizing the error caused by thermal expansion of the frame when performing handheld measurements.
- The ABS (absolute) rotary sensor also eliminates the need to perform origin setting each time the power is turned on, letting you start measuring straight away. With no possibility of overspeed errors, the High-Accuracy Digimatic Micrometer also delivers a higher level of reliability.
- The High-Accuracy Digimatic Micrometer has a range of features to enable flexible measurement, including switchable resolution (0.0001mm/0.0005mm), function lock and preset.
- Carbide-tipped measuring faces



Function lock



- High-Accuracy Digimatic Micrometer received GOOD DESIGN AWARD 2011.



An inspection certificate is supplied as standard. Refer to page X for details.

ABSOLUTE™

Absolute Encoder

Technical Data

Measuring force: 7 to 9N
 Power supply: Lithium battery (CR2032) x 1
 Battery life: Approx. two years when used under normal conditions

Functions

Preset (ABS measurement system):
 The measurement origin can be preset to any value within the display range for convenience in measuring.

Zero-setting (INC measurement system):
 The display can be zeroed at any position of the spindle, making comparison measurement easier. Returning to the absolute-measurement mode is easily accomplished.

Hold:
 The displayed value is held while the spindle is withdrawn and the micrometer moved so that the display can be read at the operator's convenience. After cancelling the hold, the instrument returns to the previous measuring mode (absolute or incremental).

Resolution switching:
 The resolution of the display can be switched. If 0.1μm measurement is not required, the resolution can be switched to 0.5μm.

Function lock:
 Functions such as preset or zero-set can be locked to avoid inadvertently changing the origin position.

On/off:
 The power can be turned off after measurement is complete. Even after the power is turned off, the origin or last zero-set position remains in the memory.

Auto power off:
 Even if the power is left on, the power turns off automatically if the micrometer is not used within a 20-minute period.

Measurement data output:
 Measurement data can be output, allowing easy incorporation of this instrument into a statistical process control or measurement system.

Error alarm:
 In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected.

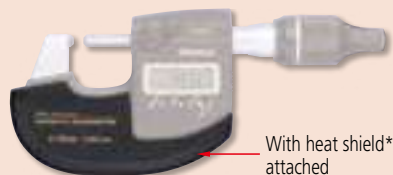
Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.



Refer to the Digimatic Micrometer leaflet (E12004) for more details.

Standard accessories

Heat shield (No.04AAB969A: 293-100
No.04AAB969B: 293-130) x 1
Lithium battery CR2032 (1 pc),
for initial operational checks (standard accessory)
Spanner (No.200877) x 1
Screwdriver (No.04AAB985) x 1
Cleaning paper for measuring faces
Inspection certificate



With heat shield*
attached

Heat shield



Optional accessories

Connecting cables with output switch

1m: No. 05CZA662

2m: No. 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): No. 06ADV380B

Connecting cables for U-WAVE-T (160mm)

No. 02AZD790B

For foot switch: No. 02AZE140B

Refer to page B-46 for details.

Cleaning paper for measuring faces (1000sheet): No.04AZB581



SPECIFICATIONS

Metric

Order No.	Range	Resolution	Accuracy*	Anvil/spindle faces	Mass
293-100	0 - 25mm	0.0001mm/ 0.0005mm (switchable)	±0.5μm	ø3.2mm	400g

* Excluding quantizing error

Inch/Metric

Order No.	Range	Resolution	Accuracy*	Anvil/spindle faces	Mass
293-130	0 - 1"	.000005"/.00002" 0.0001mm/0.0005mm (switchable)	±.00002"	ø3.2mm	400g

* Excluding quantizing error



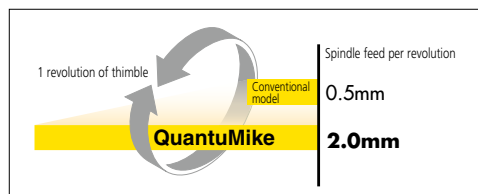
Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

QuantuMike

SERIES 293 — IP65 Micrometer with 2mm/rev Spindle Feed

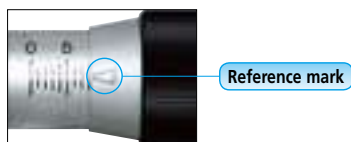
- Advanced pioneering technology has created the next generation of micrometer, the most revolutionary advance in micrometer technology since James Watt invented the instrument.
- Faster measurement is achieved by using a coarser thread which feeds the spindle by 2mm per revolution of the thimble. This increase in thread lead has been made possible thanks to new high precision thread-cutting and testing techniques.



- QuantuMike is equipped with a function lock feature to prevent the origin point being moved by mistake during measurement.



- A graduated scale is provided on the sleeve for use with a reference mark on the thimble so that every millimeter displacement can be checked to provide extra confidence.



- The patented ratchet thimble mechanism* helps ensure repeatable results by transmitting microvibrations along the spindle to the contact face to provide a constant measuring force and encourage good contact with the workpiece. The ratchet works from the thimble as well as the speeder so it is always easy to use – even when making measurements one-handed. The sound of the ratchet provides the user with a sense of confidence and the speeder enables the rapid spindle feed needed when measuring widely different dimensions.

*Patent registered (in Japan, USA, China, Germany, UK and France)



Ratchet-induced microvibrations along the spindle help ensure repeatable measurements.

Mitutoyo

B-3

IP65

These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



An inspection certificate is supplied as standard. Refer to page X for details.



The name QuantuMike is from Quantum and Micrometer, reflecting our belief this tool represents a quantum leap in micrometer ergonomics.

- A statistical process control system and a measurement network system can be established to share information regarding quality with a model equipped with the data output function. (Refer to page A-1 for details.)
- There is a lineup of convenient Interface Input Tools which enable the conversion of measurement data to keyboard signals and directly input them to cells in off-the-shelf spreadsheet software such as Excel. (Refer to page A-3 for details.)
- Excellent resistance against oil, water and dust (IP65 protection level) enables this product to be used in machining situations that include splashing coolant fluid.
- Measuring faces: Carbide.



Refer to the Digimatic Micrometer leaflet (E12022) for more details.

IP Codes

Level 6: Dust -proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Dust/Water protection level: IP65 (IEC60529)*2

Measuring force: 7 to 12N*3

Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)

Length standard: Electromagnetic rotary sensor

Battery life: Approx. 1.2 years under normal use

Standard accessories: Reference bar, 1 pc (except for 0-25mm (0-1") models) Spanner (**No. 301336**), 1 pc

*2 Rustproofing shall be applied after use.

*3 Measuring force when using the speeder ratchet (Apply a measuring force in the same condition as for measurement and then set the origin.)

Functions

Origin point setting (ABS length measurement system):

Pressing the ORIGIN button resets the ABS origin at the current spindle position. Origin values can be set depending on each size.

Zero setting (INC length measurement system):

A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

Hold:

Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility when the instrument must be moved away from the workpiece before the reading can be recorded.

Function lock:

This function allows the ORIGIN (origin point setting) function and the ZERO (zero setting) function to be locked to prevent these points being reset accidentally.

Auto power ON/OFF:

The reading on the LCD disappears after this instrument is idle for approx. 20 minutes, but the origin point is retained. Turning the spindle causes the reading on the LCD to reappear.

Data output*4:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

Error alarm:

In case of an overflow on the LCD or a computing error, an error message appears on the LCD, and the measuring function stops. This prevents an instrument from giving an erroneous reading. Also, when the battery voltage drops to a certain level, the low-battery-voltage alarm annunciator appears well before the micrometer becomes unusable.

*4: Only for the models with SPC data output

Optional accessories

(Only for models with data output function)

Connecting cables with output switch

1m: **No. 05CZA662**

2m: **No. 05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **No. 06ADV380B**

Connecting cables for **U-WAVE-T** (160mm)

No. 02AZD790B

For foot switch: **No. 02AZE140B**

Refer to page B-46 for details.



SPECIFICATIONS

Metric							
	Order No.	Range	Resolution	Accuracy*1	Flatness	Parallelism	Mass
with SPC data output	293-140-30	0 - 25mm	0.001mm	±1μm	0.3μm	1μm	265g
	293-141-30	25 - 50mm					325g
	293-142-30	50 - 75mm		±2μm		2μm	465g
	293-143-30	75 - 100mm					620g
without SPC data output	293-145-30	0 - 25mm		±1μm		1μm	265g
	293-146-30	25 - 50mm					325g
	293-147-30	50 - 75mm		±2μm		2μm	465g
	293-148-30	75 - 100mm					620g

*1 Excluding quantizing error

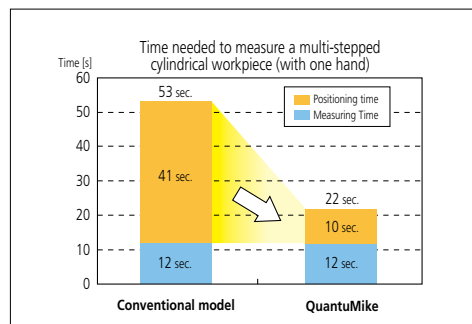
Inch/Metric							
	Order No.	Range	Resolution	Accuracy*1	Flatness	Parallelism	Mass
with SPC data output	293-180-30	0 - 1"	.00005"/ 0.001mm	±.00005"	.000012"	.00004"	265g
	293-181-30	1" - 2"					325g
	293-182-30	2" - 3"		±.0001"		.00008"	465g
	293-183-30	3" - 4"					620g
without SPC data output	293-185-30	0 - 1"		±.00005"		.00004"	265g
	293-186-30	1" - 2"					325g
	293-187-30	2" - 3"		±.0001"		.00008"	465g
	293-188-30	3" - 4"					620g

*1 Excluding quantizing error

Measuring time on a 6-stepped workpiece with one hand

Thanks to the quick movement, positioning times are reduced by 60%* and measuring times by 35%* compared with a conventional micrometer.

*According to Mitutoyo's comparison test data for measuring time on typical workpieces.



Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Coolant Proof Micrometers

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

- World's highest performing micrometer overall.
- Extended battery life of approximately 2.4 years.
- Ergonomic anti-slip frame cover and front panel for more comfortable hand-held measurements.
- Ratchet thimble provides better operability for one-handed operation.
- Oil-resistant material used for all plastic parts.
- Models equipped with a Digimatic output port can form part of a statistical process control or networked measurement system. (Refer to page A-1 for details.)
- Interface Input Tools are available that enable the conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel. (Refer to page A-3 for details.)
- Two types of constant-force devices are available: Ratchet Stop and Ratchet Thimble.
- Measuring faces: Carbide



293-230-30



293-252-30



293-234-30
With ratchet thimble



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



www.tuv.com
ID 000040191



An inspection certificate is supplied as standard.

IP Codes

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Flatness: 0.3µm/0.00012"
Dust/water protection level: IP65 (IEC60529) *2
Measuring force: 5 to 10N (ratchet thimble type is 7 to 12N.) *3
Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
Battery life: Approx. 2.4 years under normal use
Length standard: Electromagnetic rotary sensor
Standard accessories: Reference bar, 1 pc (except for 0-25mm (0-1") models)
Spanner (**301336**), 1 pc

*2 Rustproofing shall be applied after use.

*3 Refer to page B-4 for details.

Optional accessories

(Only for models with data output function)

Connecting cables with output switch

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

Connecting cables for **U-WAVE-T** (160mm)

02AZD790B

For foot switch: **02AZE140B**

Refer to page B-46 for details.



These are dedicated connecting cables for Coolant Proof micrometers.



Refer to the MDC-MX leaflet (MAP1394) for more details.

Functions

Origin point setting (ABS measurement system):

Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

Zero-setting (INC measurement system):

A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

HOLD:

Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility where the instrument must be moved away from the workpiece before the reading can be recorded.

Data output*4 :

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

*4: Only models with the data output function

Auto power ON/OFF:

The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

Error alarm:

In case of an overflow on the LCD or a computing error, an error message appears on the LCD, and the measuring function stops. This prevents an instrument from giving an erroneous reading. Also, when the battery voltage drops to a certain level, the low-battery-voltage alarm annunciator appears well before the micrometer becomes unusable.

Function lock :

This function allows the ORIGIN (origin point setting) function and the ZERO (zero-setting) function to be locked to prevent these points being reset accidentally.

SPECIFICATIONS

Metric							
	Order No	Range	Resolution	Accuracy*	Parallelism	Constant-force device	Mass
with SPC data output	293-230-30	0 - 25mm	0.001mm	±1μm	1μm	With ratchet stop	270g
	293-231-30	25 - 50mm					330g
	293-232-30	50 - 75mm		±2μm	2μm		470g
	293-233-30	75 - 100mm					625g
	293-250-30	100 - 125mm		3μm			600g
	293-251-30	125 - 150mm					740g
	293-252-30	150 - 175mm		±3μm			800g
	293-253-30	175 - 200mm					970g
	293-254-30	200 - 225mm		4μm		1100g	
	293-255-30	225 - 250mm				1270g	
	293-256-30	250 - 275mm		±4μm		1370g	
	293-257-30	275 - 300mm				1590g	
	293-234-30	0 - 25mm		±1μm	1μm	With ratchet thimble	280g
	293-235-30	25 - 50mm					340g
293-236-30	50 - 75mm	2μm			480g		
293-237-30	75 - 100mm				635g		
without SPC data output	293-240-30	0 - 25mm	0.001mm	±1μm	1μm	With ratchet stop	270g
	293-241-30	25 - 50mm					330g
	293-242-30	50 - 75mm		±2μm	2μm		470g
	293-243-30	75 - 100mm					625g
	293-244-30	0 - 25mm		±1μm	1μm	With ratchet thimble	280g
	293-245-30	25 - 50mm					340g
	293-246-30	50 - 75mm		±2μm	2μm		480g
	293-247-30	75 - 100mm					635g

* Excluding quantizing error

• All-Digit preset type: models over 125mm (5") measuring range

Inch/Metric								
	Order No	Range	Resolution	Accuracy*	Parallelism	Constant-force device	Mass	
with SPC data output	293-330-30	0 - 1"	.00005" /0.001mm	±.00005"	.00004"	With ratchet stop	270g	
	293-331-30	1" - 2"					330g	
	293-332-30	2" - 3"		±.0001"	.00008"		470g	
	293-333-30	3" - 4"					625g	
	293-350-30	4" - 5"	.0001" /0.001mm	±.00015"	.00012"		600g	
	293-351-30	5" - 6"					740g	
	293-352-30	6" - 7"		±.00015"	.00016"		800g	
	293-353-30	7" - 8"						970g
	293-354-30	8" - 9"	±.0002"	.00016"	1100g			
	293-355-30	9" - 10"				1270g		
	293-356-30	10" - 11"	±.0002"	.0002"	1370g			
	293-357-30	11" - 12"				1590g		
without SPC data output	293-334-30	0 - 1"	.00005" /0.001mm	±.00005"	.00004"	With ratchet thimble	280g	
	293-335-30					With friction thimble	275g	
	293-336-30	1" - 2"	.00005" /0.001mm	±.00005"	.00004"	With ratchet stop	335g	
	293-340-30	0 - 1"						270g
	293-341-30	1" - 2"		±.0001"	.00008"	With ratchet stop	330g	
	293-342-30	2" - 3"						470g
	293-343-30	3" - 4"		±.00005"	.00004"	With ratchet thimble	625g	
	293-344-30	0 - 1"						280g
	293-345-30	1" - 2"		±.0001"	.00008"			340g
	293-346-30	2" - 3"						480g
	293-347-30	3" - 4"	±.00005"	.00004"	With friction thimble	635g		
	293-348-30	0 - 1"					275g	

* Excluding quantizing error

• All-Digit preset type: models over 125mm (5") measuring range

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Digimatic outside micrometers SERIES 293

- Models equipped with a Digimatic output port can form part of a statistical process control or networked measurement system. (Refer to page A-1 for details.)
- Constant-force device: ratchet stop
- Interface Input Tools are available that enable the conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet

software such as Excel. (Refer to page A-3 for details.)

- Measuring faces: Carbide



SPECIFICATIONS

Metric				
Order No.	Range	Accuracy*	Flatness	Parallelism
293-582	300 - 325mm	±6µm	0.6µm	5µm
293-583	325 - 350mm			
293-584	350 - 375mm			
293-585	375 - 400mm	±7µm	0.6µm	6µm
293-586	400 - 425mm			
293-587	425 - 450mm			
293-588	450 - 475mm	±8µm	0.6µm	7µm
293-589	475 - 500mm			

* Excluding quantizing error

Inch/Metric				
Order No.	Range	Accuracy*	Flatness	Parallelism
293-782	12"-13"	±.0003"	.000024"	.0002"
293-783	13"-14"			
293-784	14"-15"			
293-785	15"-16"	±.00035"	.000024"	.00024"
293-786	16"-17"			
293-787	17"-18"			
293-788	18"-19"	±.0004"	.000024"	.00028"
293-789	19"-20"			

* Excluding quantizing error

SERIES 293 — Digimatic outside micrometers

- Extended battery life of approximately 2.4 years.
- An economical price is achieved through simple design and excluding the data output function.
- One switch operation (Origin Set) for easy use.
- Equipped with Ratchet Stop for constant measuring force.
- Measuring faces: Carbide



SPECIFICATIONS

Metric			
With ratchet stop / Measuring force: 5 - 10N			
Order No.	Range	Resolution	Accuracy*
293-821-30	0 - 25mm	0.001mm	±2µm

* Excluding quantizing error

Inch/Metric			
With ratchet stop / Measuring force: 5 - 10N			
Order No.	Range	Resolution	Accuracy*
293-831-30	0 - 1"	.00005"/0.001mm	±.0001"

* Excluding quantizing error

Inch/Metric			
With friction thimble / Measuring force: 5 - 10N			
Order No.	Range	Resolution	Accuracy*
293-832-30	0 - 1"	.00005"/0.001mm	±.0001"

* Excluding quantizing error

Technical Data

Resolution: 0.001mm or .0001"/0.001mm
Measuring force: 10 to 15N
SR44 (2 pc), **938882**, for initial operational checks (standard accessory)
Battery life: Approx. 1.8 years under normal use
Length standard: Electromagnetic rotary sensor
Standard accessories: Reference bar, 1 pc
Spanner (200154), 1 pc

Functions

Origin point setting (ABS measurement system): Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

Zero-setting (INC measurement system):

A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

Hold:

Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility where the instrument must be moved away from the workpiece before the reading can be recorded.

Function lock:

This function allows the PRESET (origin point setting) function and the ZERO (zero-setting) function to be locked to prevent these points being reset accidentally.

Auto power ON/OFF:

The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

Error alarm:

In case of an overflow on the LCD or a computing error, an error message appears on the LCD, and the measuring function stops. This prevents an instrument from giving an erroneous reading. Also, when the battery voltage drops to a certain level, the low-battery-voltage alarm annunciator appears well before the micrometer becomes unusable.

Optional accessories

Connecting Cables

Recommended cables:

L-Type (does not interfere with operating the thimble.)

1m: **04AZB512**

2m: **04AZB513**

Straight type (may interfere with operating the thimble.)

1m: **959149**

2m: **959150**

Refer to page B-46 for detailed information about recommended cables.



An inspection certificate is supplied as standard.

Technical Data

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)
Length standard: Electromagnetic rotary sensor
Standard accessories: Reference bar, 1 pc
Spanner (301336), 1 pc

Functions

Zero-setting:

A brief press on the ORIGIN button sets display to zero at the current spindle position (zero-setting), which allows easy comparison measurement.

Auto power ON/OFF:

The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading is retained. Turning the spindle causes the reading on the LCD to reappear.

Error alarm:

In case of an overflow on the LCD or a computing error, an error message appears on the LCD, and the measuring function stops. This prevents an instrument from giving an erroneous reading. Also, when the battery voltage drops to a certain level, the low-battery-voltage alarm annunciator appears well before the micrometer becomes unusable.

IP Codes

Level 5: Protected against dust.

Ingress of dust is not totally prevented, but dust that does penetrate must not interfere with satisfactory operation of the apparatus or impair safety.

Level 4: Protected against splashing water.

Water splashed against the enclosure from any direction shall have no harmful effects.

Technical Data

Resolution: 0.001mm, .00005"/0.001mm

Accuracy: Refer to the list of specifications.

Measuring force: 5 - 10N

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 3 years under normal use

(1 year for No. 293-667, 668, 669, 677, 678, 679)

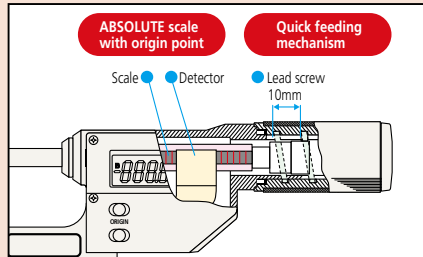
Length standard: Electrostatic capacity absolute sensor

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-30mm (0-1.2") models)

Maximum response speed: without limit

The non-rotating spindle enables even inexperienced operators to perform measurements repeatably and accurately.



Optional accessories

Connecting cables

1m: **937387**

2m: **965013**

USB Input Tool Direct

USB-ITN-E (2m): **06ADV380E**

Connecting cables for **U-WAVE-T**

02AZD790E 160mm

For foot switch: **02AZE140E**

Refer to page B-46 for details.

Quickmike

SERIES 293 — IP54 ABSOLUTE Digimatic Micrometers

- The Quickmike provides a speedy spindle feed of 10mm per thimble rotation, which enables widely differently sized features to be measured quickly.
- Set the origin only once. The absolute linear scale maintains the origin throughout the life of battery, meaning no more zero setting (presetting) or overspeed error.

- Measuring faces: Carbide
- Supplied with a Ratchet Stop for constant measuring force.
- The lineup includes Blade Micrometer types (refer to page B-36), Disk Micrometer types (refer to page B-26 for details) and Crimp Height Micrometer types (refer to page B-39).



SPECIFICATIONS

Metric							
Order No.	Range	Accuracy*	Flatness	Parallelism	Mass	Output function	
293-661-10	0 - 30mm	±2μm	0.3μm	2μm	275g	Without	
293-666						With	
293-667	25 - 55mm	±3μm					
293-668	50 - 80mm				525g		
293-669	75 - 105mm			3μm	625g		

* Excluding quantizing error

Inch/Metric							
Order No.	Range	Accuracy*	Flatness	Parallelism	Mass	Output function	
293-676	0 - 1.2"	±.0001"	.000012"	.00008"	275g	With	
293-677	1" - 2.2"				355g		
293-678	2" - 3.2"	±.00015"			.00012"		525g
293-679	3" - 4.2"						625g

* Excluding quantizing error

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

ABSOLUTE Digimatic Micrometers SERIES 227 — with Adjustable Measuring Force

- Digimatic micrometer dedicated to applications requiring a constant/low measuring force such as measuring wire, paper, and plastic/rubber parts.
- Ratchet mechanism in the thimble applies constant force to workpiece.
- Compact and easy to handle.
- Measuring force is adjustable (in steps) to suit various kinds of workpiece.
- High-accuracy measurement can be performed even by unskilled operators due to the repeatability of the automatically applied measuring force.
- Non-rotating spindle.
- Measuring faces: Carbide



227-201

SPECIFICATIONS

Metric

Order No.	Range	Measuring force	Resolution	Accuracy*	Measuring force	Accuracy of the selected measuring force*1	Repeatability of measuring force*1	Mass		
227-201	0 - 15mm	0.5N - 2.5N	0.001mm	±2μm	0.5, 1.0, 1.5, 2.0, 2.5 N	± (0.1+ the selected measuring force/10) N	within 0.1 N	300g		
227-203	15 - 30mm						380g			
227-205	0 - 10mm	2N - 10N			2, 4, 6, 8, 10 N	± (0.4+ the selected measuring force/10) N	within 0.4 N	340g		
227-206	10 - 20mm						425g			
227-207	20 - 30mm							415g		

* Excluding quantizing error

Inch/Metric

Order No.	Range	Measuring force	Resolution	Accuracy*	Measuring force	Accuracy of the selected measuring force*1	Repeatability of measuring force*1	Mass
227-211	0 - .6"	0.5N - 2.5N	.00005"/0.001mm	±.0001"	0.5, 1.0, 1.5, 2.0, 2.5 N	± (0.1+ the selected measuring force/10) N	within 0.1 N	300g
227-213	.6" - 1.2"							380g

* Excluding quantizing error

* 1: These values are guaranteed used in a horizontal orientation (within ±3 degrees)

ABSOLUTE™ Absolute Encoder

Technical Data

Flatness: 0.3μm/0.00012"
 Parallelism: 2μm/0.0008"
 Measurement posture: horizontal orientation only
 (Recommended spindle inclination: within ±3°)
SR44 (1 pc), **938882**, for initial operational checks
 (standard accessory)
 Battery life: Approx. 3 years under normal use
 (1 year for No.227-203, 206, 207, 213, 216, 217)
 Length standard: Electrostatic capacity absolute sensor
 Standard accessories: Reference bar, 1 pc
 (except for measuring range 0-15mm (0-6") / 0-10mm (0-4") models)
 Screwdriver (210183), 1 pc

Functions

Adjustable measuring force mechanism
 Hold
 Origin point setting
 ABS measurement system
 Low voltage alarm
 Data output
 Presetting (No.227-203, 206, 207, 213, 216, 217)

Optional accessories

Connecting cables
 1m: **937387**
 2m: **965013**
USB Input Tool Direct
USB-ITN-E (2m): **06ADV380E**
 Connecting cables for **U-WAVE-T**
02AZD790E 160mm
 For foot switch: **02AZE140E**
 Refer to page B-46 for details.

Adjustable measuring force

To preset the measuring force, adjust the measuring force setting scale on the thimble with the screwdriver supplied.



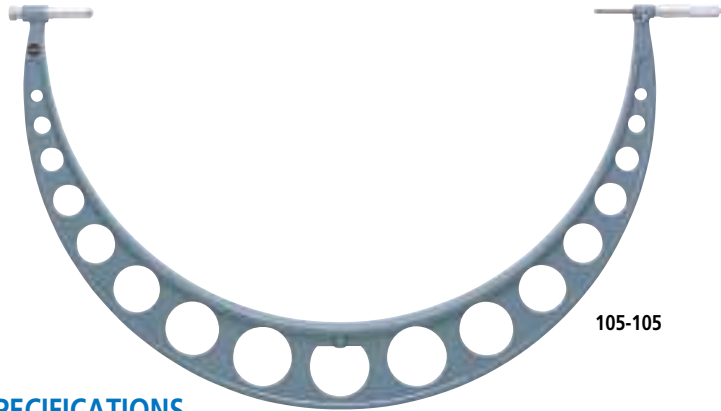
Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Outside micrometers

SERIES 105 — with Anvil Extension Collars

- Adjustable measuring range with extension collars.
- 50mm/2" spindle stroke
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



105-105

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Extension Collars	Setting Standard
105-103	500 - 600mm	0.01mm	1 pc (50mm)	2 pcs.
105-104	600 - 700mm			
105-105	700 - 800mm			
105-106	800 - 900mm			
105-107	900 - 1000mm			

Technical Data

Flatness: 1.3μm

Parallelism:

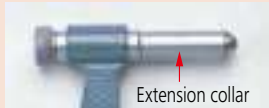
$(2 + R/100)\mu\text{m}$, R = max. range (mm)
fraction rounded down

Accuracy:

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

Standard accessories: Spanner (200154), 1 pc

Anvil Extension Collar



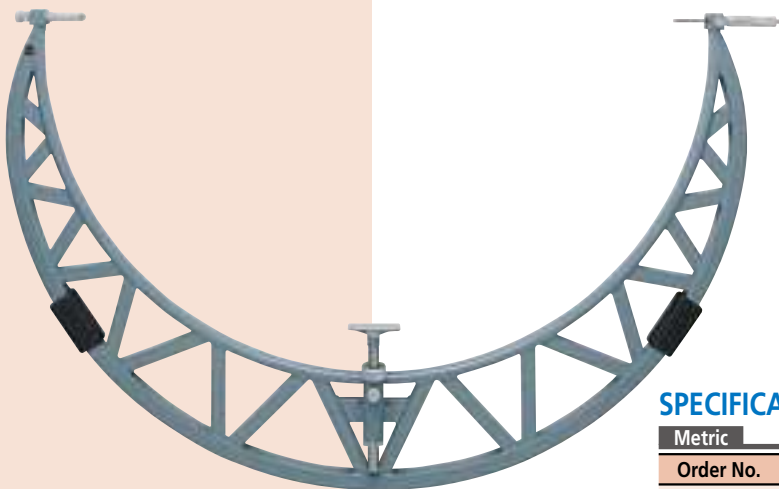
Extension collar

Measuring range 700 to 750mm
with 105-105



Extension collar

Measuring range 750 to 800mm
with 105-105



105-408

Technical Data

Flatness: 1.3μm/.000052"

Parallelism:

$(2 + R/100)\mu\text{m}$, R = max. Range (mm)
[.00008" + .00004(R/4)]", R = max. Range (inch)
fraction rounded down

Accuracy:

$\pm(6+R/75)\mu\text{m}$, R = max. Range (mm)
 $\pm[.0003" + .00005"(R/3)]"$, R = max. range (inch)
fraction rounded up

Standard accessories: Spanner (200154), 1 pc



Outside micrometers

SERIES 105 — with Anvil Extension Collars

- Wide measuring range with anvil extension collars
- 50mm/2" spindle stroke
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.

SPECIFICATIONS

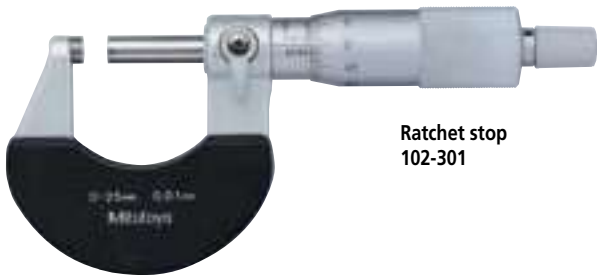
Metric				
Order No.	Range	Graduation	Extension Collars	Setting Standard (pcs)
(every 100mm)				
105-408	1000 - 1100mm	0.01mm	1 pc (50mm)	2
105-409	1100 - 1200mm			
105-410	1200 - 1300mm			
105-411	1300 - 1400mm			
105-412	1400 - 1500mm			
105-413	1500 - 1600mm			
105-414	1600 - 1700mm			
105-415	1700 - 1800mm			
105-416	1800 - 1900mm			
105-417	1900 - 2000mm			
(every 200mm)				
105-418	1000 - 1200mm	0.01mm	2 pcs (50mm, 100mm)	4
105-419	1200 - 1400mm			
105-420	1400 - 1600mm			
105-421	1600 - 1800mm			
105-422	1800 - 2000mm			

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Outside Micrometers SERIES 102

- Heat-insulated frame.
- Cut-away frame (behind anvil) for measuring in hard-to-reach places.
- A ratchet stop or a friction thimble for a constant measuring force.
- Measuring faces: Carbide



Ratchet stop
102-301



SPECIFICATIONS

Metric						
Order No.	Range	Graduation	Accuracy	Flatness	Parallelism	Constant-force device
102-301	0 - 25mm	0.01mm	±2µm	0.6µm	2µm	Ratchet stop
102-311		0.001mm	±1µm	0.3µm	1µm	friction thimble
102-313		0.01mm	±2µm	0.6µm	2µm	Ratchet stop
102-302	25 - 50mm	0.01mm	±2µm	0.6µm	2µm	
102-312	50 - 75mm	0.001mm	±1µm	0.3µm	1µm	
102-303		0.01mm	±2µm	0.6µm	2µm	
102-304	75 - 100mm	0.01mm	±3µm	0.6µm	3µm	

Metric			Micrometer set
Order No.	Range	Models included	
102-911-40	0 - 100mm (Four micrometers per set)	• 102-301 102-302 102-303 102-304 • 3 micrometer standards	



An inspection certificate is supplied as standard.

Common specifications:
Standard accessories: Reference bar, 1 pc
(except for measuring range 0-25mm models)
Spanner (301336), 1 pc
(for measuring range 0-25mm/25-50mm models)
Spanner (200877), 1 pc
(for measuring range 50-75mm/75-100mm models)



Ratchet stop type



Friction thimble type

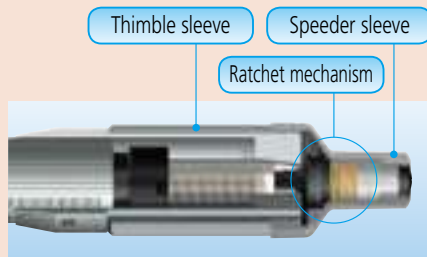


An inspection certificate is supplied as standard.

Technical Data

Flatness: 0.6µm/0.00024"
 Parallelism: 2µm/0.0008"
 Measuring force: 5-10N
 Standard accessories: Reference bar, 1 pc
 (except for measuring range 0-25mm (0-1") models)
 Spanner (301336), 1 pc

Internal structure

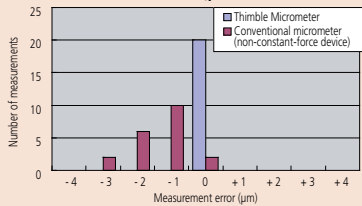


Greatly improved accuracy and repeatability

Measurement results of one-handed operation

A beginner performed a test by measuring a workpiece 20 times using a conventional micrometer and a Ratchet Thimble Micrometer.

Table showing results of test

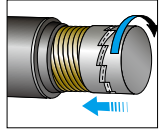


Ratchet Thimble Micrometer SERIES 102 — Outside Micrometers

- More accurate in one-handed operation: inexperienced operators measure significantly more accurately with the new micrometer.
- Ratchet function works both from the thimble and the speeder.



- Rotating the thimble/speeder when the workpiece is between the anvil and spindle causes the ratchet mechanism to operate and apply a constant measuring force to the workpiece.
- Clearly audible ratchet operation for reassurance that measurement is being performed at constant, preset force.
- The speeder is always available for quick rotation of spindle.
- A simple mechanism, which requires neither parts maintenance nor special technique, is employed in the constant-force device.
- Heat-insulated frame.
- Measuring faces: Carbide



SPECIFICATIONS

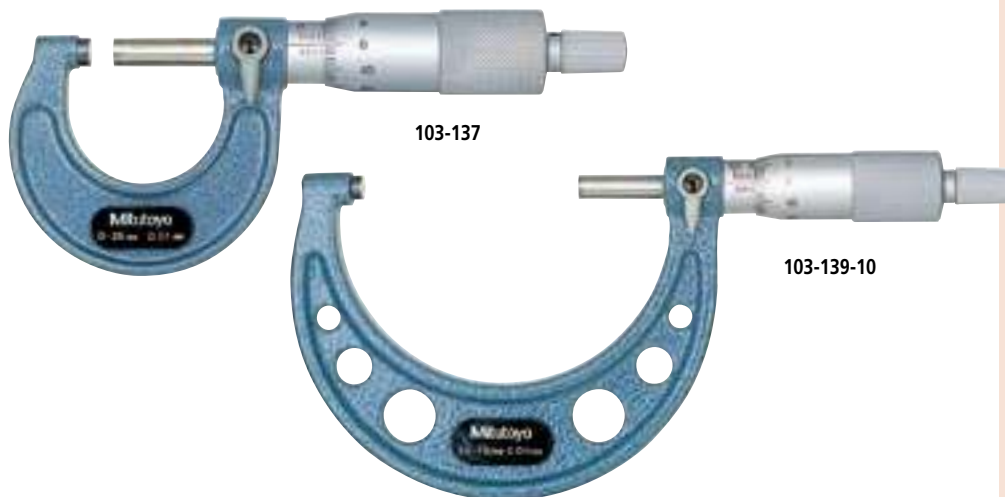
Metric				
Order No.	Range	Graduation	Accuracy	Mass
102-701	0 - 25mm	0.01mm	±2µm	180g
102-707		0.001mm		
102-702	25 - 50mm	0.01mm	±2µm	270g
102-708		0.001mm		

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Outside Micrometers SERIES 103

- Baked-enamel-finished frame.
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



Metric	With ratchet stop		
Order No.	Range	Graduation	Accuracy
103-137	0 - 25mm	0.01mm	±2μm
103-129		0.001mm	
103-138		0.01mm	
103-130		0.001mm	
103-139-10	50 - 75mm	0.01mm	±3μm
103-140-10	75 - 100mm		
103-141-10	100 - 125mm		
103-142-10	125 - 150mm		
103-143-10	150 - 175mm		±4μm
103-144-10	175 - 200mm		
103-145-10	200 - 225mm		
103-146-10	225 - 250mm		
103-147-10	250 - 275mm		±5μm
103-148-10	275 - 300mm		
103-149	300 - 325mm		
103-150	325 - 350mm		±6μm
103-151	350 - 375mm		
103-152	375 - 400mm		
103-153	400 - 425mm		±7μm
103-154	425 - 450mm		
103-155	450 - 475mm		
103-156	475 - 500mm		±8μm
103-157	500 - 525mm		
103-158	525 - 550mm		
103-159	550 - 575mm		±9μm
103-160	575 - 600mm		
103-161	600 - 625mm		
103-162	625 - 650mm		±10μm
103-163	650 - 675mm		
103-164	675 - 700mm		
103-165	700 - 725mm		±11μm
103-166	725 - 750mm		
103-167	750 - 775mm		
103-168	775 - 800mm		±12μm
103-169	800 - 825mm		
103-170	825 - 850mm		
103-171	850 - 875mm		±13μm
103-172	875 - 900mm		
103-173	900 - 925mm		
103-174	925 - 950mm		±14μm
103-175	950 - 975mm		
103-176	975 - 1000mm		



103-905-10



103-904-10



103-906

Technical Data

Flatness: 0.6μm/0.000024" for models up to 300mm/12"
1μm/0.00004" for models over 300mm/12"

Parallelism:

(2 + R/100) μm, R = max. range (mm)

[.00008 + .00004 (R/4)]", R = max. range (inch)

*fraction rounded down

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-25mm (0-1") models)

Spanner (301336), 1 pc

(for maximum measuring range up to 300mm (12"))

Spanner (200154), 1 pc

(for maximum measuring range 325mm (13") or over)

Metric	Micrometer set / With ratchet thimble	
Order No.	Range	Models included
103-927-10	0 - 75mm (3 pcs./set)	103-137, 103-138, 103-139-10, 2 micrometer standards
103-913-50	0 - 150mm (6 pcs./set)	103-137, 103-138, 103-139-10, 103-140-10, 103-141-10, 103-142-10, 5 micrometer standards
103-915-10	150 - 300mm (6 pcs./set)	103-143-10, 103-144-10, 103-145-10, 103-146-10, 103-147-10, 103-148-10, 6 micrometer standards
103-914-50	0 - 300mm (12 pcs./set)	All micrometers of 103-913-50 and 103-915-10 in one set, 11 micrometer standards

Technical Data

Counter Reading : 0.01mm or .001"

Flatness: 0.6µm/0.00024"

Parallelism:

(2 + R/100)µm, R = max. range (mm)

[.00008" + .00004(R/4)]" R = max. range (inch)

fraction rounded down

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-25mm (0-1") models)

Spanner (301336), 1 pc

Digit Outside Micrometers SERIES 193

- Mechanical digit counter with 0.01mm or .001" resolution for quick and error-free reading.
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



193-101



193-111



193-112

SPECIFICATIONS

Metric With ratchet stop			
Order No.	Range	Graduation	Accuracy
193-101	0 - 25mm	0.01mm	±2µm
193-111		0.001mm	
193-102	25 - 50mm	0.01mm	
193-112		0.001mm	
193-103	50 - 75mm	0.01mm	±3µm
193-113		0.001mm	
193-104	75 - 100mm	0.01mm	
193-114		0.001mm	

Metric Micrometer set		
Order No.	Range	Models included
193-901	0 - 75mm (3 pcs./set)	<ul style="list-style-type: none"> • 193-101, 193-102, 193-103 • 2 micrometer standards
193-902	0 - 100mm (4 pcs./set)	<ul style="list-style-type: none"> • 193-101, 193-102, 193-103, 193-104 • 3 micrometer standards

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Outside Micrometers

SERIES 406 — Digimatic straight line micrometer outside micrometer

- Non-rotating spindle.
- Equipped with Ratchet Stop for constant measuring force.



406-250-30

Metric

Order No.	Range	Resolution	Accuracy*	Flatness	Parallelism
406-250-30	0 - 25mm	0.001mm	±3μm	0.3μm	3μm
406-251-30	25 - 50mm				
406-252-30	50 - 75mm				
406-253-30	75 - 100mm		±4μm		4μm

* Excluding quantizing error

Inch/Metric

Order No.	Range	Resolution	Accuracy*	Flatness	Parallelism
406-350-30	0 - 1"	.00005" / 0.001mm	±.00015"	.000012"	.00012"
406-351-30	1" - 2"				
406-352-30	2" - 3"				

* Excluding quantizing error

Indicator Type Micrometers

SERIES 107

- Designed to mount a dial indicator for direct GO/±NG judgment on mass-produced parts.
- Anvil retracting trigger for quick measurement.
- Various kinds of indicators*1 are selectable depending on the measurement type (accuracy required, measuring range, etc.).
- Measuring faces: Carbide
- Anvil stroke: 3mm



107-201
(Indicator shown is optional)

SPECIFICATIONS

Metric

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

Technical Data

Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
 Battery life: Approx. 2.4 years under normal use
 Length standard: Electromagnetic rotary sensor
 Standard accessories: Reference bar, 1 pc (except for measuring range 0-25mm (0-1") models)
 Spanner (301336), 1 pc

Optional accessories

Connecting cables

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

SPC cables for U-WAVE w/ data switch (160mm):

02AZD790B

For foot switch: **02AZE140B**

(Refer to page B-46 for details.)

Technical Data

Flatness: 0.6μm/.000024"

Parallelism:

(2 + R/100)μm, R = max. measuring range (mm)
 fraction rounded down

Standard accessories: Reference bar, 1 pc (except for measuring range 0-25mm models)
 Spanner (301336), 1 pc



Typical indicator choice

Dial indicator (0.01mm) / **2046SB**

Dial indicator (0.001mm) / **2109SB-10**

ABS Digimatic Indicator (0.01mm) / **543-400B**

ABS Digimatic Indicator (0.001mm) / **543-390B**

*1 Indicators with stems cannot be installed on this micrometer.

IP Codes (series 340)

Level 6: Dust -proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Flatness:

0.6µm/ .000024" for models up to 300mm/ 12"

1.0µm/ .00004" for models over 300mm/ 12"

Parallelism:

2µm/ .00008" for models up to 75mm/ 3"

3µm/ .00012" for models up to 150mm/ 6"

(2+R/100)µm for models over 150mm,

R=max. range (mm)

Fraction rounded up

±[.00008" + .00004 (R/4)]" For models over 6"

R= max. range (inch)

Fraction rounded up

Accuracy:

±(4+R/75)µm, R = max. range (mm)

±[.00016" + .00004 (R/3)]" R = max. range (inch)

(excluding quantizing error for digital models)

Fraction rounded up

Excluding quantizing error

Battery for series 340

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life:

Approx. 2.4 years under normal use (for series 340-2XX)

Approx. 1.8 years under normal use (for series 340-5XX, 340-7XX)

Length standard: Electromagnetic rotary sensor (for series 340)

Standard accessories: Spanner (301336), 1 pc

(for maximum measuring range up to 300mm (12"))

Spanner (200154), 1 pc

(for maximum measuring range 400mm (16") or over)

Optional accessories

Connecting cables for

340-251-30 & 340-252-30, 340-351-30 & 340-252-30

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

SPC cables for U-WAVE w/ data switch (160mm):

02AZD790B

For foot switch: **02AZE140B**

Connecting cables for

340-520/1/2/3/4/5/6, 340-720/1/2/3 models

Recommended cables:

L-Type (does not interfere with operating the thimble.)

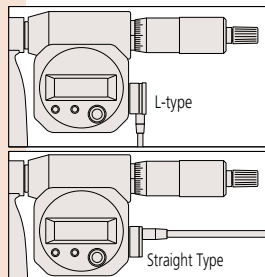
1m: **04AZB512**

2m: **04AZB513**

Straight type (may interfere with operating the thimble.)

1m: **959149**

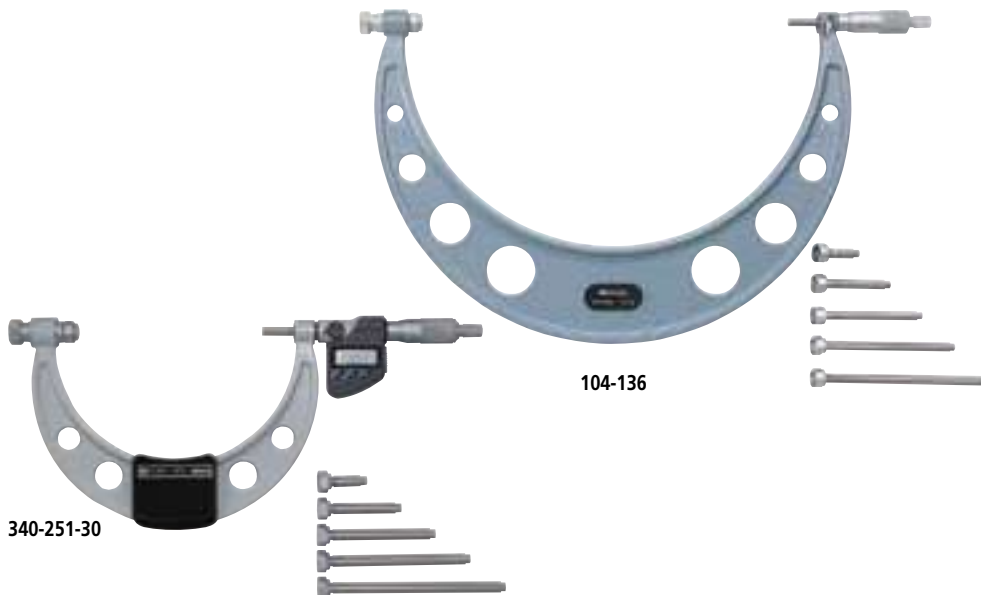
2m: **959150**



Outside Micrometers SERIES 340, 104 — with Interchangeable Anvils

- Wide measuring range with interchangeable anvils.
- Measuring face of the spindle is carbide tipped (standard model).

- IP 65 water/dust protection (series 340).
- * Models with a measuring range up to 300mm.
- Equipped with Ratchet Stop for constant measuring force.



SPECIFICATIONS

Metric

Order No.	Range	Resolution	Interchangeable anvils	Setting Standard		Micrometer head stroke
				Qty	Size	
Digimatic (LCD)						
340-251-30	0 - 150mm	0.001mm	6pcs.	5	25-125mm	25mm
340-252-30	150 - 300mm			6	150-275mm	
340-520	300 - 400mm		4pcs.	4	300-375mm	
340-521	400 - 500mm				400-475mm	
340-522	500 - 600mm				500-575mm	
340-523	600 - 700mm				600-675mm	
340-524	700 - 800mm				700-775mm	
340-525	800 - 900mm				800-875mm	
340-526	900 - 1000mm				900-975mm	

Inch/Metric

Order No.	Range	Resolution	Interchangeable anvils	Setting Standard		Micrometer head stroke
				Qty	Size	
Digimatic (LCD)						
340-251-30	0 - 6"	.00005"/ 0.001mm	6pcs.	5	1" - 5"	1"
340-252-30	6" - 12"	.0001" / 0.001mm		6	6" - 11"	
340-720	12" - 18"				12" - 17"	
340-721	18" - 24"				18" - 23"	
340-722	24" - 30"				24" - 29"	
340-723	30" - 36"				30" - 35"	

Metric

Order No.	Range	Graduation	Interchangeable anvils	Setting Standard		Micrometer head stroke
				Qty	Size	
Analog						
104-171*	0 - 50mm	0.01mm	1pcs.	1	25mm	25mm
104-139A	0 - 100mm		4pcs.	3	25-75mm	
104-135A	0 - 150mm		6pcs.	5	25-125mm	
104-161A	50 - 150mm		4pcs.	4	50-125mm	
104-140A	100 - 200mm				100-175mm	
104-136A	150 - 300mm		6pcs.	6	150-275mm	
104-141A	200 - 300mm		4pcs.	4	200-275mm	
104-142A	300 - 400mm				300-375mm	
104-143A	400 - 500mm				400-475mm	
104-144A	500 - 600mm				500-575mm	
104-145A	600 - 700mm				600-675mm	
104-146A	700 - 800mm				700-775mm	
104-147A	800 - 900mm				800-875mm	
104-148A	900 - 1000mm				900-975mm	

* The frame is fitted with a heat shield.

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Caliper Type Micrometers SERIES 343, 143

- Effective for measuring workpiece features where access is difficult.
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



SPECIFICATIONS

Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
343-250-30	0 - 25mm	0.001mm	±5μm
343-251-30	25 - 50mm		±6μm
343-252-30	50 - 75mm		±7μm
343-253-30	75 - 100mm		±8μm

* Excluding quantizing error

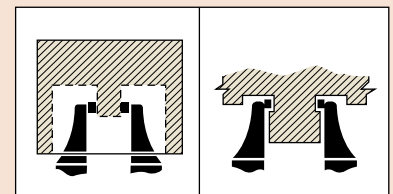
Metric			
Order No.	Range	Graduation	Accuracy
Analog			
143-101	0 - 25mm	0.01mm	±5μm
143-102	25 - 50mm		±6μm
143-103	50 - 75mm		±7μm
143-104	75 - 100mm		±8μm
143-105	100 - 125mm		±9μm
143-106	125 - 150mm		±10μm
143-107	150 - 175mm		±11μm
143-108	175 - 200mm		±12μm
143-109	200 - 225mm		±13μm
143-110	225 - 250mm		±14μm
143-111	250 - 275mm		±15μm
143-112	275 - 300mm		±16μm

Inch/Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
343-350-30	0 - 1"	.00005" / 0.001mm	±.00025"
343-351-30	1" - 2"		±.0003"
343-352-30	2" - 3"		±.00035"
343-353-30	3" - 4"		±.0004"

* Excluding quantizing error

Technical Data

Flatness: 0.3μm/.000012"
Parallelism: (3+R/75)μm, R = max. range (mm)
[.00012"+.00004(R/3)]" R = max. range (inch)
fraction rounded down



Battery for series 343

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 343)

Length standard: Electromagnetic rotary sensor (for series 343)

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-25mm (0-1") models)

Spanner (301336), 1 pc

Optional accessories for series 343

Connecting cables

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

Connecting cables for **U-WAVE-T**

02AZD790B 160mm

For foot switch: **02AZE140B**

Refer to page B-46 for details.

Technical data

Accuracy: $\pm(2+R/75)\mu\text{m}$, R = max. range (mm)
fraction rounded up
Standard accessories: Spanner (301336), 1 pc



Screw Thread Micrometers SERIES 125

- Fixed anvil type to suit 60° threads
- Directly indicates screw pitch diameter (no need for calculation)
- Equipped with Ratchet Stop for constant measuring force.



125-103

SPECIFICATIONS

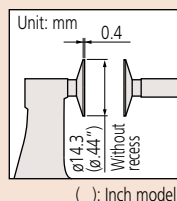
Metric			
Order No.	Thread to be measured (Metric/Unified)	Range	Graduation
125-101	0.4 - 0.5mm/64 - 48TPI	0 - 25mm	0.01mm
125-102	0.6 - 0.9mm/44 - 28TPI		
125-103	1 - 1.75mm/24 - 14TPI		
125-104	2 - 3mm/13 - 9TPI		
125-105	3.5 - 5mm/8 - 5TPI		
125-106	0.4 - 0.5mm/64 - 48TPI	25 - 50mm	
125-107	0.6 - 0.9mm/44 - 28TPI		
125-108	1 - 1.75mm/24 - 14TPI		
125-109	2 - 3mm/13 - 9TPI		
125-110	3.5 - 5mm/8 - 5TPI		

Metric			
Order No.	Thread to be measured (Metric/Unified)	Range	Graduation
125-111	0.6 - 0.9mm/44 - 28TPI	50 - 75mm	0.01mm
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		
125-116	0.6 - 0.9mm/44 - 28TPI	75 - 100mm	
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		

* A setting standard is supplied with each model (except for 0-25mm measuring range).
The setting standard is for metric threads (unified) 60°.



Anvil dimensions



Technical Data

Standard accessories: Spanner (301336), 1 pc

Paper Thickness Micrometers SERIES 169 — Non-Rotating Spindle Type

- For paper thickness measurement.
- Non-rotating spindle.
- Equipped with Ratchet Stop for constant measuring force. (8.02±0.8N)



169-101

SPECIFICATIONS

Metric					
Order No.	Range	Graduation	Accuracy	Flatness	Parallelism
169-101	0 - 25mm	0.01mm	$\pm 4\mu\text{m}$	$1\mu\text{m}$	$3\mu\text{m}$

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Screw Thread Micrometers

SERIES 326, 126 — Interchangeable Anvil / Spindle Tip Type

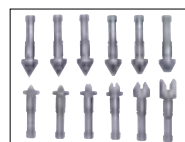
- Anvils and spindle tips are interchangeable in matching pairs to enable measurement of Metric/Unified or Whitworth threads.
- Direct reading of screw pitch diameter (no need for calculation)
- Equipped with Ratchet Stop for constant measuring force.
- Interchangeable anvils / spindle tips are optional.



326-251-30



126-125



Interchangeable anvils / spindle tips (optional)

SPECIFICATIONS

Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
326-251-30	0 - 25mm	0.001mm	±4μm
326-252-30	25 - 50mm		
326-253-30	50 - 75mm		±5μm
326-254-30	75 - 100mm		

* Excluding quantizing error

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

Notes: 1) A matching setting standard is supplied with each model (except for 0-25mm measuring range). (Refer to page B-63 for details.)

The setting standard is for metric threads (unified) 60°.

2) For functional details of series 326, refer to series 293.

Please note that origin setting of these models is free-digit preset type. Also, connecting cables (optional) have to be a waterproof type.

Inch/Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
326-351-30	0 - 1"	.00005"/ 0.001mm	±.0002"
326-352-30	1" - 2"		
326-353-30	2" - 3"		±.00025"
326-354-30	3" - 4"		

* Excluding quantizing error



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



IP Codes (series 326)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data



Battery for series 326

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 326)

Length standard: Electromagnetic rotary sensor (for series 326)

Standard accessories: Spanner (301336), 1 pc

Optional accessories

Connecting cables

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

Connecting cables for U-WAVE-T

02AZD790B 160mm

For foot switch: 02AZE140B

Refer to page B-46 for details.

Optional accessories

Sets of interchangeable anvils / spindle tips

- For Metric/Unified threads (pair)

Order No.	Matching anvils/spindle tips included
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 threads (pair)

Order No.	Matching anvils/spindle tips included
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)

Technical description

- Anvils / spindle tips



Allowable error of the angle of anvils and spindle tips

Type	Metric (Unified)	Whitworth (Unified)	Half angle error
Pitch (mm), Nominal designation of threads per inch	M1 (U1)	W1	±30'
		W2	±30'
		W3	±20'
	M2 (U2)	W4	±20'
		W5	±15'
		W6	±15'
	M3 (U3)	W7	±10'
		W8	±10'
		W9	±10'
	M4 (U4)	W10	±10'

Note) This chart indicates the difference between the angle made by anvil's contact faces and spindle's axes and the half angle with error α.
Metric/Unified θ = 60°
Whitworth θ = 55°

Technical Data

Standard accessories: Spanner (301336), 1 pc

Universal Micrometer SERIES 116 — Interchangeable Anvil Type

- Non-rotating spindle type which accepts seven forms of optional interchangeable anvil / spindle tip (flat, spline, spherical, point, knife-edge, disk, and blade) for a wide range of applications.
- Equipped with Ratchet Stop for constant measuring force.
- Optional anvils / spindle tips for screw thread measurement (matching V and cone) are also available.



116-101



SPECIFICATIONS

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

* 116-102 is provided with a plain setting standard (167-101) and a 60°-thread setting standard (167-261) for adjusting the minimum range point according to the application.

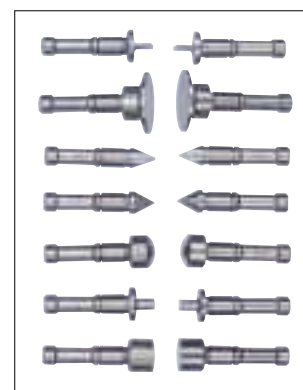
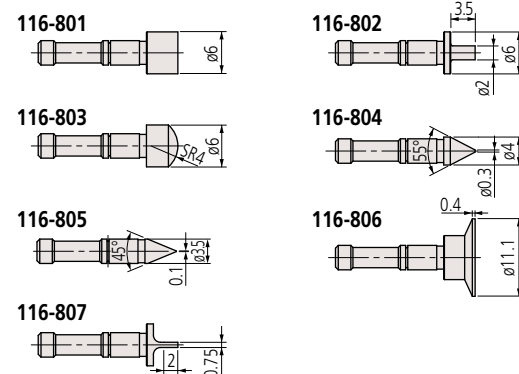
* 116-106 is provided with a plain setting standard (167-141) and a 60°-thread setting standard (167-294) for adjusting the minimum range point according to the application.

Order No.	Description
116-801	Flat
116-802	Spline
116-803	Spherical
116-804	Point
116-805	Knife-edge
116-806	Disk
116-807	Blade

116-800 116-801 - 116-807 Set
Anvils / spindle tips set (7 pairs)

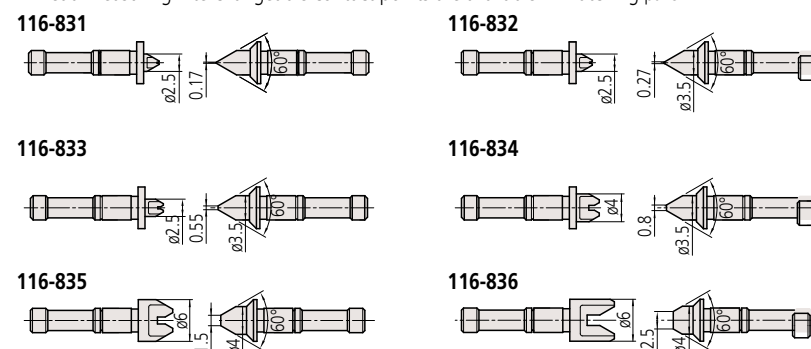
Optional accessories

- Interchangeable anvils / spindle tips are available in matching pairs.



Interchangeable contact points (optional)

- Thread-measuring interchangeable contact points are available in matching pairs.



Order No.	Set Identifier Range of measurement (mm)
116-831	0.4 - 0.5mm/64 - 48TPI
116-832	0.6 - 0.9mm/44 - 28TPI
116-833	1 - 1.75mm/24 - 14TPI
116-834	2 - 3mm/13 - 9TPI
116-835	3.5 - 5mm/8 - 5TPI
116-836	5.5 - 7mm/4.5 - 3.5TPI
116-830	116-831 - 116-836 M (U) Set

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

3-Wire Units SERIES 313

- Enables measurement of the pitch diameter of screw threads with a standard micrometer.
- Determination of the pitch diameter: refer to "Quick Guide to Precision Measuring Instruments".



Technical Data

Accuracy of wire diameter: $\pm 2\mu\text{m}$

SPECIFICATIONS

3-Wire Units set

Order No.	Set	Wire dia. (mm)	Support spindle dia. (mm)
313-101	18	0.170 - 3.200	$\varnothing 6.35$

Order No. (One pair) (Support spindle dia.) $\varnothing 6.35\text{mm}$ (.25" DIA.)	Wire dia. (mm)	Pitch		
		Metric thread (mm)	Unified thread (thread per inch)	Whitworth thread (thread per inch)
952131	0.170	0.2, 0.25, 0.3	80	—
952132	0.195	0.35	72	—
952133	0.220	0.4	64	—
952134	0.250	0.45	56	60
952135	0.290	0.5	48	48
952136	0.335	0.6	44, 40	40
952137	0.390	0.7	36	36
952138	0.455	0.75, 0.8	32	32
952139	0.530	0.9	28	28, 26
952140	0.620	1.0	24	24, 22
952141	0.725	1.25	20	20, 19, 18
952142	0.895	1.5	18, 16	16
952143	1.100	1.75, 2.0	14, 13, 12	14, 12
952144	1.350	2.5	11, 10	11, 10
952145	1.650	3.0	9, 8	9, 8
952146	2.050	3.5	7	7
952147	2.550	4, 4.5	6	6
952148	3.200	5, 5.5, 6	5, 4.5	5, 4.5

IP Codes (series 324)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.



Optional accessories

- Interchangeable ball anvil / spindle tip set

Order No.	Diameter* (mm)	Gear module	Dia. pitch
124-801	ø0.8	0.5 - 0.55	50
124-802	ø1.0	0.6 - 0.65	45
124-803	ø1.191 (³ / ₆₄ "*)	0.7 - 0.8	35 - 30
124-821	ø1.5	0.9 - 1	28 - 26
124-804	ø1.588 (¹ / ₁₆ "*)	0.9 - 1	28 - 26
124-805	ø2.0	1.25	22
124-806	ø2.381 (³ / ₃₂ "*)	1.5	17
124-822	ø2.5	1.5	17
124-807	ø3.0	1.75	15
124-808	ø3.175 (¹ / ₈ "*)	—	14
124-823	ø3.5	2	13
124-809	ø3.969 (⁵ / ₃₂ "*)	2	13
124-810	ø4.0	2.25	11
124-824	ø4.5	2.5	10
124-811	ø4.763 (³ / ₁₆ "*)	2.5	10
124-812	ø5.0	2.75	9
124-813	ø5.556 (⁷ / ₃₂ "*)	3.0 - 3.25	8
124-814	ø6.0	3.5	7
124-815	ø6.35 (¹ / ₄ "*)	3.75	7
124-816	ø7.0	4.0	6.5
124-817	ø7.144 (⁹ / ₃₂ "*)	4.25	6
124-818	ø7.938 (⁵ / ₁₆ "*)	4.5	5.5
124-819	ø8.0	4.75	5.5
124-820	ø8.731 (¹¹ / ₃₂ "*)	5.0 - 5.25	5

* ø2mm or less/ carbide-tipped type

Battery for series 324

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 324)

Length standard: Electromagnetic rotary sensor (for series 324)

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-25mm (0-1") models)

Spanner (301336), 1 pc

Optional accessories

Connecting cables for series 324

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

SPC cables for U-WAVE w/ data switch (160mm):

02AZD790B

For foot switch: 02AZE140B

(Refer to page B-46 for details.)

Gear Tooth Micrometers SERIES 324, 124 — Interchangeable Ball Anvil / Spindle Tip Type

- Measures over-pin diameter of gears using precision steel (or carbide) ball anvils / spindle tips.
- Series 324: IP65 Digimatic gear tooth micrometers.
- Determination of the over-pin diameter: refer to "Quick Guide to Precision Measuring Instruments".
- Interchangeable ball anvils / spindle tips for various gear modules (0.5-5.25) are optional.
- Equipped with Ratchet Stop for constant measuring force.
- Ball anvil / spindle tips: optional.



SPECIFICATIONS

Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
324-251-30	0 - 25mm	0.001mm	±4μm
324-252-30	25 - 50mm		
324-253-30	50 - 75mm		±5μm
324-254-30	75 - 100mm		

* Excluding quantizing error

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

Inch/Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
324-351-30	0 - 1"	.00005"/ 0.001mm	±.0002"
324-352-30	1" - 2"		
324-353-30	2" - 3"		±.00025"
324-354-30	3" - 4"		

* Excluding quantizing error

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Disk Micrometers SERIES 323, 223, 123

- Measures "root tangent length" of spur gears and helical gears.
- Determination of the root tangent length: refer to "Quick Guide to Precision Measuring Instruments".
- Equipped with Ratchet Stop for constant measuring force.
- Supplied with a setting standard (except for 0-25mm/0-1" measuring range).



SPECIFICATIONS

Metric					
Order No.	Range	Resolution	Accuracy*	Anvil dia.	Measurable module
Digimatic (LCD)					
323-250-30	0 - 25mm	0.001mm	±4μm	ø20mm	0.5 - 6
323-251-30	25 - 50mm				
323-252-30	50 - 75mm				
323-253-30	75 - 100mm				

* Excluding quantizing error

Metric					
Order No.	Range	Graduation	Accuracy	Anvil dia.	Measurable module
Mechanical counter model					
223-101	0 - 25mm	0.01mm	±4μm	ø20mm	0.5 - 6
223-102	25 - 50mm				
Analog					
123-101	0 - 25mm	0.01mm	±4μm	ø20mm	0.5 - 6
123-113*					
123-102	25 - 50mm				
123-114*					
123-103	50 - 75mm				
123-115*					
123-104	75 - 100mm				
123-116*					
123-105	100 - 125mm				
123-106	125 - 150mm				
123-107	150 - 175mm				
123-108	175 - 200mm				
123-109	200 - 225mm				
123-110	225 - 250mm				
123-111	250 - 275mm				
123-112	275 - 300mm				

* The measuring disks have carbide tips.

Inch/Metric					
Order No.	Range	Resolution	Accuracy*	Anvil dia.	Measurable module
Digimatic (LCD)					
323-350-30	0 - 1"	.00005"/0.001mm	±.0002"	.787"	0.5 - 6
323-351-30	1" - 2"				
323-352-30	2" - 3"				
323-353-30	3" - 4"				

* Excluding quantizing error

IP65

These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



IP Codes (series 323)

Level 6: Dust-proof.

No ingress of dust allowed.

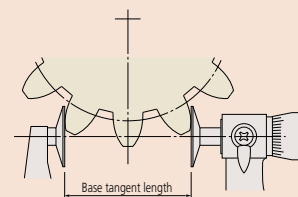
Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Flatness: 1μm/.00004" for models up to 100mm/4"
1.6μm/.000063" for models over 100mm/4"
Parallelism: 4μm for models up to 50mm
.0002" for models up to 2"
6μm for models up to 100mm
.0003" for models up to 4"
(5+R/75)μm for models over 100mm,
R = max. range (mm)
fraction rounded up

Root tangent length of gear (En)



Battery for series 323

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 323)

Length standard: Electromagnetic rotary sensor (for series 323)

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-25mm (0-1") models)

Spanner (301336), 1 pc

Optional accessories for series 323

Connecting cables

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

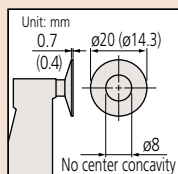
Connecting cables for U-WAVE-T

02AZD790B 160mm

For foot switch: 02AZE140B

Refer to page B-46 for details.

Anvil



(): Adjustable measuring force type

Battery for series 369 and 227

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use

(for series 369-2XX, 3XX)

Approx. 1 year under normal use

(for series 369-4XX)

Approx. 3 years under normal use

(for series 227-2XX)

Length standard: Electromagnetic rotary sensor

(for series 369-2XX, 3XX)

Electrostatic capacity absolute sensor

(for series 369-4XX, 2XX)

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-10mm / 0-15mm / 0-25mm / 0-30mm (0-1" / 0-1.2") models)

Spanner (301336), 1 pc (for series 169-2XX, 369-2XX, 3XX)

Screwdriver (No.210183), 1 pc (for series 227-2XX)

Optional accessories

• Connecting cables

for **369-250-30** to **369-253-30**, **369-350-30** to **369-353-30**

1m: **05CZA662**

2m: **05CZA663**

• **USB Input Tool Direct**

USB-ITN-B (2m): **06ADV380B**

• SPC cables for U-WAVE w/ data switch (160mm):

02AZD790B

For foot switch: **02AZE140B**

(Refer to page B-46 for details.)

• SPC cables for Quickmike and micrometers with adjustable measuring force device

937387: SPC cable (1m)*

965013: SPC cable (2m)*

• only for Quickmike and micrometers with adjustable measuring force device

06ADV380E: USB Input Tool Direct with data switch(2m)

02AZD790E: SPC cable for U-WAVE (160mm)

For footswitch: **02AZE140E**



Quickmike

Provides a speedy spindle feed of 10mm per thimble rotation, which enables widely differently sized features to be measured quickly.

Quickmike type with adjustable measuring force

Digimatic micrometer dedicated to applications requiring a constant/low measuring force such as measuring wire, paper, and plastic/rubber parts.

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

- Measures "root tangent length" of spur gears and helical gears.
- Determination of the root tangent length: refer to "Quick Guide to Precision Measuring Instruments".
- Non-rotating spindle type.
- Measurable range of gear pitch: 0.5 to 6 module (series 227: 0.4 to 3 module).
- Equipped with Ratchet Stop for constant measuring force.
- Supplied with a setting standard (except for 0-25mm/0-1" measuring range).



SPECIFICATIONS

Metric								
	Order No.	Range	Resolution	Accuracy*	Anvil dia.	Flatness	Parallelism	Measuring force
Digimatic (LCD)	369-250-30	0 - 25mm	0.001mm	±4μm	ø20	1μm	4μm	—
	369-251-30	25 - 50mm		±6μm			6μm	
	369-252-30	50 - 75mm					4μm	
	369-253-30	75 - 100mm		±4μm			3μm	
Quickmike type (LCD)	369-411	0 - 30mm	0.001mm	±4μm	ø14.3	1μm	4μm	—
	369-412	25 - 55mm					3μm	
Quickmike type adjustable measuring force (LCD)	227-221	0 - 15mm	0.001mm	±4μm	ø14.3	1μm	3μm	0.5N - 2.5N
	227-223	0 - 10mm						2N - 10N

* Excluding quantizing error

Metric								
	Order No.	Range	Graduation	Accuracy	Anvil dia.	Flatness	Parallelism	Measuring force
Analog	169-201	0 - 25mm	0.01mm	±4μm	ø20	1μm	4μm	—
	169-202	25 - 50mm		±6μm			6μm	
	169-205	50 - 75mm					4μm	
	169-207	75 - 100mm					6μm	

Inch/Metric								
	Order No.	Range	Resolution	Accuracy*	Anvil dia.	Flatness	Parallelism	Measuring force
Digimatic (LCD)	369-350-30	0 - 1"	.00005"/ 0.001mm	±.0002"	ø20	.00004"	.0002"	—
	369-351-30	1" - 2"		±.0003"			.0003"	
	369-352-30	2" - 3"					.0003"	
	369-353-30	3" - 4"					.0003"	
Quickmike type (LCD)	369-421	0 - 1.2"	0.001mm	±.0002"	ø20	.00004"	.0002"	—
	369-422	1" - 2.2"					.0002"	

* Excluding quantizing error

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Sheet Metal Micrometers SERIES 389, 118

- Measures thickness of sheet metal.
- IP65 water/dust protection (series 389).
- Measuring faces: Carbide
- Profile of measuring faces: Flat-Flat, Spherical-Flat and Spherical-Spherical.
- Equipped with Ratchet Stop for constant measuring force.



SPECIFICATIONS

Metric					
Order No.	Range	Resolution	Accuracy*	Throat depth	Measuring surfaces
Digimatic (LCD)					
389-251-30	0 - 25mm	0.001mm	±4μm	150mm	F-F
389-261-30					S-F
389-271-30					S-S
389-514			±5μm	300mm*	F-F
389-252-30	25 - 50mm	0.001mm	±4μm	150mm	S-F
389-262-30					S-S
389-272-30					S-S

* Excluding quantizing error

Metric					
Order No.	Range	Graduation	Accuracy	Throat depth	Measuring surfaces
Analog					
118-101	0 - 25mm	0.01mm	±4μm	100mm	F-F
118-102				150mm	S-F
118-114				300mm*	S-S
118-118			±5μm	300mm*	F-F
118-103	25 - 50mm	0.01mm	±4μm	150mm	S-F
118-110					S-S
118-126					

*1 Models with a 300mm (12") throat are equipped with a stand for convenience of measurement in the horizontal orientation as standard.

Sheet Metal Micrometer SERIES 119

- Large diameter dial model enables easy and quick measurement of sheet metal thickness.
- Adjustable anvil.
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



119-202

Technical Data

Standard accessories: Spanner (200168), 1 pc

SPECIFICATIONS

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



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



IP Codes (series 389)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Flatness: 0.6μm/0.00024" for models with 150mm/6" throat

1μm/0.0004" for models with 300mm/12" throat

Parallelism: 3μm/0.0012"

Quantizing error (series 389): excluding ±1 count

Standard, Flat-Flat (F-F)



Spherical-Flat (S-F)



Spherical-Spherical (S-S)



Battery for series 389

SR44 (1 pc), 938882, 2 pcs: 389-514, 389-714 for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 389-2XX, 3XX)

Approx. 1.8 years under normal use (for series 389-514, 714)

Length standard: Electromagnetic rotary sensor (for series 389)

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-25mm (0-1") models)

Spanner (200877), 1 pc (for series 118-1XX)

Spanner (301336), 1 pc (for series 389-2XX, 3XX)

Spanner (200154), 1 pc (for series 118-103/107, 389-514/714)

Optional accessories

- Connecting cables for Series 389 (excluding 389-514 and 389-714)

1m: 05CZA662

2m: 05CZA663

- USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

- SPC cables for U-WAVE, series 389

(excluding 389-514 and 389-714)

w/ data switch (160mm): 02AZD790B

For foot switch: 02AZE140B

- Connecting cables for 389-514, 389-714

- Recommended cables: L-Type (does not interfere with operating the thimble.)

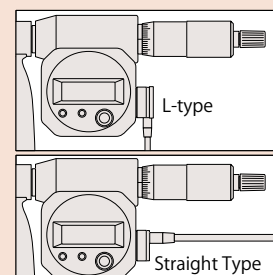
1m: 04AZB512

2m: 04AZB513

- Straight type (may interfere with operating the thimble.)

1m: 959149

2m: 959150



Refer to page B-46 for detailed information about recommended cables.

Battery for series 314

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 314)

Length standard: Electromagnetic rotary sensor (for series 314)

Standard accessories:

Spanner (301336), 1 pc (for Digimatic type)

(Maximum measuring range up to 55mm/1.6")*1

(Maximum measuring range up to 45mm/1")*2

Spanner (200877), 1 pc

(for maximum measuring range 70mm or over)*1

(for maximum measuring range 65mm or over)*2

*1 For analog type with 3-flute cutting tools.

*2 For analog type with 5-flute cutting tools.

Optional accessories

Connecting cables for **series 314**

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

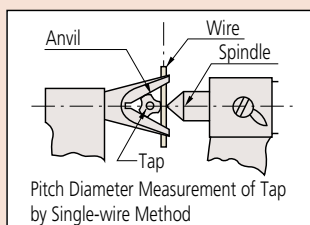
USB-ITN-B (2m): **06ADV380B**

SPC cables for **U-WAVE** w/ data switch (160mm):

02AZD790B

For foot switch: **02AZE140B**

(Refer to page B-46 for details.)



V-Anvil Micrometers SERIES 314, 114 — 3 Flutes and 5 Flutes

- Measures the outside diameter of cutting tools (such as taps, reamers, end mills) which have three or five flutes.
- Measures pitch diameter: refer to "Quick Guide to Precision Measuring Instruments" on page B-73.
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



314-251-30



114-121



114-102



114-101

SPECIFICATIONS

Metric For 3-flute cutting tools

Order No.	Range	Resolution	Accuracy*	Remarks	Anvil
Digimatic (LCD)					
314-251-30	1 - 15mm	0.001mm	±4μm	w/groove	60°
314-252-30	10 - 25mm				
314-253-30	25 - 40mm				
314-261-30	1 - 15mm				
314-262-30	10 - 25mm				

*Excluding quantizing error

Metric For 3-flute cutting tools

Order No.	Range	Graduation	Accuracy	Remarks	Anvil
Analog Anvil, Spindle (With carbide tip)					
114-204	2.3 - 25mm		±4μm	—	
Analog Spindle (With carbide tip)					
114-101	1 - 15mm	0.01mm	±4μm	w/groove	60°
114-102	10 - 25mm		±5μm	—	
114-103	25 - 40mm		±6μm	—	
114-104	40 - 55mm		±7μm	—	
114-105	55 - 70mm		±4μm	—	
114-106	70 - 85mm				
114-161	1 - 15mm				
114-162	10 - 25mm				

Inch/Metric For 3-flute cutting tools

Order No.	Range	Resolution	Accuracy*	Remarks	Anvil
Digimatic (LCD)					
314-351-30	.05 - .6"	.0005"/0.001mm	±.0002"	w/groove	60°
314-352-30	.4" - 1"				
314-353-30	1" - 1.6"				
314-361-30	.05 - .6"				
314-362-30	.4" - 1"				

*Excluding quantizing error

Metric For 5-flute cutting tools

Order No.	Range	Resolution	Accuracy	Remarks	Anvil		
Analog Anvil, Spindle (With carbide tip)							
114-137	2.3 - 25mm	0.01mm	±4μm	—	108°		
Analog Spindle (With carbide tip)							
114-121	5 - 25mm		±4μm	w/groove			
114-122	25 - 45mm		±5μm	—			
114-123	45 - 65mm		±6μm	—			
114-124	65 - 85mm		±7μm	—			
114-165	5 - 25mm		±4μm	—			

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Tube Micrometers SERIES 395, 115, 295

- Measuring faces: Carbide
(**115-101**: only the spindle is carbide tipped.)
- series 395: IP65 digital spherical-flat anvil type micrometer.
- Equipped with Ratchet Stop for constant measuring force.



SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	øD
Digimatic (LCD)				
395-251-30	0 - 25mm	0.001mm	±2μm	ø15
395-252-30	25 - 50mm			ø19
395-253-30	50 - 75mm			ø20
395-254-30	75 - 100mm			ø20

* Excluding quantizing error

Metric				
Order No.	Range	Graduation	Accuracy	øD
Analog				
115-101	0 - 15mm	0.01mm	±3µm	ø5.5
115-115	0 - 25mm			ø10
115-116	25 - 50mm			ø11
115-117	50 - 75mm			ø17
115-118	75 - 100mm		±4µm	ø18
Mechanical counter model				
295-115	0 - 25mm		±3µm	ø10

Inch/Metric				
Order No.	Range	Resolution	Accuracy*	øD
Digimatic (LCD)				
395-351-30	0 - 1"	.00005" / 0.001mm	±.0001"	ø.59"
395-352-30	1" - 2"			ø.75"
395-353-30	2" - 3"			ø.79"
395-354-30	3" - 4"		±.00015"	ø.79"

* Excluding quantizing error



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



IP Codes (series 395)

Level 6: Dust-proof.

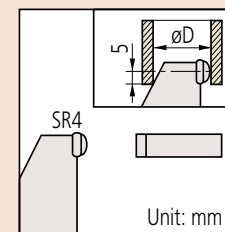
No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Flatness: 0.6μm / .000024" (series 115 & 295)
0.3μm / .000012" (series 395)



Battery for series 395

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 395)

Length standard: Electromagnetic rotary sensor (for series 395)

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-15mm/0-25mm (0-1") models)

Spanner (200168), 1 pc (for series 115-101)

Spanner (301336), 1 pc (for models other than series 115-101)

Optional accessories

Connecting cables for **series 395**

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

Connecting cables for **U-WAVE-T**

02AZD790B 160mm

For foot switch: **02AZE140B**

Refer to page B-46 for details.

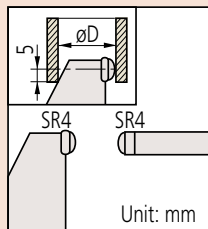
IP Codes (series 395)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.



Battery for series 395

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 395)

Length standard: Electromagnetic rotary sensor (for series 395)

Standard accessories: Reference bar, 1 pc

(except for measuring range 0-15mm/0-25mm (0-1") models)

Spanner (200168), 1 pc (for series 115-201)

Spanner (301336), 1 pc (for models other than series 115-201)

Optional accessories

Connecting cables for **series 395**

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

Connecting cables for **U-WAVE-T**

02AZD790B 160mm

For foot switch: **02AZE140B**

Refer to page B-46 for details.

Tube Micrometers

SERIES 395, 115, 295 — Spherical Anvil and Spindle Type

- Measuring faces: Carbide (**115-201**: only the spindle is carbide tipped.)
- series 395: IP65 spherical anvil and spindle type digital micrometer.
- Equipped with Ratchet Stop for constant measuring force.



395-271-30



115-215

SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	øD
Digimatic (LCD)				
395-271-30	0 - 25mm	0.001mm	±2μm	ø15
395-272-30	25 - 50mm			ø19
395-273-30	50 - 75mm		±3μm	ø20
395-274-30	75 - 100mm			ø20

* Excluding quantizing error

Inch/Metric				
Order No.	Range	Resolution	Accuracy*	øD
Digimatic (LCD)				
395-371-30	0 - 1"	.00005"/ 0.001mm	±.0001"	ø.59"
395-372-30	1" - 2"			ø.75"
395-373-30	2" - 3"		±.00015"	ø.79"
395-374-30	3" - 4"			ø.79"

* Excluding quantizing error

Metric				
Order No.	Range	Graduation	Accuracy	øD
Analog				
115-201	0 - 15mm	0.01mm	±3μm	ø5.5
115-215	0 - 25mm			ø10
115-216	25 - 50mm			ø11
115-217	50 - 75mm			ø17
115-218	75 - 100mm		±4μm	ø18
Mechanical counter model				
295-215	0 - 25mm	0.01mm	±3μm	ø10

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Tube Micrometers

SERIES 395, 115, 295 — Spherical and Cylindrical Anvil Type

- Spindle face: Carbide
- series 395: IP65 spherical and cylindrical anvil type digital micrometers.
- Equipped with Ratchet Stop for constant measuring force.



395-261-30



SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	Remarks
Digimatic (LCD)				
395-261-30	0 - 25mm	0.001mm	±3μm	Type A
395-262-30				Type B
395-263-30				Type C
395-264-30				Type D

* Excluding quantizing error

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

Inch/Metric				
Order No.	Range	Resolution	Accuracy*	Remarks
Digimatic (LCD)				
395-362-30	0 - 1"	.00005"/ 0.001mm	±.00015"	Type B
395-363-30				Type C
395-364-30				Type D

* Excluding quantizing error



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



IP Codes (series 395)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Type A (pin)



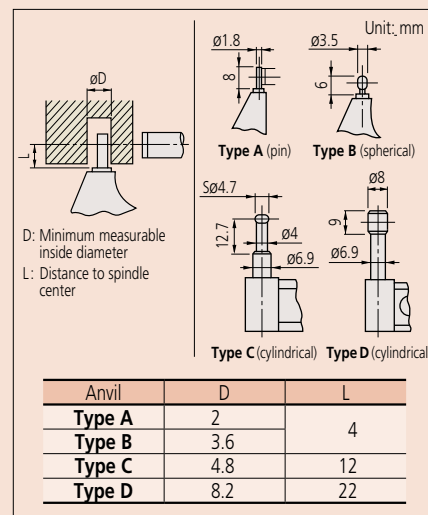
Type B (spherical)



Type C (cylindrical)



Type D (cylindrical)



Battery for series 395

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use

(for series 395)

Length standard: Electromagnetic rotary sensor (for series 395)

Standard accessories: Reference bar, 1 pc (except for measuring range 0-25mm (0-1") models)

Spanner (301336), 1 pc

Optional accessories

Connecting cables for series 395

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

Connecting cables for U-WAVE-T

02AZD790B 160mm

For foot switch: 02AZE140B

Refer to page B-46 for details.

IP Codes (series 331)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

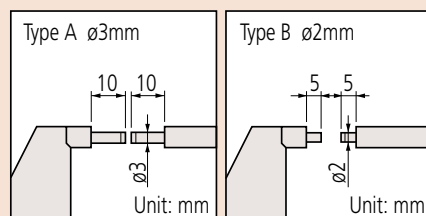
Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Flatness: $0.3\mu\text{m}/.000012''$

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

$[.00008'' + .00004(R/4)]''$ $R = \text{max range (inch)}$
fraction rounded down



Battery for series 331

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 331)

Length standard: Electromagnetic rotary sensor (for series 331)

Standard accessories: Reference bar, 1 pc (except for measuring range 0-25mm (0-1") models)
Spanner (301336), 1 pc

Optional accessories

Connecting cables for series 331

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

Connecting cables for U-WAVE-T

02AZD790B 160mm

For foot switch: 02AZE140B

Refer to page B-46 for details.

Spline Micrometers SERIES 331, 111, 131

- The anvil and spindle are of small diameter for measuring splined shafts, slots, and keyways.
- IP65 water/dust protection (series 331).
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



331-251-30



111-115

SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	Remarks
Digimatic (LCD)				
331-251-30	0 - 25mm	0.001mm	±2μm	Type A
331-252-30	25 - 50mm			
331-253-30	50 - 75mm		±3μm	Type B
331-254-30	75 - 100mm			
331-261-30	0 - 25mm	0.001mm	±2μm	Type B
331-262-30	25 - 50mm			
331-263-30	50 - 75mm		±3μm	Type B
331-264-30	75 - 100mm			

* Excluding quantizing error

Inch/Metric				
Order No.	Range	Resolution	Accuracy*	Remarks
Digimatic (LCD)				
331-351-30	0 - 1"	.00005"/0.001mm	±.0001"	Type A
331-352-30	1" - 2"			
331-353-30	2" - 3"		±.00015"	Type B
331-354-30	3" - 4"			
331-361-30	0 - 1"	.00005"/0.001mm	±.0001"	Type B
331-362-30	1" - 2"			
331-363-30	2" - 3"		±.00015"	Type B
331-364-30	3" - 4"			

* Excluding quantizing error

Metric				
Order No.	Range	Graduation	Accuracy	Remarks
Analog				
111-215	0 - 25mm	0.01mm	±3μm	Type B
111-115	0 - 25mm			
111-116	25 - 50mm		±4μm	Type A
111-117	50 - 75mm			
111-118	75 - 100mm	0.01mm	±5μm	Type A
111-119	100 - 125mm			
111-120	125 - 150mm		±6μm	Type A
111-121	150 - 175mm			
111-122	175 - 200mm	0.01mm	±6μm	Type A
111-123	200 - 225mm			
111-124	225 - 250mm			
111-125	250 - 275mm			

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Point Micrometers SERIES 342, 142, 112

- Pointed spindle and anvil for measuring the web thickness of drills, small grooves, keyways, and other hard-to-reach features.
- The measuring points (carbide tipped) have approximately 0.3mm radius.
- series 342: IP65 Digimatic micrometers
- Equipped with Ratchet Stop for constant measuring force.



SPECIFICATIONS

Metric					
Order No.	Range	Resolution	Accuracy*	Point	
Digimatic (LCD) (With carbide tip)					
342-251-30	0 - 25mm	0.001mm	±2μm	15°	
342-252-30	25 - 50mm				
342-253-30	50 - 75mm				
342-254-30	75 - 100mm		±3μm	30°	
342-261-30	0 - 25mm				
342-262-30	25 - 50mm				
342-263-30	50 - 75mm		±3μm		
342-264-30	75 - 100mm				

* Excluding quantizing error

Inch/Metric					
Order No.	Range	Resolution	Accuracy*	Point	
Digimatic (LCD) (With carbide tip)					
342-351-30	0 - 1"	.00005"/ 0.001mm	±.0001"	15°	
342-352-30	1 - 2"				
342-353-30	2 - 3"				
342-354-30	3 - 4"		±.00015"	30°	
342-361-30	0 - 1"				
342-362-30	1 - 2"				
342-363-30	2 - 3"		±.00015"		
342-364-30	3 - 4"				

* Excluding quantizing error

Metric				
Order No.	Range	Graduation	Accuracy	Point
Analog				
112-153	0 - 25mm	0.01mm	±3μm	15°
112-154	25 - 50mm			
112-155	50 - 75mm		±4μm	30°
112-156	75 - 100mm			
112-201	0 - 25mm		±3μm	30°
112-202	25 - 50mm			
112-203	50 - 75mm		±4μm	
112-204	75 - 100mm			
Analog (With carbide tip)				
112-165	0 - 25mm	0.01mm	±3μm	15°
112-166	25 - 50mm			
112-167	50 - 75mm		±4μm	30°
112-168	75 - 100mm			
112-213	0 - 25mm		±3μm	30°
112-214	25 - 50mm			
112-215	50 - 75mm		±4μm	
112-216	75 - 100mm			
Mechanical counter model				
142-153	0 - 25mm		±3μm	15°
142-201				30°



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV.



IP Codes (series 342)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

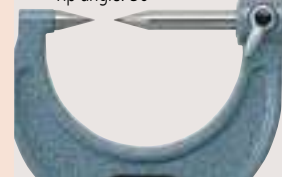
Technical Data



Tip angle: 15°



Tip angle: 30°



Battery for series 342

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use

(for series 342)

Length standard: Electromagnetic rotary sensor (for series 342)

Standard accessories: Reference bar, 1 pc (except for measuring range 0-25mm (0-1") models)
Spanner (301336), 1 pc

Optional accessories

Connecting cables for series 342

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

SPC cables for U-WAVE w/ data switch (160mm):

02AZD790B

For foot switch: 02AZE140B

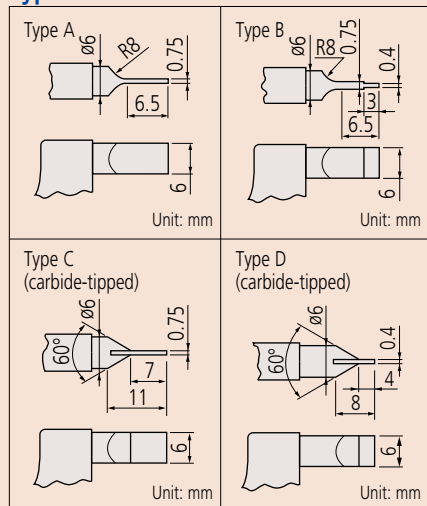
(Refer to page B-46 for details.)

Technical Data

Parallelism

3μm for models up to 75mm
 .00015" for models up to 3"
 (3+R/100)μm for models over 75mm
 .0002" for models over 3"
 R = max. range (mm)
 fraction rounded up

Type and Dimensions



Battery for series 422

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 422-2XX, 3XX)

Approx. 1 year under normal use (for series 422-4XX)

Length standard: Electromagnetic rotary sensor (for series 422-2XX, 3XX)

Electrostatic capacity absolute sensor (for series 422-4XX)

Standard accessories: Reference bar, 1 pc (except for measuring range 0-25mm/0-30mm (0-1"/0-1.2") models)
 Spanner (301336), 1 pc (for series 122-1XX, 422-2XX, 3XX)

Optional accessories

Connecting cables for digital models

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

Connecting cables for **U-WAVE-T** (digital models)

02AZD790B (160mm)

For foot switch: **02AZE140B**

Connecting cables for Quickmike type

1m: **937387**

2m: **965013**

USB Input Tool Direct

USB-ITN-E (2m): **06ADV380E**

Connecting cables for **U-WAVE-T** (Quickmike type)

02AZD790E (160mm)

For foot switch: **02AZE140E**

Refer to page B-46 for details.

Blade Micrometers

SERIES 422, 122 — Non-Rotating Spindle Type

- The anvil and spindle are blade-shaped for measuring the groove diameter of shafts, keyways, and other hard-to-reach features.
- Carbide-tipped measuring faces are also available.

- Non-rotating spindle type.
- Equipped with Ratchet Stop for constant measuring force.



SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	Remark
Digimatic (LCD)				
422-230-30	0 - 25mm	0.001mm	±3μm	Type A
422-231-30	25 - 50mm			
422-232-30	50 - 75mm		±4μm	Type A
422-233-30	75 - 100mm			
422-260-30	0 - 25mm		±3μm	Type B
422-261-30	25 - 50mm			Type C
422-270-30	0 - 25mm			Type D
422-271-30				

* Excluding quantizing error

Metric Quickmike type				
Order No.	Range	Resolution	Accuracy*	Remark
Digimatic (LCD)				
422-411	0 - 30mm	0.001mm	±3μm	Type A
422-412	25 - 55mm			

* Excluding quantizing error

Metric				
Order No.	Range	Graduation	Accuracy	Remark
Analog				
122-101	0 - 25mm	0.01mm	±3μm	Type A
122-102	25 - 50mm			
122-103	50 - 75mm			
122-104	75 - 100mm			
122-105	100 - 125mm			
122-106	125 - 150mm			
122-107	150 - 175mm			
122-108	175 - 200mm			
122-109	200 - 225mm			
122-110	225 - 250mm			
122-115	250 - 275mm	±5μm		
122-116	275 - 300mm			
122-111	0 - 25mm	0.01mm	±3μm	Type B
122-112	25 - 50mm			
Analog (With carbide tip)				
122-161	0 - 25mm	0.01mm	±3μm	Type C
122-162	25 - 50mm			
122-141	0 - 25mm	0.01mm		
122-142	25 - 50mm			

Notes: 1) A heat shield is provided with Digimatic models and **422-230-30** as standard.

Inch/Metric				
Order No.	Range	Resolution	Accuracy*	Remark
Digimatic (LCD)				
422-330-30	0 - 1"	.0005"/ 0.001mm	±.00015"	Type A
422-331-30	1" - 2"			
422-332-30	2" - 3"		±.0002"	
422-333-30	3" - 4"			
422-360-30	0 - 1"		±.00015"	Type B
422-361-30	1" - 2"			Type C
422-370-30	0 - 1"			Type D
422-371-30				

* Excluding quantizing error

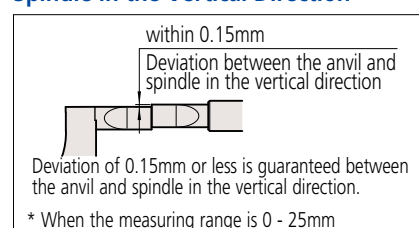
Inch/Metric Quickmike type				
Order No.	Range	Resolution	Accuracy*	Remark
Digimatic (LCD)				
422-421	0 - 1.2"	.00005"/0.001mm	±.00015"	Type A

* Excluding quantizing error

Quickmike

Provides a speedy spindle feed of 10mm per thimble rotation, which enables widely differently sized features to be measured quickly.

Deviation between the Anvil and Spindle in the Vertical Direction



Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Crimp Height Micrometers Series 342, 112, 142

- Measures the height of crimp contacts.
- Equipped with Ratchet Stop for constant measuring force.
- IP65 water/dust protection (digital model).
- Model **342-451** is the Quickmike type, which provides a speedy spindle feed of 10mm per thimble rotation, which enables widely differently sized features to be measured quickly.



Digimatic (LCD)
342-271-30 IP65



Quickmike type (LCD)
342-451 IP54
ABSOLUTE™



112-401

SPECIFICATIONS

Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
342-271-30	0 - 20mm	0.001mm	±3μm
Quickmike (LCD)			
342-451	0 - 15mm	0.001mm	±3μm

* Excluding quantizing error

Metric			
Order No.	Range	Graduation	Accuracy
Mechanical counter model			
142-402	0 - 25mm	0.01mm	±3μm
142-403		0.001mm	

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

Inch/Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
342-371-30	0 - .8"	.00005" / 0.001mm	±.00015"

* Excluding quantizing error



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



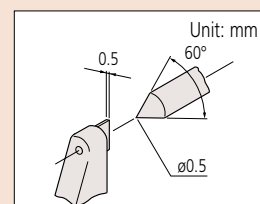
IP Codes (series 342-271-30, 342-371-30)

Level 6: Dust-proof.

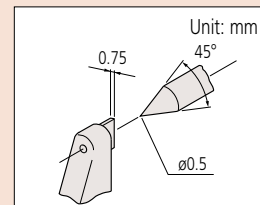
No ingress of dust allowed.

Level 5: Protected against water jets.

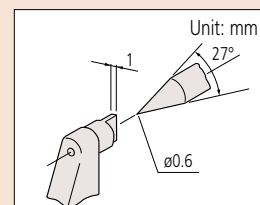
Water projected in jets against the enclosure from any direction shall have no harmful effects.



342-271-30, 342-371-30, 112-401



342-451



142-402, 142-403

Battery for series 342

SR44 (1 pc), 938882, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use

(for series 342-271-30/342-371-30)

Approx. 3 years under normal use

(for series 342-451)

Length standard: Electromagnetic rotary sensor

(for series 342-271-30/342-371-30)

Electrostatic capacity absolute sensor

(for series 342-451)

Standard accessories:

Spanner (301336), 1 pc (except for series 342-451)

Optional accessories

Connecting cables (digital model)

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct

USB-ITN-B (2m): 06ADV380B

Connecting cables for U-WAVE-T (digital model)

02AZD790B (160mm)

For foot switch: 02AZE140B

Connecting cables (Quickmike type)

1m: 937387

2m: 965013

USB Input Tool Direct

USB-ITN-E (2m): 06ADV380E

Connecting cables for U-WAVE-T (Quickmike type)

02AZD790E 160mm

For foot switch: 02AZE140E

Refer to page B-46 for details.

IP Codes (series 317)

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical data

Flatness: Spindle face 0.6µm

Anvil face 2µm

Parallelism: 3µm



Battery for series 317

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use (for series 317)

Length standard: Electromagnetic rotary sensor (for series 317)

Standard accessories: Reference bar, 1 pc (except for measuring range 0-25mm (0-1") models)

Spanner (200877), 1pc (for series 117-XXX)

Spanner (301336), 1 pc (for series 317-XXX)

Optional accessories

Connecting cables (series 317)

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

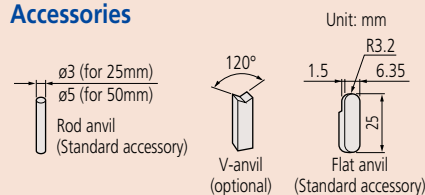
Connecting cables for **U-WAVE-T**

02AZD790B 160mm

For foot switch: **02AZE140B**

Refer to page B-46 for details.

Accessories



Order No.	Item
201216	Flat anvil (standard accessory)
201217	Rod anvil (standard accessory for 117-101/117-107/317-251-30/317-351-30)
201379	Rod anvil (standard accessory for 117-102/117-108/317-252-30/317-352-30)
201218	V-anvil (optional)
950758	Base for 25mm (optional)

"Uni-Mike" Series 317, 117 — Interchangeable Anvil Type

- Measures tubing thickness, shoulder-edge distance, rivet head height, etc., with interchangeable anvils (flat anvil, rod anvil, V-anvil).
- IP65 water/dust protection (series 317).
- Equipped with Ratchet Stop for constant measuring force.



317-251-30



117-101

SPECIFICATIONS

Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
317-251-30	0 - 25mm	0.001mm	±4µm
317-252-30	25 - 50mm		

* Excluding quantizing error

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

Inch/Metric			
Order No.	Range	Resolution	Accuracy*
Digimatic (LCD)			
317-351-30	0 - 1"	.00005" / 0.001mm	±.0002"
317-352-30	1" - 2"		

* Excluding quantizing error

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Indicating Micrometers SERIES 510

- Suited to the measurement of low-volume manufactured parts.
- Easy to use when operating one-handed due to retractable anvil.
- In the 25mm measuring range, the model lineup offers a choice of left or right positioning of the anvil-retraction button.
- Greatly improved accuracy: indication error and graduation of 1μm.
- Water-proof to protection level IP54.
- Hard-coated crystal: enhanced oil and scratch resistance.
- Indicator scale is large and easy-to-read.
- The zero position and adjustable limit markers, for GO/±NG testing, are easily set.
- Measuring faces: Carbide



SPECIFICATIONS

Metric							
Order No.	Range	Indicating range	Graduation	Dial graduation	Measuring force	Anvil retraction button	Mass
510-121	0 - 25mm	±0.06mm	0.001mm	0.001mm	5 - 10N	Right side	520g
510-141						Left side	530g
510-122	25 - 50mm						670g
510-123	50 - 75mm						820g
510-124	75 - 100mm						970g



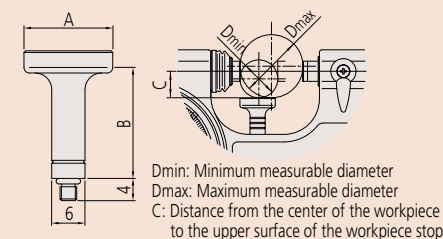
Technical Data

Flatness: 0.3μm/0.00012"
 Parallelism: 0.6μm/0.00024" for models up to 50mm/ 2"
 1μm/0.00004" for models over 50mm/ 2"
 Accuracy: ±2μm
 Spindle feed error: 3μm/0.00015"
 Dispersion of indication: 0.4μm/0.00002"
 Dial indication accuracy: 1μm/0.00005"
 Standard accessories: Reference bar, 1 pc
 (except for measuring range 0-25mm (0-1") models)
 Spanner (200154), 1 pc

Workpiece stop (optional)

Realizes more stable measurement.
 Three types are available to suit workpieces of different sizes.

Unit: mm		
Range	A	B
Workpiece stop A 04AZA124	ø16	23
Workpiece stop B 04AZA125	ø14	20.5
Workpiece stop C 04AZA126	ø14	15



Order No 510-121, 510-141 Unit: mm

	Dmin	Dmax	C
Workpiece stop A	N/A	N/A	N/A
Workpiece stop B	4	16	5.0
Workpiece stop C	15	25	10.5

510-122

	Dmin	Dmax	C
Workpiece stop A	25	37	15.5
Workpiece stop B	30	42	18.0
Workpiece stop C	41	50	23.5

510-123

	Dmin	Dmax	C
Workpiece stop A	50	61	27.5
Workpiece stop B	54	66	30.0
Workpiece stop C	65	75	35.5

510-124

	Dmin	Dmax	C
Workpiece stop A	75	87	40.5
Workpiece stop B	80	92	43.0
Workpiece stop C	91	100	48.2



Technical Data

Standard accessories: Reference bar, 1 pc
(except for measuring range 0-25mm (0-1") models)
Spanner (200877), 1 pc

Limit Micrometers SERIES 113

- Dual-spindle design enables use as a GO/±NG gage by setting upper and lower limits.
- Measuring faces: Carbide



113-102

SPECIFICATIONS

Metric					
Order No.	Range	Graduation	Accuracy	Flatness	Parallelism
113-102	0 - 25mm	0.01mm	±3μm	0.6μm	3μm
113-103	25 - 50mm				

Dial Snap Meters SERIES 523

- Suited to the measurement of mass-produced parts.
- Designed for measurement using a stand: realizes stable measurement.
- Greatly improved accuracy: indication error and graduation of 1μm.
- Water-proof to protection level IP54.
- Hard-coated crystal: enhanced oil and scratch resistance.

- Indicator scale is large and easy-to-read.
- Easily settable adjustable limit markers for GO/±NG testing.
- Equipped with an elevating workpiece stop as standard.
- Measuring faces: Carbide



523-121

SPECIFICATIONS

Metric				
Order No.	Range	Dial graduation	Measuring force	Mass
523-121	0 - 25mm	0.001mm	5 - 10N	740g
523-122	25 - 50mm			840g
523-123	50 - 75mm			950g
523-124	75 - 100mm			1080g



Technical Data

Indicator
Indicating range: ±0.06mm/±.0023"
Repeatability of indication: 0.4μm/0.0002"
Dial indication accuracy: 1μm/0.0005"
Flatness: 0.3μm/0.00012"
Parallelism: 0.6μm/0.00024" for models up to 50mm/2" measuring range
1μm/0.0004" for models over 50mm/2" measuring range



Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Snap Meters SERIES 523

- Suited to the measurement of mass-produced parts.
- Various types of indicator can be selected according to the measurement application.
- Measuring faces: Carbide



523-141
(Indicator: optional)

SPECIFICATIONS

Metric				
Order No.	Range	Anvil movement	Measuring force*	Mass
523-141	0 - 25mm	2mm	5 - 10N	710g
523-142	25 - 50mm			810g
523-143	50 - 75mm			920g
523-144	75 - 100mm			1050g

* Measured at the position where the anvil is retracted by 1mm from the free position without installing the indicator.

Groove Micrometers SERIES 146

- Flanged spindle and anvil for measuring width and location of grooves inside bores and tubes.
- Two-directional ratchet stop.
- For ID and OD (except for 0 - 25mm) measurement, a master gage is required for adjusting the reference point.



146-121



146-122



146-221



146-222

Flanges (measuring faces)

SPECIFICATIONS

Metric					
Order No.	Range Outside	Range Inside	Graduation	Accuracy	Flange
Rotating spindle					
146-121	0 - 25mm	1.6 - 26.5mm	0.01mm	±10μm	ø6.35mm
146-122		26.5 - 51.5mm			ø12.7mm
146-123	25 - 50mm	51.5 - 76.5mm			
146-124	50 - 75mm	76.5 - 101.5mm			
146-125	75 - 100mm				

Metric					
Order No.	Range Outside	Range Inside	Graduation	Accuracy	Flange
Non-rotating spindle					
146-221	0 - 25mm	1.6 - 26.5mm	0.01mm	±10μm	ø6.35mm
146-222		26.5 - 51.5mm			ø12.7mm
146-223	25 - 50mm	51.5 - 76.5mm			
146-224	50 - 75mm	76.5 - 101.5mm			
146-225	75 - 100mm				

Accuracy

Flatness: 0.3μm/0.00012"
Parallelism: 0.6μm/0.00024" for models up to 50mm/2"
1μm/0.0004" for models over 50mm/2"
Repeatability of indication: 0.4μm/0.0002"

Typical Indicators used with gage

ID-C (0.001mm)/ **543-390B**
LGF-L (0.0001mm)/ **542-181** & Counter **542-015**



ABS Digimatic Indicator



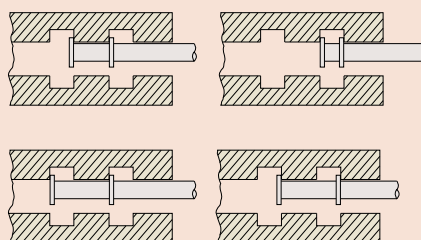
Linear Gage and counter

Technical data

Parallelism: 10μm/0.004"



Standard accessories: Spanner (301336), 1 pc





Technical Data

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Quick-Mini SERIES 700

- Lightweight and palm-sized.
- Highly suitable for quick dimensional inspection of small, thin and delicate objects.
- Functions: origin setting and zero-setting.
- Application examples
 Measurement of small objects: pearls, jewels, shims for engine tappets and screws.
 Measurement of thin objects: printing paper, polyethylene bags, sheet materials, foods including noodles, lenses for glasses, media substrates, foils, thin plates and medical products including filter cloths.
 Measurement of fine lines and bars: fishing lines, dental reamers, pasta, drills for PCB and hard wiring.



700-119-20

SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	Mass
700-119-20	0 - 12mm	0.01mm	±0.02	70 g
* Excluding quantizing error				
Inch/Metric				
Order No.	Range	Resolution	Accuracy*	Mass
700-118-20	0" - 5" / 0 - 12mm	.0005" / 0.01mm	±.001"	70 g

* Excluding quantizing error

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Small Hole Gage Set SERIES 154

- Extra long for gaging deep and shallow holes, slots, and similar workpiece features.
- Two sprung leaves are fully expanded inside a feature so that its size can be measured with an outside micrometer after extraction.



154-902

SPECIFICATIONS

Metric	
Order No.	Range
4-gage Set	
154-902	3 - 13mm
Gages included	
154-101	3 - 5mm
154-102	5 - 7.5mm
154-103	7.5 - 10mm
154-104	10 - 13mm

Telescoping Gage Set SERIES 155

- A spring-loaded plunger expands within a bore (or groove) and is locked in place, allowing measurement of diameter (or width) with an outside micrometer after extraction.



155-905

SPECIFICATIONS

Metric	
Order No.	Range
6-gage Set	
155-905	8 - 150mm
Gages included	
155-127	8 - 12.7mm
155-128	12.7 - 19mm
155-129	19 - 32mm
155-130	32 - 54mm
155-131	54 - 90mm
155-132	90 - 150mm



DIMENSIONS

Unit: mm				
	ϕd_1	L	ϕD	ℓ
	ϕd_1	L	ϕD	ℓ
Range	ϕd_1	L	ϕD	ℓ
3 - 5mm	2.8 - 5.2	90	5.5	22.5
5 - 7.5mm	4.8 - 7.8	97.6	5.5	30
7.5 - 10mm	7.3 - 10.3	108	8.5	40
10 - 13mm	9.8 - 13.2			



DIMENSIONS

Unit: mm				
	ϕd_2	L	ϕD	ϕd_1
	ϕd_2	L	ϕD	ϕd_1
Range	ϕd_2	L	ϕD	ϕd_1
8 - 12.7mm	5	110	5.5	4
12.7 - 19mm	5.5		5.5	5
19 - 32mm	5.5		5.5	5
32 - 54mm	8	150	8	7.5
54 - 90mm	8		8	7.5
90 - 150mm	8		8	7.5

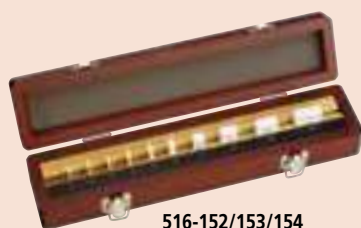
Technical Data

Flatness: 0.3µm
Parallelism: 2µm



Micrometer Inspection Gauge Block

Refer to page E-9 for details.



516-152/153/154



Micro Checker (holder only)
516-607

Setting Standards for Outside Micrometers SERIES 167

- Used for adjusting the reference point of the outside micrometer.



167-108



167-103

Metric				
Order No.	Length (L)	Tolerance	ℓ	Diameter (D)
167-101	25mm	±1.5µm	18	6.35mm
167-102	50mm	±2.0µm	40	
167-103	75mm	±2.5µm		

Metric			
Order No.	Length (L)	Tolerance	Diameter (D)
167-104	100mm	±3µm	7.9mm
167-105	125mm	±3.5µm	
167-106	150mm	±4µm	
167-107	175mm	±4.5µm	

Metric				
Order No.	Length (L)	Tolerance	ℓ	Diameter (D)
167-108	200mm	±5.0µm	47	9.4mm
167-109	225mm	±5.5µm	47	
167-110	250mm	±6.0µm	52	
167-111	275mm	±6.5µm	57	
167-112	300mm	±7µm	64	
167-113	325mm	±7.5µm	69	
167-114	350mm	±8µm	74	
167-115	375mm	±8.5µm	80	
167-116	400mm	±9µm	85	
167-117	425mm	±9.5µm	90	
167-118	450mm	±10µm	95	
167-119	475mm	±10.5µm	101	

Metric				
Order No.	Length (L)	Tolerance	ℓ	Diameter (D)
167-120	500mm	±11µm	106	11.9mm
167-121	525mm	±11.5µm	112	
167-122	550mm	±12.0µm	117	
167-123	575mm	±12.5µm	122	
167-124	600mm	±13µm	128	
167-125	625mm	±13.5µm	133	
167-126	650mm	±14µm	138	
167-127	675mm	±14.5µm	142	
167-128	700mm	±15µm	147	
167-129	725mm	±15.5µm	153	
167-130	750mm	±16µm	158	
167-131	775mm	±16.5µm	164	11.9mm
167-132	800mm	±17µm	170	
167-133	825mm	±17.5µm	175	
167-134	850mm	±18µm	180	
167-135	875mm	±18.5µm	185	
167-136	900mm	±19µm	191	
167-137	925mm	±19.5µm	196	
167-138	950mm	±20µm	201	
167-139	975mm	±20.5µm	207	
167-140	1000mm	±21µm	211	
167-365	1025mm	±21.5µm	217	11.9mm
167-366	1050mm	±22µm	222	
167-367	1075mm	±22.5µm	227	
167-368	1100mm	±23µm	232	
167-369	1125mm	±23.5µm	238	
167-370	1150mm	±24µm	243	
167-371	1175mm	±24.5µm	248	
167-372	1200mm	±25µm	254	
167-373	1225mm	±25.5µm	259	
167-374	1250mm	±26µm	264	
167-375	1275mm	±26.5µm	269	
167-376	1300mm	±27µm	275	11.9mm
167-377	1325mm	±27.5µm	280	
167-378	1350mm	±28µm	285	
167-379	1375mm	±28.5µm	291	
167-380	1400mm	±29µm	296	
167-381	1425mm	±29.5µm	301	
167-382	1450mm	±30µm	306	
167-383	1475mm	±30.5µm	312	
167-384	1500mm	±31µm	317	
167-385	1525mm	±31.5µm	322	
167-386	1550mm	±32µm	328	11.9mm
167-387	1575mm	±32.5µm	333	
167-388	1600mm	±33µm	338	
167-389	1625mm	±33.5µm	343	
167-390	1650mm	±34µm	349	
167-391	1675mm	±34.5µm	354	
167-392	1700mm	±35µm	359	
167-393	1725mm	±35.5µm	364	
167-394	1750mm	±36µm	370	
167-395	1775mm	±36.5µm	375	
167-396	1800mm	±37µm	380	11.9mm
167-397	1825mm	±37.5µm	386	
167-398	1850mm	±38µm	391	
167-399	1875mm	±38.5µm	396	
167-400	1900mm	±39µm	401	
167-401	1925mm	±39.5µm	407	
167-402	1950mm	±40µm	412	
167-403	1975mm	±40.5µm	417	
167-404	2000mm	±41µm	423	

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Setting Standards for Screw Thread Micrometers SERIES 167

- Used for accurately setting screw thread micrometers at the start or end of the measuring range.



167-264
(60° screw)



167-262
(60° screw)

Metric		
Order No.	Length	Accuracy
Metric (unified) $\theta = 60^\circ$		
167-261	25mm	$\pm 4\mu\text{m}$
167-262	50mm	$\pm 5\mu\text{m}$
167-263	75mm	$\pm 6\mu\text{m}$
167-264	100mm	$\pm 7\mu\text{m}$
167-265	125mm	$\pm 8\mu\text{m}$
167-266	150mm	$\pm 9\mu\text{m}$
167-267	175mm	$\pm 10\mu\text{m}$
167-268	200mm	$\pm 11\mu\text{m}$
167-269	225mm	$\pm 12\mu\text{m}$
167-270	250mm	$\pm 13\mu\text{m}$
167-271	275mm	$\pm 14\mu\text{m}$
Whitworth $\theta = 55^\circ$		
167-272	25mm	$\pm 4\mu\text{m}$
167-273	50mm	$\pm 5\mu\text{m}$
167-274	75mm	$\pm 6\mu\text{m}$
167-275	100mm	$\pm 7\mu\text{m}$
167-276	125mm	$\pm 8\mu\text{m}$
167-277	150mm	$\pm 9\mu\text{m}$
167-278	175mm	$\pm 10\mu\text{m}$
167-279	200mm	$\pm 11\mu\text{m}$
167-280	225mm	$\pm 12\mu\text{m}$
167-281	250mm	$\pm 13\mu\text{m}$
167-282	275mm	$\pm 14\mu\text{m}$

Setting Standards for V-Anvil Micrometers SERIES 167

- Specially designed for accurately setting of V-anvil micrometers.



167-329

Metric			
Order No.	Length	Accuracy	Type
167-327	5mm	$\pm 2\mu\text{m}$	Plug
167-328	10mm		
167-329	25mm		
167-330	40mm	$\pm 3\mu\text{m}$	Ring
167-331	55mm		
167-332	70mm		
167-333	85mm		





Optical Parallels SERIES 157

- Designed to inspect parallelism and flatness of measuring faces of micrometers. For details, refer to "Quick Guide to Precision Measuring Instruments".
- Each set consists of 4 sizes to aid in testing parallelism at various angular positions of the micrometer spindle.



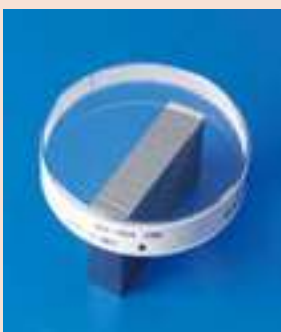
157-903

SPECIFICATIONS

Metric						
Order No.	Range of micrometer to be checked	Sizes of parallels included in set	Diameter	Flatness	Parallelism	Remarks
157-903	0 - 25mm	12.00, 12.12, 12.25, 12.37mm	ø30	0.1µm	0.2µm	For 25mm
157-904	25 - 50mm	25.00, 25.12, 25.25, 13.37mm				For 50mm

Optical Flats SERIES 158

- Used for inspecting the flatness of very flat surfaces. For details, refer to "Quick Guide to Precision Measuring Instruments".



158-118

SPECIFICATIONS

Metric			
Order No.	Thickness	Diameter	Flatness grade
158-117	12mm	ø45	0.2µm
158-118		ø45	0.1µm
158-119	15mm	ø60	0.2µm
158-120		ø60	0.1µm

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Color-Coded Ratchet and Speeder Covers

- Ratchet and speeder covers in a choice of seven colors for use in instrument identification control schemes: red, blue, yellow, green, brown, black and gray.

SPECIFICATIONS

Ratchet and speeder covers



Order No.		Color	Material
Ratchet	Speeder		
04GZA239	04GAA260	Gray	Plastic
985056	301708	Black	
985061	301709	Red	
985081	301713	Blue	
985071	301711	Yellow	
985076	301712	Green	
985066	301710	Brown	
950700	—	Gray	Steel

Order No.		Color	Material
Ratchet	Speeder		
04GZA243	04GAA260	Gray	Plastic
—	301708	Black	
—	301709	Red	
—	301713	Blue	
—	301711	Yellow	
—	301712	Green	
—	301710	Brown	
950701	—	Gray	Steel

Order No.*		Color	Material
Ratchet	Speeder		
04GZA241	04GAA260	Gray	Plastic
—	301708	Black	
—	301709	Red	
—	301713	Blue	
—	301711	Yellow	
—	301712	Green	
—	301710	Brown	
951588	—	Gray	Steel

*Cannot be used for analog types.

Color-coded speeder covers

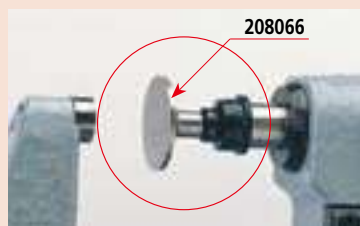


Color-coded speeder covers

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

Technical Data

Tip length: 10mm \pm 5 μ m



Spindle Attachment Tips

- Simple interchangeable tips attached to standard micrometer spindles enable measurement of contours otherwise unmeasurable (for 6.35 spindles only).
- Measuring range changes when a spindle attachment tip is mounted: the maximum measuring range is 10mm or less (accuracy is not guaranteed).



208062



208063



208064



208065



208066

Micrometer Oil

- Special lubricant for micrometers.



207000
(Content: 30ml)

SPECIFICATIONS

Order No.	Product name	Remarks
207000	Micrometer oil	Grease (30ml)

Micrometer Stands SERIES 156

- Designed to allow benchtop use of hand micrometers or other gages which have frames suitable for gripping by the clamp.



156-105-10



156-101-10



156-102

SPECIFICATIONS

Order No.	Micrometer ranges	Remarks
156-101-10	Up to 100mm (4")*	Adjustable angle type
156-105-10	0-25mm (0-1"), 25-50mm (1"-2")	Fixed angle type
156-102	125-300mm (5"-12")	Vertical type
156-103	300-1000mm (12"-40")	Vertical type

* Items that cannot be mounted on these stands

(Order No. 406-253-30, 323-253-30, 331-254-30, 342-254-30, 342-264-30, 369-253-30, 422-232-30, 422-233-30, etc.)

Micrometer

The origin of Mitutoyo's trustworthy brand of small tool instruments

Can Seam Micrometers SERIES 147

- Measures the width, height, and depth of can seams.



147-103

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Accuracy	Remarks
147-103	0 - 13mm	0.01mm	±3μm	for steel cans
147-105				for aluminum cans
147-202				for spray cans



Standard accessories: Spanner (200168), 1 pc
Spanner (202863), 1pc

Hub Micrometers SERIES 147

- Measures hub thickness and shoulders inside a bore.
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



147-301

SPECIFICATIONS

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



Wire Micrometers Series 147

- Designed for measuring wire thickness.
- Measurable wire dia.: 10mm or less
- Measuring faces: Carbide
- Equipped with Ratchet Stop for constant measuring force.



147-401

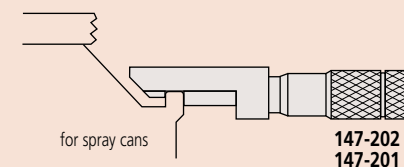
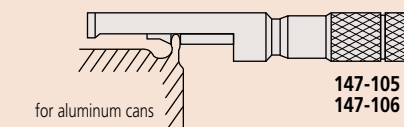
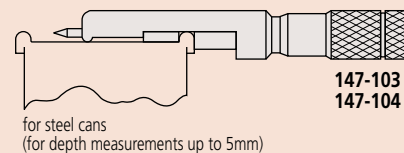
SPECIFICATIONS

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



Standard accessories: Spanner (200168), 1 pc
Spanner (202863), 1pc

Technical Data



Technical data

Flatness: 0.6μm/0.00024"
Parallelism: (2+R/100)μm, R = max. range (mm)
[.00008" + .00004"(R/4)]" R = max. range (mm)
*fraction rounded up

Standard accessories: Reference bar, 1 pc
(except for measuring range 0-25mm (0-1") models)
Spanner (301336), 1 pc

Technical Data

Flatness: 0.6μm/0.00024"
Parallelism: 1.3μm/0.0005"

Introduction for Measurement data recording tools for Micrometers and Micrometer Heads (optional)

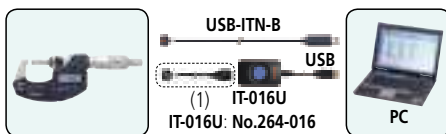
For Digimatic Micrometers other than Quickmike type, and Digimatic Micrometer Heads series 350 (Connector type B)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- PC connection (wired system) ... USB Input Tool (refer to page A-3/A-4)

USB-ITN-B (2m): No.06ADV380B



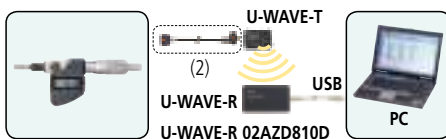
Dedicated cable for models with SPC data output

- (1) 1m: No.05CZA662
- 2m: No.05CZA663

- PC connection (wireless system) ... U-WAVE (refer to page A-5)

U-WAVE-T (IP67): No.02AZD730D

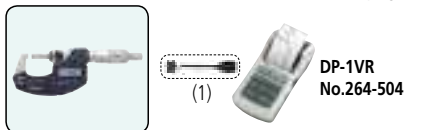
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: No.02AZD790B
- For footswitch: No.02AZE140B

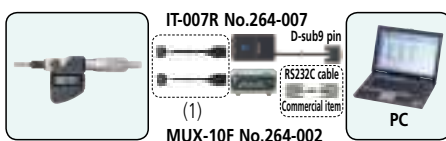
- Dedicated printer connection (only for wired system) ... DP-1VR (refer to page A-11)



Dedicated cable for models with SPC data output

- (1) 1m: No.05CZA662
- 2m: No.05CZA663

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system) ... IT-007R (refer to page A-4), MUX-10F (refer to page A-12)



Dedicated cable for models with SPC data output

- (1) 1m: No.05CZA662
- 2m: No.05CZA663

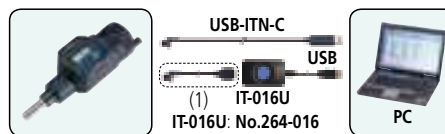
For Digimatic Micrometer Heads series 164 (Connector type C)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- PC connection (wired system) ... USB Input Tool (refer to page A-3/A-4)

USB-ITN-C (2m): No.06ADV380C



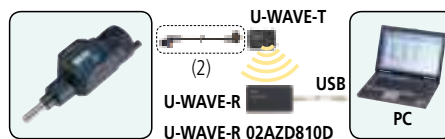
Dedicated cable for models with SPC data output

- (1) 1m: No.959149
- 2m: No.959150

- PC connection (wireless system) ... U-WAVE (refer to page A-5)

U-WAVE-T (IP67): No.02AZD730D

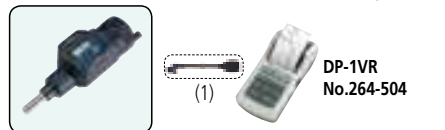
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: No.02AZD790C
- For footswitch: No.02AZE140C

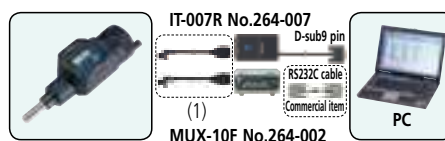
- Dedicated printer connection (only for wired system) ... DP-1VR (refer to page A-11)



Dedicated cable for models with SPC data output

- (1) 1m: No.959149
- 2m: No.959150

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system) ... IT-007R (refer to page A-4), MUX-10F (refer to page A-12)



Dedicated cable for models with SPC data output

- (1) 1m: No.959149
- 2m: No.959150

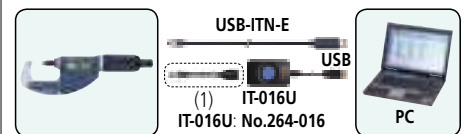
For Quickmike type (Connector type E)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- PC connection (wired system) ... USB Input Tool (refer to page A-3/A-4)

USB-ITN-E (2m): No.06ADV380E



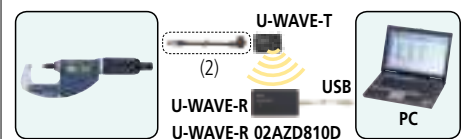
Dedicated cable for models with SPC data output

- (1) 1m: No.937387
- 2m: No.965013

- PC connection (wireless system) ... U-WAVE (refer to page A-5)

U-WAVE-T (IP67): No.02AZD730D

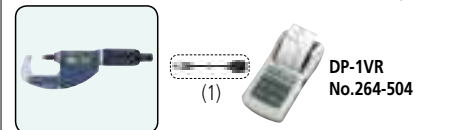
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: No.02AZD790E
- For footswitch: No.02AZE140E

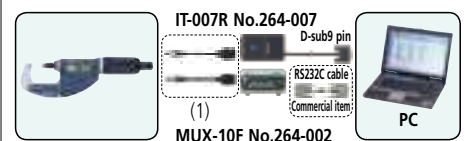
- Dedicated printer connection (only for wired system) ... DP-1VR (refer to page A-11)



Dedicated cable for models with SPC data output

- (1) 1m: No.937387
- 2m: No.965013

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system) ... IT-007R (refer to page A-4), MUX-10F (refer to page A-12)



Dedicated cable for models with SPC data output

- (1) 1m: No.937387
- 2m: No.965013

Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

Digimatic Micrometer Heads Series 164, 350

- Equipped with digital display and output.
- series 350 IP65 models: the Digimatic output port enables inclusion in a statistical process control or networked measurement system. (Refer to page A-1 for details).

SPECIFICATIONS

Metric								
Order No.	Range	Resolution	Accuracy**	Stem	Stem dia	Spindle end	Graduation features	
164-163	0 - 50mm	0.001mm	±3µm	Plain	18mm	Flat (carbide tip)	Standard	
350-251-30	0 - 25mm		±2µm	W/ clamp nut	10mm			Spherical (SR4) (carbide tip)
350-252-30				Plain				
350-253-30				W/ clamp nut				
350-254-30				Plain	12mm	Flat (carbide tip)		
350-281-30*				W/ clamp nut				
350-282-30*				Plain				
350-283-30*				W/ clamp nut				
350-284-30*				Plain				Spherical (SR4) (carbide tip)
350-261-30*								Flat

* IP65 dust/water protection type

** Excluding quantizing error

Inch/Metric								
Order No.	Range	Resolution	Accuracy**	Stem	Stem dia	Spindle end	Graduation features	
164-164	0 - 2"	.00005"/ 0.001mm	±.00015"	Plain	0.709"	Flat (carbide tip)	Standard	
350-351-30	0 - 1"		±.0001"	W/ clamp nut	0.375"	Spherical (SR4) (carbide tip)		
350-352-30				Plain				
350-353-30				W/ clamp nut				
350-354-30				Plain	0.5"	Flat (carbide tip)		
350-381-30*				W/ clamp nut				
350-382-30*				Plain				Spherical (SR4) (carbide tip)
350-383-30*				W/ clamp nut				
350-384-30*				Plain				

* IP65 dust/water protection type

* Note: Stem diameter of IP65 type is 12mm.

** Excluding quantizing error

SERIES 148 — Small/Ultra-small Type

- Miniature micrometer heads for ease of incorporating into machines.

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation
148-215	0 - 5mm	±5µm	3.5mm	Plain	Spherical (SR1.5)	Standard
148-216				W/ clamp nut		
148-201				Plain		
148-203	0 - 6.5mm		6mm	W/ clamp nut	Flat	
148-205				Plain		
148-207				W/ clamp nut	Spherical (SR3)	
148-209				Plain		
148-211				W/ clamp nut	Flat	Reverse reading



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



IP Codes (series 350)

Level 6: Dustproof

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Battery for series 350

SR44(1 pc), 938882 for initial operation checks (standard accessory)

Battery for series 164

SR44(2 pcs.), 938882 for initial operation checks (standard accessory)

Battery life: Approx. 2.4 years under normal use

(for series 350-XXX)

Approx. 1.8 years under normal use

(for series 164-163, 164)

Length standard: Electromagnetic rotary sensor

Standard accessories: Reference bar, 1 pc

Spanner (301336), 1 pc (for series 350-XXX)

Screwdriver (No.05CAA952), 1pc (for series 164-163, 164)

Functions (series 164/350)

Origin point setting (ABS measurement system):

Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

Zero-setting (INC measurement system):

A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

Data output:

Equipped with output port for transferring measurement data to a Statistical Process Control (SPC) and measurement system.

Auto power ON/OFF:

The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading on the LCD to reappear.

Error alarm:

In case of an overflow on the LCD or a computing error, an error message appears on the LCD and the measuring function stops. This prevents an instrument from giving an erroneous reading. Also, when the battery voltage drops to a certain level, the low-battery-voltage alarm annunciator appears well before the micrometer becomes unusable.

Optional accessories

Connecting cables for **series 164**

1m: **959149**

2m: **959150**

USB Input Tool Direct

USB-ITN-C (2m): **06ADV380C**

02AZD790C 160mm

For foot switch: **02AZE140C**

Connecting cables for **series 350**

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct

USB-ITN-B (2m): **06ADV380B**

Connecting cables for **U-WAVE-T**

02AZD790B 160mm

For foot switch: **02AZE140B**

Refer to page B-46 for details.

Technical Data

Graduation: 0.02mm (**148-215, 148-216**),
0.01mm

Technical Data

Graduation: 0.01mm
Spindle pitch: 0.5mm

SERIES 148 — Short Thimble with Choice of Diameter

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
148-301	0 - 6.5mm	±2μm	9.5mm	Plain	Flat	15mm thimble dia.
148-302				W/ clamp nut		20mm thimble dia.
148-303				Plain		
148-304				W/ clamp nut	Spherical (SR4)	29mm thimble dia.
148-305				Plain		15mm thimble dia.
148-306				W/ clamp nut		
148-313	0 - 13mm	±2μm	9.5mm	Plain	Flat	15mm thimble dia.
148-314				W/ clamp nut		20mm thimble dia.
148-307				Plain	Spherical (SR4)	29mm thimble dia.
148-308				W/ clamp nut		15mm thimble dia.
148-309				Plain		
148-310				W/ clamp nut		
148-311				Plain	Flat	20mm thimble dia.
148-312				W/ clamp nut		

SERIES 148 — Small Standard Type

- Measuring range of 13mm.

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation features
148-104	0 - 13mm	±2μm	9.5mm	Plain	Flat	Standard
148-103				W/ clamp nut		
148-121				Plain*		
148-120				W/ clamp nut*	Spherical (SR4)	
148-801				Plain		
148-802				W/ clamp nut		
148-803				Plain*	Flat	Reverse reading
148-804				W/ clamp nut*		
148-821				Plain		
148-822				W/ clamp nut	Spherical (SR4)	
148-823				Plain*		
148-824				W/ clamp nut*		

* with spindle lock

SERIES 148 — Small Thimble Diameter Standard Type

- Measuring range of 13mm.
- The thimble can be set to zero at any position by loosening the setscrew.
- Stainless steel throughout: 148-513, 518, 511

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
148-503	0 - 13mm	±2μm	9.5mm	Plain	Flat	Standard
148-513				W/ clamp nut		Stainless steel throughout
148-508				Plain*	Spherical (SR4)	Standard
148-506				W/ clamp nut*		
148-504				Plain		
148-853				W/ clamp nut*	Flat	Reverse reading
148-854				Plain		
148-863				W/ clamp nut*		
148-864				Plain	Spherical (SR4)	Standard
				W/ clamp nut*		

* with spindle lock

Technical Data

Graduation: 0.01mm
Spindle pitch: 0.5mm

Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

SERIES 148 — Locking-screw Type

- Locking screw provides secure locking at any position of the spindle.
- Position of the locking screw is the same as the sleeve index line.

SPECIFICATIONS

Metric									
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Graduation features		
148-220	0 - 6.5mm	0.01mm	±5µm	6mm	Plain	Flat	Standard		
148-221					W/ clamp nut				
148-222					Plain	Spherical (SR3)			
148-223					W/ clamp nut				
148-150	0 - 13mm		±2µm	9.5mm	Plain	Flat			
148-151					W/ clamp nut				
148-152					Plain	Spherical (SR4)			
148-153					W/ clamp nut				
148-316	0 - 6.5mm				±2µm	9.5mm		Plain	Flat
148-317								W/ clamp nut	
148-318								Plain	Spherical (SR4)
148-319								W/ clamp nut	



Secure spindle

SERIES 149 — Small Standard Type with Carbide-Tipped Spindle

- Carbide-tipped spindle provides high abrasion resistance.

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation features
149-132	0 - 15mm	±2μm	9.5mm	Plain	Flat (carbide tip)	Standard
149-131				W/ clamp nut		
149-183				Plain*		
149-184				W/ clamp nut*		
149-801				Plain	Spherical (SR4) (carbide tip)	
149-802				W/ clamp nut		
149-821				Plain	Flat (carbide tip)	Reverse reading
149-822				W/ clamp nut	Spherical (SR4) (carbide tip)	Standard
149-803**				Plain*		
149-804**				W/ clamp nut*		
149-823**				Plain*	Flat (carbide tip)	Reverse reading
149-824**				W/ clamp nut*		

* with spindle lock ** made-to-order models

SERIES 150 — Medium-sized Standard Type

- Measuring range of 25mm.

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
150-192	0 - 25mm	±2μm	10mm	Plain	Flat (carbide tip)	Standard
150-191				W/ clamp nut		
150-209				Plain*		
150-210				W/ clamp nut*		
150-801				Plain	Spherical (SR4) (carbide tip)	Standard
150-802				W/ clamp nut		
150-821				Plain	Flat (carbide tip)	Reverse reading
150-822				W/ clamp nut		W/vernier (0.001mm)
150-190				Plain		
150-189				W/ clamp nut		w/o ratchet stop
150-183**				Plain*		
150-184				W/ clamp nut*		
150-196				Plain	Flat	Long spindle
150-195				W/ clamp nut		
150-211				Plain*		
150-212				W/ clamp nut*		
150-219				Plain	Spherical (SR4) (carbide tip)	Standard
150-220				W/ clamp nut		
150-803**				Plain*	Flat (carbide tip)	Reverse reading
150-804**				W/ clamp nut*		
150-823**				Plain*	Flat	Long spindle
150-824**				W/ clamp nut*		
150-223**				Plain*		
150-224**				W/ clamp nut*		

* with spindle lock ** made-to-order models

Technical Data

Graduation: 0.01mm
Spindle pitch: 0.5mm

Technical Data

Graduation: 0.01mm, 0.001mm
Spindle pitch: 0.5mm

SERIES 151 — Medium-sized Standard Type with 8mm diameter spindle

- Larger spindle for heavy-duty applications (normally $\phi 6.35\text{mm}$).

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
151-224	0 - 25mm	$\pm 2\mu\text{m}$	12mm	Plain	Flat (carbide tip)	—
151-223				W/ clamp nut		
151-214**				Plain*		
151-213**				W/ clamp nut*		
151-222				Plain		W/ vernier (0.001mm)
151-221				W/ clamp nut		
151-212**				Plain*		
151-211**				W/ clamp nut*		
151-227				Plain		w/o ratchet stop
151-228				W/ clamp nut		
151-225				Plain*		
151-226				W/ clamp nut*		
151-256	0 - 50mm	$\pm 4\mu\text{m}$		Plain		—
151-255				W/ clamp nut		w/o ratchet stop
151-260				Plain		
151-259				W/ clamp nut		

* with spindle lock ** made-to-order models

SERIES 152 — Quick Spindle Feed of 1mm/rev

- Quick spindle feed of 1mm/rev.

SPECIFICATIONS

Metric							
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch
152-101	0 - 15mm	0.01mm	$\pm 2\mu\text{m}$	12mm	Plain	Flat (carbide tip)	1mm
152-102	0 - 25mm						
152-103	0 - 50mm		$\pm 4\mu\text{m}$				

SERIES 153 — Non-rotating Spindle Type

- The spindle translates without rotation.
- Torsion-free feed reduces workpiece deformation and wear.

SPECIFICATIONS

Metric								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features
153-101	0 - 15mm	0.01mm	±3µm	9.5mm	Plain	Flat (carbide tip)	0.5mm	Standard
153-201*	0 - 25mm	0.001mm		12mm				w/ vernier (0.001mm)
153-202*		0.01mm						Standard
153-203		0.001mm						w/ vernier (0.001mm)
153-204								

SERIES 250 — Digit Counter type

- Digit counter for easy reading of spindle movement.
- Carbide measuring face.

SPECIFICATIONS

Metric								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features
250-301	0 - 25mm	0.01mm	$\pm 2\mu\text{m}$	10mm	Plain	Flat (carbide tip)	0.5mm	—

Micro Jack SERIES 7

- Used for accurate leveling of machines, surface plates, and other precision instruments.
- Zero-setting is possible at any position.
- Easy adjustment under heavy load.

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Handle power at the max. loading	Remarks
7850	60 - 75mm	0.01mm	90 N	Max. load: 400kg



Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

SERIES 148 — Fine Spindle Feed of 0.1mm/rev

- Highly accurate 0.1mm pitch thread is only one-fifth of that used for a standard-pitch head (0.5mm).
- External dimensions are compatible with standard 0.5mm pitch heads.

Spindle pitch



Pitch = 0.1mm



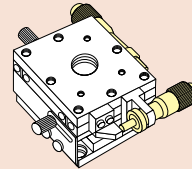
Pitch = 0.5mm

SPECIFICATIONS

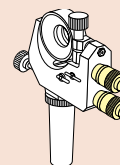
Metric									
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Special features	
148-142	0 - 6.5mm	0.002mm	±2μm	9.5mm	Plain	Spherical (SR4)	0.1mm	Thicker & shorter thimble	
148-143					w/ clamp nut				
148-342					Plain				
148-343					w/ clamp nut				
148-242	0 - 5mm	0.004mm	±5μm	6mm	Plain	Spherical (SR3)	0.1mm	Small thimble diameter	
148-243					w/ clamp nut				
148-244					Plain				
148-245					w/ clamp nut				

Applications

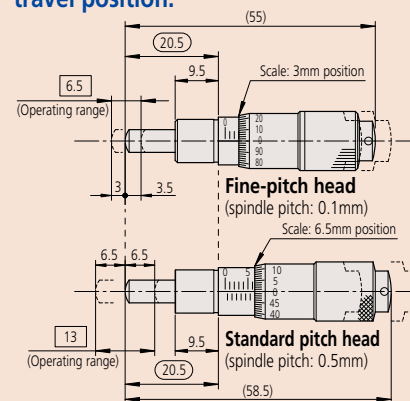
- Semiconductor-wafer positioning machinery and optical component alignment units, etc.
- Precision X-Y table positioning



- Precision adjustment of mirror in holder



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



While the fine-pitch micrometer head has a measuring range of 6.5mm, the standard head has a larger range of 13mm.

When replacing a standard 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 otherwise completely interchangeable.

SERIES 148 — Fine Spindle Feed of 0.25mm/rev

- Miniature micrometer heads for ease of incorporating into machines.

SPECIFICATIONS

Metric								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	
148-132	0 - 13mm	0.01mm	±2μm	9.5mm	Plain	Spherical (SR4)	0.25mm	
148-133					w/ clamp nut			
148-322	0 - 6.5mm	0.01mm	±2μm	9.5mm	Plain	Spherical (SR4)	0.25mm	
148-323					w/ clamp nut			

SERIES 153 — High Accuracy and Resolution

- Fine graduation and high resolution model.
- Non-rotating spindle type.

SPECIFICATIONS

Metric									
Order No.	Range	Graduation	Accuracy*	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features	
153-301	0 - 25mm	0.0005mm	±1/±0.5μm	18mm	Plain	Flat (carbide tip)	0.5mm	Bidirectional	

* Wide range / narrow range

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

- The differential movement of spindle threads and nuts allows ultra-fine feeding.

SPECIFICATIONS

Metric										
Order No.	Range		Graduation		Accuracy**	Stem dia.	Stem	Spindle end	Graduation features	
110-101	0 - 2.5mm		0.001mm		±5µm/±1.5µm	12mm	w/ clamp nut	Flat (carbide tip)	Standard	
110-102			0.0001mm						Fine	
110-105	0 - 1mm		0.001mm		±3µm/±1.5µm				Spherical (SR10) (carbide tip)	Standard
110-106			0.0001mm							Fine
110-107			0.001mm					Standard		
110-108			0.0001mm					Fine		
110-502	Thimble (fine)	0 - 0.2mm	Thimble (fine)	0.0005mm	±3µm/±1.5µm	9.5mm	Spherical (SR3)	Dual scales; 0.2mm fine-feed range		
	Thimble (coarse)	0 - 13mm	Thimble (coarse)	0.01mm						

** Wide range / narrow range

SERIES 152 — Large thimble type

- Large-diameter thimble for fine adjustment and positioning.

SPECIFICATIONS

Metric								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features
152-283	0 - 10mm	0.002mm	±2µm	12mm	w/ clamp nut	Flat (carbide tip)	0.5mm	Standard
152-332	0 - 25mm				Plain			Bidirectional
152-348	0 - 50mm		±4µm					
152-380								

SERIES 152 — XY-Stage type

- Micrometer heads especially designed for accurate cross-travel stage translation in X and Y.
- Spindle end: Flat form and hardened, or spherical with carbide tip (more than HRA90), lapped surface.

SPECIFICATIONS

Metric								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle pitch	Graduation features	
152-390	0 - 25mm	0.005mm	$\pm 2\mu\text{m}$	18mm	Plain	1mm	for X-axis, bidirectional	
152-389								
152-402		0.001mm					for X-axis, with Vernier	
152-401		Vernier graduation						

SERIES 197 — Long Stroke Non-rotating Spindle

- Large thimble micrometer head with non-rotating spindle.
- Floating thimble allows easy zero setting at any spindle position.
- Dual-spindle mechanism for quick feed of 1mm/rev (standard models: 0.5mm/rev).

SPECIFICATIONS

Metric								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features
197-101	0 - 50mm	0.005mm	$\pm 5\mu\text{m}$	18mm	Plain	Flat (carbide tip)	1mm	Bidirectional

Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

Micrometer Heads Mounting Fixtures

- Manufacturing 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.

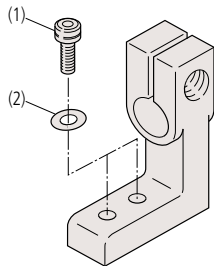
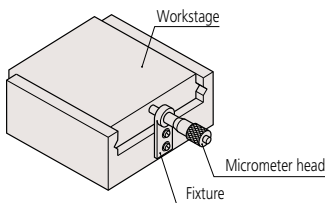


SPECIFICATIONS

Mounting hole size

Micrometer Head	Fixtures (Order No.)	Mounting hole size
148 Series	303560, 303562, 303564, 303566 303559, 303561, 303563, 303565	ø9.5×9.5 long for plain stem or stem locknut type micrometer heads
149 Series	303569, 303571, 303573, 303575 303568, 303570, 303572, 303574	ø9.5×15 long for plain stem or stem locknut type micrometer heads
150 Series	303579, 303581, 303583, 303585 303578, 303580, 303582, 303584	ø10×15 long for plain stem or stem locknut type micrometer heads

* Supplied with a socket head screw (M3 x 0.5 x 12) for fixtures to be used with a micrometer head without stem locknut (plain stem type micrometer head).



SPECIFICATIONS

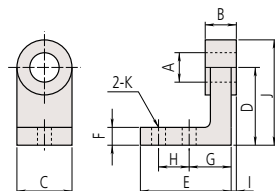
Recommended socket head screws for the fixtures

Fixtures (Order No.)	Socket head screw (1)	Washer (2)
303559, 303560, 303561, 303562, 303563, 303564 303565, 303566	M3×0.5×8 M3×0.5×12	Small, Nominal dia.: 3 Small, Nominal dia.: 3
303568, 303569, 303570, 303571, 303572, 303573 303578, 303579, 303580, 303581, 303582, 303583	M4×0.7×10	Small, Nominal dia.: 4
303574, 303575 303584, 303585	M4×0.7×12	Small, Nominal dia.: 4

() : with spindle fully retracted

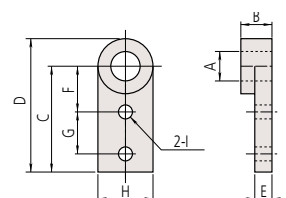
Micrometer Heads Mounting Fixtures

Fixtures for micrometer heads with stem locknut



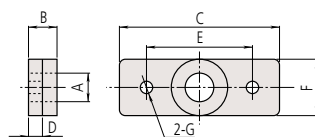
(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K
303559	ø9.5	6	15	20	24	5	11	8	0.5	27.5	ø3.4
303568		11.5	20	30	35	7	16	12	1.75	40	ø4.5
303578		ø10									



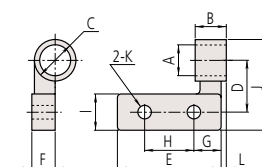
(Unit: mm)

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



(Unit: mm)

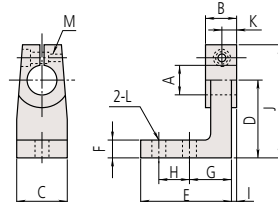
Order No.	A	B	C	D	E	F	G
303561	ø9.5	6	40	3.5	30	15	ø3.4
303570		11.5	60	5.5	40	20	ø4.5
303580		ø10					



(Unit: mm)

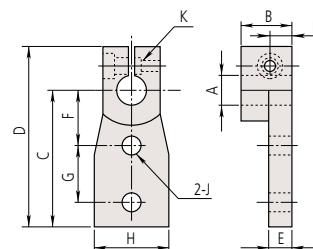
Order No.	A	B	C	D	E	F	G	H	I	J	K	L
303565	ø9.5	6		15	25		7.5	10	10	27.5	ø3.4	0.75
303574		11.5	ø15	20	40	8.5	10	20	15	35	ø4.5	1.25
303584		ø10										

Fixtures for plain stem type micrometer heads



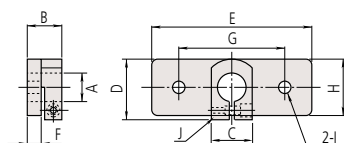
(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K	L	G
303560	ø9.5	9	15	20	23	5	11	8	1.5	3.25	4.5	ø3.4	
303569		14.5	20	30	35	7	16	12	3.25	4.25	7.25	ø4.5	M3x0.5
303579		ø10											



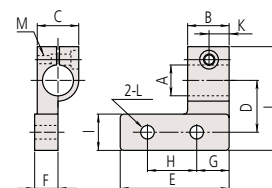
(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K
303564	ø9.5	9		4.25	4	15	10	15	4.5	ø3.4	
303573		14.5	30	5.25	6	18	15	20	7.25	ø4.5	M3x0.5
303583		ø10									



(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J
303562	ø9.5	9		20	40	3	30	15	ø3.4	
303571		14.5	15	22.5	60	5	40	20	ø4.5	M3x0.5
303581		ø10								



(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K	L	M
303566	ø9.5	9		15	25		7.5	10	10	32.5	4.5	ø3.4	
303575		14.5	15	20	40	8.5	10	20	15	40	7.25	ø4.5	M3x0.5
303585		ø10											

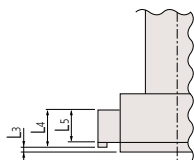
Holtest

For easy and accurate measurement of inside diameters

Digimatic Holtest SERIES 468 — Three-point Internal Micrometers

- Three-point internal micrometer with large LCD readout. (Character height 7.4mm)
- Titanium-coated measuring pins provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- One SR44 battery is required and battery life is approx. 1.2 years under normal use.
- ABSolute and INCremental measurement modes allow highly efficient operation.
- The IP65 protection rating allows the instrument to be used in the presence of splashing coolant.
- Measurements can be made close to the bottom of a blind hole.
- Deep holes can be measured by attaching an extension rod (optional).
- A function lock prevents accidental change of reference point.
- Measurement data output enables operation with Statistical Process Control (SPC) and measurement control systems. Refer to page A-1.
- An interface input tool is available for transferring measurement data, under keyboard control, directly to commercial spreadsheet software. Refer to page A-3.
- Interchangeable-Head Sets (interchangeable measuring heads type) covering an extended measuring range using multiple heads and Non-interchangeable-Head Sets are available.
- For Setting Rings, refer to page C-35.

Range (mm)	L3 (mm)	L4 (mm)	L5 (mm)
6 - 12	2 or below	—	2.5
12 - 20	0.3 or below	5.6	3.5
20 - 30		8.3	5.2
30 - 50		13.0	10.0
50 - 100		17.0	14.0
100 - 300	12.4 or below	21.0	13.8



468-161



468-168



468-174



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



www.tuv.com
ID: 0000021605



An inspection certificate is supplied as standard.

IP Codes

Level 6: Dust-proof.

Degree of protection against solid foreign objects.
No ingress of dust allowed.

Level 5: Protected against water jets.

Degree of protection against water.
Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Display: LCD

Battery: SR44 (1 pc), **938882**,
for initial operational checks (standard accessory)

Battery life: Approx. 1.2 years under normal use

Scale type: Electromagnetic induction-type rotary encoder

Functions

Zero-setting

Origin restoration

Data hold

2-point Preset

Function lock (see illustration of lock symbol below)



inch/mm readout (inch/mm models)

Automatic power ON/OFF

Error alarm

Data output

Optional accessories

Refer to page A-16 for details.

- USB Input Tool Direct (2m): **06ADV380B**

- Connecting cables for **U-WAVE-T**

For standard (160mm): **02AZD790B**

For foot switch: **02AZE140B**

Optional accessories

Shown mounted on stand using bracket



Mounting bracket
No.04AZB157

SPECIFICATIONS

Metric					
Order No.	Range	Resolution	Accuracy* ¹	Optional Accessories* ²	
				Extension rod	SPC cable
468-161	6 - 8mm	0.001mm	±2µm (within 2µm)	952322 (100mm)	05CZA662 (1m) 05CZA663 (2m)
468-162	8 - 10mm			952621 (150mm)	
468-163	10 - 12mm				
468-164	12 - 16mm		±3µm (within 3µm)	952622 (150mm)	
468-165	16 - 20mm				
468-166	20 - 25mm			952623 (150mm)	
468-167	25 - 30mm				
468-168	30 - 40mm				
468-169	40 - 50mm				
468-170	50 - 63mm		±5µm (within 5µm)		
468-171	62 - 75mm				
468-172	75 - 88mm				
468-173	87 - 100mm				
468-174	100 - 125mm				
468-175	125 - 150mm				
468-176	150 - 175mm				
468-177	175 - 200mm				
468-178	200 - 225mm				
468-179	225 - 250mm				
468-180	250 - 275mm				
468-181	275 - 300mm				

*1 Excluding quantizing error.

Accuracy: values measured with the entire measuring face.

Maximum difference: differences between the maximum and minimum values.

*2 Setting ring and extension rod: optional.

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)

Inch/Metric					
Order No.	Range	Resolution	Accuracy* ¹	Optional Accessories* ²	
				Extension rod	SPC cable
468-261	.275" - .35"	.00005"/ 0.001mm	±.0001" (within .0001")	952322 (100mm)	05CZA662 (1m) 05CZA663 (2m)
468-262	.35" - .425"			952621 (150mm)	
468-263	.425" - .5"				
468-264	.5" - .65"		±.00015" (within .00015")	952622 (150mm)	
468-265	.65" - .8"				
468-266	.8" - 1"			952623 (150mm)	
468-267	1" - 1.2"				
468-268	1.2" - 1.6"				
468-269	1.6" - 2"				
468-270	2" - 2.5"				
468-271	2.5" - 3"				
468-272	3" - 3.5"				
468-273	3.5" - 4"				
468-274	4" - 5"	.0001"/ 0.001mm	±.00025" (within .00025")		
468-275	5" - 6"				
468-276	6" - 7"				
468-277	7" - 8"				
468-278	8" - 9"				
468-279	9" - 10"				
468-280	10" - 11"				
468-281	11" - 12"				

*1 Excluding quantizing error.

Accuracy: values measured across the entire measuring face.

Maximum difference: differences between the maximum and minimum values.

*2 Setting ring and extension rod: optional.

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)



Interchangeable-Head Sets (interchangeable measuring heads type)

* For details, refer to page C-3.



Non-interchangeable-Head Sets

** For details, refer to page C-4.

Holtest

For easy and accurate measurement of inside diameters

Interchangeable-Head Sets

Metric				Inch/Metric			
Set Order No.	Range*	Content of set	Accessories (optional)	Set Order No.	Range*	Content of set	Accessories (optional)
468-971	6 - 12mm	Display unit 6 - 12mm 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)	468-976	.275-.5"	Display unit .275-.5" 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)
		Measuring head 6 - 8mm 1 pc				Measuring head .275-.35" 1 pc	
		8 - 10mm 1 pc				.35-.425" 1 pc	
		10 - 12mm 1 pc				.425-.5" 1 pc	
		Setting ring (ø8, ø10) 1 pc each				Setting ring (.35"DIA., .425"DIA.) 1 pc each	
468-972	12 - 20mm	Extension rod (100mm) 1 pc		468-977	.5-.8"	Extension rod (100mm) 1 pc	
		Spanner 2 pcs				Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	
468-973	20 - 50mm	Display unit 20 - 50mm 1 pc		468-978	.8-2"	Display unit .8-2" 1 pc	
		Measuring head 20 - 25mm 1 pc				Measuring head .8-1" 1 pc	
		25 - 30mm 1 pc				1-1.2" 1 pc	
		30 - 40mm 1 pc				1.2-1.6" 1 pc	
		40 - 50mm 1 pc				1.6-2" 1 pc	
468-974	50 - 100mm	Setting ring (ø25, ø40) 1 pc each		468-979	2-4"	Setting ring (1"DIA., 1.6"DIA.) 1 pc each	
		Extension rod (150mm) 1 pc				Extension rod (150mm) 1 pc	
		Spanner 2 pcs				Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	
468-975	100 - 200mm	Display unit 100 - 200mm 1 pc		468-980	4-8"	Display unit 4-8" 1 pc	
		Measuring head 100 - 125mm 1 pc				Measuring head 4-5" 1 pc	
		125 - 150mm 1 pc				5-6" 1 pc	
		150 - 175mm 1 pc				6-7" 1 pc	
		175 - 200mm 1 pc				7-8" 1 pc	
		Setting ring (ø125, ø175) 1 pc each				Setting ring (5"DIA., 7"DIA.) 1 pc each	
		Extension rod (150mm) 1 pc				Extension rod (150mm) 1 pc	
		Spanner 2 pcs				Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)



468-971



468-972



468-973



468-974



Standard accessory
(packed separately)
Setting Rings (ø125, ø175)
468-975

Optional accessories

Refer to page A-16 for details.
USB Input Tool Direct (2m): **06ADV380B**
Connecting cables for **U-WAVE-T**
For standard (160mm): **02AZD790B**
For foot switch: **02AZE140B**

Non-Interchangeable-Head Sets

Metric					Inch/Metric				
Set Order No.	Range*2	Content of set	Accessories (optional)		Set Order No.	Range*2	Content of set	Accessories (optional)	
			Extension rod	SPC cable				Extension rod	SPC cable
468-981	6 - 12mm	Display unit 6 - 8mm 1 pc 8 - 10mm 1 pc 10 - 12mm 1 pc Setting ring (ø8, ø10) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	100mm 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)	468-986	.275"-.5"	Display unit .275-.35" 1 pc .35-.425" 1 pc .425-.5" 1 pc Setting ring (.35" DIA., .425" DIA) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	100mm 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)
468-982	12 - 25mm	Display unit 12 - 16mm 1 pc 16 - 20mm 1 pc 20 - 25mm 1 pc Setting ring (ø16, ø20) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	150mm 2 pcs*1		468-987	.5"-1"	Display unit .5-.65" 1 pc .65-.8" 1 pc .8-1" 1 pc Setting ring (.65" DIA., .8" DIA) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	150mm 2 pcs*1	
468-983	25 - 50mm	Display unit 25 - 30mm 1 pc 30 - 40mm 1 pc 40 - 50mm 1 pc Setting ring (ø30, ø40) 1 pc each Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc		468-988	1"-2"	Display unit 1-1.2" 1 pc 1.2-1.6" 1 pc 1.6-2" 1 pc Setting ring (1.2" DIA., 1.6" DIA) 1 pc each Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc	
468-984	50 - 75mm	Display unit 50 - 63mm 1 pc 62 - 75mm 1 pc Setting ring (ø62) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc		468-989	2"-3"	Display unit 2-2.5" 1 pc 2.5-3" 1 pc Setting ring (2.5" DIA) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc	
468-985	75 - 100mm	Display unit 75 - 88mm 1 pc 87 - 100mm 1 pc Setting ring (ø87) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc		468-990	3"-4"	Display unit 3-3.5" 1 pc 3.5-4" 1 pc Setting ring (3.5" DIA) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc	

*1 Total 2 pcs of extension rods: 1 pcs of Part **No. 952621** (for measuring range 12 to 16mm, 16 to 20mm) and Part **No. 952622** (for measuring range 20 to 25mm).
Two extension rods cannot be connected due to the different mounting positions.

*2 It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measurement accuracy in such cases is not guaranteed.)



468-981



468-982



468-983



468-984



468-985

Optional accessories

Refer to page A-16 for details.

USB Input Tool Direct (2m): **06ADV380B**

Connecting cables for **U-WAVE-T**

For standard (160mm): **02AZD790B**

For foot switch: **02AZE140B**

Holtest

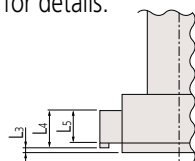
For easy and accurate measurement of inside diameters

Holtest

SERIES 368 — Three-point/Two-point Internal Micrometers

- Titanium-coated measuring pins on the three-point type (over 6mm range models) provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Three-point bore micrometer with measuring range 6mm or longer allows stable measurement through automatic centering.
- Can measure deep holes using an Extension rod (optional) which is available on models over 6mm (.275") measuring range.
- Ratchet Stop ensures constant-force, repeatable measurement.
- Setting Rings for accurately setting the instrument are optional. Refer to page C-35 for details.

Range (mm)	L ₃ (mm)	L ₄ (mm)	L ₅ (mm)
2 - 6	—	—	2
6 - 12	2 or below	—	2.5
12 - 20	0.3 or below	5.6	3.5
20 - 30		8.3	5.2
30 - 50		13.0	10.0
50 - 100	12.4 or below	17.0	14.0
100 - 300		21.0	13.8



368-001
(Two-point contact model)



368-170



368-168



368-174

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Accuracy* ¹	Extension Rod (optional)
(Two-point)				
368-001	2 - 2.5mm	0.001mm	±2μm (within 2μm)	—
368-002	2.5 - 3mm			
368-003	3 - 4mm			
368-004	4 - 5mm			
368-005	5 - 6mm			
(Three-point)				
368-161	6 - 8mm	0.001mm	±2μm (within 2μm)	952322 (100mm)
368-162	8 - 10mm			
368-163	10 - 12mm			
368-164	12 - 16mm			
368-165	16 - 20mm			
368-166	20 - 25mm	0.005mm	±3μm (within 3μm)	952621 (150mm)
368-167	25 - 30mm			
368-168	30 - 40mm			
368-169	40 - 50mm			
368-170	50 - 63mm			
368-171	62 - 75mm	0.005mm	±5μm (within 5μm)	952622 (150mm)
368-172	75 - 88mm			
368-173	87 - 100mm			
368-174	100 - 125mm			
368-175	125 - 150mm			
368-176	150 - 175mm	0.005mm	±5μm (within 5μm)	952623 (150mm)
368-177	175 - 200mm			
368-178	200 - 225mm			
368-179	225 - 250mm			
368-180	250 - 275mm			
368-181	275 - 300mm			

*1 Excluding quantizing error.

Accuracy: values measured across the entire measuring face.

Maximum difference: differences between the maximum and minimum values.

* Setting ring and extension rod: optional.

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)



An inspection certificate is supplied as standard.



Application using an extension rod



An inspection certificate is supplied as standard.



368-911



368-913



Setting rings supplied as standard
($\phi 125$, $\phi 175$) (Packed separately)

368-915



368-912



368-914

Holtest SERIES 368 — Three-point/Two-point Internal Micrometers

Non-Interchangeable-Head Sets

Metric			
Set Order No.	Range*	Graduation	Content of Set
(Two-point) 368-906	2 - 3mm	0.001mm	Micrometer head unit 2 - 2.5mm 1 pc 2.5 - 3mm 1 pc Setting ring ($\phi 2.5$) 1 pc Hex wrench 1 pc
368-907	3 - 6mm		Micrometer head unit 3 - 4mm 1 pc 4 - 5mm 1 pc 5 - 6mm 1 pc Setting ring ($\phi 4$, $\phi 5$) 1pc each Hex wrench 1 pc
(Three-point) 368-911	6 - 12mm		Micrometer head unit 6 - 8mm 1 pc 8 - 10mm 1 pc 10 - 12mm 1 pc Setting ring ($\phi 8$, $\phi 10$) 1pc each Extension rod (100mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-912	12 - 20mm	0.005mm	Micrometer head unit 12 - 16mm 1 pc 16 - 20mm 1 pc Setting ring ($\phi 16$) 1 pc Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-913	20 - 50mm		Micrometer head unit 20 - 25mm 1 pc 25 - 30mm 1 pc 30 - 40mm 1 pc 40 - 50mm 1 pc Setting ring ($\phi 25$, $\phi 40$) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-914	50 - 100mm		Micrometer head unit 50 - 63mm 1 pc 62 - 75mm 1 pc 75 - 88mm 1 pc 87 - 100mm 1 pc Setting ring ($\phi 62$, $\phi 87$) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-915	100 - 200mm		Micrometer head unit 100 - 125mm 1 pc 125 - 150mm 1 pc 150 - 175mm 1 pc 175 - 200mm 1 pc Setting ring ($\phi 125$, $\phi 175$) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)



368-906



368-907

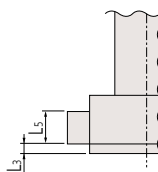
Holtest

For easy and accurate measurement of inside diameters

Holtest (Type II) SERIES 368 — Three-point Internal Micrometers

- Hardened tool-steel anvils (instead of titanium-coated carbide) for a more economically priced tool.
- Same accuracy as the titanium-coated Holtest models.
- For details of setting rings, refer to page C-35.
- Constant-force device allows repeatable measurement.

Range (mm)	L ₃ (mm)	L ₅ (mm)
12 - 20	2.6 or below	3.5
20 - 30	3.4 or below	5.2
30 - 50		10
50 - 100		14
100 - 300	19.6 or below	13.8



- Can measure deep holes using an Extension Rod (optional).



368-769



368-770



368-774

SPECIFICATIONS

Metric — individual				
Order No.	Range	Graduation	Accuracy*1	Extension Rod (optional)
368-764	12 - 16mm	0.005mm	±2μm (within 2μm)	952621 (150mm)
368-765	16 - 20mm			
368-766	20 - 25mm		±3μm (within 3μm)	952622 (150mm)
368-767	25 - 30mm			
368-768	30 - 40mm			
368-769	40 - 50mm			
368-770	50 - 63mm		±5μm (within 5μm)	952623 (150mm)
368-771	62 - 75mm			
368-772	75 - 88mm			
368-773	87 - 100mm			
368-774	100 - 125mm			
368-775	125 - 150mm			
368-776	150 - 175mm			
368-777	175 - 200mm			
368-778	200 - 225mm			
368-779	225 - 250mm			
368-780	250 - 275mm			
368-781	275 - 300mm			

*1 Excluding quantizing error.

Accuracy: values measured across the entire measuring face.

Maximum difference: differences between the maximum and minimum values.

* Setting ring and extension rod: optional.

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)



An inspection certificate is supplied as standard.

For details of Special-order Products,
refer to page C-49.

Non-Interchangeable-Head Sets

Metric			
Order No.	Range*	Graduation	Content of Set
368-991	12 - 20mm	0.005mm	Micrometer head unit 12 - 16mm 1 pc 16 - 20mm 1 pc Setting ring (ø16) 1 pc Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-992	20 - 50mm		Micrometer head unit 20 - 25mm 1 pc 25 - 30mm 1 pc 30 - 40mm 1 pc 40 - 50mm 1 pc Setting ring (ø25, ø40) 1 pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-993	50 - 100mm		Micrometer head unit 50 - 63mm 1 pc 62 - 75mm 1 pc 75 - 88mm 1 pc 87 - 100mm 1 pc Setting ring (ø62, ø87) 1 pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-994	100 - 200mm		Micrometer head unit 100 - 125mm 1 pc 125 - 150mm 1 pc 150 - 175mm 1 pc 175 - 200mm 1 pc Setting ring (ø125, ø175) 1 pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)



368-991



368-992



368-993



Setting rings are supplied as standard (ø125, ø175) (Packed separately)

368-994

Holtest

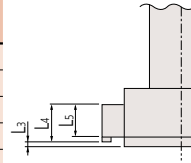
For easy and accurate measurement of inside diameters

ABSOLUTE Borematic SERIES 568 — ABSOLUTE Digimatic Snap-Open Bore Gages

- A snap-type digital display, inside-diameter measuring instrument allows quick and easy measurement with lever operation.
- Titanium-coated measuring pins provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Three-Point contact measuring head enables highly repeatable measurement data to be obtained.
- The ABSOLUTE linear encoder eliminates overspeed errors.
- GO/NO-GO judgment function.
- Dual HOLD function buttons, optimally located, enable high operability.
- 330-degree rotatable display unit for easy reading at any angle.

- Measurement can be made close to the bottom of a blind hole.

Range (mm)	L3 (mm)	L4 (mm)	L5 (mm)
6 - 12	2 or below	—	2.5
12 - 20	0.3 or below	5.6	3.5
20 - 30		8.3	5.2
30 - 50		13.0	10
50 - 125		17.0	14



Extension rod (optional)

- Can measure deep holes by attaching an optional extension rod.
- Digimatic output port enables inclusion in a statistical process control or networked measurement system. (Refer to page A-1 for details.)
- Interface Input Tools are available that enable the conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel. (Refer to page A-3 for details.)
- Interchangeable-Head Bore Gages are available in part sets and full sets.
- For details of Setting rings, refer to page C-35.



568-364



568-368



An inspection certificate is supplied as standard.

ABSOLUTE™

Technical Data

Resolution: 0.001mm or .00005"/0.001mm
Display: LCD
Response speed: Infinite
Battery: SR44 (1 pc), **938882**, for initial operational checks (standard accessory)
Battery life: Approx. 5,000 hours in continuous use
Scale type: Electrostatic capacitance type absolute encoder

Functions

GO/NO-GO judgment
GO/NO-GO judgment zoom
2-Point Preset
Zero-setting
Data hold, Error alarm
Low battery voltage alert
Data output
Function Lock
330° rotary display
inch/mm conversion (inch/mm models)

Optional accessories

Refer to page A-16 for details
USB Input Tool Direct (2m): 06ADV380F
Connecting cables for **U-WAVE-T**
For standard (160mm): **02AZD790F**
For foot switch: **02AZE140F**

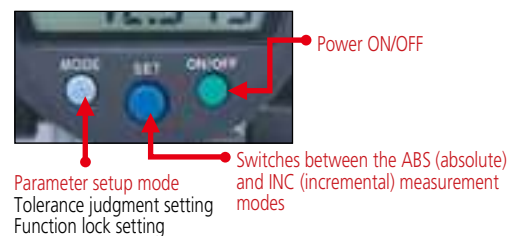
• Large LCD

Character height of 11mm (1.5 times the character area of conventional 8.5mm products)



• Three large buttons

The three large-button design employed by ID-N/ID-B, the ABSOLUTE coolant proof Digimatic indicators, enables easier and simpler operation.



• Function locking

Ensures reliability of measurement by locking the settings to prevent preset function settings from being changed by mistake.



SPECIFICATIONS

Metric individual					
Order No.	Range*2	Accuracy*1	Mass	Accessories (optional)*2	
				Extension Rod	SPC cable
568-361	6 - 8mm	±5μm (within 5μm)	480g	952322 (100mm)	
568-362	8 - 10mm		485g		
568-363	10 - 12mm		475g		
568-364	12 - 16mm		480g		
568-365	16 - 20mm		540g		
568-366	20 - 25mm	±6μm (within 6μm)	555g	952622 (150mm)	905338 (1mm)
568-367	25 - 30mm		565g		
568-368	30 - 40mm		610g		
568-369	40 - 50mm		730g	952623 (150mm)	905409 (2mm)
568-370	50 - 63mm		740g		
568-371	62 - 75mm		790g		
568-372	75 - 88mm		800g		
568-373	87 - 100mm		900g		
568-374	100 - 113mm		910g		
568-375	112 - 125mm				

*1 Excluding quantizing error

Instrumental error excluding quantizing error (maximum error)

*2 The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).

Note: Setting rings are optional.

Inch/Metric individual					
Order No.	Range*2	Accuracy*1	Mass	Extension Rod (optional)*2	
				Extension Rod	SPC cable
568-461	.275" - .35"	±.00025" (within .00025")	480g	952322 (100mm)	
568-462	.35" - .425"		485g		
568-463	.425" - .5"		475g		
568-464	.5" - .65"		480g		
568-465	.65" - .8"		540g		
568-466	.8" - 1"	±.0003" (within .0003")	555g	952622 (150mm)	905338 (1mm)
568-467	1" - 1.2"		565g		
568-468	1.2" - 1.6"		610g		
568-469	1.6" - 2"		730g	952623 (150mm)	905409 (2mm)
568-470	2" - 2.5"		740g		
568-471	2.5" - 3"		790g		
568-472	3" - 3.5"		800g		
568-473	3.5" - 4"		900g		
568-474	4" - 4.5"		910g		
568-475	4.5" - 5"				

Holtest

For easy and accurate measurement of inside diameters



An inspection certificate is supplied as standard.

ABSOLUTE Borematic SERIES 568 — ABSOLUTE Digimatic Snap-Open Bore Gages

Interchangeable-Head Bore Gage Sets

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

Metric			
Order No.	Range	Content of Set	
568-924	6 - 12mm	Display unit	1 pc
		Measuring head	
		6 - 8mm	1 pc
		8 - 10mm	1 pc
		10 - 12mm	1 pc
		Attachment	1 pc
		Setting ring (ø8, ø10)	1 pc each
Spanner	3 pcs		
568-925	12 - 25mm	Display unit	1 pc
		Measuring head	
		12 - 16mm	1 pc
		16 - 20mm	1 pc
		20 - 25mm	1 pc
		Attachment	2 pcs
		Setting ring (ø16, ø20)	1 pc each
Spanner	2 pcs		
568-926	25 - 50mm	Display unit	1 pc
		Measuring head	
		25 - 30mm	1 pc
		30 - 40mm	1 pc
		40 - 50mm	1 pc
		Attachment	1 pc
		Setting ring (ø30, ø40)	1 pc each
Spanner	2 pcs		
568-927	50 - 100mm	Display unit	1 pc
		Measuring head	
		50 - 63mm	1 pc
		62 - 75mm	1 pc
		75 - 88mm	1 pc
		87 - 100mm	1 pc
		Attachment	1 pc
Setting ring (ø62, ø87)	1 pc each		
Spanner	2 pcs		

Inch/Metric		
Order No.	Range	Content of Set
568-928	.275" - .5"	Display unit 1 pc
		Measuring head
		.275-.35" 1 pc
		.35-.425" 1 pc
		.425-.5" 1 pc
		Attachment 1 pc
		Setting ring (.35" DIA, .425" DIA) 1 pc each
		Spanner 3 pcs
568-929	.5" - 1"	Display unit 1 pc
		Measuring head
		.5-.65" 1 pc
		.65-.8" 1 pc
		.8-1" 1 pc
		Attachment 2 pcs
		Setting ring (.65" DIA, .8" DIA) 1 pc each
		Spanner 2 pcs
568-930	1" - 2"	Display unit 1 pc
		Measuring head
		1-1.2" 1 pc
		1.2-1.6" 1 pc
		1.6-2" 1 pc
		Attachment 1 pc
		Setting ring (1.2" DIA, 1.6" DIA) 1 pc each
		Spanner 2 pcs
568-936	2" - 4"	Display unit 1 pc
		Measuring head
		2-2.5" 1 pc
		2.5-3" 1 pc
		3-3.5" 1 pc
		3.5-4" 1 pc
		Attachment 1 pc
Setting ring (2.5" DIA, 3.5" DIA) 1 pc each		
		Spanner 2 pcs

Non-Interchangeable-Head Snap-Open Bore Gage Sets

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

Metric			
Order No.	Range	Content of Set	
568-955	6 - 12mm	Display unit	
		6 - 8mm	1 pc
		8 - 10mm	1 pc
		10 - 12mm	1 pc
		Setting ring (ø8, ø10)	1 pc each
		Spanner	3 pcs
568-956	12 - 25mm	Display unit	
		12 - 16mm	1 pc
		16 - 20mm	1 pc
		20 - 25mm	1 pc
		Setting ring (ø16, ø20)	1 pc each
		Spanner	2 pcs
568-957	25 - 50mm	Display unit	
		25 - 30mm	1 pc
		30 - 40mm	1 pc
		40 - 50mm	1 pc
		Setting ring (ø30, ø40)	1 pc each
		Spanner	2 pcs
568-958	50 - 75mm	Display unit	
		50 - 63mm	1 pc
		62 - 75mm	1 pc
		Setting ring (ø62)	1 pc
568-959	75 - 100mm	Display unit	
		75 - 88mm	1 pc
		87 - 100mm	1 pc
		Setting ring (ø87)	1 pc

Inch/Metric			
Order No.	Range	Content of Set	
568-965	.275" - .5"	Display unit	
		.275-.35"	1 pc
		.35-.425"	1 pc
		.425-.5"	1 pc
		Setting ring (.35" DIA, .425" DIA)	1 pc each
		Spanner	3 pcs
568-966	.5" - 1"	Display unit	
		.5-.65"	1 pc
		.65-.8"	1 pc
		.8-1"	1 pc
		Setting ring (.65" DIA, .8" DIA)	1 pc each
		Spanner	2 pcs
568-967	1" - 2"	Display unit	
		1-1.2"	1 pc
		1.2-1.6"	1 pc
		1.6-2"	1 pc
		Setting ring (1.2" DIA, 1.6" DIA)	1 pc each
		Spanner	2 pcs
568-968	2" - 3"	Display unit	
		2-2.5"	1 pc
		2.5-3"	1 pc
		Setting ring (2.5" DIA)	1 pc
			Spanner
568-969	3" - 4"	Display unit	
		3-3.5"	1 pc
		3.5-4"	1 pc
		Setting ring (3.5" DIA)	1 pc
			Spanner



568-924



568-926



568-955



568-957



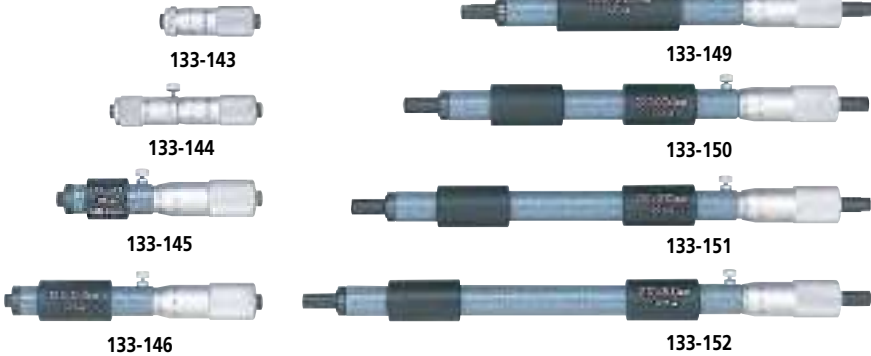
568-959

Inside Micrometers

For easy and accurate measurement of inside diameters

Tubular Inside Micrometers SERIES 133 — Single Rod Type

- Standard single rod type inside micrometer.
- Carbide measuring faces.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- Setting ring (nominal size below 300mm), CERA Inside Micro Checker, and Gauge Block accessory set are provided as a reference gage for datum adjustment (refer to page C-35 and E-13 - E16 for details).



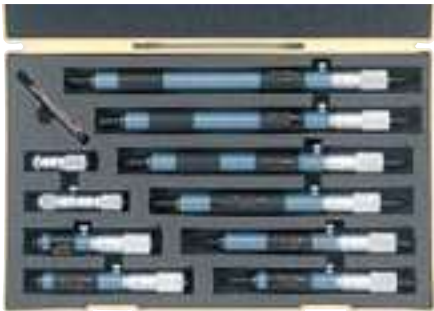
SPECIFICATIONS

Metric	Individual		
Order No.	Range	Graduation	Accuracy
133-143	50 - 75mm	0.01mm	±3µm
133-144	75 - 100mm		±4µm
133-145	100 - 125mm		±5µm
133-146	125 - 150mm		
133-147	150 - 175mm		
133-148	175 - 200mm		
133-149	200 - 225mm		±6µm
133-150	225 - 250mm		
133-151	250 - 275mm		
133-152	275 - 300mm		
133-153	300 - 325mm		±7µm
133-154	325 - 350mm		
133-155	350 - 375mm		
133-156	375 - 400mm		
133-157	400 - 425mm		±8µm
133-158	425 - 450mm		±9µm
133-159	450 - 475mm		
133-160	475 - 500mm		
133-161	500 - 525mm		
133-162	525 - 550mm		±10µm
133-163	550 - 575mm		
133-164	575 - 600mm		
133-165	600 - 625mm		
133-166	625 - 650mm		±11µm
133-167	650 - 675mm		±12µm
133-168	675 - 700mm		
133-169	700 - 725mm		
133-170	725 - 750mm		
133-171	750 - 775mm		±13µm
133-172	775 - 800mm		
133-173	800 - 825mm		
133-174	825 - 850mm		
133-175	850 - 875mm		±14µm
133-176	875 - 900mm		
133-177	900 - 925mm		
133-178	925 - 950mm		
133-179	950 - 975mm		±15µm
133-180	975 - 1000mm		

Optional Accessory



Single Rod Type Inside Micrometer Set



133-902

Metric	Micrometer set	
Order No.	Range	Models included
133-901	50 - 150mm (4 heads/set)	133-143 133-144 133-145 133-146 with fitted case
133-902	50 - 300mm (10 heads/set)	133-143 133-144 133-145 133-146 133-147 133-148 133-149 133-150 133-151 133-152 with fitted case



IP Codes

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

Accuracy

$\pm(3 + \text{number of rods} + \text{maximum measurement length}/50) \mu\text{m}$ (fraction rounded up)

Excluding quantizing error (only for Digimatic)



Functions

(for 337-101/301/302/102/303/304)

Zero-setting

Origin restoration

Data hold

2-point Preset

Function lock

Automatic power ON/OFF

Error alarm

Data output

Battery and scale type

(for 337-101/301/302/102/303/304)

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 1.2 years under normal use

Scale type: Electromagnetic induction-type rotary encoder

Optional accessories

Refer to page A-16 for details.

Connecting cables with **IT/DP/MUX**, etc.

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct (2m): 06ADV380B

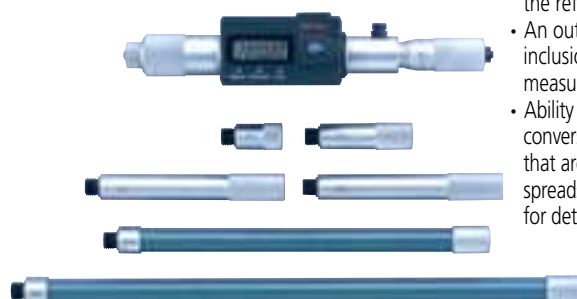
Connecting cables for **U-WAVE-T**

For standard (160mm): **02AZD790B**

For foot switch: **02AZE140B**

Tubular Inside Micrometers SERIES 137, 337 — Extension Rod Type

- Wide range of inside measurements possible by combining extension rods and anvils with the micrometer head.
- Two types of measuring faces are available; with or without carbide tip. (No. 337-101/301/302/102/303/304 only available with carbide tip.)
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An inside length standard is required for accurately setting the micrometer.
- Order No. 337-101/301/302/102/303/304 features:
 - IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
 - A large-character LCD display.
 - Storage of 2 preset values for use when setting to an inside length standard.
 - A function lock that prevents accidental changing of the reference setting during measurement.
 - An output port for measurement data that enables inclusion in a statistical process control or networked measurement system. Refer to page A-1 for details.
 - Ability to use Interface Input Tools that enable conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel. Refer to page A-3 for details.



337-301



137-205

SPECIFICATIONS

Metric

Order No.	Range	Resolution	Micrometer head stroke	Extension rods		Display unit
				Qty	Size	
Digimatic (LCD)						
337-101	200 - 225mm	0.001mm	25mm	—	—	200 - 225mm
337-301	200 - 1000mm			6	25, 50, 100 (2pcs), 200, 300mm	
337-302	200 - 1500mm			7	25, 50, 100, 200, 300 (3pcs) mm	

Metric

Order No.	Range	Graduation	Micrometer head stroke	Qty	Extension rods Size	Main unit
Analog						
137-201	50 - 150mm	0.01mm	13mm	3	13, 25, 50mm	50 - 63mm
137-202	50 - 300mm			5	13, 25, 50 (2 pcs.), 100mm	
137-203	50 - 500mm			6	13, 25, 50 (2 pcs.), 100, 200mm	
137-204	50 - 1000mm			8	13, 25, 50 (2 pcs.), 100, 200 (2 pcs.), 300 mm	
				10	13, 25, 50 (2 pcs.), 100, 200 (3 pcs.), 300 (2 pcs.)mm	
137-205	50 - 1500mm					
Analog (With carbide measuring face)						
137-206	50 - 150mm	0.01mm	13mm	3	13, 25, 50mm	50 - 63mm
137-207	50 - 300mm			5	13, 25, 50 (2 pcs.), 100mm	
137-208	50 - 500mm			6	13, 25, 50 (2 pcs.), 100, 200mm	
137-209	50 - 1000mm			8	13, 25, 50 (2 pcs.), 100, 200 (2 pcs.), 300 mm	
				10	13, 25, 50 (2 pcs.), 100, 200 (3 pcs.), 300 (2 pcs.)mm	
137-210	50 - 1500mm					

Inch/Metric

Order No.	Range	Resolution	Micrometer head stroke	Qty	Extension rods Size (inch)	Display unit
Digimatic (LCD)						
337-102	8" - 9"	.0001"/ 0.001mm	1"	—	—	8 - 9"
337-303	8" - 40"			6	1", 2", 4" (2 pcs.), 8", 12"	
337-304	8" - 60"			7	1", 2", 4", 8", 12" (3 pcs.)	

Inside Micrometers

For easy and accurate measurement of inside diameters

Tubular Inside Micrometers

SERIES 139, 339, 140 — Extension Pipe Type

- Wide range of inside diameter measurements possible by combining extension pipes and anvils with the micrometer head.
- Carbide measuring faces are available.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An inside length standard is required for accurately setting the micrometer.
- Order No. 339-101/301/302/102/303/304 features:
 - IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
 - A large-character LCD display.
 - Storage of 2 preset values for use when setting to an inside length standard.
 - A function lock that prevents accidental changing of the reference setting during measurement.
 - An output port for measurement data that enables inclusion in a statistical process control or networked measurement system. Refer to page A-1 for details.
 - Ability to use Interface Input Tools that enable conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel. Refer to page A-3 for details.



339-301



139-177



140-158

SPECIFICATIONS

Metric						
Order No.	Range	Resolution	Micrometer head stroke	Qty	Extension pipes Size	Display unit
Digimatic (LCD)						
339-101	200 - 225mm	0.001mm	25mm	—	—	200 - 225mm
339-301	200 - 1000mm			5	25,50,100,200,400mm	
339-302	200 - 2000mm			8	25,50,100,200 (2pcs),400 (3pcs)mm	
Metric						
Order No.	Range	Graduation	Micrometer head stroke	Qty	Extension pipes Size	Main unit
Analog						
139-173	100 - 500mm	0.01mm	25mm	4	25, 50, 100, 200mm	100 - 125mm
139-174	100 - 900mm			5	25, 50, 100, 200, 400mm	
139-175	100 - 1300mm			6	25, 50, 100, 200, 400mm (2 pcs.)	
139-176	100 - 1700mm			7	25, 50, 100, 200, 400mm (3 pcs.)	
139-177	100 - 2100mm			8	25, 50, 100, 200, 400mm (4 pcs.)	
140-157	1000 - 2000mm		50mm	5	50, 100 (2 pcs.), 200, 500mm	1000 - 1050mm
140-158	1000 - 3000mm			6	50, 100 (2 pcs.), 200, 500, 1000mm	
140-159	1000 - 4000mm			7	50, 100 (2 pcs.), 200, 500, 1000mm (2 pcs.)	
140-160	1000 - 5000mm			8	50, 100 (2 pcs.), 200, 500, 1000mm (3 pcs.)	



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



IP Codes

- Level 6: Dust-proof.
No ingress of dust allowed.
- Level 5: Protected against water jets.
Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

- Accuracy
- 339 series**
±(3 + number of pipes + maximum measurement length/50)μm (fraction rounded up)
- 139 series**
±(3 + number of pipes + maximum measurement length/50)μm (fraction rounded up)
- 140 series**
±(7 + number of pipes + maximum measurement length/50)μm (fraction rounded up)
- Excluding quantizing error (only for Digimatic)



Functions

(for 339-101/301/302/102/303/304)

- Zero-setting
- Origin restoration
- Data hold
- Function lock
- Automatic power ON/OFF
- 2-point Preset
- Error alarm
- Data output

Battery and scale type

(for 339-101/301/302/102/303/304)

- SR44 (1 pc), **938882**, for initial operational checks (standard accessory)
- Battery life: Approx. 1.2 years under normal use
- Scale type: Electromagnetic induction-type rotary encoder

Optional accessories

- Refer to page A-16 for details
- Connecting cables with IT/DP/MUX, etc.

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct (2m): 06ADV380B

Connecting cables for **U-WAVE-T**

For standard (160mm): **02AZD790B**

For foot switch: **02AZE140B**

Tubular Inside Micrometers SERIES 137 — Extension Rod Type (main unit)

- Micrometer head for Extension Rod Type inside micrometer.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- Setting ring and Gauge Block accessory set are provided as a reference gage for datum adjustment (refer to page C-35 and E-13 - E16 for details).



137-011

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Accuracy	Micrometer head stroke
137-011	50 - 63mm	0.01mm	±3μm	13mm
Carbide-tipped 137-013				

Tubular Inside Micrometers SERIES 139 — Extension Pipe Type (main unit)

- Micrometer head for Extension Pipe Type inside micrometer.
- The sleeve is rotated to adjust the index line position when setting to a length standard
- Setting ring, CERA Inside Micro Checker, and Gauge Block accessory set are provided as a reference gage for datum adjustment (refer to page C-35 and E-13 - E16 for details).



139-001

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Accuracy	Micrometer head stroke
139-001	100 - 125mm	0.01mm	±3μm	25mm

Inside Micrometers

For easy and accurate measurement of inside diameters

Inside Micrometers SERIES 345, 145 — Caliper Type

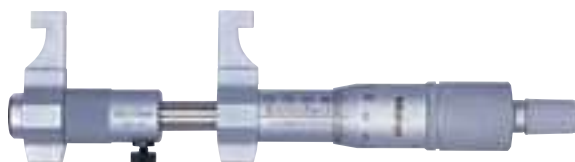
- Carbide measuring faces.
- Equipped with a constant measuring-force device.
- Setting ring (nominal size below 300mm), CERA Inside Micro Checker (more than 50mm), and Gauge Block accessory set are provided as a reference gage for datum adjustment (refer to page C-35 and E-13 - E16 for details).



345-250-30



145-185



145-187

SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	Mass
Digimatic (LCD)				
345-250-30	5 - 30mm	0.001mm	±5μm	320g
345-251-30	25 - 50mm		±6μm	325g

* Excluding quantizing error

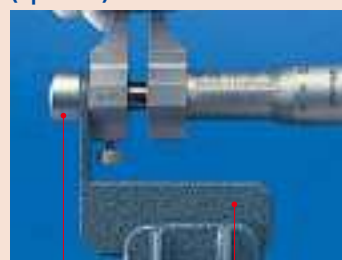
Inch/Metric				
Order No.	Range	Resolution	Accuracy*	Mass
Digimatic (LCD)				
345-350-30	.2" - 1.2"	.00005"/0.001mm	±.00025"/±.0003"	320g
345-351-30	1" - 2"	0.001mm	±.0003"	325g

* Excluding quantizing error

Metric				
Order No.	Range	Graduation	Accuracy	Mass
Analog				
145-185	5 - 30mm	0.01mm	±5μm	130g
145-186	25 - 50mm		±6μm	140g
145-187	50 - 75mm		±7μm	160g
145-188	75 - 100mm		±8μm	180g
145-189	100 - 125mm		±9μm	210g
145-190	125 - 150mm			230g
145-191	150 - 175mm		±10μm	250g
145-192	175 - 200mm			270g
145-217	200 - 225mm		±11μm	310g
145-218	225 - 250mm			330g
145-219	250 - 275mm		±12μm	350g
145-220	275 - 300mm			370g



Accessories for 145-185/186/193/194 (optional)



Cap (No.300401) Holder (No.300400)

* This instrument requires the cap and the holder for mounting on a micrometer stand.

Battery and scale type (for 345-250-30/251-30/350-30/351-30)

SR44 (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 2.4 years under normal use

Scale type: Electromagnetic induction-type rotary encoder

Optional accessories

Refer to page A-16 for details

Connecting cables for Input Tool/ Digimatic Mini-Processor, etc.

1m: **05CZA662**

2m: **05CZA663**

USB Input Tool Direct (2m): 06ADV380B

Connecting cables for **U-WAVE-T**

For standard (160mm): **02AZD790B**

For foot switch: **02AZE140B**

Technical Data

Accuracy
 $\pm(6+\text{maximum measurement length}/50)\mu\text{m}$
 (fraction rounded up)



Inside Micrometers SERIES 141 — Interchangeable Rod Type

- Wide range of inside diameter measurements possible by combining one or more interchangeable rods.
- Each interchangeable rod is marked with its measuring range.
- For models supplied with more than one interchangeable rod, the full measuring range is achieved by combining spacing collars with the rods.
- Both micrometer head and rods are satin-chrome finished throughout.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- Setting ring (nominal size below 300mm), CERA Inside Micro Checker, and Gauge Block accessory set are provided as a reference gage for datum adjustment (refer to page C-35 and E-13 - E16 for details).



When using one of the extension rods supplied
 (Measuring range 43 to 50mm)

141-101

When using one of the extension rods supplied
 (Measuring range 25 to 32mm)

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Micrometer head stroke	Remarks
141-001 / 141-003*	25 - 32mm	0.01mm	7mm	—
141-101 / 141-103*	25 - 50mm			with 2 rods
141-025 / 141-027*	50 - 63mm		13mm	—
141-205 / 141-211*	50 - 200mm			with 3 rods
141-206 / 141-212*	50 - 300mm			with 5 rods
141-009 / 141-011*	200 - 225mm		25mm	—
141-117	200 - 500mm			with 3 rods
141-118	200 - 1000mm			with 8 rods

* with carbide measuring face

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages

SERIES 526 — for Extra Small Holes

- These gages are designed to measure the diameters of very small holes. The radial displacement of the split-ball anvil is converted to axial displacement of the measuring rod, which is shown on the dial indicator.
- Alternative indicators may be used in place of those recommended*.
 - * Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.
- An optional stand (**215-120-10**) is available for efficient measurement of multiple small holes. Refer to page C-20 for details.



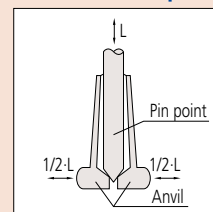
526-170

* The dial indicator and the protection cover are optional.

SPECIFICATIONS

Metric								
Order No.	Range	Content of set						Probing depth
		Bore gage	Dial indicator	Dial protection cover	Anvil	Pin point	Setting ring	
526-170	0.95-1.55mm	526-170	Not supplied	Not supplied	5 pcs.	1 pc.	5 pcs.	11.5mm
526-160	1.50-4.00mm	526-160			9 pcs.	2 pcs.	9 pcs.	17.5, 22.5mm
526-150	3.70-7.30mm	526-150			7 pcs.	1 pc.	7 pcs.	32.0mm
526-172	0.95-1.55mm	526-170	2109SB-10 (Graduation 0.001mm)	21DZA000	5 pcs.	1 pc.	5 pcs.	11.5mm
526-162	1.50-4.00mm	526-160			9 pcs.	2 pcs.	9 pcs.	17.5, 22.5mm
526-152	3.70-7.30mm	526-150			7 pcs.	1 pc.	7 pcs.	32.0mm
526-173	0.95-1.55mm	526-170	2046SB (Graduation: 0.01mm)	21DZA000	5 pcs.	1 pc.	5 pcs.	11.5mm
526-163	1.50-4.00mm	526-160			9 pcs.	2 pcs.	9 pcs.	17.5, 22.5mm
526-153	3.70-7.30mm	526-150			7 pcs.	1 pc.	7 pcs.	32.0mm

Measurement principle



Technical Data

Accuracy
 Metric models: 4μm
 Inch models: .00016"
 Repeatability
 Metric models: 2μm
 Inch models: .00008"

Optional Accessories

– : Dial indicator (See Chapter F)
21DZA000: Dial protection cover
215-120-10: Stand for small holes

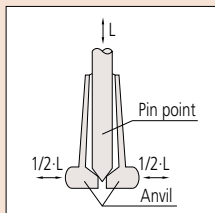
Recommended dial indicators (see Chapter F)

Metric models: **2046SB** (0.01mm)
2972TB (0.01mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
 Inch models: **2922SB** (.0005")
2977TB (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators (see Chapter F)

Metric models: **543-310B** (ID-C112GXB: 0.001mm)
 Inch models: **543-312B** (ID-C112GEXB: 0.001mm/.00005")
 * Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

Measurement principle



Technical Data

Accuracy

Metric models: 7-10mm, 4μm / 10-18mm, 6μm

Inch models: .3-.4", .00016" / .4-.7", .00024"

Repeatability

Metric models: 2μm

Inch models: .00008"

Optional accessories

–: Dial indicator (See Chapter F)

21DZA000: Dial protection cover

–: Setting ring (See page C-35)

215-120-10: Stand for small holes

Recommended dial indicators (see Chapter F)

Metric models: **2046SB** (0.01mm)

2972TB (0.01mm - One-revolution type)

2109SB-10 (0.001mm)

2900SB-10 (0.001mm - One-revolution type)

Inch models: **2922SB** (.0005")

2977TB (.0005" - One-revolution type)

2923SB-10 (.0001")

2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators (see Chapter F)

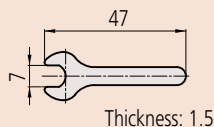
Metric models: **543-310B** (ID-C112GXB, 0.001mm)

Inch models: **543-312B** (ID-C112GEXB, 0.001mm/.00005")

* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

Spanner

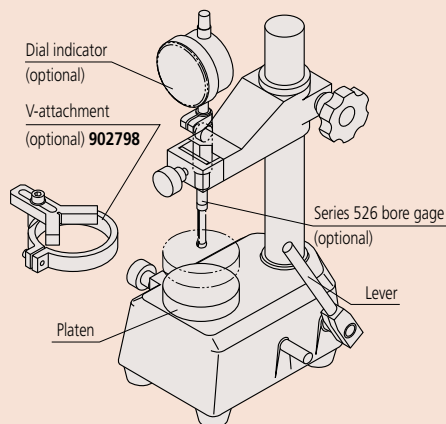
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Operating method

Pulling the lever forwards moves the platen upwards and the instrument goes into measurement mode.

The V-attachment aids positioning the workpiece on the platen and is useful when measuring a large number of the same size of workpiece.



Bore Gages SERIES 526 — for Extra Small Holes



526-101

* The dial indicator and the protection cover are optional.

SPECIFICATIONS

Order No.	Range	Content of set				Probing depth
		Bore gage	Dial indicator	Dial protection cover	Anvil	
526-101	7-10mm	526-101	Not supplied	Not supplied	6 pcs.	32mm
526-102	10-18mm	526-102			8 pcs.	62mm
526-124	7-10mm	526-101	2109SB-10 (Graduation: 0.001mm)	21DZA000	6 pcs.	32mm
526-125	10-18mm	526-102			8 pcs.	62mm
526-126	7-10mm	526-101	2046SB (Graduation: 0.01mm)	21DZA000	6 pcs.	32mm
526-127	10-18mm	526-102			8 pcs.	62mm

Bore Gage Stand SERIES 215

- Optimal for efficient measurement of multiple small holes with a bore gage (series 526).
- V-attachment (**902798**) is available for centering a large number of workpieces quickly (option).
- With platen (60mm).



215-120-10

SPECIFICATIONS

Order No.	Measuring table displacement	Measuring table
215-120-10	38 mm	Flat measuring table (ø60mm)

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511 — for Small Holes

- Alternative indicators may be used in place of those recommended*.
- Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to page C-35)

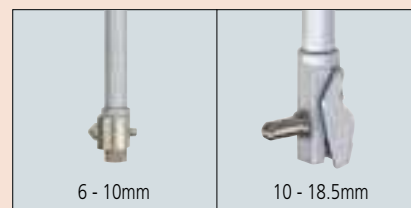
* Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.



511-201

The dial indicator and protection cover are optional.

Close-up view of anvils and contact points



Technical Data

Accuracy: Metric models: 5µm
Inch models: .0002"
Repeatability: Metric models: 2µm
Inch models: .00008"
Adjacent error: Metric models: 2µm
Inch models: .00008"

Optional Accessories

– : Dial indicator (See Chapter F)
21DZA000: Dial protection cover

Recommended digimatic indicators (see Chapter F)

Metric models: **2046SB** (0.01mm)
2972TB (0.01mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: **2922SB** (.0005")
2977TB (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

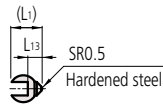
Recommended digimatic indicators (see Chapter F)

Metric models: **543-310B** (ID-C112GXB: 0.001mm)
Inch models: **543-312B** (ID-C112GEXB: 0.001mm/.00005")
* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

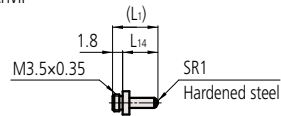
SPECIFICATIONS

Metric										
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set					Probing depth
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	
511-209	6-10mm	0.5mm	2N or less	—	511-209	Not supplied	Not supplied	9 pcs.	Not supplied	50mm
511-201	10-18.5mm	0.6mm		6N or less	511-201				1 pc.	100mm
511-210	6-10mm	0.5mm	2N or less	—	511-209	2109SB-10 (Graduation: 0.001mm)	21DZA000	9 pcs.	Not supplied	50mm
511-203	10-18.5mm	0.6mm		6N or less	511-201				1 pc.	100mm
511-211	6-10mm	0.5mm	2N or less	—	511-209	2046SB (Graduation: 0.01mm)	21DZA000	9 pcs.	Not supplied	50mm
511-204	10-18.5mm	0.6mm		6N or less	511-201				1 pcs.	100mm

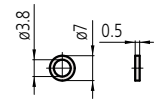
511-209/511-214
Anvil



511-201/511-205
Anvil



Interchangeable washer
(Supplied only with **511-201/511-205**)



No.204355

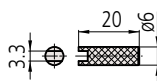
STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable Washer	Spanner
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₃	Parts No.	Parts No.
511-209 511-214	1	952168	6.0mm/.24"	4.7mm/.19"	1.2mm/.05"	Not supplied	206709
	2	952169	6.5mm/.26"	5.3mm/.21"	1.7mm/.07"		
	3	952170	7.0mm/.28"	5.8mm/.23"	2.2mm/.09"		
	4	952414	7.5mm/.30"	6.3mm/.25"	2.7mm/.11"		
	5	952415	8.0mm/.32"	6.8mm/.27"	3.2mm/.13"		
	6	952416	8.5mm/.34"	7.3mm/.29"	3.7mm/.15"		
	7	952417	9.0mm/.36"	7.8mm/.31"	4.2mm/.17"		
	8	952418	9.5mm/.38"	8.3mm/.33"	4.7mm/.19"		
	9	952419	10.0mm/.40"	8.8mm/.35"	5.2mm/.21"		

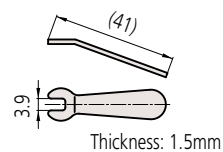
Bore gage (Main body)	Anvil					Interchangeable Washer	Spanner
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	Parts No.
511-201* 511-205	1	204356	10mm/.40"	3.8mm/.15"	2mm/.08"	204355	204354
	2	204357	11mm/.44"	4.8mm/.19"	3mm/.12"		
	3	204358	12mm/.48"	5.8mm/.23"	4mm/.16"		
	4	204359	13mm/.52"	6.8mm/.27"	5mm/.20"		
	5	204360	14mm/.56"	7.8mm/.31"	6mm/.24"		
	6	204361	15mm/.60"	8.8mm/.35"	7mm/.28"		
	7	204362	16mm/.64"	9.8mm/.39"	8mm/.32"		
	8	204363	17mm/.68"	10.8mm/.43"	9mm/.36"		
	9	204364	18mm/.72"	11.8mm/.46"	10mm/.40"		

* Equipped with an anvil fixing plate.

Spanner
No.206709



No.204354



Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

- Longer plunger stroke with no affect on accuracy.
- Carbide is used for the contact point ensuring high durability and wear resistance.
- This model reduces the influence of heat from the operator's hand by 50% by increasing the grip size and making the grip hollow-structured, thereby retaining high-accuracy measurement.
- Alternative indicators may be used in place of those recommended*.
- * Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.
- Optional extension rods can be attached for measuring deep holes. (For details, refer to page C-36.)
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-35.)



511-702

Dial indicators and protection covers are optional.



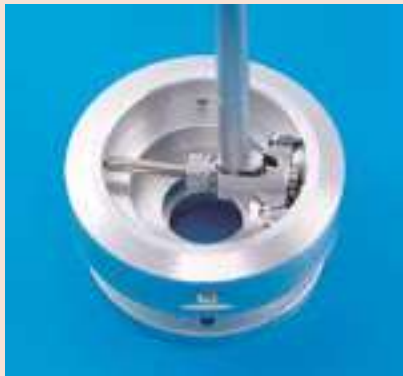
511-703

SPECIFICATIONS

Metric															
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set							Probing depth			
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner				
511-701	18-35mm	1.2mm	4N or less	6N or less	511-701	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	100mm			
511-702	35-60mm				511-702			6 pcs.							
511-703	50-150mm	1.6mm	5N or less	10N or less	511-703			11 pcs.	4 pcs.	1 pc.	Not supplied	150mm			
511-704	100-160mm				511-704			13 pcs.							
511-705	160-250mm		6N or less	15N or less	511-705			6 pcs.	7 pcs.	1 pc.			250mm		
511-706	250-400mm				511-706			5 pcs.							
511-721	18-35mm	1.2mm	4N or less	6N or less	511-701	2109SB-10 (Graduation: 0.001mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	100mm			
511-722	35-60mm				511-702			6 pcs.							
511-723	50-150mm	1.6mm	5N or less	10N or less	511-703			4 pcs.	1 pc.	Not supplied	150mm				
511-724	100-160mm				511-704							13 pcs.			
511-725	160-250mm		6N or less	15N or less	511-705							6 pcs.	7 pcs.	1 pc.	250mm
511-726	250-400mm				511-706							5 pcs.			
511-711	18-35mm	1.2mm	4N or less	6N or less	511-701	2046SB (Graduation: 0.01mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	100mm			
511-712	35-60mm				511-702			6 pcs.							
511-713	50-150mm	1.6mm	5N or less	10N or less	511-703			4 pcs.	1 pc.	Not supplied	150mm				
511-714	100-160mm				511-704							13 pcs.			
511-715	160-250mm		6N or less	15N or less	511-705							6 pcs.	7 pcs.	1 pc.	250mm
511-716	250-400mm				511-706							5 pcs.			
511-921	18-150mm	—	—	—	511-701	2046SB	21DZA000	—	—	—	—				
511-922					511-702	2109SB-10									
511-925-10					511-703	543-310B									

Notes: 1) A 50mm sub-anvil is supplied with 511-703, and a 75mm sub-anvil is supplied with 511-706.

2) It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)



New grip improves accuracy during prolonged use

Technical Data

Accuracy: Metric models 2μm
Inch models .00008"
Repeatability: Metric models 0.5μm
Inch models .00002"
Adjacent error: Metric models 1μm
Inch models .00004"

Optional Accessories

—: Dial indicator (See Chapter F)
21DZA000: Dial protection cover

Recommended dial indicators (see Chapter F)

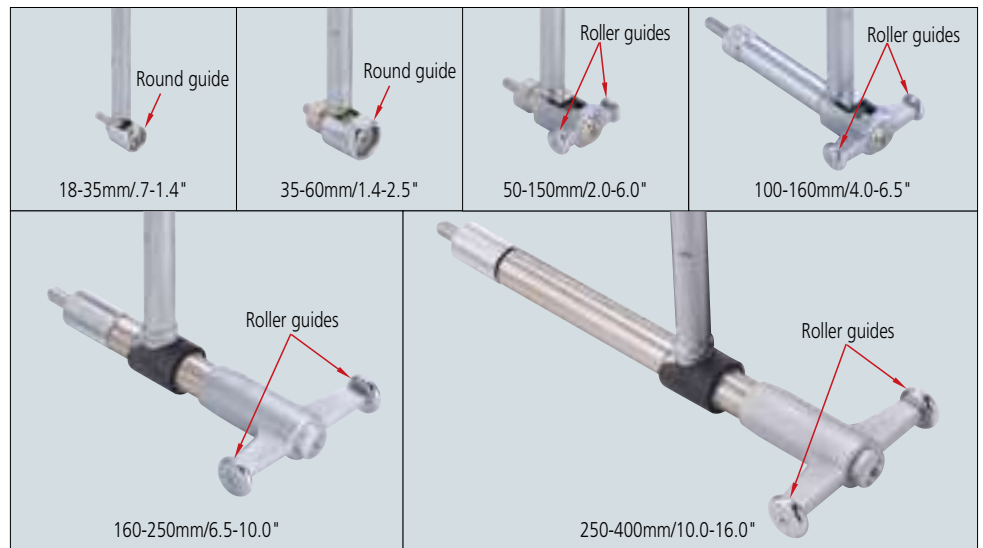
Metric models: **2046SB** (0.01mm)
2972TB (0.01mm - One revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: **2922SB** (.0005")
2977TB (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators (see Chapter F)

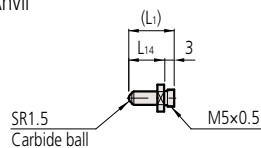
Metric models: **543-310B** (ID-C112GXB: 0.001mm)
Inch models: **543-312B** (ID-C112GEXB: 0.001mm/.00005")

* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

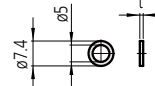
Contact Points



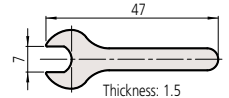
Anvil



Interchangeable washer



Spanner
102148



STANDARD ACCESSORIES

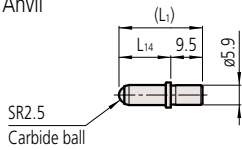
Bore gage (Main body)	Anvil					Interchangeable washer		Spanner
	Marked No.	Parts No.	Indication of measuring size	L1	L14	Parts No.	t	Parts No.
511-701 511-731	1	21DZA213A	18mm/.71"	5.5mm/2.17"	2.5mm/.10"	205623 205624	0.5mm/.02" 1.0mm/.04"	102148
	2	21DZA213B	20mm/.79"	7.5mm/2.95"	4.5mm/.18"			
	3	21DZA213C	22mm/.87"	9.5mm/3.74"	6.5mm/.26"			
	4	21DZA213D	24mm/.94"	11.5mm/4.53"	8.5mm/.33"			
	5	21DZA213E	26mm/1.02"	13.5mm/5.31"	10.5mm/.41"			
	6	21DZA213F	28mm/1.10"	15.5mm/6.10"	12.5mm/.49"			
	7	21DZA213G	30mm/1.18"	17.5mm/6.89"	14.5mm/.57"			
	8	21DZA213H	32mm/1.26"	19.5mm/7.68"	16.5mm/.65"			
	9	21DZA213J	34mm/1.34"	21.5mm/8.46"	18.5mm/.73"			

Bore Gages

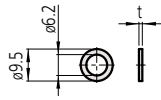
For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

Anvil

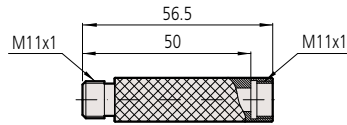


Interchangeable washer



Sub-anvil

(Supplied only for **511-703/733**)



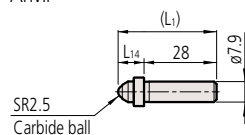
102178

Notes: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

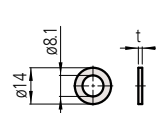
STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	t	Parts No.
511-702 511-732	1	21DZA232A	35mm/1.38"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"	
	2	21DZA232B	40mm/1.57"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	45mm/1.77"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	50mm/1.97"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	55mm/2.17"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	60mm/2.36"	40mm/1.57"	30.5mm/1.20"			
511-703 511-733 () Used 50mm/2" Sub-Anvil	1	21DZA232A	50mm (100mm)/1.97" (3.94")	15mm/.59"	5.5mm/.22"			102178 (50mm/2")
	2	21DZA232B	55mm (105mm)/2.17" (4.13")	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	60mm (110mm)/2.36" (4.33")	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	65mm (115mm)/2.55" (4.53")	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	70mm (120mm)/2.74" (4.72")	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	75mm (125mm)/2.93" (4.92")	40mm/1.57"	30.5mm/1.20"			
	7	21DZA232G	80mm (130mm)/3.12" (5.12")	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	85mm (135mm)/3.31" (5.31")	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	90mm (140mm)/3.50" (5.51")	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	95mm (145mm)/3.69" (5.71")	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	100mm (150mm)/3.88" (5.91")	65mm/2.56"	55.5mm/2.19"			
511-704 511-734	1	21DZA232A	100mm/3.94"	15mm/.59"	5.5mm/.22"			
	2	21DZA232B	105mm/4.13"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	110mm/4.33"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	115mm/4.53"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	120mm/4.72"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	125mm/4.92"	40mm/1.57"	30.5mm/1.20"			
	7	21DZA232G	130mm/5.12"	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	135mm/5.31"	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	140mm/5.51"	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	145mm/5.71"	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	150mm/5.91"	65mm/2.56"	55.5mm/2.19"			
	12	21DZA232N	155mm/6.10"	70mm/2.76"	60.5mm/2.38"			
	13	21DZA232P	160mm/6.30"	75mm/2.95"	65.5mm/2.58"			

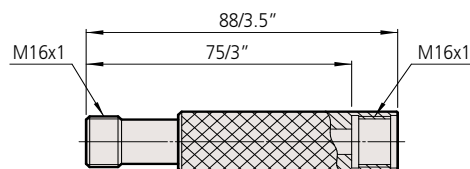
Anvil



Interchangeable washer



Sub-anvil

(Supplied only for **511-706 (202974)** and **511-736 (202975)**)**No. 202974 (511-706)****No. 202975 (511-736)**

Notes: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	t	Parts No.
511-705 511-735	1	21DZA241A	160mm/6.30"	38mm/1.50"	10mm/.39"	205467 205461 205462 205463 205464 205465 205466	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12" 4.0mm/.16" 5.0mm/.20" 6.0mm/.24"	
	2	21DZA241B	175mm/6.89"	53mm/2.09"	25mm/.98"			
	3	21DZA241C	190mm/7.48"	68mm/2.68"	40mm/1.57"			
	4	21DZA241D	205mm/8.07"	83mm/3.27"	55mm/2.17"			
	5	21DZA241E	220mm/8.66"	98mm/3.86"	70mm/2.76"			
	6	21DZA241F	235mm/9.25"	113mm/4.45"	85mm/3.35"			
511-706 511-736 () Used 75mm/3" Sub-Anvil	1	21DZA241A	250mm (325mm)/9.84" (12.80")	38mm/1.50"	10mm/.39"			Metric: 202974 (75mm) Inch: 202975 (3.0")
	2	21DZA241B	265mm (340mm)/10.43" (13.39")	53mm/2.09"	25mm/.98"			
	3	21DZA241C	280mm (355mm)/11.02" (13.98")	68mm/2.68"	40mm/1.57"			
	4	21DZA241D	295mm (370mm)/11.61" (14.57")	83mm/3.27"	55mm/2.17"			
	5	21DZA241E	310mm (385mm)/12.20" (15.16")	98mm/3.86"	70mm/2.76"			

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages

SERIES 511 — Short Leg Type

- Compact and lightweight due to the short length below the grip.
- Longer plunger stroke with no affect on accuracy.
- Carbide contact point ensuring high durability and wear resistance.
- This model reduces the influence of heat from the operator's hand by 50% by increasing the grip size and making the grip hollow-structured, thereby retaining high-accuracy measurement.
- Alternative indicators may be used in place of those recommended*.

* Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.

- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-35.)



511-761



511-763

Dial indicators and protection covers are optional.

SPECIFICATIONS

Metric											
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set						
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner
511-761	18-35mm	1.2mm	4N or less	6N or less	511-761	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.
511-762	35-60mm				511-762			6 pcs.	4 pcs.	Not supplied	Not supplied
511-763	50-150mm	1.6mm	5N or less	10N or less	511-763			11 pcs.			
511-764	100-160mm				511-764			13 pcs.			
511-771	18-35mm	1.2mm	4N or less	6N or less	511-761	2109SB-10 (Graduation: 0.001mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.
511-772	35-60mm				511-762			6 pcs.	4 pcs.	Not supplied	Not supplied
511-773	50-150mm	1.6mm	5N or less	10N or less	511-763			11 pcs.			
511-774	100-160mm				511-764			13 pcs.			
511-766	18-35mm	1.2mm	4N or less	6N or less	511-761	2046SB (Graduation: 0.01mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.
511-767	35-60mm				511-762			6 pcs.	4 pcs.	Not supplied	Not supplied
511-768	50-150mm	1.6mm	5N or less	10N or less	511-763			11 pcs.			
511-769	100-160mm				511-764			13 pcs.			

Notes: 1) A 50mm sub-anvil is supplied with 511-763.

2) It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

Technical Data

Accuracy: Metric models 2µm
Inch models .00008"
Repeatability: Metric models 0.5µm
Inch models .00002"
Adjacent error: Metric models 1µm
Inch models .00004"

Optional Accessories

–: Dial indicator (See Chapter F)
21DZA000: Dial protection cover

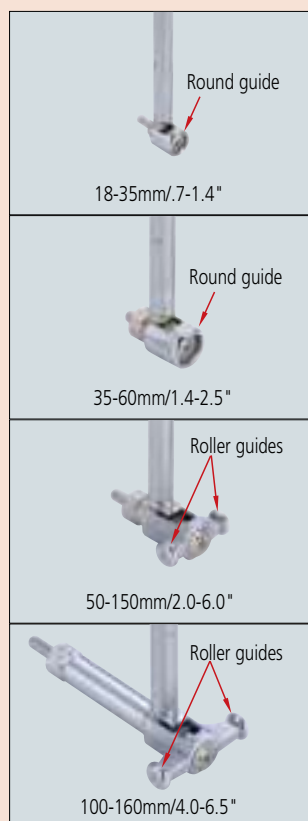
Recommended dial indicators (see Chapter F)

Metric models: **2046SB** (0.01mm)
2972TB (0.01mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: **2922SB** (.0005")
2977TB (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators (see Chapter F)

Metric models: **543-310B** (ID-C112GXB, 0.001mm)
Inch models: **543-312B** (ID-C112GEXB, 0.001mm/.00005")
* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

Contact Points



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Spanner Parts No.
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	t	
511-761 511-781	1	21DZA213A	18mm/.71"	5.5mm/.22"	2.5mm/.10"	205623 205624	0.5mm/.02" 1.0mm/.04"	102148
	2	21DZA213B	20mm/.79"	7.5mm/.30"	4.5mm/.18"			
	3	21DZA213C	22mm/.87"	9.5mm/.37"	6.5mm/.26"			
	4	21DZA213D	24mm/.94"	11.5mm/.45"	8.5mm/.33"			
	5	21DZA213E	26mm/1.02"	13.5mm/.53"	10.5mm/.41"			
	6	21DZA213F	28mm/1.10"	15.5mm/.61"	12.5mm/.49"			
	7	21DZA213G	30mm/1.18"	17.5mm/.69"	14.5mm/.57"			
	8	21DZA213H	32mm/1.26"	19.5mm/.77"	16.5mm/.65"			
	9	21DZA213J	34mm/1.34"	21.5mm/.85"	18.5mm/.73"			

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil Parts No.
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	t	
511-762 511-782	1	21DZA232A	35mm/1.38"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"	
	2	21DZA232B	40mm/1.57"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	45mm/1.77"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	50mm/1.97"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	55mm/2.17"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	60mm/2.36"	40mm/1.57"	30.5mm/1.20"			
511-763 511-783 () Used 50mm/2" Sub-Anvil	1	21DZA232A	50mm (100mm)/1.97" (3.94")	15mm/.59"	5.5mm/.22"			102178 (50mm/2")
	2	21DZA232B	55mm (105mm)/2.17" (4.13")	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	60mm (110mm)/2.36" (4.33")	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	65mm (115mm)/2.55" (4.53")	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	70mm (120mm)/2.74" (4.72")	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	75mm (125mm)/2.93" (4.92")	40mm/1.57"	30.5mm/1.20"			
	7	21DZA232G	80mm (130mm)/3.12" (5.12")	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	85mm (135mm)/3.31" (5.31")	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	90mm (140mm)/3.50" (5.51")	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	95mm (145mm)/3.69" (5.71")	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	100mm (150mm)/3.88" (5.91")	65mm/2.56"	55.5mm/2.19"			
511-764 511-784	1	21DZA232A	100mm/3.94"	15mm/.59"	5.5mm/.22"			
	2	21DZA232B	105mm/4.13"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	110mm/4.33"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	115mm/4.53"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	120mm/4.72"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	125mm/4.92"	40mm/1.57"	30.5mm/1.20"			
	7	21DZA232G	130mm/5.12"	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	135mm/5.31"	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	140mm/5.51"	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	145mm/5.71"	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	150mm/5.91"	65mm/2.56"	55.5mm/2.19"			
	12	21DZA232N	155mm/6.10"	70mm/2.76"	60.5mm/2.38"			
	13	21DZA232P	160mm/6.30"	75mm/2.95"	65.5mm/2.58"			

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages

SERIES 511 — with Micrometer Head

- Micrometer head is attached to the anvil for accurate dimensional setting.
- Longer plunger stroke with no affect on accuracy.
- Carbide is used for the contact point ensuring high durability and wear resistance.
- This model reduces the influence of heat from the operator's hand by 50% by increasing the grip size and making the grip hollow-structured, thereby retaining high-accuracy measurement.
- Wide measuring range with sub-anvils.
- Alternative indicators may be used in place of those recommended*.

* Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.

- Optional extension rods can be attached for measuring deep holes. (For details, refer to page C-36.)
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-35.)



511-803

511-804

Dial indicators and protection covers are optional.



511-804



511-806

SPECIFICATIONS

Metric												
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set						Probing depth	
					Bore gage	Dial indicator	Dial protection cover	Micrometer head	Sub-Anvil	Spanner		
511-803	60-100mm	1.6mm	5N or less	10N or less	511-803	Not supplied	Not supplied	1 pc.	2 pcs.	3 pcs.	150mm	
511-804	100-160mm				511-804				3 pcs.			
511-805	150-250mm		6N or less	15N or less	511-805				4 pcs.		2 pcs.	250mm
511-806	250-400mm				511-806				3 pcs.			
511-807	400-600mm				511-807				2 pcs.			
511-808	600-800mm		20N or less	511-808	2 pcs.							
511-823	60-100mm	1.6mm	5N or less	10N or less	511-803	2109SB-10 (Graduation: 0.001mm)	21DZA000	1 pc.	2 pcs.	3 pcs.	150mm	
511-824	100-160mm				511-804				3 pcs.			
511-825	150-250mm		6N or less	15N or less	511-805				4 pcs.		2 pcs.	250mm
511-826	250-400mm				511-806				3 pcs.			
511-827	400-600mm				511-807				2 pcs.			
511-828	600-800mm		20N or less	511-808	2 pcs.							
511-813	60-100mm	1.6mm	5N or less	10N or less	511-803	2046SB (Graduation: 0.01mm)	21DZA000	1 pc.	2 pcs.	3 pcs.	150mm	
511-814	100-160mm				511-804				3 pcs.			
511-815	150-250mm		6N or less	15N or less	511-805				4 pcs.		2 pcs.	250mm
511-816	250-400mm				511-806				3 pcs.			
511-817	400-600mm				511-807				2 pcs.			
511-818	600-800mm		20N or less	511-808	2 pcs.							

Notes: 1) Storage boxes for 511-807/808 models are made of wood. The boxes of other models are made of plastic.

2) It is not permissible to expand measuring range using sub-anvils other than as supplied as standard accessories. (The measurement accuracy in such cases is not guaranteed.)

Technical Data

Accuracy: Metric models 2μm
Inch models .00008"
Repeatability: Metric models 0.5μm
Inch models .00002"
Adjacent error: Metric models 1μm
Inch models .00004"

Optional Accessories

–: Dial indicator (See Chapter F)

21DZA000: Dial protection cover

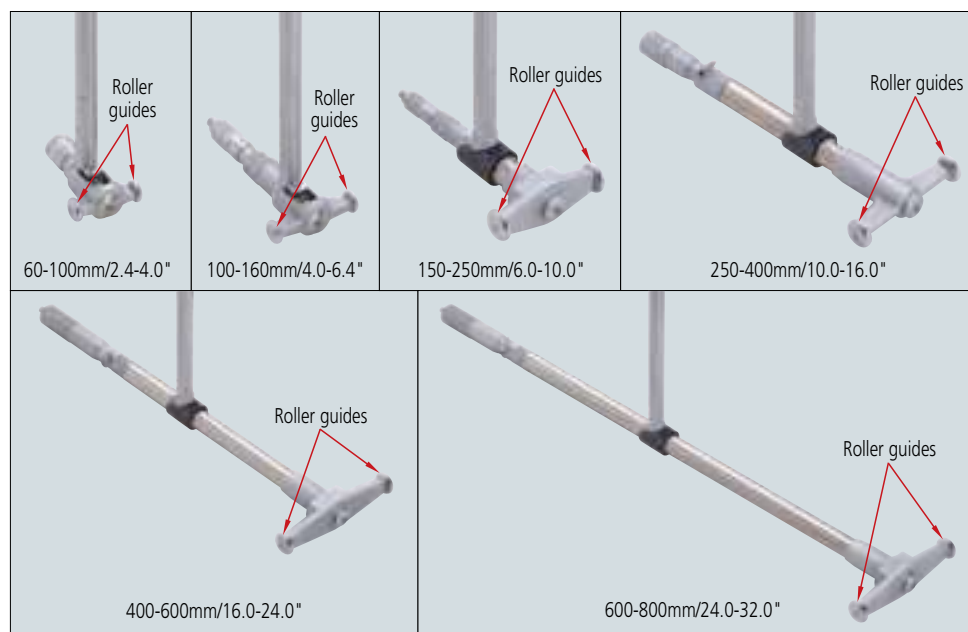
Recommended dial indicators (see Chapter F)

Metric models: **2046SB** (0.01mm)
2972TB (0.01mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: **2922SB** (.0005")
2977TB (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators (see Chapter F)

Metric models: **543-310B** (ID-C112GXB: 0.001mm)
Inch models: **543-312B** (ID-C112GXB: 0.001mm/.00005")
* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

Contact Points



STANDARD ACCESSORIES

Metric								
Bore gage (Main body)	Micrometer head			Sub-Anvil				Spanner
	Parts No.	Stroke	Screw size	Marked No.	Parts No.	L ₁	L ₁₉	Parts No.
511-803	21DZA267	10mm	M11x1	10mm	208892	15mm	10mm	301336 (2 pcs.) 202863 (1 pcs.)
				20mm	208894	25mm	20mm	
511-804	21DZA268	13mm	M11x1	10mm	208892	15mm	10mm	301336 (2 pcs.)
				20mm	208894 (2 pcs.)	25mm	20mm	
511-805	21DZA268	13mm	M11x1	10mm	208892	15mm	10mm	301336 (2 pcs.)
				20mm	208894 (2 pcs.)	25mm	20mm	
				50mm	21DAA492	55mm	50mm	
511-806	953118	25mm	M16x1	25mm	208926	35mm	25mm	200154 (2 pcs.)
				50mm	208928 (2 pcs.)	60mm	50mm	
511-807	953120	50mm	M16x1	50mm	208928	60mm	50mm	200154 (2 pcs.)
				100mm	208932	110mm	100mm	
511-808	953120	50mm	M16x1	50mm	208928	60mm	50mm	200154 (2 pcs.)
				100mm	208932	110mm	100mm	

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511 — for Blind Holes

- Capable of ID (inside diameter) measurement close to the bottom of a hole.
- Carbide contact point ensuring high durability and wear resistance.
- Grip is large and hollow to reduce effect of body heat on high-accuracy measurements.
- Alternative indicators may be used in place of those recommended*.

* Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo

- sales office if considering the use of dial or digimatic indicators other than the recommended models.
- Optional extension rods can be attached for measuring deep holes. (For details, refer to page C-36.)
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-35.)

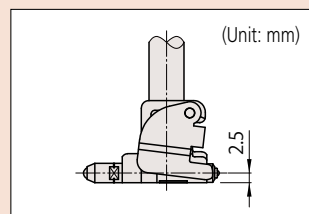


511-416



511-417

The dial indicator and protection cover are optional.



Technical Data

Accuracy: Metric models 4μm
Inch models .00016"
Repeatability: Metric models 1μm
Inch models .00004"
Adjacent error: Metric models 1μm
Inch models .00004"

Optional Accessories

—: Dial indicator (See Chapter F)
21DZA000: Dial protection cover

Recommended dial indicators (see Chapter F)

Metric models: 2046SB (0.01mm)
2972TB (0.01mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: 2922SB (.0005")
2977TB (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators (see Chapter F)

Metric models: 543-310B (0.001mm)
Inch models: 543-312B (0.001mm/.00005")

* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

SPECIFICATIONS

Metric									
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set				
					Bore gage	Dial indicator	Dial protection cover	Anvil	Washer
511-415	15-35mm		4N or less	6N or less	511-415			11 pcs.	1 pc.
511-416	35-60mm	1.2mm	4N or less	6N or less	511-416	Not supplied	Not supplied	6 pcs.	4 pcs.
511-417	50-150mm		5N or less	10N or less	511-417			11 pcs.	1 pc.
511-425	15-35mm		4N or less	6N or less	511-415	2046SB		11 pcs.	1 pc.
511-426	35-60mm	1.2mm	4N or less	6N or less	511-416	(Graduation: 0.01mm)	21DZA000	6 pcs.	4 pcs.
511-427	50-150mm		5N or less	10N or less	511-417			11 pcs.	1 pc.
511-435	15-35mm		4N or less	6N or less	511-415	2109SB-10		11 pcs.	1 pc.
511-436	35-60mm	1.2mm	4N or less	6N or less	511-416	(Graduation: 0.001mm)	21DZA000	6 pcs.	4 pcs.
511-437	50-150mm		5N or less	10N or less	511-417			11 pcs.	1 pc.

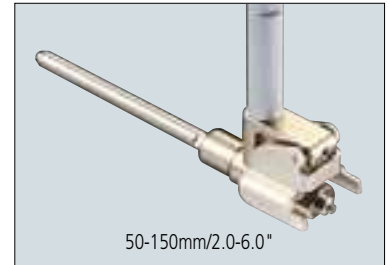
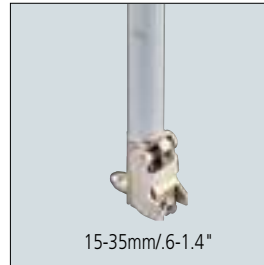
Notes: 1) A 10mm (.4") sub-anvil is supplied with 511-415/425/435 and a 50mm (2") sub-anvil is supplied with 511-417/427/437.

2) It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)



Refer to the Digimatic Micrometer leaflet (MAP1392) for more details.

Contact Points



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil							Interchangeable washer		Sub-Anvil		
	Marked No.	Order No.	Indication of measuring size	L1	L22	R4	L14	Order No.	t	Order No.	L23	L19
511-415 511-418 () Used 10mm/.4" Sub-Anvil	1	21DZA376A	15mm(25mm)/.59"(1.98")	4.5mm/.18"	2.5 mm/.1"	SR1 mm/SR.04"	2mm/.08"	212127	0.5mm/.02"	21DAA563	2.5mm/.1"	10mm/.4"
	2	21DZA376B	16mm(26mm)/.63"(1.02")	5.5mm/.22"			3mm/.12"					
	3	21DZA376C	17mm(27mm)/.67"(1.06")	6.5mm/.26"			4mm/.16"					
	4	21DZA376D	18mm(28mm)/.71"(1.10")	7.5mm/.30"			5mm/.20"					
	5	21DZA376E	19mm(29mm)/.75"(1.14")	8.5mm/.33"			6mm/.24"					
	6	21DZA376F	20mm(30mm)/.79"(1.18")	9.5mm/.37"		SR1.5 mm/SR.06"	7mm/.28"					
	7	21DZA376G	21mm(31mm)/.83"(1.22")	10.5mm/.41"			8mm/.31"					
	8	21DZA376H	22mm(32mm)/.87"(1.26")	11.5mm/.45"			9mm/.35"					
	9	21DZA376J	23mm(33mm)/.91"(1.30")	12.5mm/.49"			10mm/.39"					
	10	21DZA376L	24mm(34mm)/.94"(1.34")	13.5mm/.53"			11mm/.43"					
	11	21DZA376M	25mm(35mm)/.98"(1.38")	14.5mm/.57"			12mm/.47"					
511-416 511-419	1	21DZA404A	35mm/1.38"	17.5mm/.69"	7.5 mm/.3"	SR1.5 mm/SR.06"	10mm/.39"	212127 212128 212129 212130	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"			
	2	21DZA404B	40mm/1.57"	22.5mm/.89"			15mm/.59"					
	3	21DZA404C	45mm/1.77"	27.5mm/1.08"			20mm/.79"					
	4	21DZA404D	50mm/1.97"	32.5mm/1.28"			25mm/.98"					
	5	21DZA404E	55mm/2.17"	37.5mm/1.48"			30mm/1.18"					
	6	21DZA404F	60mm/2.36"	42.5mm/1.67"			35mm/1.38"					
511-417 511-420 () Used 50mm/2" Sub-Anvil	1	21DZA404A	50mm(100mm)/1.97"(3.94")	17.5mm/.69"	7.5 mm/.3"	SR1.5 mm/SR.06"	10mm/.39"	212127 212128 212129 212130	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"	21DAA596	7.5mm/.3"	50mm/2"
	2	21DZA404B	55mm(105mm)/2.17"(4.13")	22.5mm/.89"			15mm/.59"					
	3	21DZA404C	60mm(110mm)/2.36"(4.33")	27.5mm/1.08"			20mm/.79"					
	4	21DZA404D	65mm(115mm)/2.56"(4.53")	32.5mm/1.28"			25mm/.98"					
	5	21DZA404E	70mm(120mm)/2.76"(4.72")	37.5mm/1.48"			30mm/1.18"					
	6	21DZA404F	75mm(125mm)/2.95"(4.92")	42.5mm/1.67"			35mm/1.38"					
	7	21DZA404G	80mm(130mm)/3.15"(5.12")	47.5mm/1.87"			40mm/1.57"					
	8	21DZA404H	85mm(135mm)/3.35"(5.31")	52.5mm/2.07"			45mm/1.77"					
	9	21DZA404J	90mm(140mm)/3.54"(5.51")	57.5mm/2.26"			50mm/1.97"					
	10	21DZA404L	95mm(145mm)/3.74"(5.71")	62.5mm/2.46"			55mm/2.17"					
	11	21DZA404M	100mm(150mm)/3.94"(5.91")	67.5mm/2.66"			60mm/2.36"					

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages

SERIES 511 — ABSOLUTE Digimatic Bore Gages

- These ABSOLUTE Digimatic bore gages are exclusively designed for inside diameter measurement.
- Up to four extension rods (250mm or 500mm) can be used for measuring at the bottom of a hole 2m deep.
- ABS (ABSOLUTE) type bore gages are not subject to overspeed error.
- The display and grip can be rotated up to 320 degrees and the display can be inclined up to 90 degrees, so that it is easily readable from any direction.
- The minimum value holding function provides easy measurement of hole diameter.
- Setting the Bore Gage to a master value using a gauge block set allows quick and accurate setting.
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-35.)



SPECIFICATIONS

Metric									
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Resolution	Content of set			Probing depth
						Anvil	Interchangeable washer	Battery (SR44)	
511-501	45-100mm	1.2mm	5N or less	10N or less	0.001mm	12 pcs.	4 pcs.	2 pcs.	150mm
511-502	100-160mm					13 pcs.	4 pcs.	2 pcs.	

Notes: 1) Normal use is assumed to be 8 hours per day.
 2) The correct peak value may not be displayed if the anvil's speed exceeds 50 µm/s.
 3) IP53 indicates resistance to dust and dripping water, but only applies when the connector cap is in place.

ABSOLUTE™ (Refer to page X for details.)

Technical Data

Accuracy: Metric models 3µm
 Inch models .00012"
 Excluding quantizing error
 Repeatability: Metric models 2µm
 Inch models .00008"
 Adjacent error: Metric models 2µm
 Inch models .00008"
 Battery: SR44 (2 pc), **938882**, for initial operational checks (standard accessory)
 Battery life: Approx. 2000 hours under normal use.
 Display: LCD character height 8.5mm
 Scale type: ABSOLUTE electrostatic linear encoder
 Max. response speed: Unlimited

Function

Preset function
 Master value registration (3 values at maximum)
 Tolerance judgment
 Upper/lower limit registration (3 values at maximum)
 Minimum value holding
 Data output
 Display rotation (320°)
 Display inclination (90°, 7 steps)
 Low battery alarm display
 Error display

Optional Accessories

21DZA089: Extension rod 250 mm (10")
21DZA081: Extension rod 500 mm (20")
 Up to four extension rods can be joined, and the maximum length 2m is allowed.
 Refer to page A-16 for details
 Connecting cables for Input Tool/ Digimatic Mini-Processor, etc.
 1m: **905338**
 2m: **905409**
USB Input Tool Direct (2m): 06ADV380F
 Connecting cables for **U-WAVE-T**
 For standard (160mm): **02AZD790F**
 For foot switch: **02AZE140F**
 — : Setting ring (See page C-35.)
 • Digimatic Mini-Processor DP-1VR: **264-504**

Example of connection

When connecting four pieces of 500mm extension rods

Gauge blocks and block sets for setting the origin or master value (optional)

Usage example



Rectangular gauge blocks

* Available only for 511-501/521

516-118-10

516-118-60 with calibration certificate

Description	Order No.	Qty
Nominal length (mm)	1	611611-021
	2	611612-021
	3	611613-021
	5	611615-021
	10	611671-021
	20	611672-021
	30	611673-021
	40	611674-021
Flat jaw	630030	1 pair (2 pcs)
Holder 160 mm	619004	1
Certificate of inspection		1

* Equivalent to JIS B 7506 Grade 0

Square gauge blocks

* Available only for 511-501/521

516-119-10

516-119-60 with calibration certificate

Description	Order No.	Qty
Nominal length (mm)	1	614611-021
	2	614612-021
	3	614613-021
	5	614615-021
	10	614671-021
	20	614672-021
	30	614673-021
	40	614674-021
Flat jaw	619072	1 pair (2 pcs)
Tie rod 3"	619062	1
Tie rod 2 1/4"	619063	1
Tie rod 1 1/2"	619064	1
Flat head screw 1 1/4"	619057	2
Flat head screw 5/8"	619058	2
Certificate of inspection		1

* Equivalent to JIS B 7506 Grade 0

STANDARD ACCESSORIES

Bore gage (Main body)	Marked No.	Parts No.	Anvil Indication of measuring size	L1	L14	Interchangeable washer Parts No.	t
511-501 511-521	1	21DZA232A	45mm/1.8"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"
	2	21DZA232B	50mm/2.0"	20mm/.79"	10.5mm/.42"		
	3	21DZA232C	55mm/2.2"	25mm/.98"	15.5mm/.61"		
	4	21DZA232D	60mm/2.4"	30mm/1.18"	20.5mm/.81"		
	5	21DZA232E	65mm/2.6"	35mm/1.38"	25.5mm/1.00"		
	6	21DZA232F	70mm/2.8"	40mm/1.57"	30.5mm/1.20"		
	7	21DZA232G	75mm/3.0"	45mm/1.77"	35.5mm/1.40"		
	8	21DZA232H	80mm/3.2"	50mm/1.97"	40.5mm/1.59"		
	9	21DZA232J	85mm/3.4"	55mm/2.17"	45.5mm/1.79"		
	10	21DZA232L	90mm/3.6"	60mm/2.36"	50.5mm/1.99"		
	11	21DZA232M	95mm/3.8"	65mm/2.56"	55.5mm/2.19"		
	12	21DZA232N	100mm/4.0"	70mm/2.76"	60.5mm/2.38"		
511-502 511-522	1	21DZA232A	100mm/4.0"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"
	2	21DZA232B	105mm/4.2"	20mm/.79"	10.5mm/.42"		
	3	21DZA232C	110mm/4.4"	25mm/.98"	15.5mm/.61"		
	4	21DZA232D	115mm/4.6"	30mm/1.18"	20.5mm/.81"		
	5	21DZA232E	120mm/4.8"	35mm/1.38"	25.5mm/1.00"		
	6	21DZA232F	125mm/5.0"	40mm/1.57"	30.5mm/1.20"		
	7	21DZA232G	130mm/5.2"	45mm/1.77"	35.5mm/1.40"		
	8	21DZA232H	135mm/5.4"	50mm/1.97"	40.5mm/1.59"		
	9	21DZA232J	140mm/5.6"	55mm/2.17"	45.5mm/1.79"		
	10	21DZA232L	145mm/5.8"	60mm/2.36"	50.5mm/1.99"		
	11	21DZA232M	150mm/6.0"	65mm/2.56"	55.5mm/2.19"		
	12	21DZA232N	155mm/6.2"	70mm/2.76"	60.5mm/2.38"		
	13	21DZA232P	160mm/6.4"	75mm/2.95"	65.5mm/2.58"		

Bore Gages

For easy and accurate measurement of inside diameters

Setting Rings

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

- Used for quick and accurate setting of dial bore gages, Holtest, and inside micrometers.

Steel Setting Rings



177-146



177-300

CERA Setting Rings



177-429



177-432

Suffix

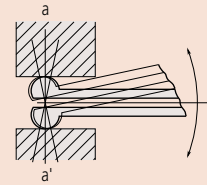
- 177-***-12:** With Inspection Certificate (provides a record of the calibrated diameter)
177-*-62:** With Inspection Certificate (provides a record of the calibrated diameter) and Calibration Certificate
177-*-82:** With Inspection Certificate (provides a record of the calibrated diameter), Calibration Certificate, and Traceability System Chart

Notes:

- The Inspection Certificate is not a substitute for a calibration certificate as it is undated.
- A more detailed inspection certificate describing roundness and cylindricity is available on request.

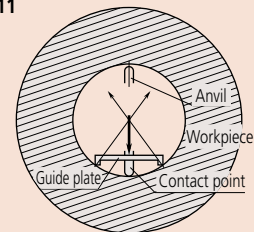
How to read the indicated value

Series 526



The 526 series has a gage head with high curvature. Alignment with the diameter (a-a') is achieved by rotating the gage head in the direction indicated by the arrow, and the reading is the maximum value read from the dial indicator.

Series 511



The 511 series provides a guide plate to align the setting ring diameter with the measurement axis of the bore gage.

SPECIFICATIONS

Steel Setting Rings

Order No.	Nominal size ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	T		Tolerance between the nominal size and the actual diameter (μm)	Uncertainty of marked diameter value (μm)*1	Roundness/Cylindricity (μm)*2	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-220	1mm	20	—	4	A	± 10	± 1.5	1	1.6	0.8
177-222	1.1mm	20	—	4	A	± 10	± 1.5	1	1.6	0.8
177-225	1.2mm	20	—	4	A	± 10	± 1.5	1	1.6	0.8
177-227	1.3mm	20	—	4	A	± 10	± 1.5	1	1.6	0.8
177-230	1.4mm	20	—	4	A	± 10	± 1.5	1	1.6	0.8
177-236	1.75mm	25	—	5	A	± 10	± 1.5	1	1.6	1.8
177-239	2mm	25	—	5	A	± 10	± 1.5	1	1.6	1.8
177-242	2.25mm	25	—	5	A	± 10	± 1.5	1	1.6	1.8
177-208	2.5mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-246	2.75mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-248	3mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-250	3.25mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-252	3.5mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-255	3.75mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-204	4mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-257	4.5mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-205	5mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-263	5.5mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-267	6mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-271	6.5mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-275	7mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-125	8mm	32	—	10	A	± 10	± 1.5	1	2.0	6.0
177-279	9mm	32	—	10	A	± 10	± 1.5	1	2.0	6.0
177-126	10mm	32	—	10	A	± 10	± 1.5	1	2.0	6.0
177-284	12mm	32	—	10	A	± 10	± 1.5	1	2.0	6.0
177-132	14mm	38	—	10	A	± 10	± 1.5	1	2.0	6.0

Order No.	Nominal size ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	T		Tolerance between the nominal size and the actual diameter (μm)	Uncertainty of marked diameter value (μm)*1	Roundness/Cylindricity (μm)*2	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-177	16mm	45	—	10	A	± 10	± 1.5	1	2.0	6.0
177-133	17mm	45	—	10	A	± 10	± 1.5	1	2.0	6.0
177-285	18mm	45	—	10	A	± 10	± 1.5	1	2.0	6.0
177-286	20mm	45	—	10	A	± 10	± 1.5	1	2.0	6.0
177-139	25mm	53	—	15	A	± 10	± 1.5	1	3.2	8.6
177-288	30mm	71	—	15	A	± 10	± 1.5	1	3.2	8.6
177-140	35mm	71	—	15	A	± 10	± 1.5	1	3.2	8.6
177-290	40mm	71	—	15	A	± 10	± 1.5	1	3.2	8.6
177-178	45mm	85	—	15	A	± 10	± 1.5	1	3.2	8.6
177-146	50mm	85	—	20	A	± 20	± 1.5	1	3.7	12.6
177-292	60mm	112	—	20	A	± 20	± 1.5	1	3.7	12.6
177-314	62mm	112	—	20	A	± 20	± 1.5	1.5	3.7	12.6
177-147	70mm	112	—	20	A	± 20	± 1.5	1.5	3.7	12.6
177-316	75mm	125	—	25	A	± 20	± 1.5	1.5	4.2	16.6
177-294	80mm	125	—	25	A	± 20	± 1.5	1.5	4.2	16.6
177-318	87mm	140	—	25	A	± 20	± 1.5	1.5	4.2	16.6
177-148	90mm	140	—	25	A	± 20	± 1.5	1.5	4.2	16.6
177-296	100mm	160	—	25	A	± 20	± 1.5	2	4.2	16.6
177-298	125mm	210	168	38.1 (25.4)	B	± 20	± 2.5	2	5.3	27.5
177-300	150mm	235	187		B	± 20	± 2.5	2	5.3	27.5
177-302	175mm	260	215		B	± 20	± 2.5	2.5	5.3	27.5
177-304	200mm	311	244		B	± 20	± 2.5	2.5	5.3	27.5
177-306	225mm	337	264		B	± 20	± 2.5	2.5	5.3	27.5
177-308	250mm	362	290		B	± 20	± 2.5	3	5.3	27.5
177-310	275mm	413	321		B	± 20	± 2.5	3	5.3	27.5
177-312	300mm	438	340		B	± 20	± 2.5	3	5.3	27.5

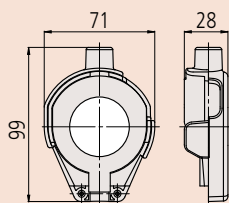
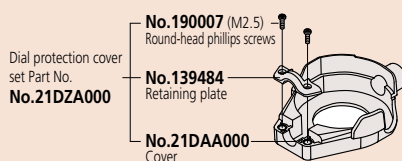
CERA Setting Rings

Order No.	Nominal size ϕ D	Dimensions (mm)			Type	Accuracy				
		ϕ D	ϕ E	T		Tolerance between the nominal size and the actual diameter (μ m)	Uncertainty of marked diameter value (μ m)* ¹	Roundness/Cylindricity (μ m)* ²	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-418	4mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-420	6mm	25	—	7	A	± 10	± 1.5	1	1.7	3.6
177-423	8mm	32	—	10	A	± 10	± 1.5	1	2.0	6.0
177-424	10mm	32	—	10	A	± 10	± 1.5	1	2.0	6.0
177-425	12mm	32	—	10	A	± 10	± 1.5	1	2.0	6.0
177-427	16mm	45	—	10	A	± 10	± 1.5	1	2.0	6.0
177-429	20mm	45	—	10	A	± 10	± 1.5	1	2.0	6.0
177-430	25mm	53	—	15	A	± 10	± 1.5	1	3.2	8.6
177-431	30mm	71	—	15	A	± 10	± 1.5	1	3.2	8.6
177-432	35mm	71	—	15	A	± 10	± 1.5	1	3.2	8.6
177-433	40mm	71	—	15	A	± 10	± 1.5	1	3.2	8.6
177-434	45mm	85	—	15	A	± 10	± 1.5	1	3.2	8.6

*1 Actual diameter is marked in 0.001 mm increments. (Dimension measuring position is the center of the height T.)
 *2 Cylindricity is defined as per JIS B 0621 Definitions and designations of geometrical deviations, Section 4.4
 "Cylindricity." Cylindricity is measured using three cross-sections between the top and bottom face of a ring, namely, close to the face near each side and the center.

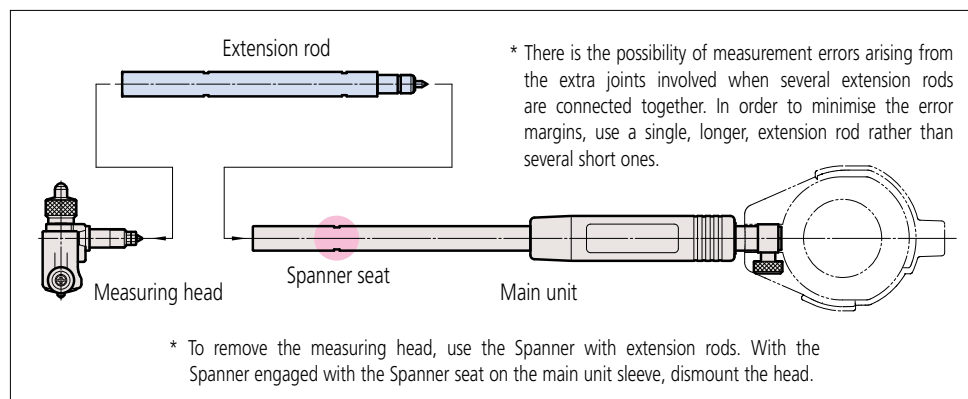
Protection cover

- Both the flat backplate of a dial indicator and backplate with a lug can be attached to a protection cover.



Extension rod SERIES 511 — Accessories for Bore Gages

- Extension rods (optional) are available to assist in deep-hole measurement.
- If two or more extension rods are connected together, measurement errors may occur due to flexure of the rod assembly. Therefore it is best to use no more than a single extension rod.
- The extension rod length is available up to 1000mm.
- Can not be connected to the products with special sizes or special specifications.
- When using a 500mm (or longer) extension rod, use the bore gage in an upright position.
- The accuracy and security of the assembly should be confirmed after connecting a rod.



SPECIFICATIONS

Applicable model	Extension rod length					Extension rod diameter	Spanner part No.
Order No.	125m	250m	500m	750m	1000m		
511-701/511-731	953549	953550	953551	—	—	$\phi 9$ mm	102148
511-415/511-418							
511-416/511-419							
511-417/511-420							
511-702/511-732	953552	953553	953554	953555	953556	$\phi 12$ mm	212556
511-703/511-733							
511-704/511-734							
511-803/511-833							
511-804/511-834	953557	952361	953558	953559	953560	$\phi 15$ mm	212556
511-705/511-735							
511-706/511-736							
511-805/511-835							
511-806/511-836							
511-807/511-837							
511-808/511-838							

*Spanner is supplied as standard.

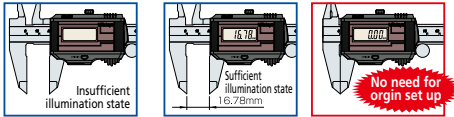
Calipers

An industry standard in measuring tools

SuperCaliper

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

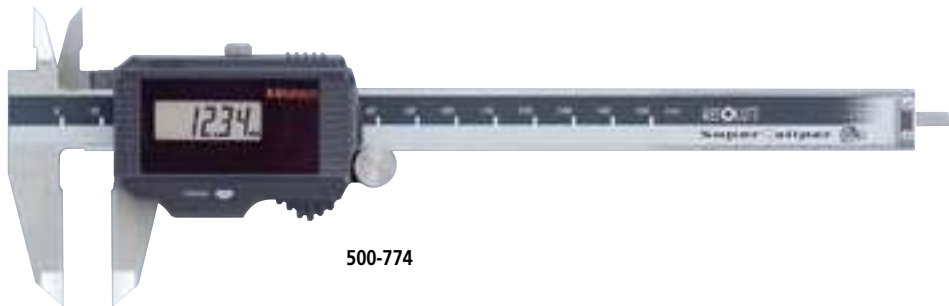
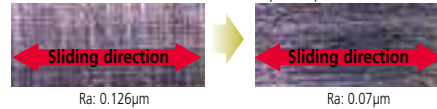
- Top-of-the-line digital caliper. Solar type caliper with no battery and IP67 protection assures waterproof reliability.



- With no annoying origin restoration necessary, a measurement can be started any time and there is no restriction on operating speed.
- The impact resistance of the display unit has been increased for improved usability in workshop conditions.

- Waterproof function makes this SuperCaliper suitable for use in an environment containing large amounts of cutting fluid or coolant. Operability is equivalent to the mechanical type caliper.
- This SuperCaliper uses components that do not contain harmful substances and is compatible with RoHS Directives.
- Slider operation is smooth and comfortable.

High quality guide surface finish for smooth slider movement



500-774

SPECIFICATIONS

Metric			
Order No.	Range	Remarks	Mass
500-776	0 - 150mm	with data output	180g
500-777	0 - 200mm		210g
500-774	0 - 150mm	w/o data output	180g
500-775	0 - 200mm		210g

Inch/metric			
Order No.	Range	Remarks	Mass
500-786	0 - 6"	with data output	180g
500-787	0 - 8"		210g
500-784	0 - 6"	w/o data output	180g
500-785	0 - 8"		210g

ABSOLUTE™

IP67

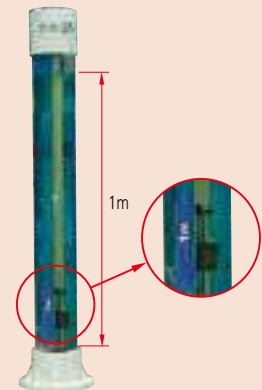


An inspection certificate is supplied as standard.

IP67 protection level

Level 6: Dust-proof.
No ingress of dust allowed.

Level 7: Protected against water penetration.
Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed to a depth of 1 meter in water under standardized conditions of pressure and time (30 min.).



Demonstration device

Technical Data

Resolution: 0.01mm or .0005"/0.01mm
Accuracy: ±0.02mm (excluding quantizing error)
Repeatability: 0.01mm
Quantizing error: ±1 count
Dust/Water protection level: IP67*
Power supply: Solar cell**
Display: LCD
Scale type: ABSOLUTE electromagnetic induction linear encoder
Max. response speed: Unlimited
* This model is not waterproof type. Therefore, rustproofing shall be applied after use.
** Can be used continuously above 60lux ambient illumination.



Refer to the Digimatic Micrometer leaflet (MAP1393) for more details.

Functions

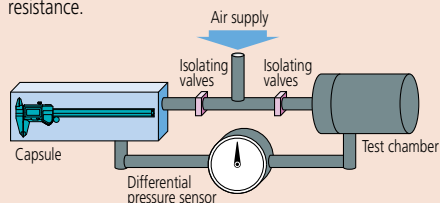
Origin-set: Absolute origin position can be changed.
Alarm: Error message is displayed and measurement functions become inoperative if:

- Tool is turned on when both illumination and charging voltage are insufficient.
- Main unit is extremely polluted and miscalculation occurs in the display unit.



Air leak test equipment for water resistance inspection

Generally, an air leak test is adopted for evaluating water resistance.



Procedure: Place the measuring tool inside the capsule and seal it. Then fill the capsule and the test chamber with air at the required pressure and close the isolating valves. If there is no leak in the measuring tool, the differential pressure sensor will read zero, because the amount of air inside the test chamber is unchanging. However, if there is a leak in the measuring tool, the differential pressure sensor will show a non-zero reading due to a decrease in pressure inside the test chamber as air leaks into the tool. By detecting this differential pressure, GO/NG judgment for the severity of the leak is performed. This air leak test is performed for all ABS coolant proof calipers and coolant proof micrometers.



Air leak test equipment for ABS coolant proof caliper

Optional accessories

(Dedicated for the models equipped with a digimatic output function
(Code No. 500-776, 500-777, 500-786 and 500-787))
For details, refer to page D-32.

- **Connecting cables for IT/DP/MUX***
 - 05CZA624:** SPC cable with data button (1m)
 - 05CZA625:** SPC cable with data button (2m)
- **USB Input Tool Direct**
 - 06ADV380A:** SPC cable for USB-ITN-A (2m)
- **Connecting cables for U-WAVE-T**
 - 02AZD790A:** SPC cable for U-WAVE with data button (160mm)
 - 02AZE140A:** SPC cable for foot switch



* Cannot be used for other than water resistant type Digital calipers with external output function.



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 with confidence in a normal work environment.

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

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

Illumination (lx)	Site (possible operations)
1500	
1000	Design room, drafting room (Fine visual work)
750	
500	Conference room, control room (Usual manufacturing environment) (Normal visual work)
300	
200	Machine room, electric room, lecture hall (Rough visual work)
150	
100	Corridor, passage, stairs (Very rough visual work)
75	
50	Emergency staircase, warehouse (Loading, unloading work)
30	
20	

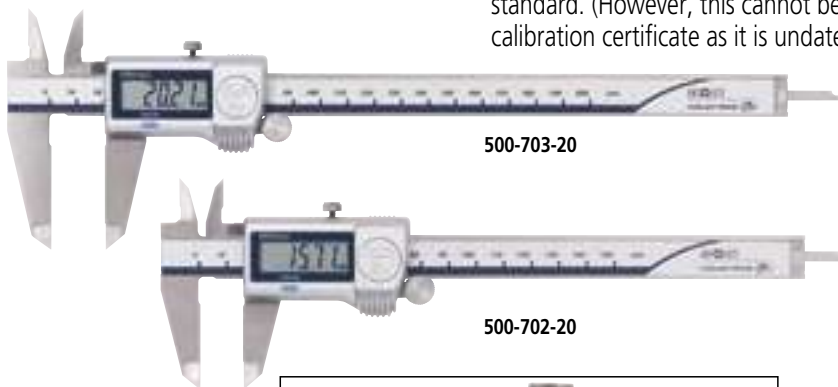
Excerpts from JIS Z 9110 Artificial illumination Intensity Standard

Calipers

An industry standard in measuring tools

ABSOLUTE Coolant Proof Caliper SERIES 500 — with Dust/Water Protection Conforming to IP67 Level

- ABS Coolant Proof Caliper with Dust/Water Protection conforming to IP67 Level. Can be used in workshop conditions exposed to coolant, water, dust or oil. 100% air-leak test ensures every caliper conforms to IP67.
- Font height is 9mm (increased by 22%) and visibility is improved (except for 0 - 300mm/ 0 - 12" models).
- Battery cap does not require a screw driver for battery replacement (except for 0 - 300mm / 0 - 12" models).
- Extended battery life of 5 years due to low current integrated circuit (except for 0 - 300mm/0 - 12" models).
- Easy to use — advanced ergonomic design uses only 1 button.
- Incorporates Mitutoyo's ABSOLUTE measurement system. No need to reset the origin.
- The automatic power-on/off function shuts down the LCD display after 20 minutes inactivity, but the ABS scale origin is unaffected. Power is restored to the display when the slider is moved.
- Stepped features can be measured.
- Can be integrated into statistical process control and measurement systems.
- An inspection certificate is supplied as standard. (However, this cannot be used as a calibration certificate as it is undated.)



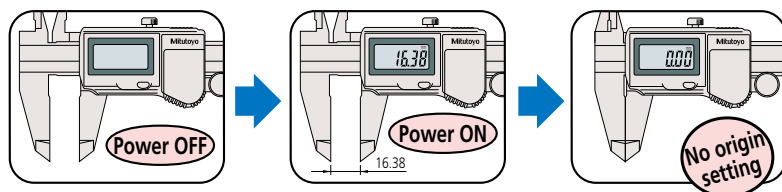
500-703-20

500-702-20



Remarkably easy to read display

A built-in ABS (absolute) scale means that these calipers are ready to use immediately after power-on without origin resetting – just like using a vernier caliper.



Optional accessories

For details, refer to page D-32.



Connecting cables for IT/DP/MUX*

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

* Cannot be used for other than water resistant type Digital calipers with external output function



USB Input Tool Direct

- 06ADV380A: SPC cable for USB-ITN-A (2m)

Connecting cables for U-WAVE-T

- 02AZD790A: SPC cable for U-WAVE with data button (160mm)
- 02AZE140A: SPC cable for footswitch

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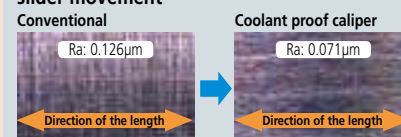
IP67



An inspection certificate is supplied as standard.

Smooth slider movement makes for comfortable operation.

High quality guide surface finish for smooth slider movement



Technical Data

- Resolution: 0.01mm or .0005"/0.01mm
- Repeatability: 0.01mm or .0005"/0.01mm
- Quantizing error: Not including ± 1 count
- Dust/Water protection level: IP67 (IEC60529)*
- Display: LCD
- Scale type: ABSOLUTE electromagnetic induction linear encoder
- Max. response speed: Unlimited
- Battery: SR44 (1 pc), 938882, for initial operational checks (standard accessory)
- Battery life: Approx. 5 years under normal use (1 year: 0 - 300mm/0 - 12" models)

* Although these models are IP67 rated, care should be taken to dry tool after use.



Refer to the Digimatic Micrometer leaflet (E12033) for more details.

Mitutoyo

Functions

Origin-set: Absolute origin position can be changed.
 Data output: Measurement data output connector allows integration into statistical process control and measurement systems.
 Automatic power on/off: LCD display will turn off after 20 minutes inactivity, but the ABS scale unit origin is stored. Power is restored when the slider is moved.
 Alarm: Error message is displayed if error in calculation is found and measurement is stopped. Measurement will not be continued while error is displayed. Also, if the battery voltage becomes low, "B" appears to alert the user before measurement is no longer possible.

IP67 protection level

IP67

First characteristic number	Protection from solid objects (people or things)		Second characteristic number	Protection from liquids (water, etc.)	
	Brief description	Description		Brief description	Description
6	Dust-proof.	No ingress of dust allowed.	7	Protected against water penetration.	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time.

For details of the test conditions used in evaluating each degree of protection, please refer to the original standard.

SPECIFICATIONS

Metric							
Order No.	Range	Accuracy*	Mass	Measurement data output port	Thumb roller	Remarks	
500-702-20	0 - 150mm	±0.02mm	168g	—	✓		
500-703-20	0 - 200mm		198g				
500-712-20	0 - 150mm		168g				
500-713-20	0 - 200mm		198g				
500-719-20	0 - 150mm		168g			Depth bar ø1.9mm	
500-721-20	0 - 150mm		168g			Carbide-tipped jaws for outside measurement	
500-722-20	0 - 200mm		198g			Carbide-tipped jaws for ouatside and inside measurement	
500-723-20	0 - 150mm		168g				
500-724-20	0 - 200mm		198g				
500-714-10	0-300mm	±0.03mm	350g	✓	✓		
500-718-11					—		
500-704-10					350g	✓	
500-708-11					345g	—	

* Not including quantizing error of ±1 count in LSD

Inch/Metric						
Order No.	Range	Accuracy*	Mass	Measurement data output port	Thumb roller	Remarks
500-731-20	0 - 6"	±.001" / ±0.02mm	168g	—	✓	Carbide-tipped jaws for outside measurement
500-732-20	0 - 8"		198g			Carbide-tipped jaws for outside and inside measurement
500-733-20	0 - 6"		168g			
500-734-20	0 - 8"		198g			
500-735-20	0 - 6"		168g	✓		Carbide-tipped jaws for outside measurement
500-736-20	0 - 8"		198g			
500-737-20	0 - 6"		168g			Carbide-tipped jaws for outside and inside measurement
500-738-20	0 - 8"		198g			
500-752-20	0 - 6"		168g	—		
500-753-20	0 - 8"		198g			
500-762-20	0 - 6"		168g	✓		
500-763-20	0 - 8"		198g			
500-768-20	0 - 6"		168g	—		Depth bar ø1.9mm
500-769-20	0 - 6"		168g	✓		Depth bar ø1.9mm
500-764-10	0-12"		"±.0015" / ±0.03mm"	350g		✓
500-754-10			350g	—		

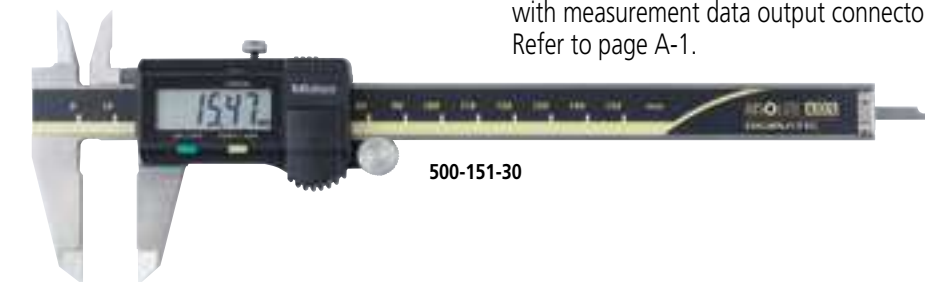
* Not including quantizing error of ±1 count in LSD

Calipers

An industry standard in measuring tools

ABSOLUTE Digimatic Caliper 500 Series — with exclusive ABSOLUTE Encoder Technology

- ABSOLUTE electromagnetic induction linear encoder system is introduced (except for 0 - 300mm/0 - 12" models).
- New ergonomic design with finger rest.
- The ZERO/ABS button allows the display to be Zero-Set at any slider position along the scale for comparison measurements. This button will also allow return to the absolute (ABS) mode and display of the true position from the origin (usually jaws closed point).
- Large and clear LCD readout.
- Smooth slider movement makes for comfortable operation.
- 18,000 hours battery life.
- Allows step measurement.
- Carbide-tipped jaw calipers are optimal for rough finished parts, castings, grinding stones, etc.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



500-151-30

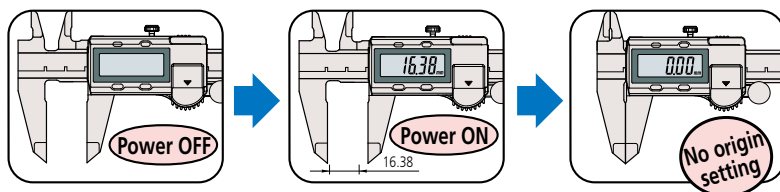


500-182-30



Remarkably easy to read display

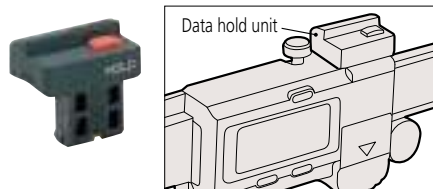
A built-in ABS (absolute) scale means that these calipers are ready to use immediately after power-on without origin resetting – just like using a vernier caliper.



Optional accessories

Dedicated for the models equipped with a digimatic output function. For details, refer to page D-32.

959143: Data hold unit



Connecting cables for IT/DP/MUX

959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

02AZD790C: SPC cable for U-WAVE with data button (160mm)

02AZE140C: SPC cable for footswitch

ABSOLUTE™



An inspection certificate is supplied as standard.

Technical Data

Accuracy: $\pm 0.02\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.03\text{mm}$ ($\leq 300\text{mm}$) (excluding quantizing error)

Resolution: 0.01mm or .0005"/0.01mm

Repeatability: 0.01mm

Display: LCD

Scale type*: ABSOLUTE electromagnetic induction linear encoder

*ABSOLUTE electrostatic capacity static linear encoder for 0 - 300mm/0 - 12" models.

Max. response speed: Unlimited

Battery: SR44 (1 pc), 938882,

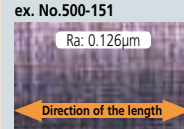
for initial operational checks (standard accessory)

Battery life: Approx. 5 years under normal use (18,000 hours for continuous use)

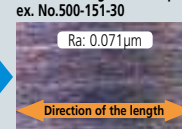
Smooth slider movement makes for comfortable operation.

High quality guide surface finish for smooth slider movement

Conventional ex. No.500-151



ABSOLUTE Digimatic Caliper ex. No.500-151-30



Refer to the Digimatic Micrometer leaflet (MAP1332) for more details.

Mitutoyo

Functions

Absolute measurement: After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The Absolute origin position can be changed by the ORIGIN button.

Incremental measurement: Display can be set to zero at any arbitrary position for comparative measurements

Low-voltage alert: If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible. A battery change advisory alert precedes this alert.

Data output: By using the connecting cable (option), measurement data can be output.

Data hold: By using the data hold unit (option), the displayed value can be held. This cannot be used with the data output function.

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy**	Mass	Depth bar	Fine adjustment	Remarks
500-150-30	0 - 100mm	±0.02mm	137	ø1.9mm rod	with thumb roller	—
500-180-30*				—		
500-151-30	0 - 150mm		162	Blade	with thumb roller	Carbide-tipped jaws for outside measurement
500-154-30						Carbide-tipped jaws for outside and inside measurement
500-155-30				ø1.9mm rod	—	—
500-158-30						
500-181-30*	0 - 200mm		192	Blade	with thumb roller	Carbide-tipped jaws for outside measurement
500-152-30						Carbide-tipped jaws for outside and inside measurement
500-156-30						—
500-157-30						
500-182-30*						
500-153	0 - 300mm	±0.03mm	350		with thumb roller	—

* Without SPC data output

* Not including quantizing error of ±1 count in LSD

Inch/Metric							
Order No.	Range	Accuracy**	Mass	Depth bar	Fine adjustment	Remarks	
500-170-30	0 - 4"	±.001" / ±0.02mm	137	.075" rod	with thumb roller	—	
500-195-30*							
500-171-30			162	Blade		Carbide-tipped jaws for outside measurement	
500-174-30	Carbide-tipped jaws for outside and inside measurement						
500-175-30	—						
500-178-30	192		Blade	Carbide-tipped jaws for outside measurement			
500-196-30*				Carbide-tipped jaws for outside and inside measurement			
500-159-30*				—			
500-160-30*				Carbide-tipped jaws for outside measurement			
500-172-30				Carbide-tipped jaws for outside and inside measurement			
500-176-30	0 - 8"	±.0015" / ±0.03mm	350	Blade		Carbide-tipped jaws for outside measurement	
500-177-30						Carbide-tipped jaws for outside and inside measurement	
500-197-30*						—	
500-163-30*						Carbide-tipped jaws for outside measurement	
500-164-30*						Carbide-tipped jaws for outside and inside measurement	
500-173	0 - 12"			±.0015" / ±0.03mm	350	—	—
500-167							Carbide-tipped jaws for outside measurement
500-168							Carbide-tipped jaws for outside and inside measurement
500-193*							—
500-165*							Carbide-tipped jaws for outside measurement
500-166*							Carbide-tipped jaws for outside and inside measurement

* Without SPC data output

* Not including quantizing error of ±1 count in LSD

Calipers

An industry standard in measuring tools

ABSOLUTE™

Long ABSOLUTE Digimatic Caliper 500 Series — with Exclusive ABSOLUTE Encoder Technology

- Long Digital caliper incorporating an ABSOLUTE scale and available with a measuring range from 450mm to 1000mm.
- Allows step measurement
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.
- For the details of the Absolute scale and its function, refer to page D-6.



SPECIFICATIONS

Metric				
Order No.	Range	Depth bar	Fine adjustment	Remarks
500-500-10	0 - 450mm	—	—	—
500-501-10	0 - 600mm			
500-502-10	0 - 1000mm			

* without SPC data output

Inch/Metric				
Order No.	Range	Depth bar	Fine adjustment	Remarks
500-505-10	0 - 18"	—	—	—
500-506-10	0 - 24"			
500-507-10	0 - 40"			

* without SPC data output

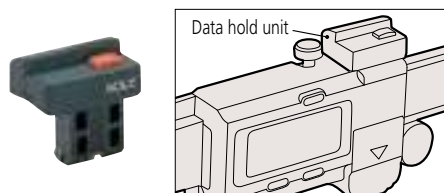
Technical Data

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

Optional accessories

Dedicated for the models equipped with a digimatic output function. For details, refer to page D-32.

959143: Data hold unit



Connecting cables for IT/DP/MUX*

959149: SPC cable with data button (1m)
959150: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

02AZD790C: SPC cable for U-WAVE with data button (160mm)
02AZE140C: SPC cable for footswitch



Technical Data

Accuracy: $\pm 0.02\text{mm}$ (excluding quantizing error)
 Resolution: 0.01mm or $.0005"/0.01\text{mm}$
 Repeatability: 0.01mm
 Display: LCD
 Scale type: ABSOLUTE electrostatic capacity linear encoder
 Power supply: Solar cell*
 Max. response speed: Unlimited
 Operational temperature: 0 to 40°C
 * Can be used continuously above 60lux ambient illumination

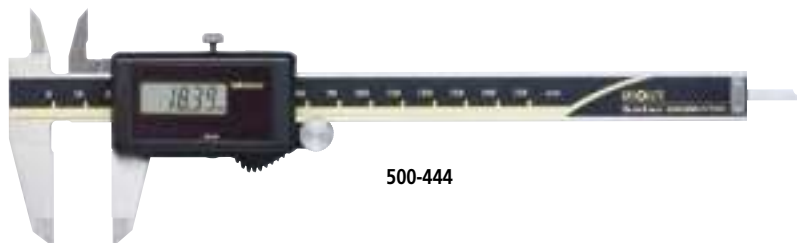
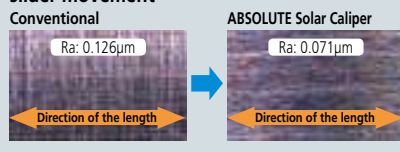
Functions

Absolute measurement
 Scale contamination detection
 Data output (use together with optional connecting cable)
 Data hold (use optional hold unit. This cannot be used with the data output function)
 * For details of the function, refer to page D-6.

ABSOLUTE Solar Caliper SERIES 500 — No battery or origin reset needed

- Mitutoyo's Absolute Solar Digimatic Caliper retains its origin point indefinitely.
- At 60 Lux and above the ABSOLUTE solar caliper is ready to start measurement. No more repeated zero setting caused by a shortage of light.
- An ABSOLUTE scale is incorporated so that zero setting is not required at each power ON. No danger of overspeed errors.
- Slider operation is smooth and comfortable.
- Allows step measurement.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.

High quality guide surface finish for smooth slider movement



500-444

SPECIFICATIONS

Metric			
Order No.	Range	Depth bar	Fine adjustment
500-443	0 - 100mm	$\varnothing 1.9\text{mm}$ rod	with thumb roller
500-453*			
500-444			
500-454*			
500-445	0 - 150mm	Blade	with thumb roller
500-455*			
500-446	0 - 200mm	Blade	with thumb roller
500-456*			

* without SPC data output

Inch/Metric			
Order No.	Range	Depth bar	Fine adjustment
500-463	0 - 4"	$.075"$ rod	with thumb roller
500-473*			
500-464			
500-474*			
500-465	0 - 6"	Blade	with thumb roller
500-475*			
500-466	0 - 8"	Blade	with thumb roller
500-476*			

* without SPC data output

Optional accessories

Dedicated for the models equipped with a digimatic output function. For details, refer to page D-32.

959143: Data hold unit



Connecting cables for IT/DP/MUX*

959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

02AZD790C: SPC cable for U-WAVE with data button (160mm)

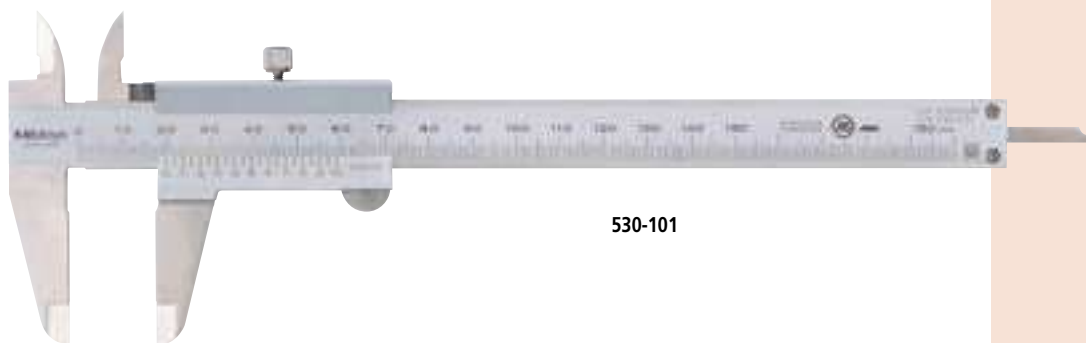
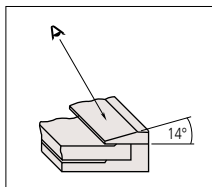
02AZE140C: SPC cable for footswitch

Calipers

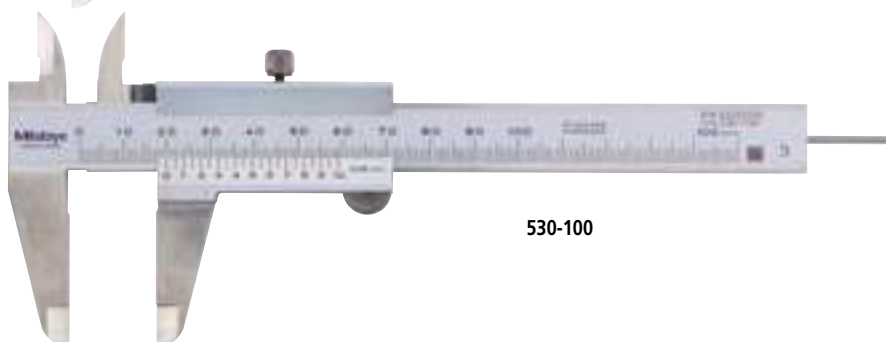
An industry standard in measuring tools

Vernier Caliper 530 Series — Standard model

- Plain and basic design.
- Stepped graduation face prevents dust ingress between the main scale and slider.
- The small vernier face angle (14°) provides easy reading.
- Can measure outside and inside dimensions, depth, and steps.
- Carbide-tipped jaw calipers are optimal for rough finished parts, castings, grinding stones, etc.
- Decimal and fractional graduated scales (metric/inch and inch models only).



530-101



530-100



530-102 (Round depth bar type)



530-320 (Carbide-tipped jaw 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 ($.001''$)

SPECIFICATIONS

Metric			
Order No.	Range	Depth bar	Remarks
530-100	0 - 100mm	ø1.9mm rod	—
530-102			—
530-101	0 - 150mm	Blade	—
530-320			Carbide-tipped jaws for outside measurement
530-335			Carbide-tipped jaws for outside and inside measurement
530-122*			High accuracy model: ±0.03mm
530-108	0 - 200mm		—
530-321			Carbide-tipped jaws for outside measurement
530-123*			High accuracy model: ±0.03mm
530-109	0 - 300mm		—
530-322			Carbide-tipped jaws for outside measurement
530-124*			High accuracy model: ±0.04mm
530-501	0 - 600mm	—	—
530-502	0 - 1000mm		

* Graduation: 0.02mm

Metric/Inch with metric/inch double scale				
Order No.	Range	Depth bar	Inch graduation	Remarks
530-104	0 - 150mm	Blade	1/128"	—
530-316			1/128"	Clamping screw below the slider
530-312*			.001"	High accuracy model: ±0.03mm
530-114	0 - 200mm		1/128"	—
530-118*			.001"	High accuracy model: ±0.03mm
530-115	0 - 300mm		1/128"	—
530-119*			.001"	High accuracy model: ±0.04mm

* Graduation: 0.02mm

Measurement Applications

1. Outside measurement



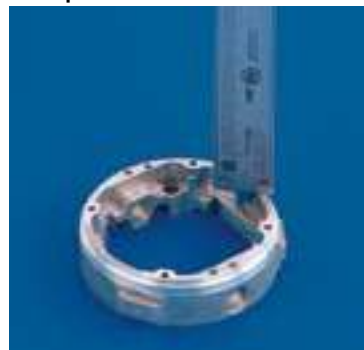
2. Inside measurement



3. Step measurement



4. Depth measurement

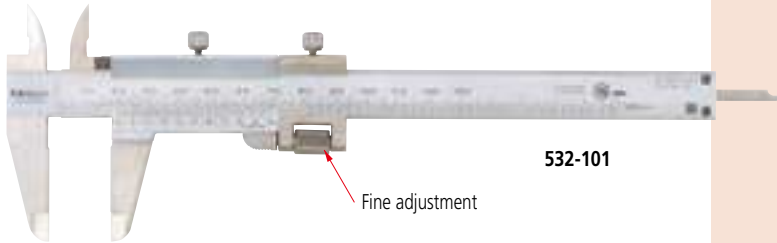


Calipers

An industry standard in measuring tools

Vernier Caliper 532 Series — with fine adjustment

- Fine-adjustment aids slider positioning.
- Allows step measurement.



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"))

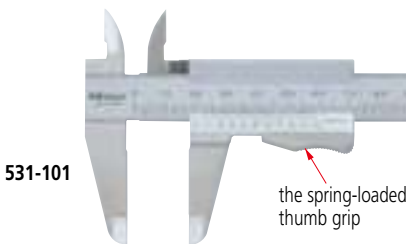
SPECIFICATIONS

Metric			
Order No.	Range	Depth bar	Remarks
532-101	0 - 130mm	Blade	with fine adjustment
532-102	0 - 180mm		
532-103	0 - 280mm		

Metric/Inch with metric/inch double scale				
Order No.	Range	Depth bar	Inch graduation	Remarks
532-119	0 - 130mm	Blade	.001"	with fine adjustment
532-120	0 - 180mm			
532-121	0 - 280mm			

Vernier Caliper 531 Series — with thumb clamp

- The slider moves only when the spring-loaded thumb grip is depressed.
- Allows step measurement.



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")

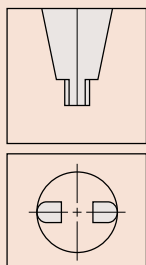
SPECIFICATIONS

Metric				
Order No.	Range	Accuracy	Depth bar	Remarks
531-101	0 - 150mm	$\pm 0.05\text{mm}$	Blade	—
531-102	0 - 200mm			
531-103	0 - 300mm			

* Graduation: 0.02mm

Metric/Inch with metric/inch double scale					
Order No.	Range	Accuracy	Depth bar	Inch graduation	Remarks
531-122	0 - 150mm	$\pm 0.05\text{mm}$	Blade	1/128"	with inch/mm conversion label
531-128*		$\pm 0.03\text{mm}$.001"	High accuracy model
531-108	0 - 200mm	$\pm 0.05\text{mm}$		1/128"	—
531-129*		$\pm 0.03\text{mm}$.001"	High accuracy model
531-109	0 - 300mm	$\pm 0.08\text{mm}$		1/128"	—
531-112*		$\pm 0.04\text{mm}$.001"	High accuracy model

* Graduation: 0.02mm



Radiused jaws for accurate
ID measurement

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)

Resolution: 0.01mm or .0005"/0.01mm

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear
encoder

Max. response speed: Unlimited

Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)

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

(3.5 years: over 300mm models)

Dust/Water protection level: IP67* (models up to 300mm)

*This model is not waterproof type.

Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-32.

959143: Data hold unit

Connecting cables for IT/DP/MUX

05CZA624: SPC cable with data button (1m)*

05CZA625: SPC cable with data button (2m)*



959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380A: SPC cable for USB-ITN-A (2m)*

06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

02AZD790A: SPC cable for U-WAVE with data button
(160mm)*

02AZE140A: SPC cable for footswitch*

02AZD790C: SPC cable for U-WAVE with data button
(160mm)

02AZE140C: SPC cable for footswitch

* For IP67 models (up to 300mm)

ABSOLUTE Digimatic Caliper 550 Series — with Nib Style Jaws

- Offers a resolution of 0.01mm with corresponding accuracy.
- Incorporates an Absolute measurement system. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Code Nos. 550-301-10, 550-331-10, 550-311-10 and 550-341-10: IP67 (These models are not a waterproof type. Therefore a rustproofing shall be applied after use.)
- Allows integration into statistical process control and measurement systems for models

with measurement data output connector.
Refer to page A-1.

- ID measurement value: displayed value + (the minimum inside measurement value mentioned below). OFFSET switch allows to input a compensation value so that the measurement value can be read directly (Code Nos. 550-301-10, 550-331-10, 550-311-10 and 550-341-10). Preset function allows to set a desired starting point (Code Nos. 550-331-10 and 550-341-10).



550-301-10

SPECIFICATIONS

Metric			
Order No.	Range*	Accuracy	Remarks
550-301-10	0 - 200mm (10.1 - 210mm)	±0.03mm	IP67
550-331-10	0 - 300mm (10.1 - 310mm)	±0.04mm	IP67, with offset/preset function for easy inside measurement
550-203-10	0 - 450mm (20.1 - 470mm)	±0.05mm	—
550-205-10	0 - 600mm (20.1 - 620mm)	±0.05mm	—
550-207-10	0 - 1000mm (20.1 - 1020mm)	±0.07mm	—

* (): Inside measurement

Note: Series 550 is not equipped with a depth bar.

Inch/Metric			
Order No.	Range*	Accuracy	Remarks
550-311-10	0 - 8" (.404" - 8.4")	±.0015"	IP67
550-341-10	0 - 12" (.404" - 12.4")	±.002"	IP67, with offset/preset function for easy inside measurement
550-223-10	0 - 18" (.504" - 18.5")		—
550-225-10	0 - 24" (.504" - 24.5")		—
550-227-10	0 - 40" (.504" - 40.2")	±.003"	—

* (): Inside measurement

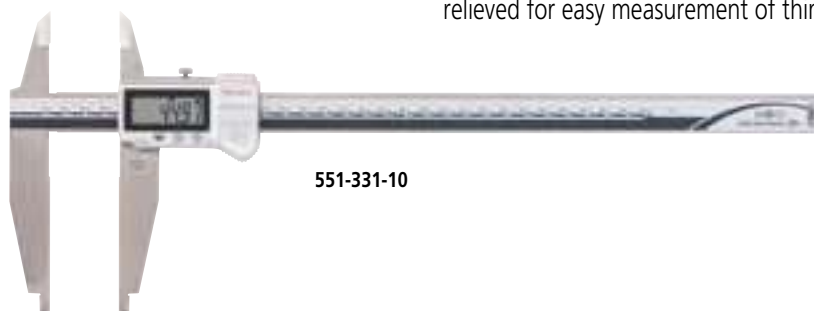
Note: Series 550 is not equipped with a depth bar.

Calipers

An industry standard in measuring tools

ABSOLUTE Digimatic Caliper 551 Series - with Nib Style and Standard Jaws

- Offers a resolution of 0.01mm with corresponding accuracy.
- Incorporates an Absolute measurement system. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.
- ID measurement value: displayed value + (the minimum inside measurement value mentioned below). OFFSET switch allows to input a compensation value so that the measurement value can be read directly (Code No. 551-301-10, 551-331-10, 551-311-10 and 551-341-10). Preset function allows to set a desired starting point (Code No. 551-331-10 and 551-341-10).
- Tips of the outside measurement jaw are relieved for easy measurement of thin parts.



551-331-10

SPECIFICATIONS

Metric

Order No.	Range*	Accuracy	Remarks
551-301-10	0 - 200mm (10.1 - 210mm)	±0.03mm	IP67
551-331-10	0 - 300mm (10.1 - 310mm)	±0.04mm	IP67, with offset/preset function for easy inside measurement
551-204-10	0 - 500mm (20.1 - 520mm)	±0.06mm	—
551-206-10	0 - 750mm (20.1 - 770mm)	±0.06mm	
551-207-10	0 - 1000mm (20.1 - 1020mm)	±0.07mm	

* (): inside measurement

Note: Series 551 is not equipped with a depth bar.

Inch/Metric

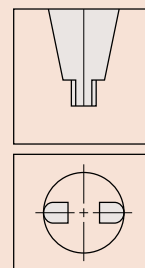
Order No.	Range*	Accuracy	Remarks
551-311-10	0 - 8" (.404" - 8.4")	±.0015"	IP67
551-341-10	0 - 12" (.404" - 12.4")	±.002"	IP67, with offset/preset function for easy inside measurement
551-224-10	0 - 20" (.504" - 20.5")	±.0025"	—
551-226-10	0 - 30" (.504" - 30.5")	±.0025"	
551-227-10	0 - 40" (1.004" - 41")	±.003"	

* (): inside measurement

Note: Series 551 is not equipped with a depth bar.

ABSOLUTE™

IP67



Radiused jaws for accurate ID measurement

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)

Resolution: 0.01mm or .0005"/0.01mm

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
Battery life: Approx. 3 years under normal use (1 year: 300mm models) (3.5 years: over 300mm models)

Dust/Water protection level: IP67* (models up to 300mm)

*This model is not waterproof type.

Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-32.

959143: Data hold unit

Connecting cables for IT/DP/MUX

05CZA624: SPC cable with data button (1m)*

05CZA625: SPC cable with data button (2m)*



959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380A: SPC cable for USB-ITN-A (2m)*

06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

02AZD790A: SPC cable for U-WAVE with data button (160mm)*

02AZE140A: SPC cable for footswitch*

02AZD790C: SPC cable for U-WAVE with data button (160mm)

02AZE140C: SPC cable for footswitch

* For IP67 models (up to 300mm)



An inspection certificate is supplied as standard.

Dial Caliper Series 505

- Newly designed dial movement for ultra-smooth sliding and high shock protection.
- Easy-to-read yellow dial.
- Large finger-rest aids ease-of-use.
- Jaw tips are relieved for easy measurement of thin parts.
- Allows step measurement.



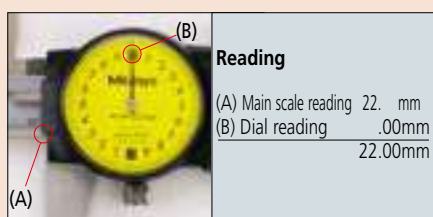
505-730



505-731



505-745



Reading

(A) Main scale reading 22. mm
(B) Dial reading .00mm
22.00mm

SPECIFICATIONS

Metric				
Order No.	Range	Accuracy	Graduation	Remarks
505-730	0 - 150mm	±0.03mm	0.02mm, 2mm/rev	Carbide-tipped jaws for outside measurement
505-734				
505-735				Carbide-tipped jaws for outside and inside measurement
505-732*	0 - 200mm	±0.02mm	0.01mm, 1mm/rev	—
505-731				
505-733*				
505-745	0 - 300mm	±0.04mm	0.02mm, 2mm/rev	

* Silver cover type

Calipers

An industry standard in measuring tools

ABSOLUTE Coolant Proof Carbon Fiber Caliper SERIES 552 - with Long Jaws

- IP66 Absolute Digital Caliper (Refer to page D-6 for a description of Absolute measurement.)
- Lightweight Digimatic Calipers that employ CFRP (Carbon Fiber Reinforced Plastics) in the beam and jaws.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.

ABSOLUTE™

IP66



552-151-10



SPECIFICATIONS

Metric		
Order No.	Range*	Accuracy
552-150-10	0 - 450mm (20.1 - 470mm)	±0.06mm
552-151-10	0 - 600mm (20.1 - 620mm)	
552-152-10	0 - 1000mm (20.1 - 1020mm)	±0.07mm
552-153-10	0 - 1500mm (20.1 - 1520mm)	±0.11mm
552-154-10	0 - 2000mm (20.1 - 2020mm)	±0.14mm

* (): Dimension in inside measurement

Inch/Metric		
Order No.	Range*	Accuracy
552-160-10	0 - 18" (.504 - 18.5")	±.0025"
552-161-10	0 - 24" (.504 - 24.5")	
552-162-10	0 - 40" (1.004 - 40.5")	±.003"
552-163-10	0 - 60" (1.004 - 60.5")	±.0045"
552-164-10	0 - 80" (1.004 - 80.5")	±.0055"

* (): Dimension in inside measurement

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Material of jaws: Stainless Steel Hardened
Display: LCD
Scale type: ABSOLUTE electromagnetic induction linear encoder
Max. response speed: Unlimited
Battery: **SR44** (1 pc, **938882**, for initial operational checks (standard accessory)
Battery life: Approx. 5,000 hours in continuous use
Dust/Water protection level: IP66 (IEC 60529)*
Standard accessory: Jaw clamps (2 pcs.), 05GZA033
*This model is not waterproof type. Please wipe away the wet after use.

Functions

Zero-setting
Data hold
Offsetting
Presetting
Data output
Low-power and low-voltage alert
Counting value composition error
Automatic power on/off, inch/mm reading (inch/mm models)

Optional accessories

For details, refer to page D-32.
Connecting cables for **IT/DP/MUX**
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for U-WAVE with data button (160mm)
02AZE140A: SPC cable for footswitch

Technical Data

Accuracy: Refer to the list of specifications.

(excluding quantizing error)

Resolution: 0.01mm or .0005"/0.01mm

Material of jaws: Ceramic

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

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

for initial operational checks (standard accessory)

Battery life: Approx. 5,000 hours in continuous use

Dust/Water protection level: IP66 (IEC 60529)*

Standard accessory: Jaw clamps (2 pcs.), 05GZA033

*This model is not waterproof type. Please wipe away the wet after use.

Functions

Zero-setting

Data hold

Offsetting

Presetting

Data output

Low-power and low-voltage alert

Counting value composition error

Automatic power on/off, inch/mm reading (inch/mm models)

Optional accessories

For details, refer to page D-32.

Connecting cables for **IT/DP/MUX**

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

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



USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for U-WAVE with data button (160mm)

02AZE140A: SPC cable for footswitch

ABSOLUTE Coolant Proof Carbon Fiber Caliper SERIES 552 - with Ceramic Jaws

- IP66 Absolute Digital Caliper (Refer to page D-6 for a description of Absolute measurement.)
- Lightweight Digimatic Calipers that employ CFRP (Carbon Fiber Reinforced Plastics) in the beam and jaws.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.
- The zirconia-ceramic jaws make this caliper suitable for measuring moderately magnetic workpieces. However, since steel is used in the main unit, it may not be suitable for measuring strongly magnetic workpieces.



552-156-10

SPECIFICATIONS

Metric		
Order No.	Range*	Accuracy
552-155-10	0 - 450mm (20.1 - 470mm)	±0.04mm
552-156-10	0 - 600mm (20.1 - 620mm)	

* (): Dimension in inside measurement

Inch/Metric		
Order No.	Range*	Accuracy
552-165-10	0 - 18" (.504 - 18.5")	±.002"
552-166-10	0 - 24" (.504 - 24.5")	

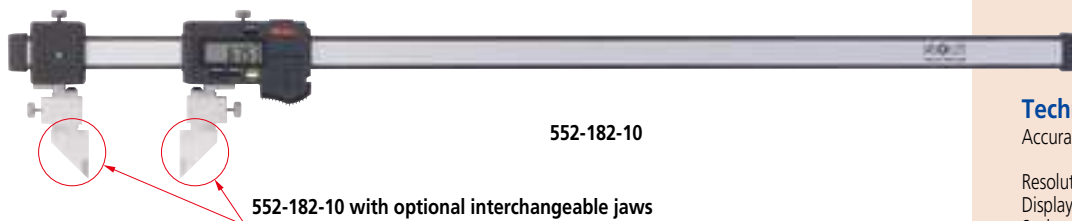
* (): Dimension in inside measurement

Calipers

An industry standard in measuring tools

ABSOLUTE Coolant Proof Carbon Fiber Caliper SERIES 552 - with Interchangeable Jaws

- IP66 Absolute Digital Caliper (Refer to page D-6 for a description of Absolute measurement.)
- The range of applications can be expanded by using interchangeable jaws (optional).
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.
- Provided with preset function for setting a desired starting point, which allows direct readout of offset measurement.



SPECIFICATIONS

Metric			Inch/Metric		
Order No.	Range	Accuracy	Order No.	Range	Accuracy
552-181-10	0 - 450mm	±0.04mm	552-191-10	0 - 18"	±.002"
552-182-10	0 - 600mm		552-192-10	0 - 24"	
552-183-10	0 - 1000mm	±0.05mm	552-193-10	0 - 40"	±.004"
552-184-10	0 - 1500mm	±0.09mm	552-194-10	0 - 60"	
552-185-10	0 - 2000mm	±0.12mm	552-195-10	0 - 80"	±.005"

ABSOLUTE™

IP66



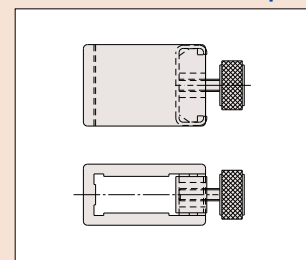
Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Scale type: ABSOLUTE electromagnetic induction linear encoder
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 5,000 hours in continuous use
Dust/Water protection level: IP66 (IEC 60529)*
Standard accessory: Jaw clamps (2 pcs.), 05GZA033
* Although these models are IP66 rated, care should be taken to dry tool after use.

Functions

Zero-setting
Data hold
Offsetting
Presetting
Data output
Low-power and low-voltage alert
Counting value composition error
Automatic power on/off, inch/mm reading
(inch/mm models)

Standard accessories (2 pcs)



Jaw clamps: No.05GZA033

Optional accessories

For details, refer to page D-32.
Connecting cables for **IT/DP/MUX**
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)



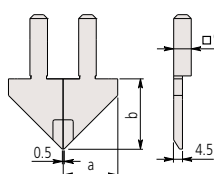
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for U-WAVE with data button
(160mm)
02AZE140A: SPC cable for footswitch

Interchangeable jaws

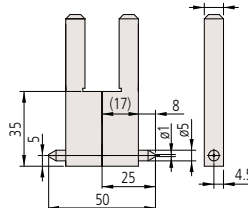
Type	Applicable calipers	Range	Accuracy when attached to the caliper
Standard type	552-181-10 (552-191-10)	0 - 450mm (0-18")	±0.06mm (± 0.0025")
	552-182-10 (552-192-10)	0 - 600mm (0-24")	
	552-183-10 (552-193-10)	0 - 1000mm (0-40")	
	552-184-10 (552-194-10)	0 - 1500mm (0-60")	
	552-185-10 (552-195-10)	0 - 2000mm (0-80")	
Inside point type	552-181-10 (552-191-10)	Inside: 50.1-500mm (2.004-20") Outside: 0 - 450mm (0-18")	±0.09mm (± 0.0035")
	552-182-10 (552-192-10)	Inside: 50.1-650mm (2.004-26") Outside: 0 - 600mm (0-24")	
	552-183-10 (552-193-10)	Inside: 50.1-1050mm (2.004-42") Outside: 0 - 1000mm (0-40")	
	552-184-10 (552-194-10)	Inside: 50.1-1550mm (2.004-62") Outside: 0 - 1500mm (0-60")	
	552-185-10 (552-195-10)	Inside: 50.1-2050mm (2.004-82") Outside: 0 - 2000mm (0-80")	
	552-181-10 (552-191-10)	30.1 - 480mm (1.204-19.2")	±0.08mm (± 0.0030")
	552-182-10 (552-192-10)	30.1 - 630mm (1.204-25.2")	
Centerline type	552-183-10 (552-193-10)	30.1 - 1030mm (1.204-41.2")	
	552-184-10 (552-194-10)	30.1 - 1530mm (1.204-61.2")	
	552-185-10 (552-195-10)	30.1 - 2030mm (1.204-81.2")	
Scriber type	552-181-10 (552-191-10)	30 - 480mm (1.2-19.2")	±0.10mm (± 0.0040")
	552-182-10 (552-192-10)	30 - 630mm (1.2-25.2")	
	552-183-10 (552-193-10)	30 - 1030mm (1.2-41.2")	
	552-184-10 (552-194-10)	30 - 1530mm (1.2-61.2")	
	552-185-10 (552-195-10)	30 - 2030mm (1.2-81.2")	
Surface plate type + Scriber type for height gages	552-181-10 (552-191-10)	0 - 450mm (0-17.7")	±0.10mm (± 0.0040")
	552-182-10 (552-192-10)	0 - 600mm (0-23.7")	
	552-183-10 (552-193-10)	0 - 1000mm (0-39.4")	
	552-184-10 (552-194-10)	0 - 1500mm (0-59.4")	
	552-185-10 (552-195-10)	0 - 2000mm (0-79.6")	
Surface plate type + Inside point type	552-181-10 (552-191-10)	Inside: 25.1 - 475mm (1.004-19") Outside: 0 - 450mm (1-18")	±0.12mm (± 0.0050")
	552-182-10 (552-192-10)	Inside: 25.1 - 625mm (1.004-25") Outside: 0 - 600mm (1-24")	
	552-183-10 (552-193-10)	Inside: 25.1 - 1025mm (1.004-41") Outside: 0 - 1000mm (1-40")	
	552-184-10 (552-194-10)	Inside: 25.1 - 1525mm (1.004-62") Outside: 0 - 1500mm (1-60")	
	552-185-10 (552-195-10)	Inside: 25.1 - 2025mm (1.004-81") Outside: 0 - 2000mm (1-80")	
Surface plate type + Centerline type	552-181-10 (552-191-10)	15 - 465mm (0.6-18.6")	±0.11mm (± 0.0045")
	552-182-10 (552-192-10)	15 - 615mm (0.6-24.6")	
	552-183-10 (552-193-10)	15 - 1015mm (0.6-40.6")	
	552-184-10 (552-194-10)	15 - 1515mm (0.6-60.6")	
	552-185-10 (552-195-10)	15 - 2015mm (0.6-80.6")	

SPECIFICATIONS

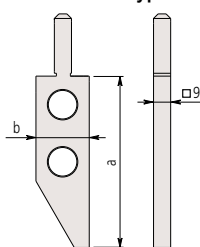
Standard type



Inside point type

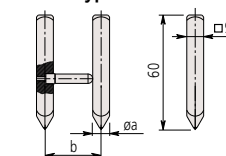


Surface Plate Type

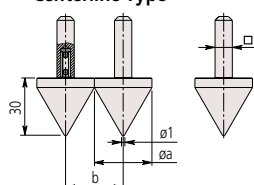


Unit: mm

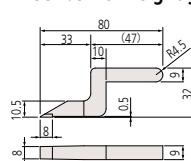
Scriber Type



Centerline Type



Scriber for height gages



Standard Type

Order No.	Components	a	b
07CZA056	Right (07CAA044), Left (07CAA045)	28mm (1.1")	30mm (1.2")

* 1 set

Inside Point Type

Order No.	Components	a	b
07CZA058	07CZA041 x 2pcs.	25mm	50mm
07CZA059	07CZA048 x 2pcs.	1"	2"

Scriber Type

Order No.	Components	a	b
07CZA055	Right (07CZA042), Left (07CZA043)	8mm	30mm
07CZA061	Right (07CZA042), Left (07CZA049)	031"	1.2"

Surface Plate Type

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

Centerline Type

Order No.	Components	a	b
07CZA057	07CZA039 x 2pcs.	30mm	30mm
07CZA060	07CZA047 x 2pcs.	1.2"	1.2"

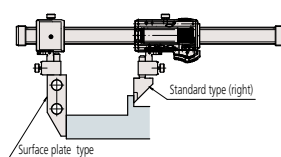
Note: Entering the appropriate offset value enables the display to indicate the correct measurement value inscribed on the jaws, which should be installed so that this inscription is visible from the display side of the caliper.

Scriber for height gages

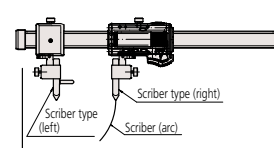
Order No.
07GZA000

Application examples

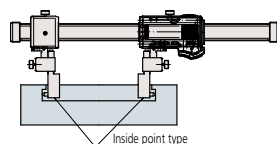
Surface plate type + Standard type



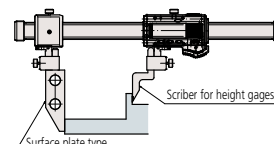
Scriber type



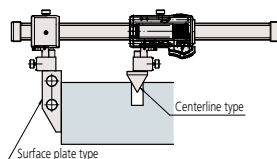
Inside point type



Surface plate type + Scriber for height gages



Surface plate type + Centerline type



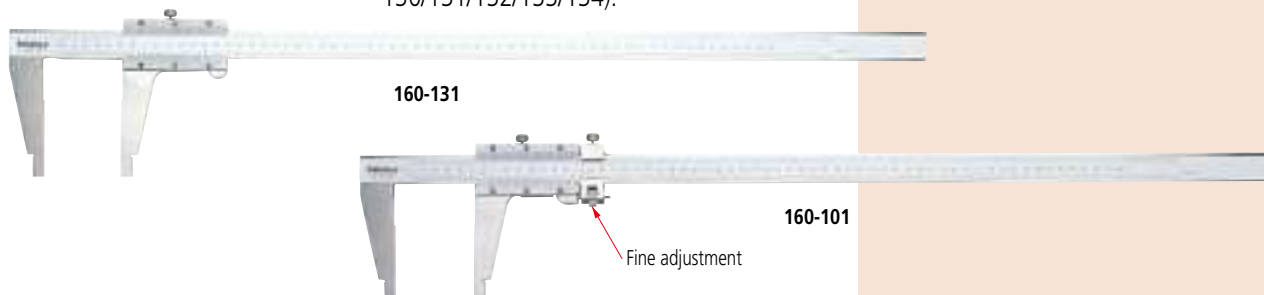
Calipers

An industry standard in measuring tools

Vernier Caliper

SERIES 160 — with Nib Style Jaws and Fine Adjustment

- Inside and outside measurements can be read directly from the upper and lower vernier scales.
- The jaws have radiused measuring faces for accurate inside diameter (ID) measurement.
- With fine adjustment (except for 160-130/131/132/133/134).



SPECIFICATIONS

Metric with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-130	0 (20.1) - 450mm	±0.10mm	0.05mm	without fine adjustment
160-131	0 (20.1) - 600mm			
160-132	0 (20.1) - 1000mm			
160-133	0 (20.1) - 1500mm			
160-134	0 (20.1) - 2000mm			

* (): Minimum dimension in ID measurement

Metric with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-127	0 (10.1) - 300mm	±0.04mm	0.02mm	with fine adjustment
160-128	0 (20.1) - 450mm	±0.05mm		
160-101	0 (20.1) - 600mm	±0.05mm		
160-104	0 (20.1) - 1000mm	±0.07mm		
160-110	0 (20.1) - 1500mm	±0.1mm		
160-113	0 (20.1) - 2000mm	±0.12mm		

* (): Minimum dimension in ID measurement

Metric/Inch with metric/inch double scale

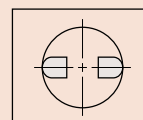
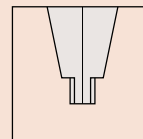
Order No.	Range*	Accuracy	Graduations	Remarks
160-150	0 (10.1) - 300mm	±0.04mm	0.02mm/.001"	+10mm/.394" to reading in inside measurement
160-151	0 (20.1) - 450mm	±0.05mm		+20mm/.787" to reading in inside measurement
160-153	0 (20.1) - 600mm	±0.05mm		
160-155	0 (20.1) - 1000mm	±0.07mm		
160-157	0 (20.1) - 1500mm	±0.1mm		
160-159	0 (20.1) - 2000mm	±0.12mm		

* (): Minimum dimension in ID measurement

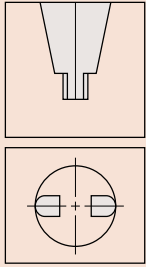
Inch/Metric with inch/metric double scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-125	0 (.304") - 12"	±.0015"	.001"/0.02mm	+3"/7.62mm to reading in inside measurement
160-119	0 (.504") - 18"	±.002"		+.5"/12.7mm to reading in inside measurement
160-103	0 (.504") - 24"	±.002"		
160-106	0 (1.004") - 40"	±.003"		+1"/25.4mm to reading in inside measurement
160-112	0 (1.004") - 60"	±.004"		
160-115	0 (1.004") - 80"	±.005"		

* (): Minimum dimension in ID measurement



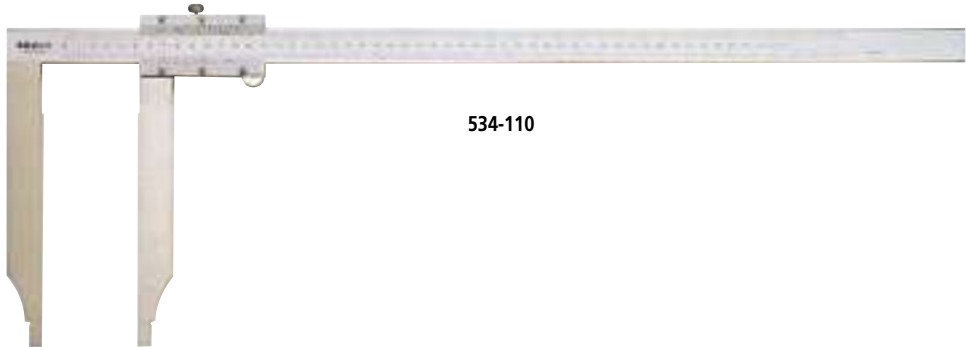
Radiused jaws for accurate ID measurement



Round jaws for accurate ID measurement

Long Jaw Vernier Caliper SERIES 534

- Long jaws for measuring hard-to-reach workpiece features.
- Inside and outside measurements can be read directly from the upper and lower vernier scales.



534-110

SPECIFICATIONS

Metric with inside measurement vernier scale				
Order No.	Range*	Accuracy	Graduation	Remarks
534-109	0 (10.1) - 300mm	±0.07mm	0.05mm	without fine adjustment
534-110	0 (20.1) - 500mm	±0.13mm		

* (): Minimum dimension in inside measurement

Metric/Inch with metric/inch double scale				
Order No.	Range*	Accuracy	Graduation	Remarks
534-101	0 (10.1) - 300mm	±0.07mm	0.05mm/ 1/128"	+10mm/.394" to reading in inside measurement without fine adjustment
534-105		±0.04mm	0.02mm/.001"	
534-102	0 (20.1) - 500mm	±0.13mm	0.05mm/ 1/128"	+20mm/.787" to reading in inside measurement without fine adjustment
534-106		±0.06mm	0.02mm/.001"	
534-103	0 (20.1) - 750mm	±0.16mm	0.05mm/ 1/128"	
534-107		±0.08mm	0.02mm/.001"	
534-104	0 (20.1) - 1000mm	±0.20mm	0.05mm/ 1/128"	
534-108		±0.10mm	0.02mm/.001"	

* (): Minimum dimension in inside measurement

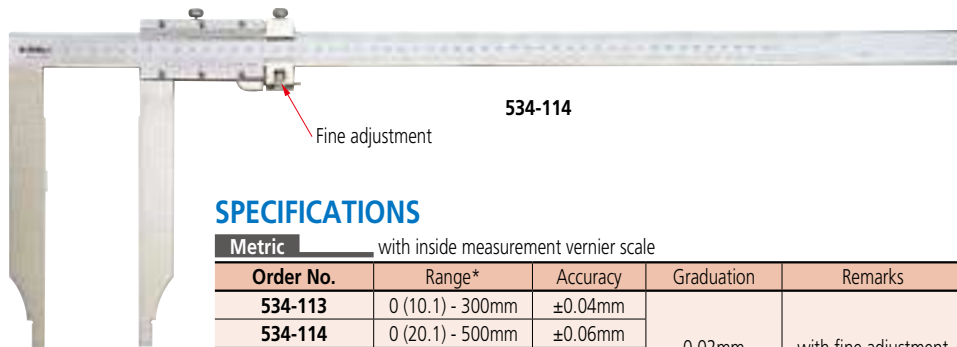
D

Calipers

An industry standard in measuring tools

Long Jaw Vernier Caliper SERIES 534

- Long jaws for measuring hard-to-reach workpiece features.
- Inside and outside measurements can be read directly from the upper and lower vernier scales.



SPECIFICATIONS

Metric with inside measurement vernier scale				
Order No.	Range*	Accuracy	Graduation	Remarks
534-113	0 (10.1) - 300mm	±0.04mm	0.02mm	with fine adjustment
534-114	0 (20.1) - 500mm	±0.06mm		
534-115	0 (20.1) - 750mm	±0.08mm		
534-116	0 (20.1) - 1000mm	±0.10mm		

* (): Minimum dimension in inside measurement

Offset Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- The beam-mounted jaw can be adjusted to facilitate measurement of stepped sections and hard-to-get-at workpiece features.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



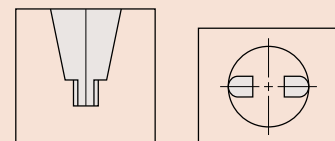
SPECIFICATIONS

Metric Digital model		
Order No.	Range	Accuracy
573-601	0 - 150mm	±0.02mm
573-611*	0 - 150mm	±0.02mm
573-602	0 - 200mm	±0.02mm
573-612*	0 - 200mm	±0.02mm
573-604	0 - 300mm	±0.03mm
573-614*	0 - 300mm	±0.03mm

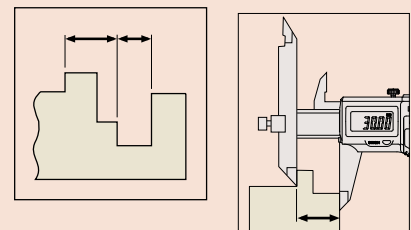
* Without thumb roller

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

Inch/Metric Digital model		
Order No.	Range	Accuracy
573-701	0 - 6"	±.001"
573-702	0 - 8"	±.001"
573-704	0 - 12"	±.0015"



Radiused jaws for accurate ID measurement



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
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
(1 year: 300mm model)
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories for Digital Model

For details, refer to page D-32.

959143: Data hold unit

Connecting cables for IT/DP/MUX

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

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

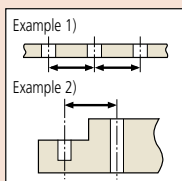
USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for **U-WAVE** with data button (160mm)

02AZE140A: SPC cable for footswitch

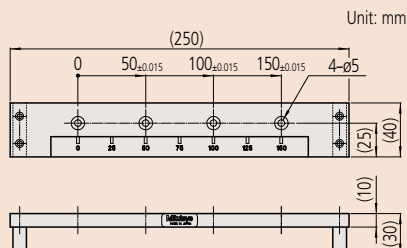


Technical Data

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
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
(1 year: 310mm model)
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

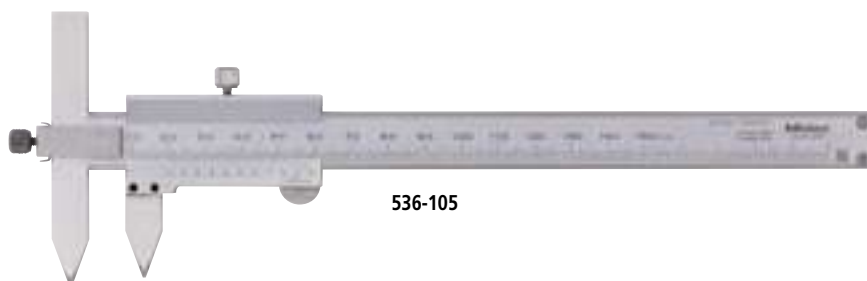
Optional accessories for Digital Models

For details, refer to page D-32.
959143: Data hold unit
Connecting cables for IT/DP/MUX
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140A: SPC cable for footswitch
05FAJ735: Centerline caliper inspection gage



Offset Centerline Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- Specially designed for hole Center-to-Center measurements on the same, or offset, planes.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Direct reading of pitch measurements is available due to the offset-value setting function.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



SPECIFICATIONS

Metric	Digital model	
Order No.	Range	Accuracy
573-605	10.1 - 160mm	±0.03mm
573-615*	10.1 - 160mm	±0.03mm
573-606	10.1 - 210mm	±0.03mm
573-616*	10.1 - 210mm	±0.03mm
573-608	10.1 - 310mm	±0.04mm
573-618*	10.1 - 310mm	±0.04mm

* Without thumb roller

Metric	Analog model	
Order No.	Range	Accuracy
536-105	10.1 - 150mm	±0.05mm
536-106	10.1 - 200mm	±0.05mm
536-107	10.1 - 300mm	±0.08mm

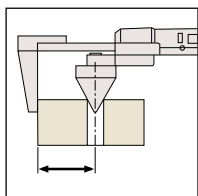
Inch/Metric	Digital model	
Order No.	Range	Accuracy
573-705	.404 - 6.4"	±.0015"
573-706	.404 - 8.4"	±.0015"
573-708	.404 - 12.4"	±.0015"

Calipers

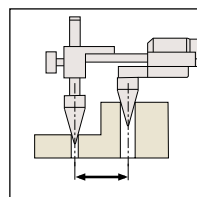
An industry standard in measuring tools

ABSOLUTE Back-Jaw Centerline Caliper SERIES 573 - Center-to-Center & Edge-to-Center Types

- Specially designed to measure hole Center-to-Center and Edge-to-Center distances.
- Provided with jaws on the back of the slider, measurements can be read easily from above.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.
- Dedicated calibration inspection tools are available.



- A digital model is IP67 Absolute type. (Refer to page D-6 for Absolute function.)
- Direct reading of pitch measurements is available due to the offset value setting function.



SPECIFICATIONS

Metric	Edge-to-center distance type	
Order No.	Range	Accuracy
573-118-10	10.1 - 200mm	±0.10mm
573-119-10	10.1 - 300mm	±0.15mm

Metric	Center-to-center distance type	
Order No.	Range	Accuracy
573-116-10	10.1 - 200mm	±0.10mm
573-117-10	10.1 - 300mm	±0.15mm

ABSOLUTE™

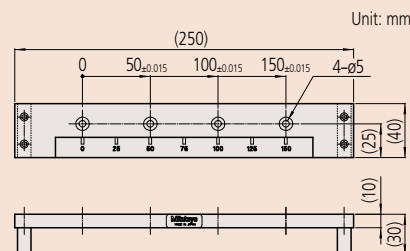


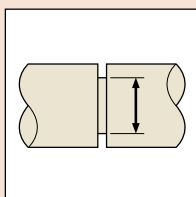
Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Scale type: ABSOLUTE electrostatic capacity linear encoder
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 3.5 years under normal use

Optional accessories

For details, refer to page D-32.
959143: Data hold unit
Connecting cables for IT/DP/MUX
959149: SPC cable with data button (1m)
959150: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380C: SPC cable for **USB-ITN-C** (2m)
Connecting cables for **U-WAVE-T**
02AZD790C: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140C: SPC cable for footswitch
05FAJ735: Centerline caliper inspection gage





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
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories for Digital Models

For details, refer to page D-32.

Connecting cables for IT/DP/MUX

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

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

USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for **U-WAVE** with data button
(160mm)

02AZE140A: SPC cable for footswitch

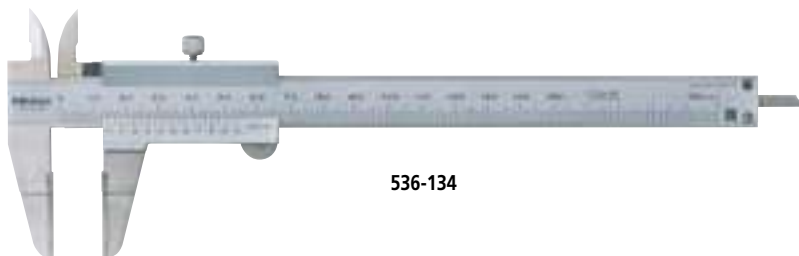
Blade Type Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- The thin blade-type jaws fit into very small grooves and make previously difficult outside measurements far easier to obtain.
- The outside measuring faces are carbide tipped.
- Allows step measurement.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



573-634

ABSOLUTE™



536-134

SPECIFICATIONS

Metric	Digital model	
Order No.	Range	Accuracy
573-634	0 - 150mm	±0.02mm
573-635*	0 - 150mm	±0.02mm

* without thumb roller

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

Inch/Metric	Digital model	
Order No.	Range	Accuracy
573-734	0 - 6"	±.001"

Calipers

An industry standard in measuring tools

Point Caliper

SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- Narrow-tip jaws fit into very small grooves and tracks, making many previously difficult outside measurements far easier to obtain.
- Allows step measurement.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- SPC output models allow integration into statistical process control and measurement systems. Refer to page A-1.



573-621

ABSOLUTE™

536-121

SPECIFICATIONS

Metric Digital model		
Order No.	Range	Accuracy
573-621	0 - 150mm	±0.02mm
573-625	0 - 150mm	±0.02mm
573-622*	0 - 150mm	±0.02mm
573-626*	0 - 150mm	±0.02mm

* without thumb roller

Metric		
Order No.	Range	Accuracy
536-121	0 - 150mm	±0.05mm

Inch/Metric Digital model		
Order No.	Range	Accuracy
573-721	0 - 6"	±.001"
573-725	0 - 6"	±.001"

IP67



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
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories for Digital Models

For details, refer to page D-32.

Connecting cables for IT/DP/MUX

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

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

USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

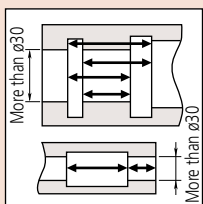
Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for **U-WAVE** with data button
(160mm)

02AZE140A: SPC cable for footswitch

Technical Data

Accuracy: $\pm 0.03\text{mm}$
Graduation: 0.02mm



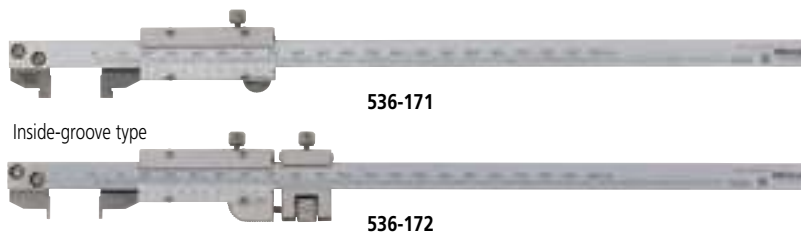
Technical Data

Accuracy: $\pm 0.05\text{mm}$
Graduation: 0.05mm



Hook Type Vernier Caliper SERIES 536

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



SPECIFICATIONS

Metric			
Order No.	Range*	Accuracy	Remarks
536-171	0 - 200mm (10.1 - 200mm)	$\pm 0.03\text{mm}$	—
536-172	0 - 200mm (2.1 - 200mm)	$\pm 0.03\text{mm}$	with fine adjustment

* (): Dimension in inside measurement

Swivel Vernier Caliper SERIES 536 — Moving Jaw type

- The moving jaw can be rotated to measure sectioned shafts.
- Allows step measurement.



SPECIFICATIONS

Metric			
Order No.	Range	Accuracy	Remarks
536-212	0 - 200mm	$\pm 0.05\text{mm}$	with depth bar

* with depth bar

Calipers

An industry standard in measuring tools

Neck Caliper

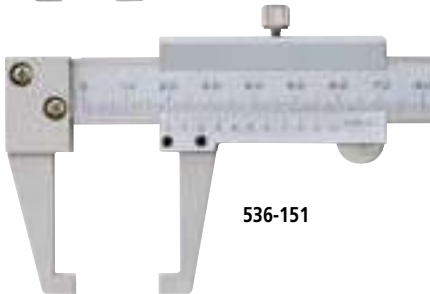
SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- Can measure wall thickness inside bores and recesses.
- Digital models are an IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.

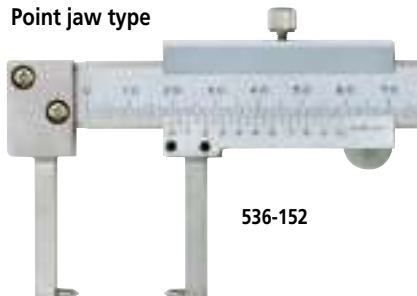


573-651

ABSOLUTE™



536-151



Point jaw type

536-152

SPECIFICATIONS

Metric Digital model		
Order No.	Range	Accuracy
573-651	0 - 150mm	±0.03mm
573-652*	0 - 150mm	±0.03mm
573-653**	0 - 150mm	±0.03mm
573-654***	0 - 150mm	±0.03mm

* Point type

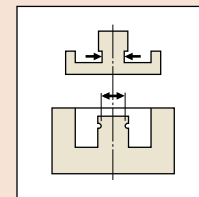
** Without thumb roller

Metric		
Order No.	Range	Accuracy
536-151	0 - 150mm	±0.05mm
536-152*	0 - 150mm	±0.05mm

* Point type

Inch/Metric Digital model		
Order No.	Range	Accuracy
573-751	0 - 6"	±.0015"
573-752*	0 - 6"	±.0015"

* Point type



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
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-32.

Connecting cables for IT/DP/MUX

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

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

USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for **U-WAVE** with data button (160mm)

02AZE140A: SPC cable for footswitch



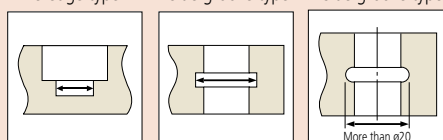
Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .00005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-32.
Connecting cables for IT/DP/MUX
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140A: SPC cable for footswitch

Knife-edge type Inside groove type Inside groove type



ABSOLUTE Inside Caliper SERIES 573, 536 — Knife-edge/Inside Groove/Point Jaw Type

- Specially designed for inside measurements in hard-to-reach places.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.

Knife-edge type



Inside groove type



Point jaw type



SPECIFICATIONS

Metric Digital model

Order No.	Range	Accuracy	Remarks
573-642	10 - 200mm	±0.05mm	Knife-edge type, Measurable min. hole diameter: ø10mm
573-643*	10 - 200mm	±0.05mm	Knife-edge type, Measurable min. hole diameter: ø10mm
573-645**	10.1 - 160mm	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10.1mm
573-647*	10.1 - 160mm	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10.1mm
573-646**	20.1 - 170mm	±0.03mm	Point jaw type, Measurable min. hole diameter: ø20.1mm
573-648*	20.1 - 170mm	±0.03mm	Point jaw type, Measurable min. hole diameter: ø20.1mm

* without thumb roller

** Incorporated with the offsetting function, which indicates the actual measurement value.

Metric

Order No.	Range	Accuracy	Remarks
536-142	10 - 200mm	±0.12mm	Knife-edge type, Measurable min. hole diameter: ø10.1mm
536-145	10.1 - 150mm	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10.1mm
536-146	20.1 - 150mm	±0.05mm	Point jaw type, Measurable min. hole diameter: ø20.1mm
536-147	30.1 - 300mm	±0.08mm	Point jaw type, Measurable min. hole diameter: ø30.1mm
536-148	70.1 - 450mm	±0.10mm	Point jaw type, Measurable min. hole diameter: ø70.1mm
536-149	70.1 - 600mm	±0.12mm	Point jaw type, Measurable min. hole diameter: ø70.1mm

Inch/Metric Digital model

Order No.	Range	Accuracy	Remarks
573-742	.4 - 6"	±.002"	Knife-edge type, Measurable min. hole diameter: ø.4"
573-745**	.404 - 6"	±.002"	Inside groove type, Measurable min. hole diameter: ø.404"
573-746**	.804 - 6"	±.0015"	Point jaw type, Measurable min. hole diameter: ø.804"

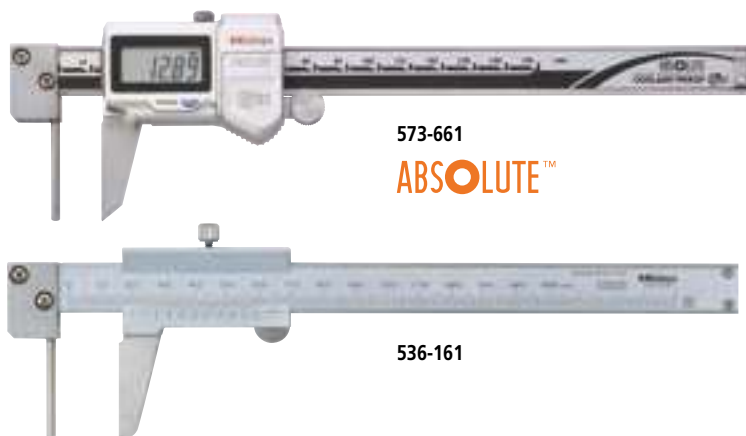
** Incorporated with the offsetting function, which indicates the actual measurement value.

Calipers

An industry standard in measuring tools

Tube Thickness Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- The beam-mounted jaw is a round bar that facilitates measurements of tube wall thickness.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



573-661

ABSOLUTE™

536-161

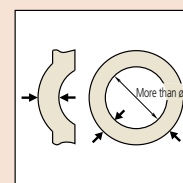
SPECIFICATIONS

Metric Digital model		
Order No.	Range	Accuracy
573-661	0 - 150mm	±0.05mm
573-662*	0 - 150mm	±0.05mm

* without thumb roller

Metric Analog model		
Order No.	Range	Accuracy
536-161	0 - 150mm	±0.05mm

Inch/Metric Digital model		
Order No.	Range	Accuracy
573-761	0 - 6"	±.002"



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
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-32.
Connecting cables for IT/DP/MUX
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for **U-WAVE** with data button (160mm)
02AZE140A: SPC cable for footswitch

Technical Explanation

Measurement procedure



A consistently low measuring force can be guaranteed by only taking measurements when the pointer is between the two fiducial lines.

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Scale type*: ABSOLUTE electromagnetic inductive linear encoder
Jaw retraction: 0.3mm
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 3.5 years under normal use

Optional accessories

For details, refer to page D-32.
959143: Data hold unit
Connecting cables for IT/DP/MUX
959149: SPC cable with data button (1m)
959150: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380C: SPC cable for **USB-ITN-C** (2m)
Connecting cables for **U-WAVE-T**
02AZD790C: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140C: SPC cable for footswitch



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Repeatability: 0.01mm
Display: LCD
Scale type: ABSOLUTE electromagnetic inductive linear encoder
Jaw retraction: 2mm
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 3.5 years under normal use

Optional accessories

For details, refer to page D-32.
959143: Data hold unit
Connecting cables for IT/DP/MUX
959149: SPC cable with data button (1m)
959150: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380C: SPC cable for **USB-ITN-C** (2m)
Connecting cables for **U-WAVE-T**
02AZD790C: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140C: SPC cable for footswitch

Absolute Low Force Caliper SERIES 573

- ABSOLUTE electromagnetic induction linear encoder system is introduced.
- Due to the low measuring force, these calipers are ideal for measuring elastic workpieces such as plastic parts and rubber parts that standard calipers cannot measure accurately.
- Allows fine feeding easily by using thumb roller.
- Displacement of main scale jaw is 0.3mm.
- Measuring force: 0.49N to 0.98N (0.5gf to 1.0gf)

- Absolute type. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



573-191-30

SPECIFICATIONS

Metric		
Order No.	Range	Accuracy*
573-191-30	0 - 180mm	±0.05mm

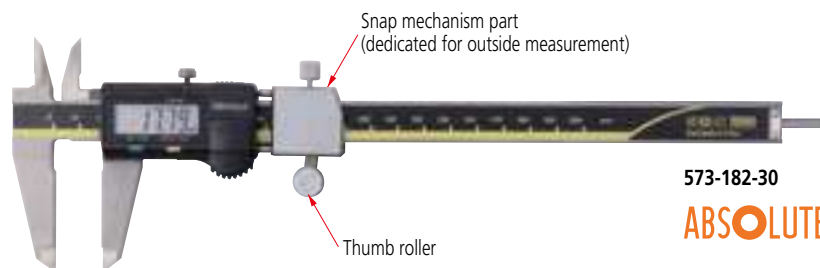
* Excluding quantizing error.
Note) Dedicated for outside measurement (depth bar is not fitted).

Inch/Metric		
Order No.	Range	Accuracy*
573-291-20	0 - 7"	±.002"

Absolute Snap Caliper SERIES 573

- ABSOLUTE electromagnetic induction linear encoder system is introduced.
- Snap mechanism allows continuous and easy measurement without moving the slider by using the lever.
- The ABSOLUTE Digimatic snap caliper features a spring-loaded mechanism to allow quick and efficient GO/NO-GO inspection for mass production parts.

- Allows step measurement.
- Displacement of snap part is 2 mm.
- Measuring force: 7N to 14N
- Absolute type. (Refer to page D-6 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



573-182-30

ABSOLUTE™

SPECIFICATIONS

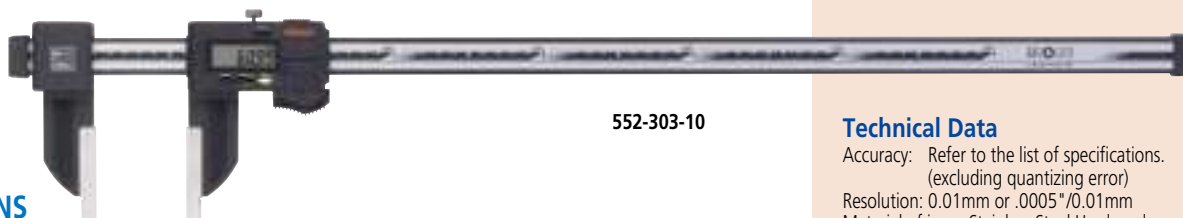
Metric		
Order No.	Range	Accuracy*
573-181-30	0 - 100mm	±0.02mm
573-182-30	0 - 150mm	±0.02mm

* Excluding quantizing error.
Note) Dedicated for outside measurement (depth bar is not fitted).

Inch/Metric		
Order No.	Range	Accuracy*
573-281-20	0 - 4"	±.001"
573-282-20	0 - 6"	±.001"

An industry standard in measuring tools

- IP66 Absolute Digital Caliper (Refer to page D-6 for Absolute function.)
- Lightweight Digimatic Calipers that employ CFRP (Carbon Fiber Reinforced Plastics) in the beam and jaws.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



Metric		
	Order No.	Range* Accuracy
	552-302-10	0 - 450mm (20.1 - 470mm) ±0.04mm
	552-303-10	0 - 600mm (20.1 - 620mm) ±0.04mm
	552-304-10	0 - 1000mm (20.1 - 1020mm) ±0.05mm
	552-305-10	0 - 1500mm (20.1 - 1520mm) ±0.09mm
	552-306-10	0 - 2000mm (20.1 - 2020mm) ±0.12mm

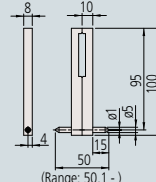
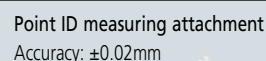
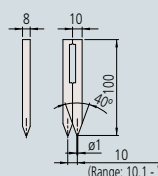
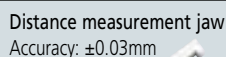
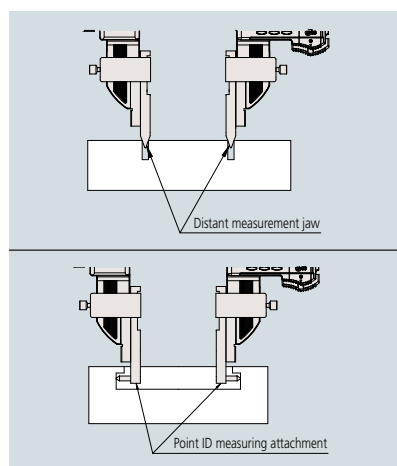
* (): Dimension in inside measurement

Inch/Metric		
Order No.	Range*	Accuracy
552-312-10	0 - 18" (.504 - 18.5")	±.002"
552-313-10	0 - 24" (.504 - 24.5")	±.002"
552-314-10	0 - 40" (1.004 - 40.5")	±.002"
552-315-10	0 - 60" (1.004 - 60.5")	±.004"
552-316-10	0 - 80" (1.004 - 80.5")	±.005"

* (): Dimension in inside measurement

Metric		
	No. 552-302-10, 552-155-10, 552-303-10 and 552-156-10.	No. 552-304-10 and 552-305-10
Clamp box (1 pair)	No.914053	No.914054
Distance measurement jaw (1 pair)	No.914055	
Point ID measuring attachment	No.914057	

Inch/Metric		
	No. 552-312-10, 552-165-10, 552-313-10 and 552-166-10	No. 552-314-10, 552-315-10, 552-316-10
Clamp box (1 pair)	No.914053	No.914054
Distance measurement jaw (1 pair)	No.914056	
Point ID measuring attachment	No.914058	



Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Material of jaws: Stainless Steel Hardened
Display: LCD
Scale type: ABSOLUTE electromagnetic induction linear
encoder
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 5,000 hours in continuous use
Dust/Water protection level: IP66 (IEC60529)*
Standard accessory: Jaw clamps (2 pcs.), 05GZA033
* This model is not waterproof type. Please wipe away
the wet after use.

- Zero-setting
- Data hold
- Offsetting
- Presetting
- Data output
- Low-power and low-voltage alert
- Counting value composition error
- Automatic power on/off, inch/mm reading (inch/mm models)

For details, refer to page D-32.
Connecting cables for **IT/DP/MUX**
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)



06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for U-WAVE with data button
(160mm)
02AZE140A: SPC cable for footswitch

Introduction for Measurement data recording tools for Calipers and Height Gages (optional)

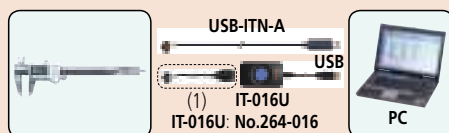
For Coolant Proof Calipers (Connector type A)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- **PC connection (wired system) ... USB Input Tool**
(refer to page A-3/A-4)

USB-ITN-A (2m): No.06ADV380A



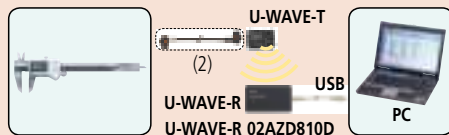
Dedicated cable for models with SPC data output

- (1) 1m: **No.05CZA624**
- 2m: **No.05CZA625**

- **PC connection (wireless system) ... U-WAVE**
(refer to page A-5)

U-WAVE-T (IP67): No.02AZD730D

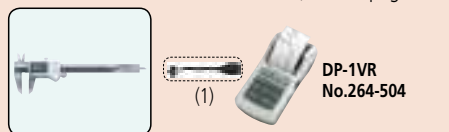
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790A**
- For footswitch: **No.02AZE140A**

- **Dedicated printer connection (only for wired system)**
... **DP-1VR** (refer to page A-11)

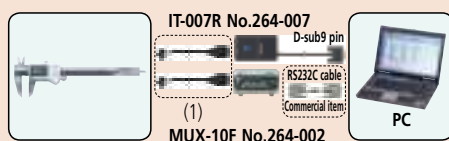


Dedicated cable for models with SPC data output

- (1) 1m: **No.05CZA624**
- 2m: **No.05CZA625**

- **Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)**

... **IT-007R** (refer to page A-4), **MUX-10F** (refer to page A-12)



Dedicated cable for models with SPC data output

- (1) 1m: **No.05CZA624**
- 2m: **No.05CZA625**

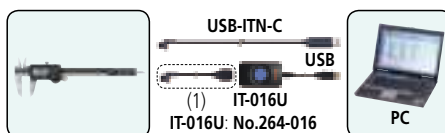
For Digimatic Calipers other than coolant proof type (Connector type C)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- **PC connection (wired system) ... USB Input Tool**
(refer to page A-3/A-4)

USB-ITN-C (2m): No.06ADV380C



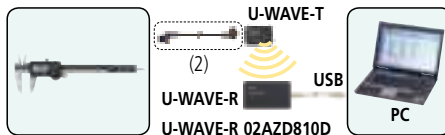
Dedicated cable for models with SPC data output

- (1) 1m: **No.959149**
- 2m: **No.959150**

- **PC connection (wireless system) ... U-WAVE**
(refer to page A-5)

U-WAVE-T (IP67): No.02AZD730D

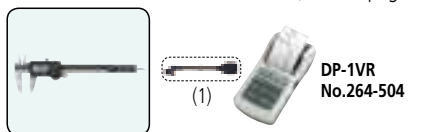
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790C**
- For footswitch: **No.02AZE140C**

- **Dedicated printer connection (only for wired system)**
... **DP-1VR** (refer to page A-11)

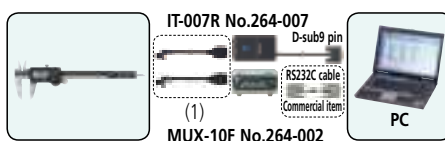


Dedicated cable for models with SPC data output

- (1) 1m: **No.959149**
- 2m: **No.959150**

- **Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)**

... **IT-007R** (refer to page A-4), **MUX-10F** (refer to page A-12)



Dedicated cable for models with SPC data output

- (1) 1m: **No.959149**
- 2m: **No.959150**

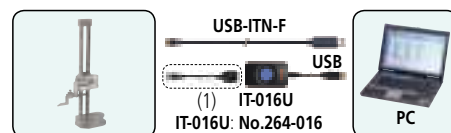
For Digimatic Height Gages (Connector type F)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- **PC connection (wired system) ... USB Input Tool**
(refer to page A-3/A-4)

USB-ITN-F (2m): No.06ADV380F



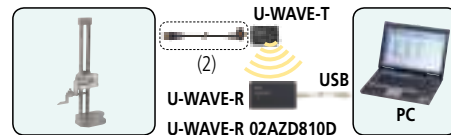
Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
- 2m: **No.905409**

- **PC connection (wireless system) ... U-WAVE**
(refer to page A-5)

U-WAVE-T (IP67): No.02AZD730D

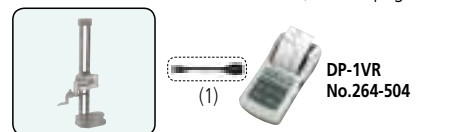
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790F**
- For footswitch: **No.02AZE140F**

- **Dedicated printer connection (only for wired system)**
... **DP-1VR** (refer to page A-11)

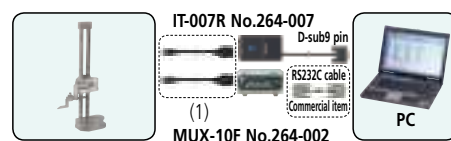


Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
- 2m: **No.905409**

- **Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)**

... **IT-007R** (refer to page A-4), **MUX-10F** (refer to page A-12)



Dedicated cable for models with SPC data output

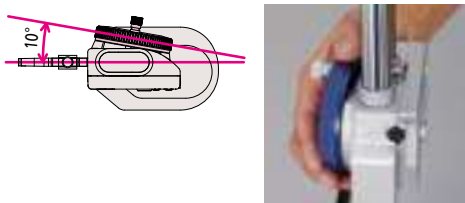
- (1) 1m: **No.905338**
- 2m: **No.905409**

Height Gage

A standard measuring tool of industry

Digimatic Height Gage SERIES 192 — Multi-function Type with SPC Data Output

- Double-column structure ensures high measuring accuracy.
- Ergonomic base fits comfortably in the hand.
- Bidirectional touch-trigger probe is available as an optional accessory.
- Character height of the LCD display has been increased (10mm to 11mm) and a high-contrast LCD display unit adopted, so that the readability is improved.
- Inclined handle improves slider ergonomics.
- Allows integration into statistical process control and measurement systems. Refer to page A-1.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 3,500 hours in continuous use.
- Carbide-tipped long scribe (No. **905200** with overall length of 150mm) is provided as a standard accessory. (Standard accessory: scribe Clamp No. **05GZA033**)
- For precision Black Granite Surface Plates.



192-663-10

SPECIFICATIONS

Metric							
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-663-10	0 - 300mm	0.01mm (0.005mm)	±0.02mm	0.01mm	500mm/s	510mm	5.7kg
192-664-10	0 - 600mm		±0.04mm			802mm	8.3kg
192-665-10	0 - 1000mm		±0.06mm			1228mm	15.7kg

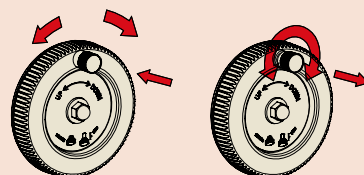
* Excluding quantizing error

Inch/Metric							
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-670-10	0 - 12"	.0005"/0.01mm (.0002"/0.005mm)	±.001"	0.01mm	500mm/s	510mm	5.7kg
192-671-10	0 - 18"		±.0015"			649mm	7.5kg
192-672-10	0 - 24"		±.0015"			802mm	8.3kg
192-673-10	0 - 40"		±.0025"			1228mm	15.7kg

* Excluding quantizing error

Functions

- Origin-setting (ABS measurement mode): Any arbitrary value can be stored as the origin point.
- Zero-setting (INC measurement mode): Displayed value can be set to zero at any arbitrary position of the slider.
- Origin restoration: Previously set origin is restored when switching back to ABS mode.
- Presetting (ABS INC measurement mode): Displayed value can be set to any arbitrary value, including negative values.
- Measuring direction: Measuring direction can be switched at the press of a button.
- Data hold: Display value can be held. Reverts to ABS or INC mode when cancelled.
- Alarm: Error message is displayed when overflow or overspeed of displayed value arises and measurement is stopped.
- Data output: Allows integration into statistical process control and measurement systems. (Refer to page A-1.)
- Fine and coarse height adjustment through knob and wheel combination.
- Slider height adjustment wheel allows fine and coarse height adjustment.



- Coarse adjustment**
Push the small fine-adjustment knob in to disengage gearing and then turn the large wheel.
- Fine adjustment**
Pull the fine-adjustment knob out to engage gearing and then turn this knob, which then slowly turns the wheel.

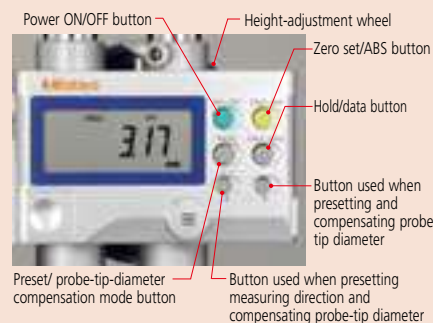
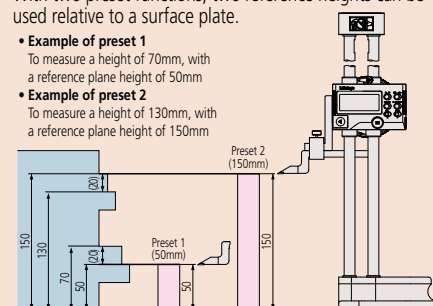
Low-voltage alert:
When battery voltage becomes low, a warning appears in the display.

Probe-tip diameter compensation:
An adjustment is applied to the raw measurement data to compensate for the effect of the size of the spherical contact point used by the bidirectional touch-trigger probe.

Presetting (2 positions)

With two preset functions, two reference heights can be used relative to a surface plate.

- Example of preset 1**
To measure a height of 70mm, with a reference plane height of 50mm
- Example of preset 2**
To measure a height of 130mm, with a reference plane height of 150mm

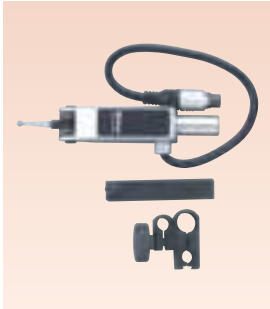


* Probe-tip-diameter compensation mode is a function provided for Order No. 192-663-10/192-664-10/192-665-10/192-670-10/192-671-10/192-672-10/192-673-10.

Optional Accessory

Bidirectional touch-trigger probe

Improves accuracy in step, internal thickness, and outside width measurement by minimizing reproducibility error.



SPECIFICATIONS

Metric							
Order No.	Measuring direction	Relay contact type	Probe overtravel	Probe size	Repeatability	Measuring force	Standard accessories
192-007	Bidirectional	Normally Open	1.5mm	ø3mm	σ : 2 μ m	0.4N	Holder arm, Clamp

For details of the connecting cable, refer to page D-32.

Connecting cables for IT/DP/MUX

905338: SPC cable (1m)

905409: SPC cable (2m)



USB Input Tool Direct

06ADV380F: SPC cable for USB-ITN-F (2m)

Connecting cables for U-WAVE-T

02AZD790F: SPC cable for U-WAVE (160mm)

02AZE140F: SPC cable for footswitch

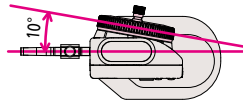
Height Gage

A standard measuring tool of industry

Digimatic Height Gage SERIES 192 — Standard Type with SPC Data Output

- Easy-to-use standard type.
- Double-column structure ensures high measuring accuracy.
- Ergonomic base fits comfortably in the hand.
- Character height of the LCD display has been increased (10mm to 11mm) and a high-contrast LCD display unit adopted, so that readability is improved.
- Allows integration into statistical process control and measurement systems. Refer to page A-1.

- Inclined handle improves slider ergonomics.



- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 3,500 hours in continuous use.
- Carbide-tipped long scriber No. **07GZA000** is provided as a standard accessory. (Standard accessory: scriber Clamp No. **05GZA033**)
- For precision Black Granite Surface Plates.



192-613-10

SPECIFICATIONS

Metric

Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-613-10	0 - 300mm	0.01mm (0.005mm)	±0.02mm	0.01mm	500mm/s	475mm	4.7kg
192-614-10	0 - 600mm		±0.05mm			802mm	7.5kg
192-615-10	0 - 1000mm		±0.07mm			1228mm	15.7kg

* Excluding the quantizing error of ±1 count.

Inch/Metric

Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-630-10	0 - 12"	.0005"/0.01mm (.0002"/0.005mm)	±.001"	0.01mm	500mm/s	475mm	4.7kg
192-631-10	0 - 18"		±.002"			649mm	7.5kg
192-632-10	0 - 24"		±.002"			802mm	8.3kg
192-633-10	0 - 40"		±.003"			1228mm	15.7kg

* Excluding the quantizing error of ±1 count.

Functions

Origin-setting (ABS measurement mode):

Any arbitrary value can be stored as the origin point.

Zero-setting (INC measurement mode):

Displayed value can be set to zero at any arbitrary position of the slider.

Origin restoration:

Previously set origin is restored when switching back to ABS mode.

Presetting (ABS INC measurement mode):

Displayed value can be set to any arbitrary value, including negative values.

Measuring direction

Measuring direction can be switched at the press of a button.

Data hold

Display value can be held. Reverts to ABS or INC mode when cancelled.

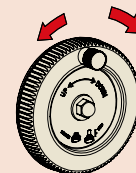
Alarm: Error message is displayed when overflow or overspeed of displayed value arises and measurement is stopped.

Data output:

Allows integration into statistical process control and measurement systems. (Refer to page A-1.)

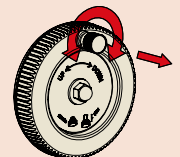
Fine and coarse height adjustment through knob and wheel combination.

Slider height adjustment wheel allows fine and coarse height adjustment.



Coarse adjustment

Push the small fine-adjustment knob in to disengage gearing and then turn the large wheel.



Fine adjustment

Pull the fine-adjustment knob out to engage gearing and then turn this knob, which then slowly turns the wheel.

Low-voltage alert:

When battery voltage becomes low, a warning appears in the display.

Probe-tip diameter compensation:

An adjustment is applied to the raw measurement data to compensate for the effect of the size of the spherical contact point used by the bidirectional touch-trigger probe.

Presetting (2 positions)

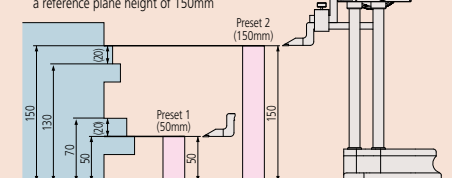
With two preset functions, two reference heights can be used relative to a surface plate.

• Example of preset 1

To measure a height of 70mm, with a reference plane height of 50mm

• Example of preset 2

To measure a height of 130mm, with a reference plane height of 150mm



Power ON/OFF button

Height-adjustment wheel

Zero set/ABS button

Hold/data button

Button used when presetting and compensating probe tip diameter

Preset/ probe-tip-diameter compensation mode button

Button used when presetting measuring direction and compensating probe-tip diameter



* Probe-tip-diameter compensation mode is a function provided for Order No. 192-663-10/192-664-10/192-665-10/192-670-10/192-671-10/192-672-10/192-673-10.

Functions

Origin-setting:

Any convenient reference surface, such as a surface plate, etc., can be stored as the absolute origin point.

Absolute measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. Absolute origin position can be changed by ORIGIN button.

Incremental measurement: Allows origin setting at any arbitrary position. In this case, the origin point is not stored after turning off the power.

Data hold

Display value can be held.

Data output:

Allows integration into statistical process control and measurement systems. (Refer to page A-1.)

Low-voltage alert:

Low-voltage alert: If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible so that the battery can be changed in good time.

Standard accessories

For **570-302, 304**

No.07GZA000 Scriber

No.05GZA033 Scriber clamp

For **570-312** and **570-313, 570-314**

No.900258 Scriber

No.901385 Scriber clamp



Optional accessories

For details, refer to page D-32.

Connecting cables for IT/DP/MUX

905338: SPC cable with data button (1m)

905409: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380F: SPC cable for **USB-ITN-F** (2m)

Connecting cables for **U-WAVE-T**

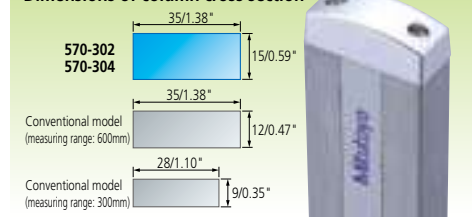
02AZD790F: SPC cable for **U-WAVE** with data button (160mm)

02AZE140F: SPC cable for footswitch

ABSOLUTE Digimatic Height Gage SERIES 570 — with ABSOLUTE Linear Encoder

- Allows smooth elevation by the slider adjustment wheel, which is the same as the well-established double-column structure height gage.
- Large slider-clamp lever ensures positive and accurate clamping action.
- High durability and high accuracy are ensured by an improved column design (35x15mm).

Dimensions of column cross section



- Character height of the LCD display is 10mm.
- Ergonomic and stylish base fits comfortably in the hand.

- Due to the built-in ABSOLUTE scale function, origin setting is not required each time power is turned ON.
- Allows integration into statistical process control and measurement systems. Refer to page A-1.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 20,000 hours under normal use.
- For precision Black Granite Surface Plates.



570-302



570-304

SPECIFICATIONS

Metric						
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Mass
570-302	0 - 300mm	0.01mm	±0.03mm	0.01mm	Unlimited	4.6kg
570-304	0 - 600mm		±0.05mm			6.4kg

* Excluding quantizing error

Inch/Metric						
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Mass
570-312	0 - 12"	.0005"/0.01mm	±.0015"	0.01mm	Unlimited	4.6kg
570-313	0 - 18"		±.002"			5.9kg
570-314	0 - 24"		±.002"			6.4kg

* Excluding quantizing error

Height Gage

A standard measuring tool of industry

ABSOLUTE Digimatic Height Gage SERIES 570 — with ABSOLUTE Linear Encoder

- ABS and INC measurement modes allow efficient operation.
- Rigid structure makes instrument suitable for use in severe work environments.
- The +/- measurement function widens the application range.
- Allows integration into statistical process control and measurement systems. Refer to page A-1.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 5,000 hours under normal use.
- Carbide-tipped scriber (No. **900173** for Nos. **570-227** and **244**, and No. **905200** for Nos. **570-230** and **248**) is provided as a standard accessory. (Standard accessory: scriber Clamp No. **901338** for Nos. **570-227** and **244**, and No. **05GZA033** for Nos. **570-230** and **248**)
- When a dial indicator or test indicator is used with **570-227**, the dedicated holding bar (**953639**, overall length 50mm) is recommended for use. However, instrumental error may be larger because the measurement point is further from the beam.
- For precision Black Granite Surface Plates.



570-227

SPECIFICATIONS

Metric							
Order No.	Range	Resolution	Fine feed	Accuracy*	Repeatability	Height	Mass
570-227	0 - 200mm	0.01mm	4mm	±0.03mm	0.01mm	355mm	1.4kg
570-230	0 - 1000mm		6mm	±0.07mm		1260mm	16.8kg

* Excluding quantizing error

Inch/Metric							
Order No.	Range	Resolution	Fine feed	Accuracy*	Repeatability	Height	Mass
570-244	0 - 8"	.0005" / 0.01mm	.16"	±.002"	0.01mm	355mm	1.4kg
570-248	0 - 40"		.24"	±.003"		1260mm	16.8kg

* Excluding quantizing error

ABSOLUTE™

Functions

Zero-setting
+/- directional measurement
Data hold
Data output
Presetting
inch/mm reading (inch/mm models)
Preset value memory
Origin restoration
Low battery voltage alert
Counting value composition error alert

Optional accessories

For details, refer to page D-32.

Connecting cables for IT/DP/MUX

905338: SPC cable with data button (1m)

905409: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380F: SPC cable for **USB-ITN-F** (2m)

Connecting cables for **U-WAVE-T**

02AZD790F: SPC cable for **U-WAVE** with data button (160mm)

02AZE140F: SPC cable for footswitch

Vernier Height Gage

SERIES 514, 506 — Standard Height Gage with Adjustable Main Scale

- Fits comfortably in the hand and moves easily on the surface plate.
- The main scale slides and clamps within the column for quick and convenient zero-setting.
- Large locking knobs are used both for the slider and fine adjustment clamps to make clamping easy and secure.
- Operability of slider has been improved.
- Large main-scale engraving for fatigue-free working.



- Carbide-tipped scriber (No. **07GZA000** for Nos. **514-102/104/106/103/105/107**, No. **905200** for Nos. **514-108** and **109**, and No. **900390** for No. **514-170**) is provided as a standard accessory. (Scriber Clamp No. **05GZA033** for Code No. **514-102/104/106/108/103/105/107/109**, and No. **905008** for No. **514-170**)
- For precision Black Granite Surface Plates.



514-102

506-207

SPECIFICATIONS

Metric

Order No.	Range	Graduation	Accuracy	Scale adjustment	Fine feed	Height	Mass	Remarks
506-207	0 - 200mm	0.02mm	±0.03mm	—	4mm	341mm	1.4Kg	—
514-102	0 - 300mm		±0.04mm			525mm	3.1Kg	—
514-104	0 - 450mm		±0.05mm			675mm	3.4Kg	—
514-106	0 - 600mm		±0.07mm	25mm	7mm	870mm	7.4Kg	—
514-108	0 - 1000mm	0.05mm	±0.07mm		6mm	1340mm	20Kg	—
514-170	0 - 1500mm		±0.18mm		20mm	1760mm	26Kg	with magnifier

Inch/Metric

Order No.	Range	Graduation	Accuracy	Scale adjustment	Fine feed	Height	Mass	Remarks
506-208	0 - 8"	.001"/0.02mm	±.001"	—	.16"	341mm	1.4Kg	—
514-103	0 - 12"		±.002"			525mm	3.1Kg	—
514-105	0 - 18"		±.002"			675mm	3.4Kg	—
514-107	0 - 24"		±.003"	1"	.27"	870mm	7.4Kg	—
514-109	0 - 40"				.24"	1340mm	20.0 Kg	—

Height Gage

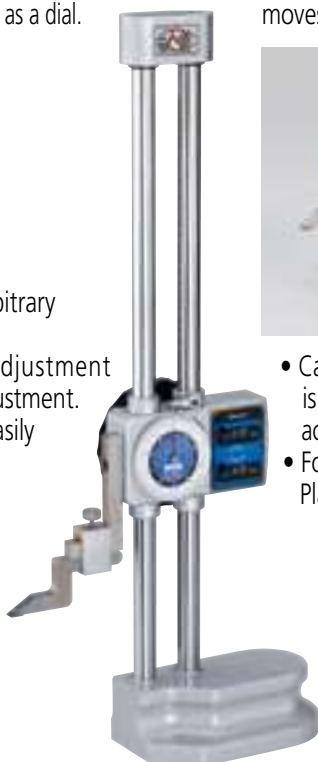
A standard measuring tool of industry

Dial Height Gage SERIES 192 — With digital counter

- Easy and error-free reading with both up and down digital counters as well as a dial.
- Fits comfortably in the hand and moves easily on the surface plate.



- Can be zero-set at any arbitrary position.
- Provided with a large adjustment wheel for easy height adjustment.
- Clamp can be operated easily and securely.



192-130



- Carbide tipped scriber (**No. 07GZA000**) is attached as standard. (Standard accessory: Scriber clamp No.**05GZA033**)
- For precision Black Granite Surface Plates.

Optional accessories

07GZA000: Scriber

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)

902053: Clamp (with dovetail groove, $\phi 6$ and $\phi 8$ holes)

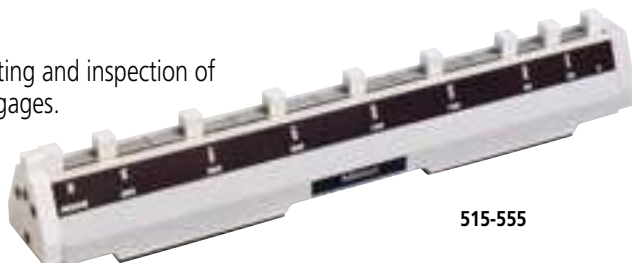
Note: A test indicator can be mounted on a height gage using a holding bar and clamp.

SPECIFICATIONS

Metric					
Order No.	Range	Accuracy	Graduation	Height	Mass
192-130	0 - 300mm	±0.03mm	0.01mm	470mm	4.2kg
192-131	0 - 450mm	±0.05mm		648mm	9.2kg
192-132	0 - 600mm			798mm	9.8kg
192-133	0 - 1000mm	±0.07mm		1220mm	17.0kg

CERA Caliper Checker SERIES 515

- Enables efficient setting and inspection of calipers and height gages.



515-555

SPECIFICATIONS

Metric						
Order No.	Range	Block pitch accuracy*		Parallelism of blocks*		Mass
		20 - 300mm	350 - 600mm	20 - 300mm	350 - 600mm	
515-555	0 - 300mm	$\pm 5.0\mu\text{m}$	—	2.0 μm	—	4kg
515-556-2	0 - 600mm		$\pm 7.0\mu\text{m}$		4.0 μm	8.5kg

* The block accuracy and the parallelism of blocks are based on the following:

Outside caliper and height gage: lower end reference plane

Inside caliper: inside reference plane

Applications



Checking accuracy of caliper (outside measurement)



Checking accuracy of caliper (inside measurement)



Checking accuracy of height gage

Height Gage

Optional accessories for height gages

SPECIFICATIONS

Metric	
Order No.	Applicable Height Gages
07GZA000	192 Series Digimatic Height Gages (192-613-10, 192-614-10, 192-615-10)
	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)
	574 Series Heightmatic (574-112-1, 574-111-1, 574-110-1)
905200	192 Series Digimatic Height Gages (192-663-10, 192-664-10, 192-665-10)
	570 Series Digimatic Height Gages (570-230)
	514 Series Vernier Height Gages (514-108, 514-109)
900390	514 Series Vernier Height Gage (514-170)

Contact Sensor



No. 900872

- The contact sensor eliminates errors caused by non-contact of the slider with a workpiece while making measurements. When the scribe of a height gage touches a conductive workpiece, an indicator lights up to indicate that a measurement can be taken, which results in consistent results.
- Magnet is incorporated.
- Battery (PR44, 2 pcs required) is not included.
- For precision Black Granite Surface Plates

Center Probe



No. 951144

- Allows quick measurement of center-to-center distance between holes.
- Measurable hole diameters: 1 - 38mm
- Mounting position dimension: 99 mm

Depth Gage Attachment



No. 900764

- Attaches to a height gage for measuring 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)
- Dial indicator contact points are usable. (Refer to pages F-39.)
- Mounting position dimension: 99 mm
- Holding bar length: 100mm

Height Gage

A standard measuring tool of industry



An inspection certificate is supplied as standard.

Linear Height SERIES 518 — High Performance 2D Measurement System

- Excellent accuracy of $(1.1+0.6L/600)\mu\text{m}$ with $0.1\mu\text{m}/0.4\mu\text{m}$ resolution/repeatability.
- High-accuracy Height Gage incorporating a wide range of measurement functions.
- To achieve best-in-class accuracy, a high-accuracy reflective-type linear encoder and high-accuracy guide are used.
- The TFT LCD provides excellent visibility and operability.
- 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.
- Backup/Restore of data and measurement part programs can be implemented using USB storage devices (FAT16/32 format compatible).



518-351A-21

With power grip
518-352A-21



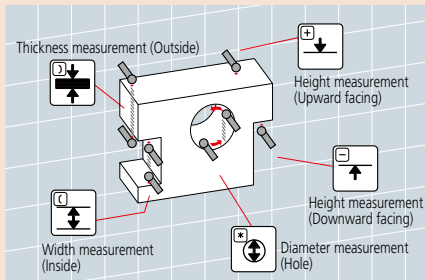
SPECIFICATIONS

Inch/Metric	Model without power grip
Order No.	Remarks
518-351E-21	Model for the UK, English manual

Inch/Metric	Model with power grip
Order No.	Remarks
518-352E-21	Model for the UK, English manual

* Power grip pre-installed models

Example of measurements



The power grip makes it easy to approach the workpiece.



The sample workpiece shown in the above photo is an optional accessory (**12AAA879**).

Optional accessories

● For Linear Height and QM-Height ● For Linear Height only



- (1) **12AAC072**: Depth probe
- (2) **12AAC073**: $\varnothing 20\text{mm}$ taper probe
- (3) **12AAA792**: Dial indicator ($\varnothing 8\text{mm}$ stem) holder
- (4) **12AAA793**: Probe extension holder (85mm/3.3")
- **12AAB136**: $\varnothing 10\text{mm}$ cylindrical probe (coaxial type)
- (6) **932361**: Mu-checker lever head holder*
*Additional auxiliary weights are required (total 4 pcs).
- **12AAF666**: $\varnothing 1\text{mm}$ ball probe (coaxial type)
- **12AAF667**: $\varnothing 2\text{mm}$ ruby ball probe (coaxial type)
- (8) **957261**: $\varnothing 2\text{mm}$ ball probe (coaxial type)
- (9) **957262**: $\varnothing 3\text{mm}$ ball probe (coaxial type)
- (10) **957263**: $\varnothing 4\text{mm}$ ball probe (coaxial type)
- (11) **12AAB552**: $\varnothing 10\text{mm}$ ball probe, L = 55mm (coaxial type)
- **12AAF668**: $\varnothing 10\text{mm}$ ball probe, L = 82mm (coaxial type)
- **12AAF669**: $\varnothing 10\text{mm}$ ball probe, L = 120mm (coaxial type)
- **12AAF670**: $\varnothing 5\text{mm}$ disk probe
- **12AAF671**: $\varnothing 10\text{mm}$ disk probe
- (12) **957264**: $\varnothing 14\text{mm}$ disk probe
- (13) **957265**: $\varnothing 20\text{mm}$ disk probe
- **12AAF672**: $\varnothing 1\text{mm}$ ball offset probe
- (14) **12AAA788**: $\varnothing 4\text{mm}$ ball offset probe
- $\varnothing 5\text{mm}$ ball offset probe **05HAA394**
- (15) **12AAA789**: $\varnothing 6\text{mm}$ ball offset probe
- (16) **226116**: Test indicator ($\varnothing 6\text{mm}$ stem) adapter
- Sample workpiece **12AAA879**
- (17) **226117**: M2 CMM stylus adapter*¹
- (18) **226118**: M3 CMM stylus adapter*¹
- CMM ball and disk hard probes are available.
 $\varnothing 2$ **932377A**, $\varnothing 3$ **932378A**
 $\varnothing 5$ **932379A**, $\varnothing 6$ **932380A**
 $\varnothing 10$ **532328**
 Disc probe
 $\varnothing 20$ **532345**, $\varnothing 30$ **930803**
- **12AAF712**: Battery pack

Various peripheral devices

- **12AAN048***²: Receipt printer (for Japan)
- 12AAN049***²: Receipt printer (for North America)
- 12AAN050***²: Receipt printer (for EU; excluded U.K.)
- 12AAN051***²: Receipt printer (for U.K.)
- **12AAN052**: Receipt paper (10-roll set)
- **12AAA804**: Cable for page printer (2m)
- **12AAA807**: RS-232C cable (2m/80")
- **12AAG920**: RS-232C cable (3m/118")
- Digimatic cable **No.936937** (1m)
- No.965014** (2m)

*¹ For enabling CMM styli to be used.

*² Attachment for fixing the connecting cable is provided as standard.

D

Height Gage

A standard measuring tool of industry

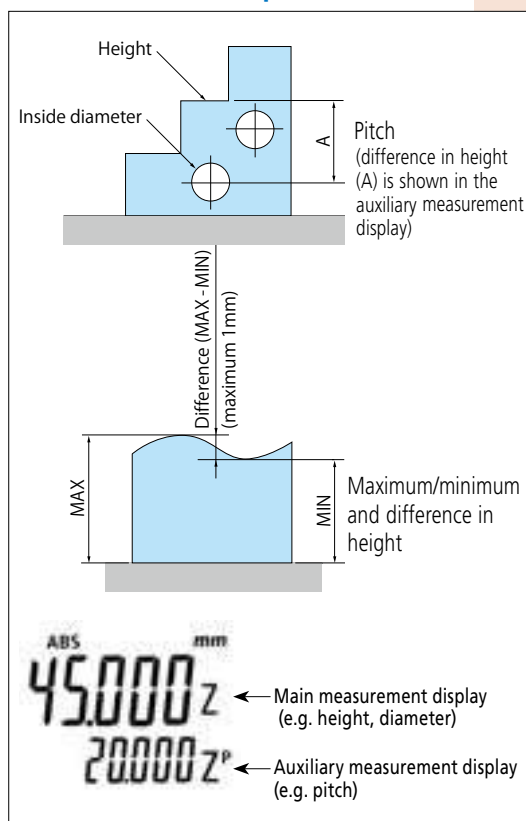
QM-Height SERIES 518 — High Precision ABSOLUTE Digital Height Gage

- Best-in-class accuracy $\pm(2.4+2.1L/600)\mu\text{m}$
- Newly developed high accuracy and high resolution ABSOLUTE linear encoder for position detection. Once origin is set, origin setting is not required each time you turn the power ON (except in the case of a large environmental temperature change).
- Built-in air-suspension feature mechanism using an internal pump enables smooth movement over a surface plate. (Lower-cost version without air suspension also available.)
- With SPC and RS-232C output.
- Continuous battery life of 300 hours*⁵ using four alkaline batteries. (Also works with four NiMH AA/HR6 rechargeable batteries.)



518-236

Measurement example



Inside diameter measurement



Height measurement



SPECIFICATIONS

Metric				
Code No.	518-230	518-232	518-234	518-236
Measuring range (stroke)	0 - 465mm (350mm)	0 - 715mm (600mm)	0 - 465mm (350mm)	0 - 715mm (600mm)
Resolution (selectable)	0.001mm/0.005mm	0.001mm/0.005mm	0.001mm/0.005mm	0.001mm/0.005mm
Accuracy at 20°C	Measurement* ¹ $\pm(2.4+2.1L/600)\mu\text{m}$			
Repeatability* ¹	$2\sigma \leq 1.8\mu\text{m}$			
Perpendicularity* ² (20°C)	7μm	12μm	7μm	12μm
Guiding method	Roller bearing			
Drive method	Manual (wheel)			
Measurement principle	Electromagnetic induction absolute encoder			
Measuring force	1.5±0.5N			
Data output ports	Digimatic / USB* ³			
Air-suspension feature	Not included	Not included	Included (for positioning only)* ⁴	Included (for positioning only)* ⁴
Power supply	Alkaline AA/LR6 batteries × 4 (standard accessories) / AC adapter (optional accessory) / Supports NiMH (HR6) rechargeable batteries × 4			
Battery life guidelines* ⁵	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination
	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day
Mass	25kg	29kg	25kg	29kg
Size (mm)	Stroke 350mm type: 280(W)×273(D)×784(H)mm Stroke 600mm type: 280(W)×273(D)×1016(H)mm			
Operating temperature range (recommended)	0 - 40°C (10 - 30°C)			
Operating temperature range	20 - 80%RH (Must be free from condensation)			
Storage temperature range	-10°C - 50°C			
Storage humidity range	5 - 90% RH (Must be free from condensation)			

*1 The indication accuracy and repeatability represent the values obtained from the height measurement of a flat surface using the standard holder with $\phi 5$ ball contact point. In the case of diameter, minimum (maximum) value, circle pitch or difference measurement, measuring errors may be larger than the accuracy ratings listed in the table due to variations in measuring force during a scanning measurement, which differs from height measurement.

*2 Indicates the value obtained from the measurement of a straight surface placed perpendicular to the the base reference surface using the Lever Head (MLH-321) and Mu-checker (M-411).

*3 Requires special communication driver and software. Consult your local Mitutoyo Sales Office for details. These can be downloaded from the Mitutoyo web site. <http://www.mitutoyo.co.jp/eng/>

*4 When using a model with the air-suspension feature, it is advisable to use a JIS 1 class, or higher, surface plate. Using on surfaces with scratches or unevenness may prevent the system operating to the specified performance.

*5 Battery life depends on the operating conditions. In particular, it is more economical to use the optional AC adapter to power the instrument if the application requires prolonged use of the air-suspension feature.

Inch/Metric				
Code No.	518-231	518-233	518-235	518-237
Measuring range	0-465mm (0 - 350mm/0-14")	0-715mm (0 - 600mm/0-24")	0-465mm (0 - 350mm/0-14")	0-715mm (0 - 600mm/0-24")
Resolution (selectable)	0.001mm/0.005mm/0.0005"/0.001"/0.002"	0.001mm/0.005mm/0.0005"/0.001"/0.002"	0.001mm/0.005mm/0.0005"/0.001"/0.002"	0.001mm/0.005mm/0.0005"/0.001"/0.002"
Accuracy at 20°C	Measurement* ¹ $\pm(2.4+2.1L/600)\mu\text{m}$			
Repeatability* ¹	$2\sigma \leq 1.8\mu\text{m}$			
Perpendicularity* ² (20°C)	7μm	12μm	7μm	12μm
Guiding method	Roller bearing			
Drive method	Manual (wheel)			
Measurement principle	Electromagnetic induction absolute encoder			
Measuring force	1.5±0.5N			
Data output ports	Digimatic / USB* ³			
Air-suspension feature	Not included	Not included	Included (for positioning only)* ⁴	Included (for positioning only)* ⁴
Power supply	Alkaline AA/LR6 batteries × 4 (standard accessories) / AC adapter (optional accessory) / Supports NiMH (HR6) rechargeable batteries × 4			
Battery life guidelines* ⁵	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination
	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day
Mass	25kg	29kg	25kg	29kg
Size (mm)	Stroke 350mm type: 280(W)×273(D)×784(H)mm Stroke 600mm type: 280(W)×273(D)×1016(H)mm			
Operating temperature range (recommended)	0 - 40°C (10 - 30°C)			
Operating temperature range	20 - 80%RH (Must be free from condensation)			
Storage temperature range	-10°C - 50°C			
Storage humidity range	5 - 90% RH (Must be free from condensation)			

Depth Gage

A standard measuring tool of industry

ABSOLUTE Digimatic Depth Gage SERIES 547

- Easy-to-read dial effectively prevents misreading.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-1.



547-211

SPECIFICATIONS

Metric

Order No.	Range	Graduation	Stroke	Accuracy*4	Measuring force	Base			Contact point*1	Extension rod*2	Indicator*3
						W	T	flatness			
547-211	0 - 200mm	0.01mm	12.7mm	±20µm	1.5N	63.5mm	16mm	5µm	Provided with a carbide-tipped ball point (No.21JAA224)	5 pcs. (10, 20, 30, 30, 100mm)	543-400B*3
547-212				101.6mm							
547-251		0.001mm		63.5mm		2µm					
547-252				101.6mm							

Inch/Metric

Order No.	Range	Graduation	Stroke	Accuracy*4	Measuring force	Base			Coutact point*1	Extension rod*2	Indicator*3
						W	T	flatness			
547-217S	0 - 8"	.0005"/0.01mm	.5"	±.001"	1.5N	2.5"	.63"	.0002"	Provided with a carbide-tipped ball point (No.21JZA242)	4 pcs. (.5", 1", 2", 4")	543-402B*3
547-218S		.00005"/0.001mm		±.0002"		4"					
547-257S						2.5"					
547-258S						4"					

*1 to *3: Refer to page D-50.

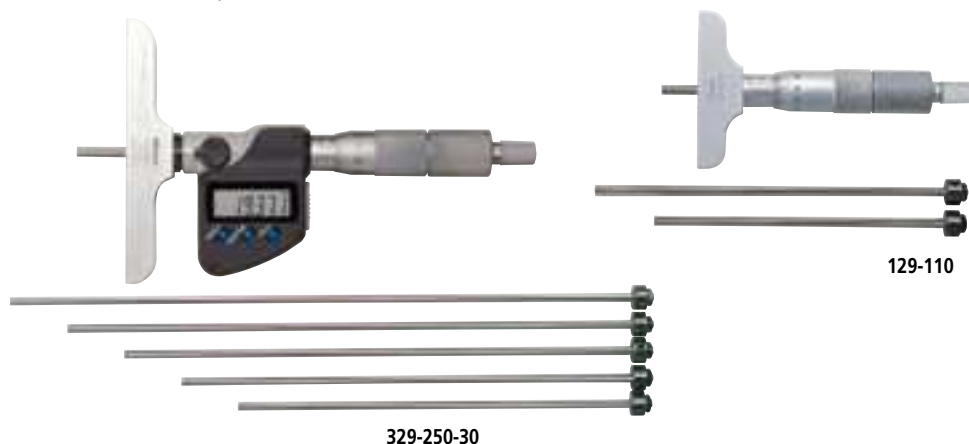
*4: Excluding quantizing error.

Depth Gage

A standard measuring tool of industry

Depth Micrometer SERIES 329, 129 — Interchangeable Rod Type

- This type uses interchangeable rods to enable wide-range measurement.
- **Order Nos. 329-250-30, 329-251-30, 329-350-30, and 329-351-30** allow integration into statistical process control and measurement systems.
- Measuring rod diameter: $\varnothing 4\text{mm}$
- Measuring rod lock.
- Ratchet stop provides constant measuring force.



SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Base	No. of rods
Digimatic (LCD)				
329-250-30	0 - 150mm	0.001mm	101.6 x 16mm	6
329-251-30	0 - 300mm			12

Metric				
Order No.	Range	Graduation	Base	No. of rods
Analog				
129-154	0 - 25mm	0.01mm	63.5 x 16mm	1
129-155			101.6 x 16mm	
129-109	0 - 50mm		63.5 x 16mm	2
129-113			101.6 x 16mm	
129-110	0 - 75mm		63.5 x 16mm	3
129-114			101.6 x 16mm	
129-111	0 - 100mm		63.5 x 16mm	4
129-115			101.6 x 16mm	
129-112	0 - 150mm		63.5 x 16mm	6
129-116			101.6 x 16mm	
129-152	0 - 300mm		63.5 x 16mm	12
129-153			101.6 x 16mm	

* For the function of Digimatic models **329-250-30, 329-251-30, 329-350-30, and 329-351-30**. These models are not waterproof.

Interchangeable rod (Optional Accessories) (Check and adjust the origin point before measurement)



Range		0 - 25mm	25 - 50mm	50 - 75mm	75 - 100mm	100 - 125mm	125 - 150mm	150 - 175mm	175 - 200mm	200 - 225mm	225 - 250mm	250 - 275mm	275 - 300mm
Analog models	Order No.	983501	983503	983505	983507	983509	983511	983525	983527	983529	983531	983533	983535
	L	104mm	129mm	154mm	179mm	204mm	229mm	254mm	279mm	304mm	329mm	354mm	379mm
Digimatic models	Order No.	983505	983507	983509	983511	983525	983527	983529	983531	983533	983535	981781	981782
	L	154mm	179mm	204mm	229mm	254mm	279mm	304mm	329mm	354mm	379mm	404mm	429mm

Technical Data

Accuracy:
 $\pm 3\mu\text{m} \pm 0.00015''$ for micrometer head
 (Excluding quantizing error)
 Flatness of reference face:
 $1.3\mu\text{m} (.00005'')$ for 63.5mm (2.5'') length base,
 $2\mu\text{m} (.00008'')$ for 101.6mm (4'') length base
 Flatness of measuring rod face: $0.3\mu\text{m}$
 Parallelism between reference face and measuring rod face:
 $(4+R/50)\mu\text{m}$, R = Max. measuring length (mm)
 Fraction rounded up
 $\pm (2+R/75)\mu\text{m}$ for interchangeable rod,
 R = Max. range (mm)
 Fraction rounded up
 Battery: **SR44** (1 pc), **938882**,
 for initial operational checks (standard accessory)
 Battery life*: Approx. 2.4 years under normal use
 * Digital models
 Scale type: Electromagnetic induction absolute encoder



Optional accessories for 329-250-30, 329-251-30, 329-350-30, and 329-351-30.

For details, refer to page A-16.
 Connection cable for **329-250-30, 329-251-30, 329-350-30, and 329-351-30**
05CZA662: SPC cable with data button (1m)
05CZA663: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380B: SPC cable for **USB-ITN-B** (2m)
 Connection cables for U-WAVE-T
02AZD790B: SPC cable for **U-WAVE** with data button (160mm)
02AZE140B: SPC cable for footswitch

Unit: mm

Technical Data

Accuracy: $\pm 3\mu\text{m}$ ($\pm 0.00015''$)

Flatness of reference face:

1.3 μm (.00005'') for 63.5mm (2.5'') length base,

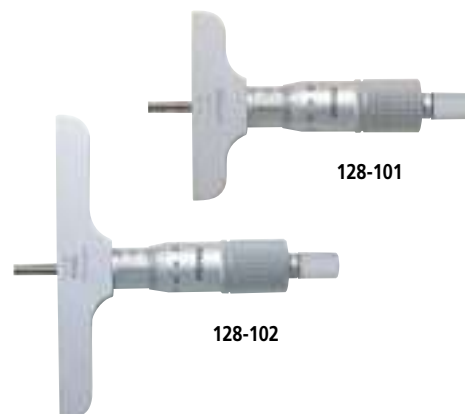
2 μm (.00008'') for 101.6mm (4'') length base

Flatness of measuring spindle face: 0.3 μm



Depth Micrometer SERIES 128

- Measuring rod diameter: $\varnothing 4\text{mm}$
- Measuring rod lock is attached.
*Measuring rod is attached on the rear side of the micrometer.
- Carbide-tipped measuring rod model is available.
- Ratchet stop provides constant measuring force.



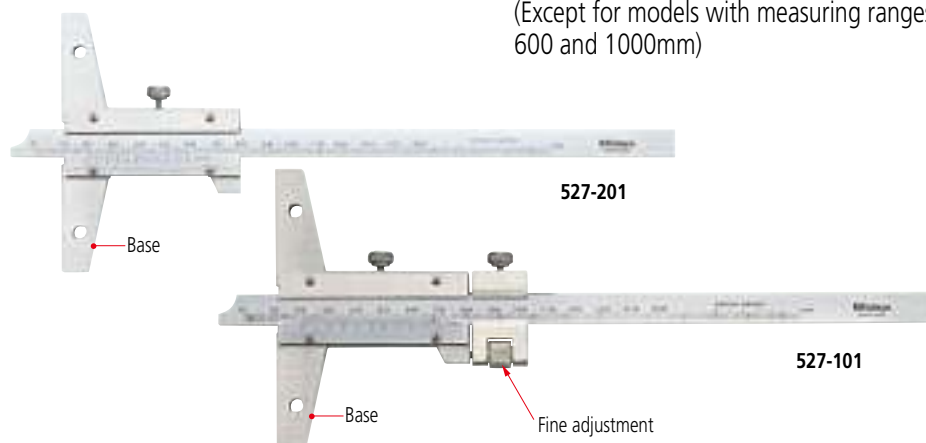
SPECIFICATIONS

Metric			
Order No.	Range	Graduation	Base
128-101	0 - 25mm	0.01mm	63.5 x 16mm
128-103* ¹			
128-102			101.6 x 16mm
128-104* ¹			

*1 with carbide-tipped measuring rod

Vernier Depth Gage SERIES 527

- Standard gage for depth measurement.
- Optional longer extension bases are available.
(Except for models with measuring ranges of 600 and 1000mm)



SPECIFICATIONS

Metric					
Order No.	Range	Vernier reading	Accuracy	Base (W x T)	Remarks
527-201	0 - 150mm	0.05mm	$\pm 0.05\text{mm}$	100 x 6.5mm	—
527-202	0 - 200mm		$\pm 0.08\text{mm}$		—
527-203	0 - 300mm		$\pm 0.10\text{mm}$		—
527-204	0 - 600mm		$\pm 0.15\text{mm}$	250 x 10mm	—
527-205	0 - 1000mm				—

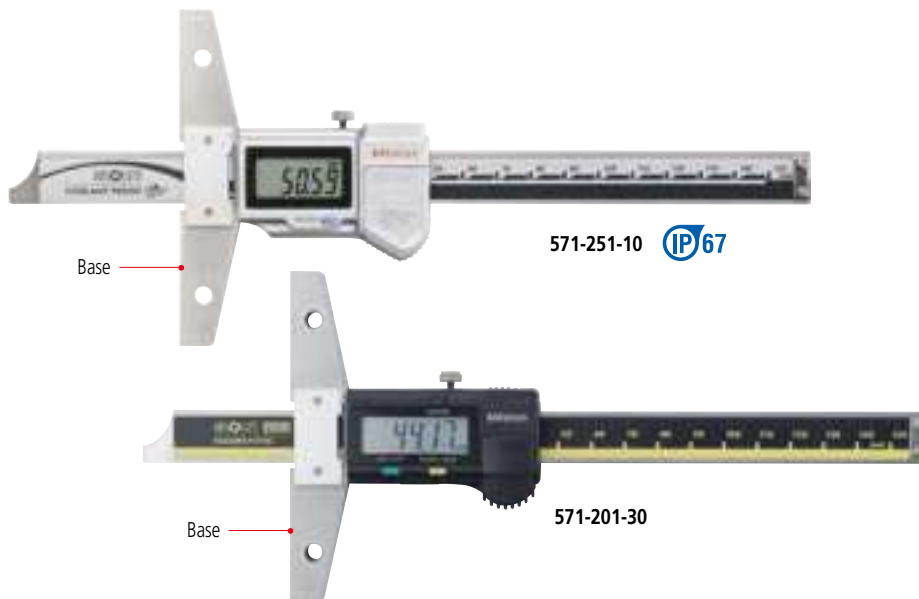
Metric					
Order No.	Range	Vernier reading	Accuracy	Base (W x T)	Remarks
527-101	0 - 150mm	0.02mm	$\pm 0.03\text{mm}$	100 x 6.5mm	with fine adjustment
527-102	0 - 200mm				

Depth Gage

A standard measuring tool of industry

ABSOLUTE Digimatic Depth Gage SERIES 571

- Coolant proof models achieve IP67 protection level.
- Enables stable depth measurement with a resolution of 0.01mm.
- ABSOLUTE Digital Caliper (Refer to page D-6 for ABSOLUTE function.)
- Sliding operation of models with the measuring ranges 150mm (6"), 200mm (8") and 300mm (12") is smooth and comfortable.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Optional longer extension bases are available. (Except for models with measuring ranges of 600, 750, 1000mm)



SPECIFICATIONS

Metric						
Order No.	Range	Resolution	Accuracy*	Repeatability	Base (W x T)	Battery life
571-201-30	0 - 150mm	0.01mm	±0.02mm	0.01mm	100 x 6mm	5years
571-202-30	0 - 200mm		±0.03mm			3.5years
571-203-20	0 - 300mm					
571-251-10**	0 - 150mm		±0.02mm			3years
571-252-10**	0 - 200mm		±0.03mm		100 x 6.3mm	1years
571-253-10**	0 - 300mm					
571-204-10	0 - 450mm		±0.05mm		250 x 10mm	3years
571-205-10	0 - 600mm		±0.06mm			
571-206-10	0 - 750mm		±0.07mm			
571-207-10	0 - 1000mm					

* Excluding quantizing error

** IP67 Coolant Proof model

Inch/Metric						
Order No.	Range	Resolution	Accuracy*	Repeatability	Base (W x T)	Battery life
571-211-30	0 - 6"	.0005"/ 0.01mm	±.001"/±0.02mm	.0005"/ 0.01mm	3.93" x .23"	5years
571-212-30	0 - 8"		±.001"/±0.02mm			3.5years
571-213-10	0 - 12"		±.0015"/±0.03mm			
571-261-10**	0 - 6"		±.001"/±0.02mm			3years
571-262-10**	0 - 8"		±.001"/±0.02mm		9.8" x .39"	1years
571-263-10**	0 - 12"		±.0015"/±0.03mm			
571-214-10	0 - 18"		±.002"/±0.05mm			
571-215-10	0 - 24"		±.002"/±0.05mm			3years
571-216-10	0 - 30"		±.0025"/±0.06mm			
571-217-10	0 - 40"		±.0025"/±0.07mm			

* Excluding quantizing error

** IP67 Coolant Proof model

ABSOLUTE™

IP67



Optional accessories for IP67 coolant proof models

For details, refer to page D-32.

Connecting cables

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

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

USB Input Tool Direct

06ADCV380A: SPC cable for USB-ITN-B (2m)

Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for U-WAVE with data button (160mm)

02AZE140A: SPC cable for footswitch

Optional accessories for other than IP67 coolant proof models

For details, refer to page D-32.

959143: Data hold unit

Connecting cables for **IT/DP/MUX**

959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380C: SPC cable for USB-ITN-C (2m)

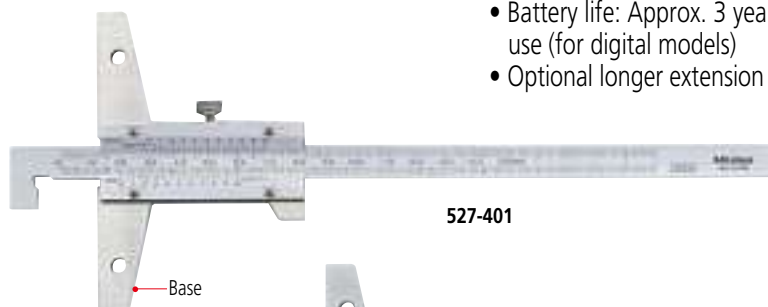
Connecting cables for **U-WAVE-T**

02AZD790C: SPC cable for U-WAVE with data button (160mm)

02AZE140C: SPC cable for footswitch

Depth Gage SERIES 527, 571 — Hook End Type

- The end of the main beam is hook-shaped to allow depth and thickness measurements of a projected portion or lip in a hole, in addition to standard depth measurement.
- Coolant proof models achieve IP67 protection level.
- Enables stable depth measurement with a resolution of 0.01mm.
- ABSOLUTE Digital Caliper (Refer to page D-6 for ABSOLUTE function.)
- Digital models display the compensation value by pressing the OFF switch to allow direct reading.
- Slider operation of the digital models is smooth and comfortable.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector.
- Refer to page A-1.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life: Approx. 3 years under normal use (for digital models)
- Optional longer extension bases are available.



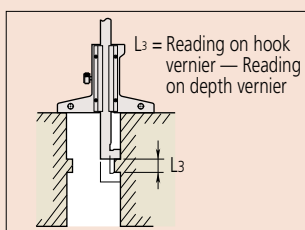
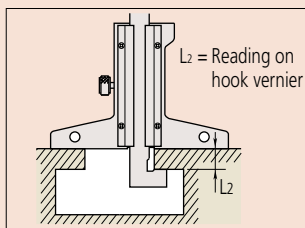
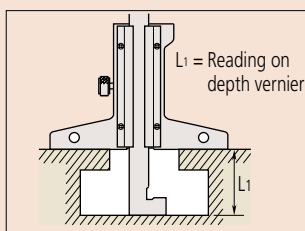
527-401



571-254-10



Applications



Optional accessories for digital models

For details, refer to page A-16.

Connection cables for coolant proof models

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

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

USB Input Tool Direct

06ADCV380A: SPC cable for USB-ITN-B (2m)

Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for U-WAVE with data button (160mm)

02AZE140A: SPC cable for footswitch

SPECIFICATIONS

Metric				
Order No.	Range: L1 (L2 and L3)	Resolution	Accuracy*	Base (WxT)
Digimatic (LCD)				
571-254-10**	10 - 160mm (0 - 150mm)	0.01mm	±0.03mm	100x6mm
571-255-10**	10 - 210mm (0 - 200mm)			
Analog				
527-401	10 - 150mm (0 - 150mm)	0.05mm	±0.05mm	100x6.5mm
527-402	10 - 200mm (0 - 200mm)		±0.08mm	
527-403	10 - 300mm (0 - 300mm)			

* Excluding quantizing error ** IP67 Coolant Proof model

Inch/Metric				
Order No.	Range: L ₁ (L ₂ and L ₃)	Resolution	Accuracy*	Base (W×T)
Digimatic (LCD)				
571-264-10	.4" - 6.4" (0 - 6")	.0005" / 0.01mm	±0.0015" / ±0.03mm	100×6mm
571-265-10	.4" - 8.4" (0 - 8")			

* Excluding quantizing error

Metric				
Order No.	Range: L ₁ (L ₂ and L ₃)	Vernier reading	Accuracy	Base (WxT)
Analog				
527-411	10 - 150mm (0 - 150mm)	0.02mm	±0.03mm	100x6.5mm
527-412	10 - 200mm (0 - 200mm)		±0.04mm	
527-413	10 - 300mm (0 - 300mm)			

Depth Gage

A standard measuring tool of industry

Extension Bases

Optional accessory for Depth Gage

- Attaches to the base (reference face) plate of a depth gage to extend its span.
- Refer to the illustrations at left for attachment details.
- Extension base is three times the length of the base for models of less than 300mm range.
- These extension bases cannot be attached to 0-600mm, 0-1000mm, 0-24" and 0-40" range models.

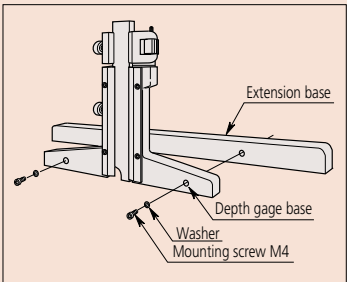
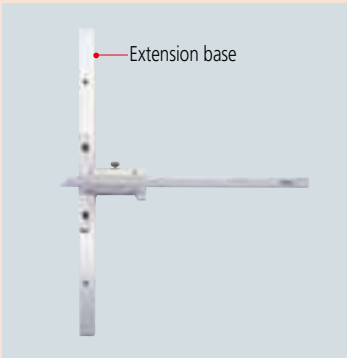


900372

SPECIFICATIONS

Metric		
Order No.	Size L	n
900370	180mm	2
900371	260mm	5
900372	320mm	4

Example of attaching the extension base



Depth Gage Attachment

Optional Accessory for Calipers

- Attaching this depth gage attachment to the depth measurement face of the caliper makes depth measurement accurate and secure.



050084-10

SPECIFICATIONS

Metric		
Order No.	Size	Applicable measuring range of caliper
050083-10	75mm	100mm, 150mm, 200mm, 4", 6" and 8"
050084-10	100mm	100mm, 150mm, 200mm, 4", 6" and 8"
050085-10	125mm	300mm and 12"

Example of attaching the extension base



Note:

*1

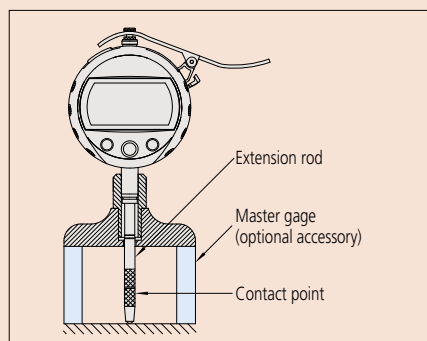
Caution should be exercised when exchanging a contact point of a Depth Gage (Dial/Digimatic Indicator)

- If a different size contact point is mounted, displacement of the contact point from the base contact surface will be changed and as a result, measurement range may not be maintained.
- A contact point cannot be mounted to a Depth Gage, if its diameter is too large for the hole diameter of the base.
- Parallelism adjustment with the bottom face of the base is required when mounting a flat contact point such as the flat/needle or carbide-tipped contact point.

*2

Caution should be exercised when using an extension rod

- If the total length of the extension rod exceeds 110mm (4.5") use the instrument in a vertical position (contact point downward).
- Use a master gage (such as Gauge blocks) to perform zero-setting when the extension rod is mounted. (Master gage is an optional accessory.)



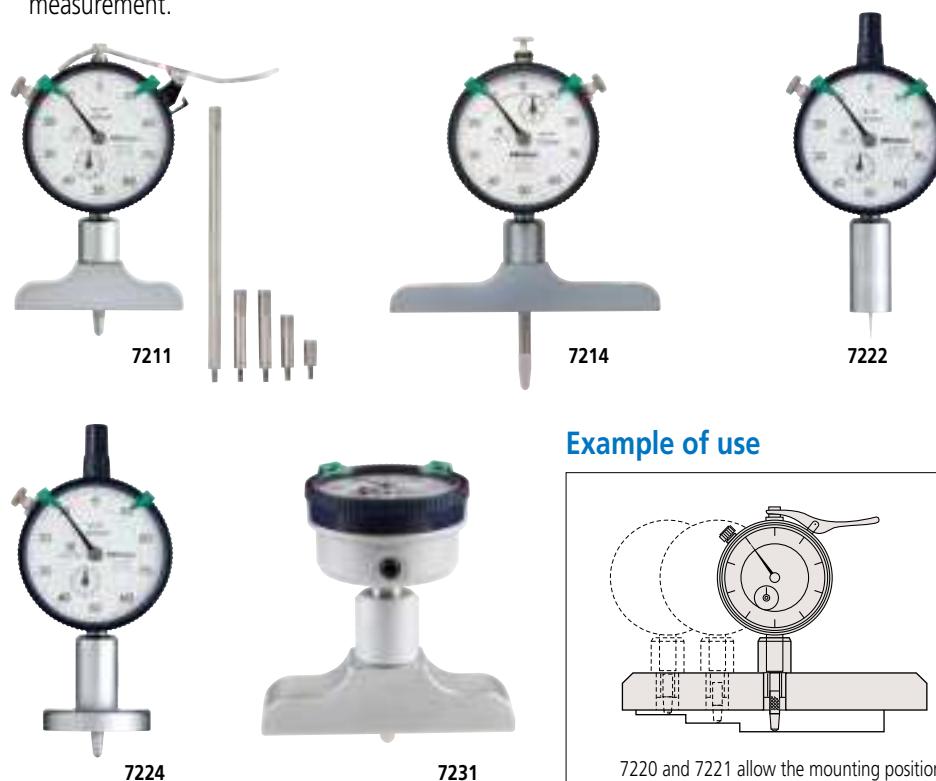
*3

Indicators

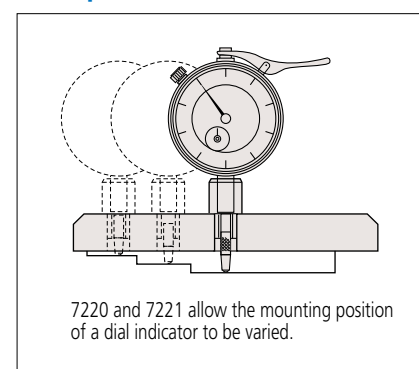
- Indicators for a Depth Gage is used for the Depth Gage. When the indicator is exchanged and extension rod is connected longer, the contact-point may incline significantly.
- Code No.543-400B / 543-402B for Depth Gage has a measuring force less than 1.5N.

Dial Depth Gage SERIES 7

- Optimal for hole, narrow groove and step measurement.



Example of use



7220 and 7221 allow the mounting position of a dial indicator to be varied.

Metric

Order No.	Range	Graduation	Accuracy	Stroke	Measuring force	Base				Contact point*1	Extension rod*2	Indicator*3 (dial indicator)
						W	T	Flatness	Mounting position of a dial indicator			
7210	0 - 10mm	0.01mm	±15μm	10mm	1.4N	40mm	16mm	5μm	1	Provided with a needle point (No.137413)	—	2902SB for Depth Gage
7211	0 - 200mm					63.5mm				Provided with a carbide-tipped ball point (No.21JAA224)	5 pcs. (10, 20, 30, 30, 100mm)	
7212						101.6mm				Provided with a carbide-tipped ball point (No.21JAA225)		
7213	0 - 210mm		±30μm	30mm	2.5N	63.5mm	18mm	2	Provided with a carbide-tipped ball point (No.21JAA224)	5 pcs. (10, 20, 30, 30, 100mm)	2952SB for Depth Gage	
7214						101.6mm						3
7220	0 - 200mm		±15μm	10mm	1.4N	100mm	1	Provided with a carbide-tipped ball point (No.21JAA224: 17mm) (No.21JAA226: 22mm)	5 pcs. (10, 20, 30, 30, 100mm)	1162T for Depth Gage (Back plunger type)		
7221						150mm					Provided with a carbide-tipped ball point (No.21JAA224: 17mm) (No.21JAA226: 22mm)	
7222	0 - 10mm					ø16mm						
7223						ø25mm						
7224						ø40mm						
7231	0 - 200mm			5mm		63.5mm	16mm					

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Features and Accuracies

Features of Mitutoyo Gauge Blocks

Mitutoyo offers 3 types of gauge block for use as length standards: rectangular steel, rectangular ceramic (CERA Blocks) and square steel gauge blocks. In addition, rectangular and square protection blocks (1mm and 2mm for each) are available in tungsten carbide. Mitutoyo gauge blocks are recognized to be of the highest quality both here in Japan and abroad, and are available in various grades to meet every need in respect of working conditions, environment and application.

Accuracy

As a world-leading precision measuring equipment manufacturer, Mitutoyo is certified by the Japanese government as an accredited calibration laboratory, which means that the accuracy of its gauge blocks is guaranteed through traceability to the Metrology Management Center of the National Institute of Advanced Industrial Science and Technology (AIST).

Wringing

Lapping measuring surfaces is one of Mitutoyo's specialties. Our advanced technique, developed over more than half a century, enables us to achieve the optimum flatness and surface finish needed for gauge blocks and thus maximize the wringing force.

Abrasion Resistance and Dimensional Stability of Steel Blocks

High-carbon high-chrome steel is employed to satisfy a variety of the material characteristics required for gauge blocks. Our advanced heat treatment technology for steel blocks, which involves repeated temperature cycling, simultaneously achieves excellent abrasion resistance and minimizes any change in length over time.

CERA Blocks

CERA blocks are made of a ceramic material with a superior surface finish, created by Mitutoyo's ultra-precision machining techniques, that provides a premium quality block with significant advantages:

1. Corrosion Resistant

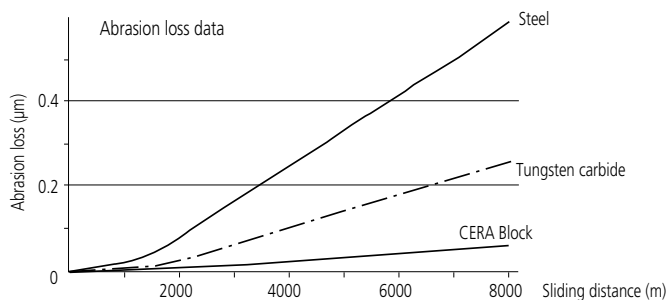
Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.

2. No Burrs Caused by Accidental Mishandling

Since the CERA Block is very hard, it will not scratch easily 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. Dimensionally Stable

CERA Blocks are free from dimensional change over time.

5. Clearly Marked Sizes

Black characters, indicating the nominal length, are inscribed by laser and are clearly visible against the white surface of the block.

6. Non-magnetic Nature Prevents Steel Swarf Contamination

7. High Wringing Force

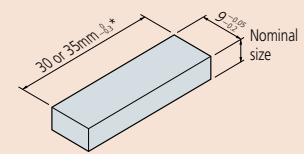
Superior flatness and surface finish provides maximum wringing force.



Classification of Gauge Blocks by Shape

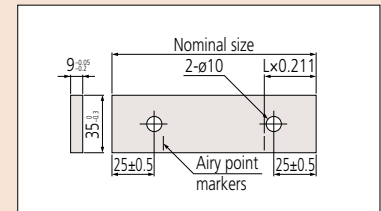
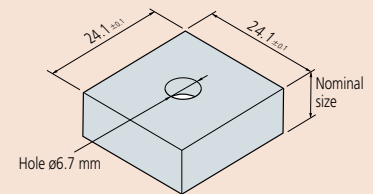
Mitutoyo broadly divides gauge blocks into two categories according to the block shape.

Rectangular gauge blocks



* Depends on the nominal size.
More than 10mm
10mm or less

Square gauge blocks



Coupling holes in long rectangular gauge blocks

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 (refer to page E-9 for details).
- If using only one length repeatedly, it is a good idea to purchase discrete gauge blocks (refer to page E-11 and E-12 for details).
- 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.

Mitutoyo Gauge Blocks and Inspection Certificates

A Certificate of Inspection is furnished with all Mitutoyo gauge blocks with a serial number on the box (in the case of sets) and an identification number on each block. The deviation of each block from nominal length, at the time of inspection, is stated. For this inspection, each gauge block is measured relative to the upper level master using a gauge block comparator. Grade K gauge blocks are measured by a primary measurement method using an interferometer.



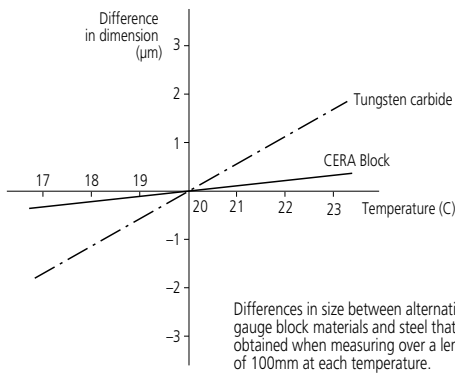
8. Superior Material Characteristics of CERA Block

Property	Material	CERA Block (ZrO ₂)	Steel (Fe)	Tungsten Carbide (WC-Co)
Hardness (HV)		1350	800	1650
Coefficient of thermal expansion (10 ⁻⁶ /K)		9.3±0.5	10.8±0.5	5.5±1.0
Flexural strength by 3-point bending (MPa)		1270	1960	1960
Fracture toughness K _{1c} (MPa•m ^{1/2})		7	120	12
Young's modulus x10 ⁴ (MPa)		20.6	20.6	61.8
Poisson's ratio		0.3	0.3	0.2
Specific gravity (Kg/dm ³)		6.0	7.8	14.8
Thermal conductivity (W/m•K)		2.9	54.4	79.5

* Ceramics have the advantage of a slow response to temperature changes due to the low thermal conductivity. However, caution is required when using CERA blocks in the environment of severe temperature change.

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 to Dropping and Impact Damage

The CERA Block material is one of the toughest ceramics. It is extremely difficult to crack a CERA block in normal use.

Features of Square Gauge Blocks



1. Gauge blocks in a stack can be clamped together

After wringing square gauge blocks, a tie rod can be inserted through the center hole to clamp the blocks together for extra security.



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 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-sectional dimensions of 24.1 x 24.1mm is available.

A square gauge block retains stable orientation both longitudinally and laterally. A wide range of applications is covered, 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.

Grade and Application

The following table can be used to select the gauge block grade according to usage (specified by DIN861, BS4311, and JIS B 7506).

	Applications	Grade
Workshop use	<ul style="list-style-type: none"> Mounting tools and cutters Manufacturing gages Calibrating instruments 	2
Inspection use	<ul style="list-style-type: none"> Inspecting mechanical parts, tools, etc. Checking the accuracy of gages Calibrating instruments 	1 or 2
Calibration use	<ul style="list-style-type: none"> Checking the accuracy of gauge blocks for workshop Checking the accuracy of gauge blocks for inspection Checking the accuracy of instruments 	0 or 1
Reference use	<ul style="list-style-type: none"> Checking the accuracy of gauge blocks for calibration For academic research 	K

Constructing a Gauge Block Stack

The following points should be noted when constructing a gauge block stack:

1. Use as few gauge blocks as possible to obtain the required length by selecting thick blocks wherever possible.
2. Select the block for the least significant digit first, then work back through the more significant digits until the required length is attained.
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: Required length = 45.6785mm

• For a 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 a 2mm-based gauge block set (112 pcs.)

$$\begin{array}{r}
 2.0005 \\
 2.008 \\
 2.17 \\
 14.5 \\
 +) \quad 25 \\
 \hline
 45.6785\text{mm}
 \end{array}$$

Gauge Blocks

Length Standards Brought to You by Mitutoyo

ACCURACY SPECIFICATIONS: JIS B 7506-2004 (JAPAN)

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

(at 20°C)

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)

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

(at 20°C)

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

ACCURACY SPECIFICATIONS: BS 4311: Part 1: 1993 (UK)

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

(at 20°C)

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)

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	±48µin	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

(at 20°C)

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



An inspection certificate is supplied as standard.

*Suffix Number (-■■■) for Selecting Standard Required

ISO/DIN/JIS			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-01B	K	○	○
ASME			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-51B	K	○	○
BS			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-11B	K	○	○

* Only for 100mm type



Inspection Certificate



For details, please refer to Leaflet No. E4334 "Gauge Block with calibrated coefficient of thermal expansion".



An inspection certificate is supplied as standard.



For details, please refer to Leaflet No. E4331 "ZERO CERA BLOCK".

Gauge Blocks with a Calibrated Coefficient of Thermal Expansion

- Mitutoyo offers top-quality gauge blocks (steel and ceramic), superior to K class blocks due to their advanced manufacturing technologies.
- Features an accurately calibrated thermal expansion coefficient measured with a proprietary double-faced interferometer (DFI).
- Each gauge block is calibrated for length on a highly accurate gauge block interferometer (GBI) system.
- Available as rectangular gauge blocks in the range 100 to 500mm.



SPECIFICATIONS

Metric Blocks with CTE		
Order No. (steel)*	Order No. (CERA)*	Length (mm)
611681	613681	100
611802	613802	125
611803	613803	150
611804	613804	175
611682	613682	200
611805	613805	250
611683	613683	300
611684	613684	400
611685	613685	500

Grade	K class in JIS/ASME/ISO
Uncertainty of thermal expansion coefficient	$0.035 \times 10^{-6}/K$ ($k = 2$)
Uncertainty of length measurement	30nm ($k = 2$), for 100mm block

* An inspection certificate and a JCSS calibration certificate are supplied as standard.

A calibration report and a calibration certificate for the thermal expansion coefficient are also supplied as standard.

ZERO CERA Blocks

- Thermal expansion in the temperature range $20 \pm 1^\circ C$ less than $1/500$ that of steel ($0 \pm 0.02 \times 10^{-6}/K(20^\circ C)$)
- Almost no secular change both in dimension and coefficient of thermal expansion
- Complementary ultra-low thermal expansion and high specific rigidity (Young's modulus/specific gravity)



SPECIFICATIONS

Metric Blocks			
Order No.			Length (mm)
JIS/ISO/DIN	BS	ASME	
617673-016	617673-116	617673-516	30
617675-016	617675-116	617675-516	50
617681-016	617681-116	617681-516	100
617682-016	617682-116	617682-516	200
617683-016	617683-116	617683-516	300
617684-016	617684-116	617684-516	400
617685-016	617685-116	617685-516	500
617840-016	617840-116	617840-516	600
617841-016	617841-116	617841-516	700
617843-016	617843-116	617843-516	800
617844-016	617844-116	617844-516	900
617845-016	617845-116	617845-516	1000
516-771-60	516-771-61	516-771-66	Above set

Gauge Blocks

Length Standards Brought to You by Mitutoyo



An inspection certificate is supplied as standard.

Metric/Inch Rectangular Gauge Block Sets SERIES 516

- Mitutoyo provides a wide selection of boxed sets of gauge blocks to meet the various needs of industry. Selecting the best set, or sets, to acquire usually depends on the accuracy required by the target applications, the level of convenience desired (larger sets offer more combination possibilities) and the environmental conditions in which they will be used.

Steel 1mm Base Block Sets



Steel 112-block set



Steel 103-block set



Steel 76-block set



Steel 56-block set



Steel 47-block set



Steel 46-block set



Steel 34-block set



Steel 32-block set

Steel 0.001mm Step Block Sets



Steel 9-block set

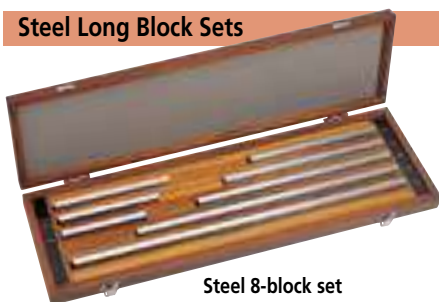


Steel 9-block set



Steel 18-block set

Steel Long Block Sets



Steel 8-block set

Steel Wear Block Sets



Steel 2-block set

Steel Thin Block Sets



Steel 9-block set

Note: Details of the contents of any particular set are given on page E-9.



An inspection certificate is supplied as standard.

CERA 1mm Base Block Sets



CERA 112-block set



CERA 103-block set



CERA 76-block set



CERA 56-block set



CERA 47-block set



CERA 46-block set



CERA 34-block set



CERA 32-block set

CERA 0.001mm Step Block Sets



CERA 9-block set



CERA 9-block set

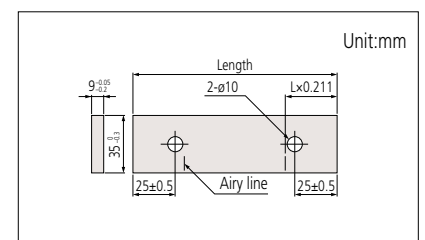


CERA 18-block set

CERA Long Block Sets



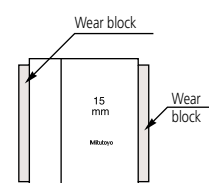
CERA 8-block set



CERA Wear Block Sets



CERA 2-block set



Note: Details of the contents of any particular set are given on page E-10.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

SPECIFICATIONS

1mm Base Block Sets

* Details of the overall sizes for forms of block are given on page E-1 and the accuracy standards to which they are manufactured are given on page E-3.

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
122	—	—	—	—	—	1.0005	—	1
	516-596	—	K: -#0	—	—	1.001 - 1.009	0.001	9
	516-597	—	O: -#0	—	—	1.01 - 1.49	0.01	49
	516-598	—	1: -#0	—	—	1.6 - 1.9	0.1	4
	516-599	—	2: -#0	—	—	0.5 - 24.5	0.5	49
112	516-531	516-541	—	K: -#6	—	1.0005	—	1
	516-937	516-337	K: -#0	00: -#6	K: -#1	1.001 - 1.009	0.001	9
	516-938	516-338	O: -#0	0: -#6	O: -#1	1.01 - 1.49	0.01	49
	516-939	516-339	1: -#0	1: -#6	1: -#1	0.5 - 24.5	0.5	49
	516-940	516-340	2: -#0	2: -#6	2: -#1	25 - 100	25	4
103	516-533	516-542	—	K: -#6	—	1.0005	—	1
	516-941	516-341	K: -#0	00: -#6	K: -#1	1.001 - 1.49	0.01	49
	516-942	516-342	O: -#0	0: -#6	O: -#1	0.5 - 24.5	0.5	49
	516-943	516-343	1: -#0	1: -#6	1: -#1	25 - 100	25	4
	516-944	516-344	2: -#0	2: -#6	2: -#1	—	—	—
88	516-969	516-369	—	—	—	1.0005	—	1
	516-970	516-370	O: -#0	—	K: -#1	1.001 - 1.009	0.001	9
	516-971	516-371	1: -#0	—	O: -#1	1.01 - 1.49	0.01	49
	516-972	516-372	2: -#0	—	1: -#1	0.5 - 9.5	0.5	19
	—	—	—	—	2: -#1	10 - 100	10	10
87	516-535	515-543	—	K: -#6	—	1.001 - 1.009	0.001	9
	516-945	516-345	K: -#0	00: -#6	K: -#1	1.01 - 1.49	0.01	49
	516-946	516-346	O: -#0	0: -#6	O: -#1	0.5 - 9.5	0.5	19
	516-947	516-347	1: -#0	1: -#6	1: -#1	10 - 100	10	10
	516-948	516-348	2: -#0	2: -#6	2: -#1	—	—	—
76	516-949	516-349	K: -#0	—	—	1.005	—	1
	516-950	516-350	O: -#0	—	—	1.01 - 1.49	0.01	49
	516-951	516-351	1: -#0	—	—	0.5 - 9.5	0.5	19
	516-952	516-352	2: -#0	—	—	10 - 40	10	4
	—	—	—	—	—	50 - 100	25	3
56	516-536	516-544	—	K: -#6	—	0.5	—	1
	516-953	516-353	K: -#0	00: -#6	—	1.001 - 1.009	0.001	9
	516-954	516-354	O: -#0	0: -#6	—	1.01 - 1.09	0.01	9
	516-955	516-355	1: -#0	1: -#6	—	1.1 - 1.9	0.1	9
	516-956	516-356	2: -#0	2: -#6	—	1 - 24	1	24
47	516-537	516-545	—	K: -#6	—	1.005	—	1
	516-957	516-357	K: -#0	00: -#6	—	1.01 - 1.09	0.01	9
	516-958	516-358	O: -#0	0: -#6	—	1.1 - 1.9	0.1	9
	516-959	516-359	1: -#0	1: -#6	—	1 - 24	1	24
	516-960	516-360	2: -#0	2: -#6	—	25 - 100	25	4
47	516-961	516-361	K: -#0	—	K: -#1	1.005	—	1
	516-962	516-362	O: -#0	—	O: -#1	1.01 - 1.19	0.01	19
	516-963	516-363	1: -#0	—	1: -#1	1.2 - 1.9	0.1	8
	516-964	516-364	2: -#0	—	2: -#1	1 - 9	1	9
	—	—	—	—	—	10 - 100	10	10
46	516-994	516-394	K: -#0	—	—	1.001 - 1.009	0.001	9
	516-995	516-395	O: -#0	—	—	1.01 - 1.09	0.01	9
	516-996	516-396	1: -#0	—	—	1.1 - 1.9	0.1	9
	516-997	516-397	2: -#0	—	—	1 - 9	1	9
	—	—	—	—	—	10 - 100	10	10
34	516-128	516-178	K: -#0	—	K: -#1	1.0005	—	1
	516-129	516-179	O: -#0	—	O: -#1	1.001 - 1.009	0.001	9
	516-130	516-180	1: -#0	—	1: -#1	1.01 - 1.09	0.01	9
	516-131	516-181	2: -#0	—	2: -#1	1.1 - 1.9	0.1	9
	—	—	—	—	—	1 - 5	1	5
32	516-965	516-365	K: -#0	—	—	10	—	1
	516-966	516-366	O: -#0	—	K: -#1	1.005	—	1
	516-967	516-367	1: -#0	—	O: -#1	1.01 - 1.09	0.01	9
	516-968	516-368	2: -#0	—	1: -#1	1.1 - 1.9	0.1	9
	—	—	—	—	2: -#1	1 - 9	1	9

Thin Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
9	516-990	—	O: -#0	—	—	0.10 - 0.50	0.05	9
	516-991	—	1: -#0	—	—	—	—	—
	516-992	—	2: -#0	—	—	—	—	—
	—	—	—	—	—	—	—	—



An inspection certificate is supplied as standard.

* Suffix Number (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets.

ASME

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets.

Suffix No. 6: Only for Grade K sets.

BS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets.

Suffix No. 6: Only for Grade K sets.

Inspection Certificate





An inspection certificate is supplied as standard.

SPECIFICATIONS

0.001mm Step Block Set

* Details of the overall sizes for forms of block are given on page E-1 and the accuracy standards to which they are manufactured are given on page E-3.

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
18	516-973	516-373	K: -#0	—	—	0.991 - 0.999	0.001	9
	516-974	516-374	0: -#0	—	—	1.001 - 1.009	0.001	9
	516-975	516-375	1: -#0	—	—			
	516-976	516-376	2: -#0	—	—			
9	516-981	516-381	K: -#0	—	K: -#1	1.001 - 1.009	0.001	9
	516-982	516-382	0: -#0	—	0: -#1			
	516-983	516-383	1: -#0	—	1: -#1			
	516-984	516-384	2: -#0	—	2: -#1			
9	516-985	516-385	K: -#0	—	—	0.991 - 0.999	0.001	9
	516-986	516-386	0: -#0	—	—			
	516-987	516-387	1: -#0	—	—			
	516-988	516-388	2: -#0	—	—			

Long Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
8	516-540	516-546	—	K: -#6	—	125 - 175	25	3
	516-701	516-731	K: -#0	00: -#6	—	200 - 250	50	2
	516-702	516-732	0: -#0	0: -#6	—	300 - 500	100	3
	516-703	516-733	1: -#0	1: -#6	—			
	516-704	516-734	2: -#0	2: -#6	—			

Wear Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
2	516-807	516-832	0: -#0	0: -#6	—	1		2
	516-806	516-833	1: -#0	1: -#6	—			
2	516-803	516-830	0: -#0	0: -#6	—	2		2
	516-802	516-831	1: -#0	1: -#6	—			

Long Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
8	—	516-564	—	K: -#6	—	5 - 7	1	3
	—	516-741	—	00: -#6	—	8, 10, 12	2	3
	516-712	516-742	—	0: -#6	—	16, 20	4	2
	516-713	516-743	—	1: -#6	—			

Wear Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
2	516-809	516-836	—	0: -#6	—	.05		2
	516-808	516-837	—	1: -#6	—			
2	516-805	516-834	—	0: -#6	—	.1		2
	516-804	516-835	—	1: -#6	—			

Gauge Blocks

Length Standards Brought to You by Mitutoyo

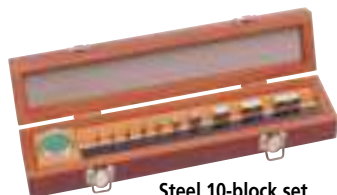


An inspection certificate is supplied as standard.

Micrometer Inspection Gauge Block Sets SERIES 516

- Dedicated gauge block sets for micrometer inspection.
Sets **516-106/7/8** and **516-322/3** are recommended for checking instrumental errors in micrometers due to the choice of block sizes ensuring that the instrument is checked through a full rotation of the spindle over the range 0-25 mm (or 0-1").
Sets **516-115/6/7**, **516-165/6** and **516-177** contain blocks in 25 mm (or 1") steps for aiding inspection of large micrometers in conjunction with one of the abovementioned sets.
Sets **516-580/1/2**, **516-390/1/2** are dedicated to the QuantuMike with its 2mm/rev spindle feed.

Steel



Steel 10-block set



Steel 10-block set



Steel 8-block set



Steel 10-block set

CERA



CERA 10-block set



CERA 10-block set



CERA 8-block set



CERA 10-block set

Micro Checker

Can clamp a stack of gauge blocks to be used for micrometer inspection.



516-607

(The gauge blocks are optional.)



Gauge Block Sets for Micrometer Inspection

A set consisting of a Micro Checker and gauge blocks for micrometer inspection.
(516-132/3/4/5/6/7)



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



An inspection certificate is supplied as standard.

*Suffix Number (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS		
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets.

ASME		
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets.

Suffix No. 6: Only for Grade K sets.

BS		
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—

Inspection Certificate



SPECIFICATIONS

Metric Block Sets						
Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set
	Steel	CERA	ISO/DIN/JIS	ASME	BS	
16	516-111	516-161	0: -■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	1: -■0	—	—	
	516-113	516-163	2: -■0	—	—	
10	516-977	—	K: -■0	—	—	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25mm, Optical parallel (t = 12mm)
	516-978	516-378	0: -■0	—	—	
	516-979	516-379	1: -■0	—	—	
	516-980	516-380	2: -■0	—	—	
10	516-103	516-152	0: -■0	0: -■6	—	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25mm
	516-101	516-153	1: -■0	1: -■6	—	
10	—	516-154	2: -■0	—	—	2.2, 4.8, 7.8, 10.4, 12, 15.2, 17.4, 19.6, 22.6, 25mm
	516-580	516-390	0: -■0	—	—	
	516-581	516-391	1: -■0	—	—	
10	516-582	516-392	2: -■0	—	—	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25mm, Optical parallel (t = 12mm)
	516-106	516-156	0: -■0	—	—	
	516-107	516-157	1: -■0	—	—	
10	516-108	516-158	2: -■0	—	—	1.25, 1.50, 1, 2, 3, 5, 10, 15, 20, 25mm, Micro Checker, Optical parallel (t = 12mm)
	516-132	516-182	0: -■0	—	—	
	516-133	516-183	1: -■0	—	—	
10	516-134	516-184	2: -■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)
	516-135	516-185	0: -■0	—	—	
	516-136	516-186	1: -■0	—	—	
8	516-137	516-187	2: -■0	—	—	25, 50, 75, 100, 125, 150, 175, 200mm
	—	516-547	—	K: -■6	—	
	—	516-164	K: -■0	00: -■6	—	
	516-115	516-165	0: -■0	0: -■6	—	
	516-116	516-166	1: -■0	1: -■6	—	
	516-117	516-167	2: -■0	2: -■6	—	
	—	—	—	—	—	

SERIES 516 – Caliper Inspection Gauge Block Sets

SPECIFICATIONS

Metric Block Sets						
Blocks per set	Order No.		Standard / grade available and Suffix No.			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
4	516-526	516-566	1: -10	—	—	4 pcs.: 10, 30, 50, 125mm, Setting ring (ø4mm, ø10mm), Pin gage (ø10mm), Glove
	516-527	516-567	2: -10	—	—	
3	516-124	516-150	1: -10	—	—	3 pcs.: 30, 41.3, 131.4mm, Setting ring (ø4mm, ø25mm), Glove
	516-125	516-151	2: -10	—	—	
2	516-122	516-172	1: -10	—	—	2 pcs.: 41.3, 131.4mm, Setting ring (ø20mm), Glove
	516-123	516-173	2: -10	—	—	

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Metric Rectangular Gauge Blocks

- If using only one length repeatedly, it is a good idea to purchase individual gauge blocks.
- Nominal sizes which are not included in the chart below can be supplied custom-made on request.
- Each Grade K gauge block to ISO/DIN/ JIS, BS or ASME standard is supplied with a Certificate of Calibration which certifies that the gauge block was calibrated by interferometry.



SPECIFICATIONS

Metric Blocks

* Details of the overall sizes for forms of block are given on page E-1 and the accuracy standards to which they are manufactured are given on page E-3.

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



An inspection certificate is supplied as standard.

*Suffix Number (-■■■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS				
Suffix No.	Grade	Inspection Certificate	Calibration Certificate	
			JCSS	RvA
-016	K	○	○	—
-021	0	○	—	—
-026	0	○	○	—
-031	1	○	—	—
-036	1	○	○	—
-041	2	○	—	—
-046	2	○	○	—

ASME			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-516	K	○	○
-521	00	○	—
-531	0	○	—
-541	1	○	—
-551	2	○	—

BS			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-116	K	○	○
-121	0	○	—
-126	0	○	○
-131	1	○	—
-136	1	○	○
-141	2	○	—
-146	2	○	○



Inspection Certificate



An inspection certificate is supplied as standard.

* Details of the overall sizes for forms of block are given on page E-1 and the accuracy standards to which they are manufactured are given on page E-3.

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	—

Length (mm)	Order No.*	
	Steel	CERA
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	—

Metric Wear Blocks	
Length (mm)	Order No.* Tungsten carbide
1	612611
2	612612

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Rectangular Gauge Blocks Accessories SERIES 516

- To expand the range of rectangular gauge block (steel and CERA) applications, Mitutoyo offers the gauge block accessories set. By assembling the items in the set, together with gauge blocks, you can easily and quickly build up a precision gage.



516-601
(22 pcs)



516-602
(14 pcs)

SPECIFICATIONS

Item Description	Item Order No.	Set		Qty
		22 pcs 516-601	14 pcs 516-602	
Holder	619002	—	○	1 pc.
	619003	○	○	
	619004	○	○	
	619005	○	○	
Base	619009	○	○	One pair (2pcs)
Half round jaw	619010	○	○	
	619011	○	○	
	619012	○	○	
	619013	○	—	
	619014	○	—	
Plain jaw	619018	○	—	1 pc.
Scriber point	619019	○	○	
Center point	619020	○	○	
Tram point	619021	○	—	One pair (2pcs)
Triangular straight edge	619022	○	○	1 pc.
	619023	○	—	

* Only 1 pc is supplied for each Order No. However, half round jaw, plain jaw, and tram point are supplied in a pair. (2 pcs).



Gaging a bore using a pair of half round jaws and a holder



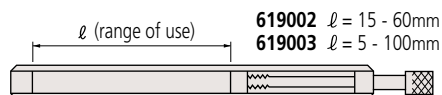
Marking a workpiece using the base, a holder and the scriber point



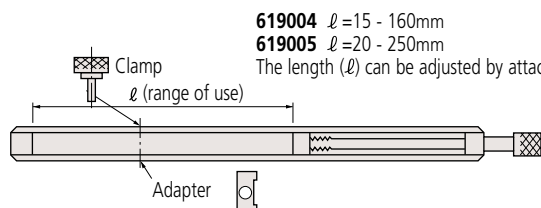
Setting a bore gage using a holder with the pair of Type I half-round jaws arranged as flat contact surfaces

Holder

Thickness = 15mm
Width = 29.5mm



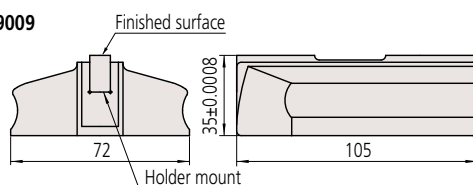
619002 $\ell = 15 - 60\text{mm}$
619003 $\ell = 5 - 100\text{mm}$



619004 $\ell = 15 - 160\text{mm}$
619005 $\ell = 20 - 250\text{mm}$

The length (ℓ) can be adjusted by attaching/removing the adapter.

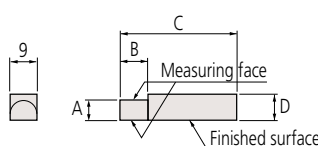
Base 619009



Flatness tolerance of the finished surface $0.5\mu\text{m}$
Flatness tolerance of the bottom surface $1\mu\text{m}$

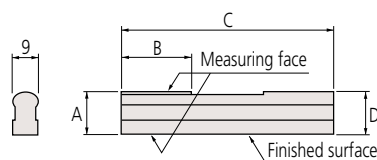
Half round jaw

Type I



Flatness tolerance of the finished surface $0.5\mu\text{m}$

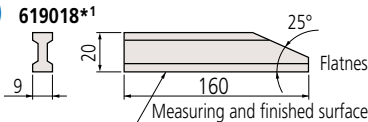
Type II



Unit: mm

Order No.	Type	Size	A	B	C	D
619011 *1	I	5	5 ± 0.0005	15.5	45	7.5
619012 *1		8	8 ± 0.0005	20	50	8.5
619013 *1	II	12	12 ± 0.0005	25	75	13
619014 *1		20	20 ± 0.0005	25	125	20.5

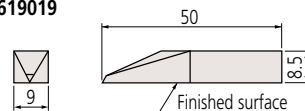
Plain jaw (B type) 619018*1



Flatness tolerance of the finished surface $1\mu\text{m}$

Scriber point

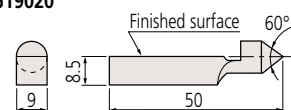
619019



Flatness tolerance of the finished surface $0.5\mu\text{m}$

Center point

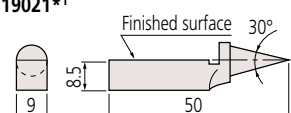
619020



Eccentricity tolerance of the point $\pm 10\mu\text{m}$
Flatness tolerance of the finished surface $0.5\mu\text{m}$

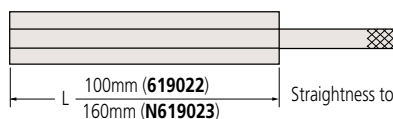
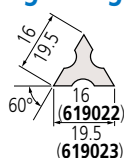
Tram point

619021*1



Eccentricity tolerance of the point $\pm 10\mu\text{m}$
Flatness tolerance of the finished surface $0.5\mu\text{m}$

Triangular straight edge



Straightness tolerance of the edge $1.2\mu\text{m}$

*1 Qty: One pair (2 pcs)

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Accessories for Rectangular Gauge Blocks over 100mm SERIES 516

- Specially designed for standard size gauge blocks over 125mm which have two coupling holes on the body: coupling of two long gauge blocks and attachment of jaws is possible.
- These accessories can also be used for CERA blocks.

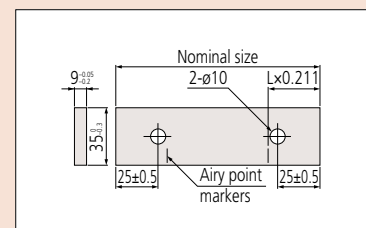


516-605
(14 pcs)

SPECIFICATIONS

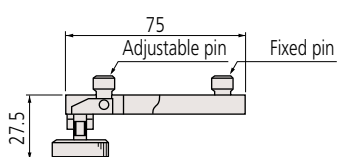
Set Order No.	Individual Item Order No.	Item Description	Quantity Supplied
516-605	619031	Connector A	1 pc.
	619032	Connector B	
	619033	Connector C	
	619034	Connector D	
	619035	Connector E	
	619036	Adapter	3 pcs.
	619009	Base	1 pc.
	619013	Half round jaw	One pair (2pcs)
	619018	Plain jaw	
	619019	Scriber point	1 pc.

* Only 1 pc is supplied for each Order No. However, half round jaw, plain jaw, and tram point are supplied in a pair. (2 pcs).



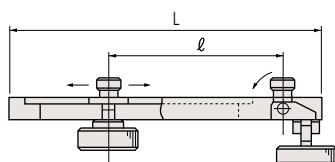
Coupling holes in long gauge blocks

Connector A 619031



Used for directly coupling two long gauge blocks.

Connectors B and C



Adapter 619036

	Order No.	ℓ (max.)	L	Adapter Qty
Connector B	619032	90mm	126mm	2
Connector C	619033	200mm	236mm	

Used for clamping jaws to the ends of one or more long gauge blocks in conjunction with adapters (619036). The length ℓ is highly adjustable to accommodate the variable length of a stack of regular gauge blocks that would be wrung to one of the long gauge blocks to achieve the required gaging size.



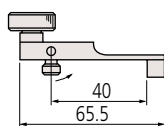
Use of B-type connectors in gage construction



Setting a dial test indicator to a long-gauge-block stack attached to the base with a D-type connector

Connector D

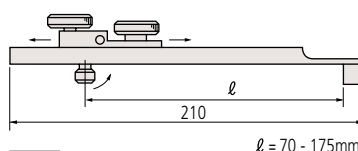
619034



Used for attaching a long gauge block directly to the base.

Connector E

619035

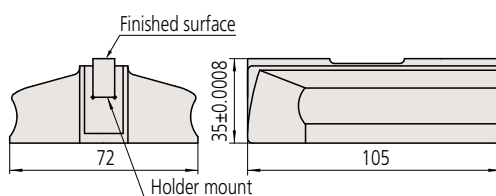


Used for attaching a long gauge block to the base over a stack of regular gauge blocks wrung between the base and long gauge block. The length l is highly adjustable to accommodate the variable length of the stack.

Adapter 619036 (1pc.)

Base

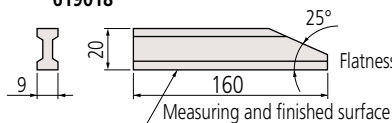
619009



Flatness tolerance of the finished surface 0.5μm
Flatness tolerance of the bottom surface 1μm

Plain jaw

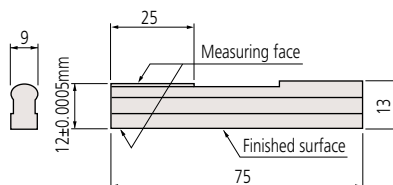
619018*2



Flatness tolerance of the finished surface 1μm

Half round jaw

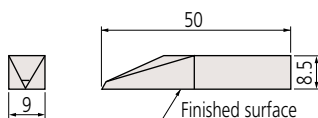
619013*2



Flatness tolerance of the finished surface 0.5μm

Scriber point

619019



Flatness tolerance of the finished surface 0.5μm

Assortment of accessories for gauge blocks

For inside and outside measurement inspection of 300 to 1000 mm (every 100mm) gauge blocks, select the appropriate combination of a rectangular gauge block and an accessory.

Items		Order No.	300mm		400mm		500mm		600mm		700mm		800mm		900mm		1000mm	
			Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer
Rectangular gauge block (nominal dimension)	200mm	611682							1	1								
	300mm	611683	1	1							1	1	1	1				
	400mm	611684			1	1			1	1	1	1			1	1		
	500mm	611685					1	1					1	1	1	1	2	2
Connector A		619031							1	1	1	1	1	1	1	1	1	1
Connector B*1		619032	2		2		2		2		2		2		2		2	
Half round jaws*2		619013	1		1		1		1		1		1		1		1	
Adapter		619036	(2)		(2)		(2)		(2)		(2)		(2)		(2)		(2)	

*1 Provided with adapters (2 pcs)

*2 2 pcs/set

Gauge Blocks

Length Standards Brought to You by Mitutoyo



An inspection certificate is supplied as standard.

Metric/Inch Square Gauge Block Sets SERIES 516 — Metric Block Sets, Long Block Sets, Wear Block Sets

- Square gauge block sets have several unique characteristics (refer to page E-2 for details.). A wide choice is provided to best match the target applications: sets containing from 2 to 112 blocks are available.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.



Steel 112-block set



Steel 103-block set



Steel 76-block set



Steel 47-block set



Steel 32-block set

Wear block set



Tungsten Carbide 2-block set

Long block set



Steel 8-block set

The wear to a frequently used square gauge block set can be drastically reduced by using tungsten-carbide wear blocks on the ends of a stack. There are two available, of nominal dimension 1mm and 2mm. These blocks are much more wear-resistant than steel blocks, and they also absorb most of the wear that would otherwise occur to the blocks in the set due to contact, and therefore maximize the set's longevity. Wear blocks are relatively inexpensive and can be readily discarded when no longer serviceable. To achieve maximum protection, the same face of each wear block should always be wrung to a set block, so the opposite, wearing, face never touches a set block.



An inspection certificate is supplied as standard.

*Suffix Number (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate
		JCSS
1	○	—
6	○	○

ASME

Suffix No.	Inspection Certificate	Calibration Certificate
		JCSS
1	○	—



Inspection Certificate

SPECIFICATIONS

Metric Block Sets

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
112	516-437	—	—	00: -#6	1.005	—	1
	516-438	—	0: -#0	0: -#6	1.001 - 1.009	0.001	9
	516-439	—	1: -#0	1: -#6	1.01 - 1.49	0.01	49
	516-440	—	2: -#0	2: -#6	0.5 - 24.5	0.5	49
	—	—	—	—	25 - 100	25	4
103	516-441	—	—	00: -#6	1.005	—	1
	516-442	—	0: -#0	0: -#6	1.01 - 1.49	0.01	49
	516-443	—	1: -#0	1: -#6	0.5 - 24.5	0.5	49
	516-444	—	2: -#0	2: -#6	25 - 100	25	4
76	516-449	—	—	00: -#6	1.005	—	1
	516-450	—	0: -#0	0: -#6	1.01 - 1.49	0.01	49
	516-451	—	1: -#0	1: -#6	0.5 - 9.5	0.5	19
	516-452	—	2: -#0	2: -#6	10 - 40	10	4
	—	—	—	—	50 - 100	25	3
47	516-457	—	—	00: -#6	1.005	—	1
	516-458	—	0: -#0	0: -#6	1.01 - 1.09	0.01	9
	516-459	—	1: -#0	1: -#6	1.1 - 1.9	0.1	9
	516-460	—	2: -#0	2: -#6	1 - 24	1	24
	—	—	—	—	25 - 100	25	4
32	516-465	—	—	00: -#6	1.005	—	1
	516-466	—	0: -#0	0: -#6	1.01 - 1.09	0.01	9
	516-467	—	1: -#0	1: -#6	1.1 - 1.9	0.1	9
	516-468	—	2: -#0	2: -#6	1 - 9	1	9
	—	—	—	—	10 - 30	10	3
	—	—	—	—	60	—	1

Metric Long Block Sets

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
8	516-751	—	—	00: -#6	125, 150, 175	25	3
	516-752	—	0: -#0	0: -#6	200, 250	50	2
	516-753	—	1: -#0	1: -#6	300, 400, 500	100	3
	516-754	—	2: -#0	2: -#6	—	—	—
	—	—	—	—	—	—	—

Metric Wear Block Sets

Blocks per set	Order No.		Standard / grade available		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	Qty.
2	516-820	—	0: -#0	—	1	—	2
	516-821	—	1: -#0	—	—	—	—
2	516-822	—	0: -#0	—	2	—	2
	516-823	—	1: -#0	—	—	—	—

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Square Gauge Block Accessories Set

- To expand the application of square gauge blocks, Mitutoyo offers the Gauge Block Accessories Set. Square gauge blocks have a much broader range of application than rectangular gauge blocks due to the central clamping hole. Also, the accessories included in the set are sold individually depending on the application.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.



516-611

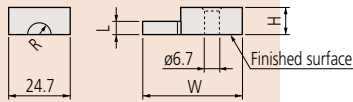
SPECIFICATIONS

Metric		
Order No.	Included in set	Quantity Supplied
516-611		
619070	Half round jaw	2 pcs.
619071	Half round jaw	
619072	Plain jaw	
619073	Center point	1 pc.
619054	Scriber point	
619074	Base	
619057	Flat head screw	2 pcs.
619058	Flat head screw	
619059	Slotted head nut	
619060	Adjustable tie rod	
619061	Adjustable tie rod	1 pc.
619062	Tie rod	
619063	Tie rod	
619064	Tie rod	
619065	Tie rod	
619056	Stud	2 pcs.
619066	Knurled head screw	

* 2 pcs of half round jaw, plain jaw, stud, flat head screw, slotted head nut, adjustable tie rod, and knurled head screw are included in each set. Please note that the above mentioned Order No. indicates only 1 set.



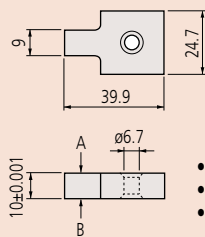
Half round jaw



Order No.	R	L	W	H
619070	1.95mm	2mm	33.6mm	5.3mm
619071	4.95mm	5mm	39.9mm	10.3mm

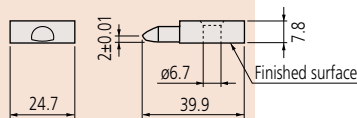
- Flatness tolerance 0.5μm
- Parallelism tolerance of L 0.5μm
- Tolerance of L ±0.5μm

Plain jaw 619072



- Flatness tolerance 0.12μm
- Parallelism tolerance 0.12μm
- A and B are finished surfaces

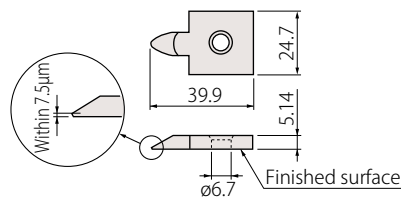
Center point 619073



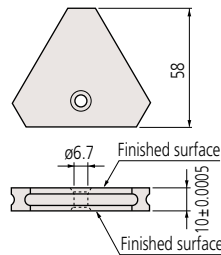
- Flatness tolerance 0.5μm

Scriber point

619054

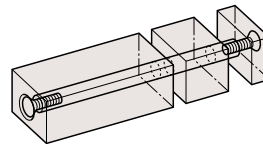
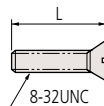


Base 619074



- Parallelism tolerance 1.5μm
- Flatness tolerance 1.5μm (The surface within 1.5mm of edge is excluded)

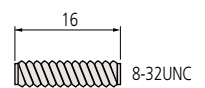
Flat head screw



Order No.	L
619057	31.6mm
619058	15.8mm

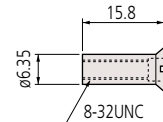
Stud

619056



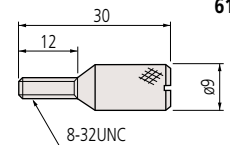
Slotted head nut

619059



Knurled head screw

619066

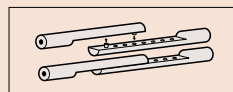
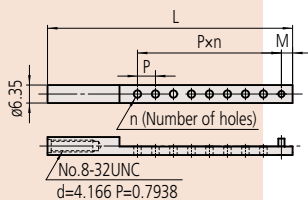


•Contraction caused by the clamping force

The minimum recommended torque to be applied to the clamping screws is approximately 600mN·m. The chart below shows the approximate length contraction of a 100mm gauge stack using typical torque values.

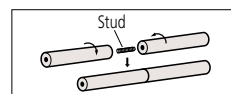
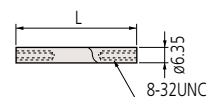
Driver	Contraction
Torque Driver 600mN·m	0.2μm/100mm
Ordinary Driver 700 - 800mN·m	0.3μm/100mm

Adjustable tie rod



Order No.	L	M	P	n
619060	124.5mm	3.85mm	6.35mm	14
619061	86.5mm	3.95mm	6.35mm	8

Tie rod



Order No.	L
619065	19mm
619064	38mm
619063	57mm
619062	76mm

Accessories used for combining square gauge blocks

Overall length (mm)		Min.	21	36	34	41	45	58	64	72	77	82	91	95	109	117	130	148	121	167	143	160	205	180	223	240	258	295	375
Order No.	Included in set	Max.	30	43	43	50	60	72	79	88	91	97	107	109	125	135	150	169	180	184	210	255	270	285	288	345	363	445	520
619059	Slotted head nut		1	1		1																							
619058	Flat head screw		1		2	1	2	1	2		1	2		1		1			2			2							
619057				1				1		2	1		2	1	2	1	2	2		2	2		2	2	2	2	2	2	2
619056	Stud					1											1	1	1		1		1		1	1	1	1	2
619065	Tie rod				1	1																							
619064							1	1		1								1											
619063										1		1		1						1									
619062													1		1	1	1	1	1		1								
619061	Adjustable tie rod																		2		2		2		2			2	2
619060																						2		2		2	2	2	2

Gauge Blocks

Length Standards Brought to You by Mitutoyo



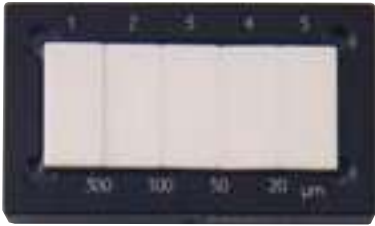
An inspection certificate is supplied as standard.

Step Master SERIES 516

- Step Master is a gauge providing 4 small increments in height (steps) constructed from an assembly of 5 highly accurate steel or ceramic blocks.
- Each step is defined as the difference in height between the center of adjacent blocks, measured to a resolution of 0.01μm by using an interferometer with an accuracy tolerance of ±0.20μm.
- Steel and ceramic types are available to suit the application.
- Height differences are measured between the centers of adjacent steps.



Steel type
516-199



Ceramic type
516-499

SPECIFICATIONS

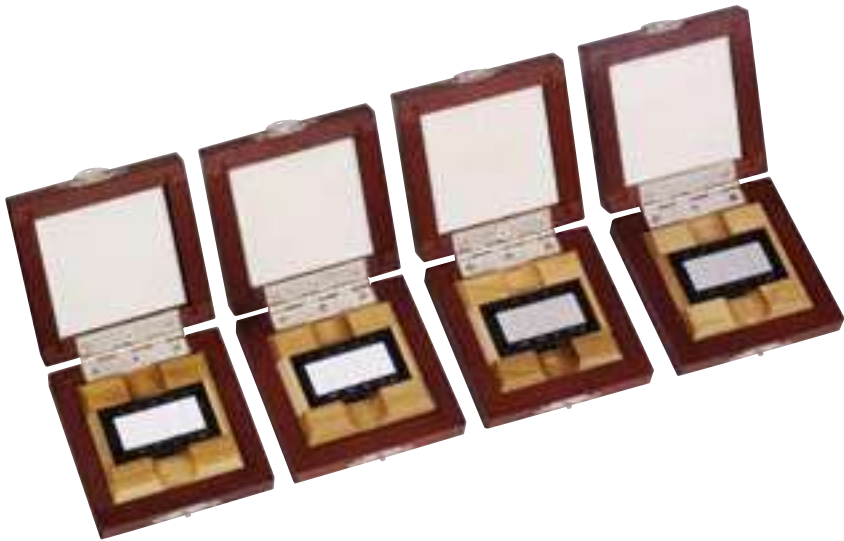
Steel type

Order No.	516-198					516-199				
Block No.	1	2	3	4	5	1	2	3	4	5
Cumulative step (μm)	0	10	15	17	18	0	300	400	450	470
Step value between adjacent blocks (μm)		10	5	2	1		300	100	50	20

Ceramic type

Order No.	516-498					516-499				
Block No.	1	2	3	4	5	1	2	3	4	5
Cumulative step (μm)	0	10	15	17	18	0	300	400	450	470
Step value between adjacent blocks (μm)		10	5	2	1		300	100	50	20

- - ○○○ -64: Provided with Calibration Certificate
- - ○○○ -84: Provided with Calibration Certificate and Traceability System Chart

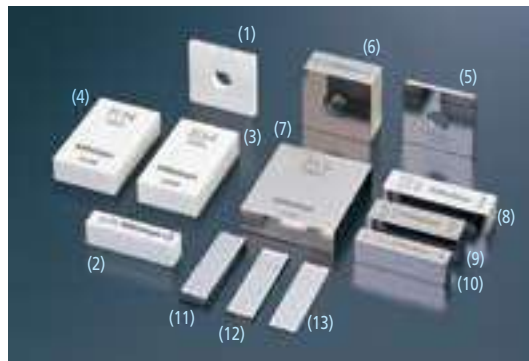


Custom-made Blocks & Gages

- Mitutoyo can manufacture Gauge Blocks and reference gages to your size and design.
- Nominal size range
 - 0.1mm to 1000mm (steel)
 - 0.5mm to 500mm (ceramic)
- Nominal size increment
 - 0.0005mm (up to 100mm)
 - 0.001mm (over 100mm)
- Cross section (same as the standard product)
 - Nominal length of 10mm or less: 30 x 9mm
 - Nominal length of more than 10mm: 35 x 9mm
 - Square types are also available.
- Special ultra-low expansion ceramic types are also available.
- Gauge Blocks and reference gages to your specifications (section dimensions) are available, including precision spacers which normally absorb much time and effort to manufacture in-house.
- Special processing including boring, step gaging and special marking are available. Consult us for details.

Note: Please specify that coupling holes are to be supplied if they are required in your long custom-made gauge blocks. These holes are always supplied with standard gauge blocks over 100mm but not for custom-made Gauge Blocks unless specified.

Typical examples of custom-made gauge blocks and reference gages.
Please enquire for price and delivery times for your particular requirements.

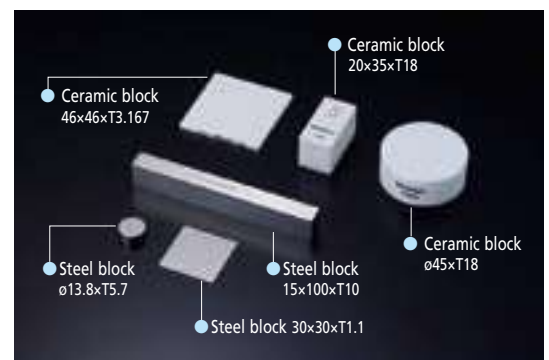
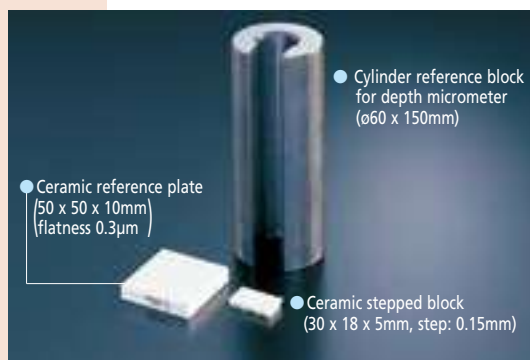


Ceramic

- (1) Square gauge block (2.1005mm)
- (2) Rectangular gauge block (6.34mm)
- (3) Rectangular gauge block (20.64mm)
- (4) Rectangular gauge block (21.94mm)

Steel

- (5) Square gauge block (2.2065mm)
- (6) Square gauge block (10.72mm)
- (7) Rectangular gauge block (31.5mm)
- (8) Rectangular gauge block (10.02mm)
- (9) Rectangular gauge block (9.694mm)
- (10) Rectangular gauge block (6.156mm)
- (11) Rectangular gauge block (3.603mm)
- (12) Rectangular gauge block (1.1505mm)
- (13) Rectangular gauge block (0.555mm)



Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Metric Square Gauge Blocks

- Purchasing individual metric square gauge blocks is a cost-effective way to replace heavily used sizes.
- Please add the suffix number representing the national standard and grade required at the end of the Order No. when ordering these items.
- Special sizes that are not included in the charts can be supplied custom-made on request.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.



SPECIFICATIONS

Metric Blocks

* Details of the overall sizes for forms of block are given on page E-1 and the accuracy standards to which they are manufactured are given on page E-3.

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 Blocks

Length (mm)	Order No. Tungsten carbide
1	615611
2	615612



An inspection certificate is supplied as standard.

*Suffix Number (- []) for Selecting Standard and Certificate Provided

ISO/DIN/JIS			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-021	0	○	—
-026	0	○	○
-031	1	○	—
-036	1	○	○
-041	2	○	—
-046	2	○	○

ASME			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-521	00	○	—
-531	0	○	—
-541	1	○	—
-551	2	○	—



Inspection Certificate



Recommendation for regular calibration

Gauge blocks are often used to define a company's standard of length for manufacturing and as such must be reliable. This means that they need regular calibration to verify accuracy. (The problem of damage or corrosion should be addressed during use and blocks seriously affected must be discarded immediately.) The frequency of calibration depends on the tolerance requirements of the work, the amount of use and conditions under which the gauge blocks are used. The most economical cycle for any particular set of gauge blocks is best determined by studying the calibration history. The list below indicates timings for a typical initial calibration cycle for the various grades of block.

Application	Cycle	Grade (reference)
Reference	1 - 2	K
Standard	2	K or 0
Inspection	2	0 or 1
Shop floor	0.5 - 1	1 or 2

As an accredited calibration laboratory, Mitutoyo offers a traceable calibration service for customers' gauge blocks. Our regular calibration service features:

- Gauge blocks manufactured by any maker can be calibrated.
- Cleansing and removal of burrs.
- Central dimension and dimensional deviations of each block are measured.
- Calibration results are provided for immediate use and for building a calibration history of each block.

Removing burrs

Figure 1

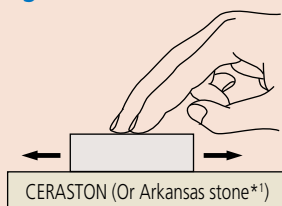
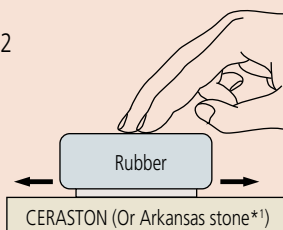


Figure 2



Maintenance Kit for Gauge Blocks SERIES 516

- Maintenance kit for gauge blocks includes all the necessary maintenance tools for removing burrs and contamination, and applying anti-corrosion treatment after use, etc.

*Order No. 516-650E; 516-650

Tools and accessories included:

1. Anti-corrosion oil (**600001**)
(100ml, spray can)
Used for both steel and tungsten-carbide gauge blocks.
2. Ceraston (**601645**)
(both sides finished by lapping)
3. Optical flat (**158-117**)
(ø45, 12mm thickness, JIS Grade 3)
Used to check the wringing of thin gauge blocks and for the presence of burrs.
4. Tweezers (**600004**)
Used for handling thin gauge blocks.
5. Blower brush (**600005**)
Used for blowing dust from measuring surfaces.
6. Cleaning paper (**600006**)
(lens paper, 82 x 304mm, 500 pcs)
Used for wiping off rust preventive oil and contamination. Lint free.
7. Artificial leather mat (B4 size) (**600007**)
Used as a gauge block mat in order to avoid scratches on the work table
8. Reagent bottle (**600008**)
(polyethylene container, 100ml)
Bottle of wiping solution.
(Mitutoyo employs n-Heptane for solvent.)
9. Gloves (**600009**)
Used for handling large gauge blocks. Effective for the prevention of corrosion and thermal expansion.

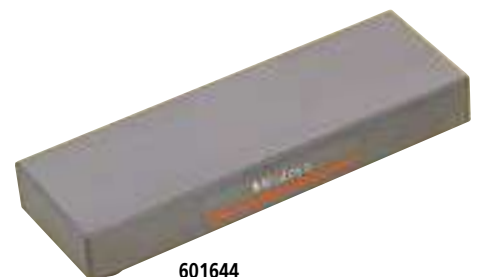
* **516-650E**: Excluding anti-corrosive oil (**600001**)
516-650: including anti-corrosive oil (**600001**) is for domestic sales only.
In the case of an order from overseas, place an order for **516-650E**: excluding anti-corrosive oil, and order anti-corrosive oil (**600001**) separately.



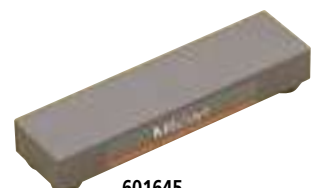
516-650

Ceraston SERIES 516 — Accessory for Gauge Block Maintenance

- Alumina-ceramic abrasive stone for removing burrs from hard materials such as ceramics that ordinary stones cannot handle.
- Can be used both for steel gauge blocks and CERA blocks.
- Excellent in the ease of removing burrs and durability compared with Arkansas stones.
- Both sides can be used.



601644
150 (W) x 50 (D) x 20 (H) mm



601645
100 (W) x 25 (D) x 12 (H) mm

- (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 an abrasive stone. If so, discard the gauge block.

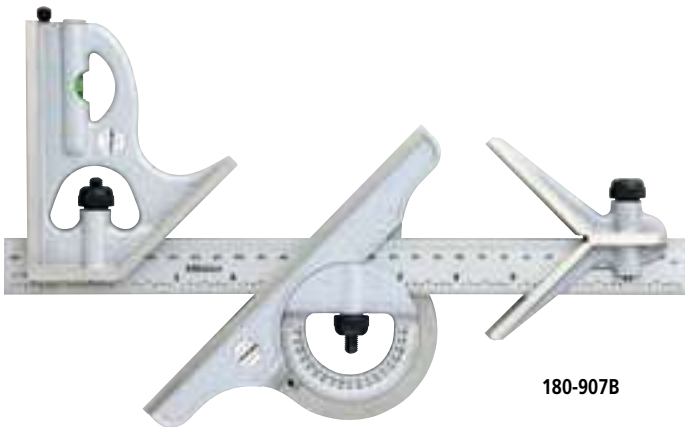
*1 Mitutoyo does not offer Arkansas stones.

Reference Gages

Length Standards Brought to You by Mitutoyo

Combination Square Set SERIES 180

- Three heads are attachable to the stainless steel rule (blade), allowing versatile measurements on various types of workpieces.



180-907B

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.

SPECIFICATIONS

Metric Combination Square Sets		
Order No.	Size	Graduation
180-910B*	300mm	1mm, 0.5mm

* 180-910B consists of blade, square head (180-102B), center head (180-202B) and protractor head (180-301B).

Inch/Metric Combination Square Sets		
Order No.	Size	Graduation
180-907B*	12"/300mm	1/32", 1/64", 1mm, 0.5mm

* 180-907B consists of blade, square head (180-102B), center head (180-202B) and protractor head (180-301B).

Heads (Individual)

Order No.	Description	Remarks
180-102B	Square head	For 300mm (12"), 450mm (18"), 600mm (24") blades
180-202B	Center head	For 300mm (12"), 450mm (18"), 600mm (24") blades
180-301B	Protractor head	For 300mm (12"), 450mm (18"), 600mm (24") blades

Steel Rules SERIES 182

- 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

Order No.	Graduations	Range	Width
182-111	1mm, 0.5mm (on both faces)	150mm	19mm
182-131		300mm	25mm
182-151		450mm	30mm
182-171		600mm	30mm

Inch/Metric Wide Rigid Rules

Order No.	Graduations	Range	Width
182-105	1/32", 1/64", 1mm, 0.5mm	6"/150mm	.75"
182-125		12"/300mm	.98"
182-145		18"/450mm	1.18"
182-165		24"/600mm	1.18"
182-106	1/50", 1/100", 1mm, 0.5mm	6"/150mm	.75"
182-126		12"/300mm	.98"
182-107	1/10", 1/100", 1mm, 0.5mm	6"/150mm	.75"
182-108		6"/150mm	.75"

Metric Fully-Flexible Rules

Order No.	Graduations	Range	Width
182-211	1mm, 0.5mm (on both faces)	150mm	12mm
182-231		300mm	12mm
182-251		450mm	19mm
182-271		600mm	19mm

Inch/Metric Fully-Flexible Rules

Order No.	Graduations	Range	Width
182-205	1/32", 1/64", 1mm, 0.5mm	6"/150mm	.47"
182-225		12"/300mm	.47"
182-245		18"/450mm	.75"
182-265		24"/600mm	.75"
182-206	1/50", 1/100", 1mm, 0.5mm	6"/150mm	.47"
182-226		12"/300mm	.47"
182-207	1/10", 1/100", 1mm, 0.5mm	6"/150mm	.47"
182-208		6"/150mm	.47"

Inch/Metric Semi-Flexible Rules

Order No.	Graduations*	Range	Width
182-302	1/16", 1/32", 1/64", 1mm, 0.5mm	6"/150mm	.51"
182-303		8"/200mm	.51"
182-305		12"/300mm	.59"
182-307		20"/500mm	.59"
182-309		40"/1000mm	.59"

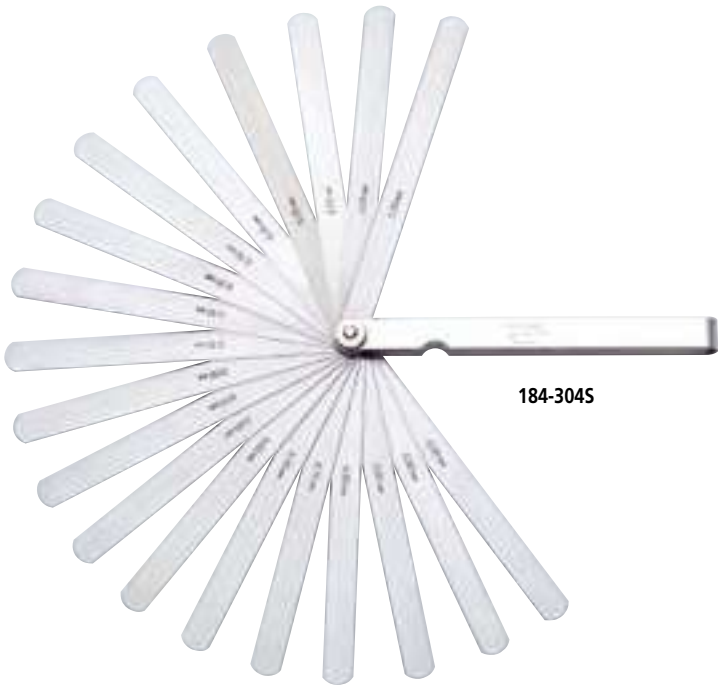
* Engraved on the front side only.

Reference Gages

Length Standards Brought to You by Mitutoyo

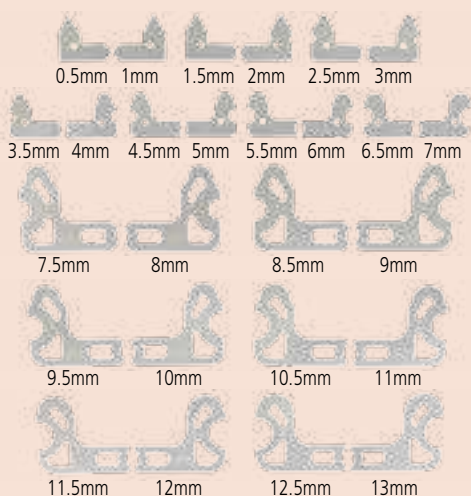
Thickness Gages SERIES 184

- Metric thickness gages are available with tapered leaves.
- Each leaf is marked with its thickness.
- Each leaf is detachable if necessary.



SPECIFICATIONS

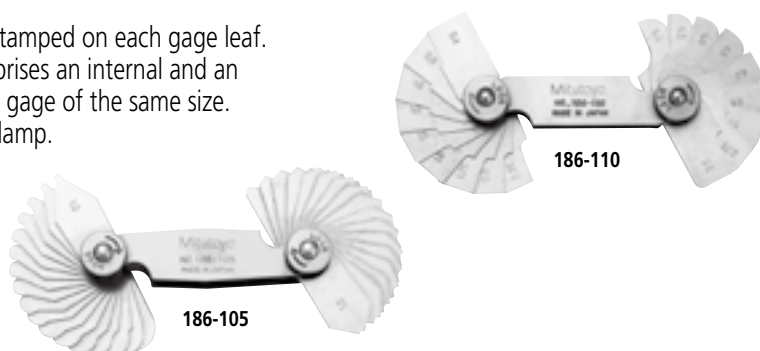
Metric			
Order No.	Range	Composition of leaves	Remarks
184-313S	0.05 - 1mm	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	—
184-303S		28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	Long leaf
184-304S	0.05 - 1mm	20 leaves: 0.05 - 1mm by 0.05mm	Long leaf
184-305S	0.05 - 1mm	13 leaves: 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
184-306S	0.05 - 0.8mm	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
184-307S	0.03 - 0.5mm	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



Composition of leaves for **186-902**

Radius Gages SERIES 186

- Radius size is stamped on each gage leaf.
- Each leaf comprises an internal and an external radius gage of the same size.
- With locking clamp.

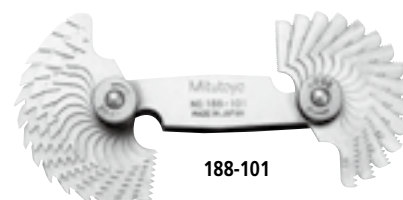


SPECIFICATIONS

Metric			
Order No.	Range	Composition of leaves	Remarks
186-110	0.4 - 6mm	18 leaves: 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
186-902	0.5 - 13mm	26 leaves: 0.5 - 13mm by 0.5mm	90° arc, separate part type
186-105	1 - 7mm	34 leaves: 1 - 3mm by 0.25mm 3.5 - 7mm by 0.5mm	180° arc
186-106	7.5 - 15mm	32 leaves: 7.5 - 15mm by 0.5mm	180° arc
186-107	15.5 - 25mm	30 leaves: 15.5 - 20mm by 0.5mm, 21 - 25mm by 1mm	180° arc

Thread Pitch Gages SERIES 188

- Thread pitch is stamped on each gage.
- Metric, Unified, and Whitworth screw pitch gages.



SPECIFICATIONS

Metric Screw Pitch Gages

Order No.	Range	Composition of leaves
188-130	0.35 - 6mm	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
188-122	0.4 - 7mm	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
188-121	0.4 - 7mm	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

Order No.	Range	Composition of leaves
188-111	4 - 42 TPI	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).

Metric and Unified Screw Pitch Gage Set

Order No.	Range	Composition of leaves
188-151	0.4 - 7mm/4 - 42 TPI	51 leaves: Set of 188-122 and 188-111

Whitworth Screw Pitch Gages

Order No.	Range	Composition of leaves
188-101	4 - 42 TPI	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
188-102	4 - 60 TPI	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

Reference Gages

Length Standards Brought to You by Mitutoyo

Digital Universal Protractor SERIES 187

- Data output function makes it easy to gather statistical data.
- Can be attached to height gages using a gage holder (**950750**, metric)
- Setting preset value.
- Removable blade.

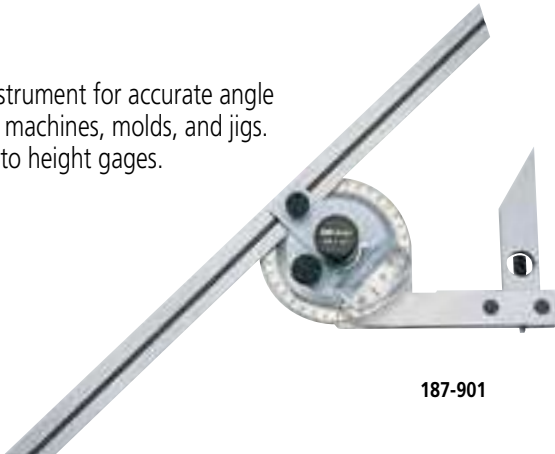
SPECIFICATIONS

Order No.	Blade length	Remarks (standard accessory)
187-501	150mm	Height gage holder (950750)
187-502	300mm	Height gage holder (950750)
187-551	6"	Height gage holder (950749)
187-552	12"	Height gage holder (950749)



Universal Bevel Protractor SERIES 187

- High-precision instrument for accurate angle measurement on machines, molds, and jigs.
- Can be attached to height gages.
- Graduation: 5'



SPECIFICATIONS

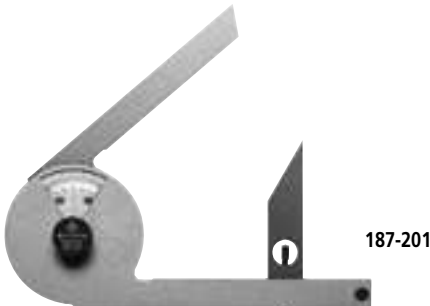
Metric		
Order No.	Blade length	Remarks
187-901	150, 300mm	w/60°, 45°, 30° edges
187-907	150mm	w/60°, 45° edges
187-908	300mm	w/60°, 45° edges

Bevel Protractor SERIES 187

- Consists of three sheets of stainless steel, the middle one of which is made for angle measurements.

SPECIFICATIONS

Order No.	Blade length	Remarks
187-201	137mm	w/60°, 30° edges



Technical Data

Range:	-360° to +360°
Accuracy:	±2' (±0.03°)
Repeatability:	1'
Resolution:	1' (0.01°)
Battery:	Lithium Battery
Battery life:	2,000 hours

Function

Presetting



Technical Data

Range:	90° x 4 (360°)
Graduation:	5 min. (0° - 90° - 0°)
Blade edge angle:	30° and 60°
Mass:	260g

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 good contact with a workpiece.
- Inside Spring Caliper — Ends fully rounded to give good contact with a workpiece.



950-212
Spring divider



950-222
Outside spring calipers



950-232
Inside spring calipers

SPECIFICATIONS

Order No.			Range
Spring divider	Outside spring calipers	Inside spring calipers	
950-212	950-222	950-232	6" (150mm)
950-213	950-223	950-233	8" (200mm)

Precision Levels SERIES 960

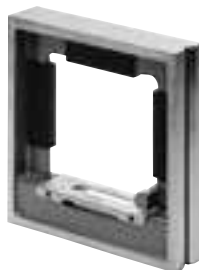
- High-precision longitudinal and transverse vials make it possible to check or level surfaces.

SPECIFICATIONS

Order No.	Sensitivity	Dimensions (W x D x H)
960-603	0.02mm/m	200 x 44 x 38.2mm
960-703	0.02mm/m	200 x 44 x 200mm



960-603



960-703

Technical Data

Accuracy of graduations: ±0.7 DIV (960-603),
±0.3 DIV (960-703)

Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

ABSOLUTE Solar-Powered Digimatic Indicator ID-SS SERIES 543

- Solar powered
An environmentally friendly measuring instrument that does not require batteries, eliminating the hassle and cost of battery replacement. Can operate under minimum light conditions of 40 lux—lower than the level in a warehouse.
- Built-in recharger
The large-capacity built-in reservoir capacitor allows you to use the indicator for long periods of time under light conditions below the minimum level.*
- User-friendly buttons
All functions can be accessed by using the two or three large buttons on the front of the indicator.

- Origin recorded even if display disappears.
The indicator includes an ABS (absolute) sensor that allows the previously set origin to be restored even if the display disappears due to insufficient light, making it easy to resume measurement. This feature makes ID-SS ideal for long-time or multi-point measurement.



543-500

SPECIFICATIONS

Metric		ISO/JIS type					ASME/ANSI/AGD type	
Order No.	Range	Resolution	Accuracy			Remarks		
			Overall*	Hysteresis*	Repeatability*			
543-500	12.7mm	0.001mm	0.003mm	0.002mm	0.002mm	With lug		
543-500B						Flat		
543-505		0.01mm	0.02mm	0.02mm	0.01mm	With lug		
543-505B						Flat		

Inch/Metric		ISO/JIS type					ASME/ANSI/AGD type	
Order No.	Range	Resolution	Accuracy			Remarks		
			Overall*	Hysteresis*	Repeatability*			
543-501	.5"	.00005"/0.001mm	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	With lug		
543-501B						Flat		
543-502						With lug		
543-502B						Flat		
543-506		.0005"/0.01mm	±.0010"/0.02mm	.0010"/0.02mm	.005"/0.01mm	With lug		
543-506B						Flat		
543-507						With lug		
543-507B						Flat		

* Quantizing error of ±1 count is excluded.

ABSOLUTE™



An inspection certificate is supplied as standard.

Technical Data

Display: 6-digit LCD and sign
Scale type: ABSOLUTE electrostatic linear encoder
Measuring force: 1.5 N or less
Usable positions: All
Power supply: Solar battery (for indoor use)
Minimum Operating light: 40 lux
Note: A built-in reservoir capacitor allows a fully charged ID-SS to be used for about 3.5 hours under light conditions below the minimum level.
The charging time differs depending on the environment, but it usually takes about 1.5 hours for a fully discharged ID-SS to fully recharge under light conditions of 500 lux.
Maximum response speed: No limit (scan-type measurement is not supported)
Stem dia: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)

Functions

Origin set (zero-set)
Count direction switching
inch/mm conversion (inch/mm models)
Data output
Alarm: Counting value composition error
Insufficient illumination intensity or change

Optional accessories

Lifting lever

Lifting knob



Lifting release



Optional Accessories

- **Lifting**
Lifting lever **No.21EZA198** (ISO/JIS/DIN Type),
Lifting knob **No.21EZA199** (ASME/ANSI/ AGD Type)
Lifting cable **No.21EZA105** (ISO/JIS/DIN Type),
No.21EZA150 (ASME/ANSI/ AGD Type)
(No. 540774)
- **SPC Cable:**
No.905338 (1m)
No.905409 (2m)
- **USB Input Tool Direct (2m) : 06ADV380F**
- **Connecting Cables for U-WAVE-T (160mm):**
No.02AZD790F
For footswitch **02AZE140F**
Refer to page F-46 for details.
- **Digimatic Mini-Processor DP-1VR: 264-504**
- **Contact points for Mitutoyo's dial indicators**
(Refer to pages F-39 to F-32 for details.)
Interchangeable backs for 2 series
(Refer to page F-39 for details.)
- **Measuring stands** (Refer to page F-61 to F-66 for details.)

• ID-SS can be used in standard work environments.
The following is excerpted from JIS Z9110:2010 General rules of recommended lighting levels; 5.4 Factories:

Luminance (lux)	Location (permissible work)
1500	Very detailed visual work
750	Detailed visual work; design and drawing work
500	Regular visual work such as work carried out in a factory; monitoring work such as using instrument panels and control panels
300	Administrative work carried out in a warehouse
200	Control rooms, bathrooms, and places where manual light work is carried out
150	Work such as loading, unloading, and shifting loads
100	Hallways, corridors, entrances and exits, and warehouses
50	Indoor emergency staircases



An inspection certificate is supplied as standard.

Technical Data

Display: 6-digit LCD and sign
Scale type: ABSOLUTE electrostatic linear encoder
Usable orientation: All
Power supply: SR44, part No. **938882** for initial operational checks (standard accessory)
Maximum response speed: No limit (scan-type measurement is not supported)
Operating temperature range: 0 to 40°C
Storage temperature range: -10 to 60°C

Functions

Origin set (zero-set): The display can be zeroed at any chosen position.

Direction switching: The measuring direction can be switched.

in/mm reading (inch/mm models only)

Measurement data output: These indicators have a measurement data output socket, which makes it possible to output measurement to the DP-1VR mini processor or to a PC through an input tool. Furthermore, the U-WAVE measurement data wireless communication system can be used to wirelessly input measurement data to a PC.

Error warning

Optional accessories

Lifting

Lifting lever No. **21EZA198** (ISO/JIS/DIN Type),
No. **21EZA199** (ASME/ANSI/AGD Type)
Lifting knob No. **21EZA105** (ISO/JIS/DIN Type),
No. **21EZA150** (ASME/ANSI/AGD Type)
Lifting cable No. **540774**

SPC Cable:

No. **905338** (1m)
No. **905409** (2m)
USB Input Tool Direct (2m): **06ADV380F**
Connecting Cables for U-WAVE-T (160mm):
No. **02AZD790F**
For footswitch: **02AZE140F**
Refer to page F-46 for details.
Digimatic Mini-Processor DP-1VR: **264-504**
Contact points for Mitutoyo's dial indicators
(Refer to pages F-39 to F-32 for details.)
Interchangeable backs for 2 series
(Refer to page F-39 for details.)
Measuring stands (Refer to page F-61 to F-66 for details.)

IP53 dust/water protection level

Level 5: Dust protection

While complete protection against invasion of dust is not provided, protection is adequate to prevent dust amounts that would inhibit the prescribed operations and safety of the electronic equipment.

Level 3: Protection against spraying water

The product suffers no harmful effects when subjected to water sprayed at an angle of up to 60 degrees on both sides.

For details on the dust/water protection level test conditions, please refer to IEC 60529:2001 and JIS C 0920:2003.

IP code is the degree of protection against solid foreign objects and water.

Mitutoyo offers a lineup of coolant proof, ID-N/B indicators that have excellent resistance to oil, water and dust and so are suitable for use in environments that include splashing cutting fluid.



Refer to the ABS Digimatic Indicator ID-S Series brochure (MAP1397) for details.

ABSOLUTE Digimatic Indicator ID-SX SERIES 543

- Cost-effective oriented design
ID-SX indicators use a button-type battery (SR44) and come with the minimum of functionality for ease of use. There is a choice of models in the lineup allowing selection of 0.01 mm, 0.001 mm or inch-based measurement resolutions.
- IP53 dust/water protection level
The models listed below also provide IP53 dust/water protection level specifications: **543-794/94B/95/95B/96/96B**
- ABS (absolute) sensor

These Digimatic indicators employ Mitutoyo's proprietary ABS (absolute) sensor, which makes it possible to restore the origin point even if the power is turned off. This eliminates the need to perform origin restoration each time the power is turned on. Furthermore, this sensor ensures that overspeed errors do not occur, which improves reliability.

Long battery life

One button battery (SR44) provides approximately 20,000 hours of continuous use for .0005"/0.01mm resolution models.



543-781
ID-S1012X



543-790
ID-S112X



543-794
ID-S112PX

IP53

SPECIFICATIONS

Metric			ISO/JIS/DIN Type			ASME/ANSI/AGD Type			
Order No.	Range	Resolution	Accuracy* ¹			Back type	Measuring force	Battery life* ³ (continuous use)	Dust/Water protection level* ⁴
			Overall* ²	Hysteresis	Repeatability				
543-790	12.7 mm	0.001 mm	0.003 mm	0.002 mm	0.002 mm	With lug	1.5N or less	18,000 hours	IP42
543-790B						Flat			
543-794						With lug	2.5N or less		
543-794B						Flat			
543-781		0.01 mm	0.02 mm	0.02 mm	0.01 mm	With lug	1.5N or less	20,000 hours	IP42
543-781B	Flat								

Inch/Metric									
Order No.	Range	Resolution	Accuracy* ¹			Back type	Measuring force	Battery life* ³	Dust/Water protection level* ⁴
			Overall* ²	Hysteresis	Repeatability				
543-791	.5"/12.7 mm	.00005"/0.001mm	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	With lug	1.5N or less	18,000 hours	IP42
543-791B						Flat			
543-792						With lug			
543-792B						Flat			
543-793		.0001"/0.001mm	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	With lug	2.5N or less	20,000 hours	IP53
543-793B						Flat			
543-795						With lug			
543-795B						Flat			
543-796		.00005"/0.001mm	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	With lug	1.5N or less	18,000 hours	IP42
543-796B						Flat			
543-782		.0005"/0.01mm	±.0010"/0.02mm	.0010"/0.02mm	.0005"/0.01mm	With lug			
543-782B						Flat			
543-783						With lug			
543-783B						Flat			

*1 These values apply at 20°C, and do not include ±1 count allowance for quantization error.

*2 Overall magnification and linearity.

*3 The battery life varies, depending on the number of times the Digimatic indicators are used as well as the way it is used. The values listed above are approximations.

*4 This is only valid when the data socket cover is in place. Does not apply if the cover is removed, a lifting accessory is attached, or a connecting cable is attached.

Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

ABSOLUTE Digimatic Indicator ID-CX SERIES 543 — Standard Type

- The ABS (absolute) sensor restores the last origin position automatically when the indicator is turned on.
Note: Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-16.
- Thanks to Mitutoyo's ABSOLUTE Linear Encoder, reliability has been increased due to elimination of over-speed errors.
- Tolerance-judging measurement is available by setting upper and lower limit values.
- Battery life of approx. 7,000 hours in continuous use has been achieved with only one battery.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.



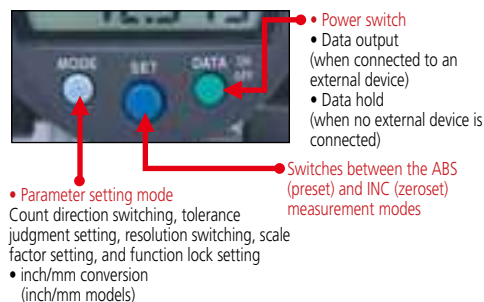
Large LCD

The large LCD incorporates 11mm characters giving 1.5 times the character area of conventional products (which display 8.5mm characters) making measurement values much easier to read.



Three large buttons

The popular three-large button design, which is used in products such as the ABS coolant proof Digimatic indicators ID-N/B, makes buttons easier to press and operations easier to perform.



330° rotary display

The display can be rotated 330°, allowing use at a position where you can easily read the measurement value.



Calculation: $f(x) = Ax$

Mounting the ID-CX on a measuring jig and setting the multiplying factor (to any practical value) allows direct indication of size (see example below) without using a conversion table and so improves measurement efficiency.



Usage example
Note: The measuring jig is not supplied with the ID-CX.

Function locking

Ensures reliability of measurement by locking the settings to prevent preset function settings from being changed by mistake.



ABSOLUTE™



An inspection certificate is supplied as standard.

Technical Data

Accuracy: Refer to the list of specifications (excluding quantizing error)

Resolution:

0.01mm type	0.01mm
0.001mm type	0.01mm/0.001mm
.0005"/0.01mm type	.0005"/0.01mm
.00005"/0.001mm type	.0005"/.0001"/.00005"/0.01mm/0.001mm

Display: 6-digit LCD and sign
Scale type: ABSOLUTE electrostatic linear encoder
Max. response speed: Unlimited (Measurement by scanning cannot be performed)

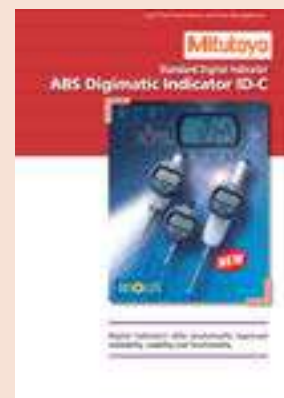
Measuring force: Refer to the list of specifications
Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
Battery: SR44 (1 pc.), **938882** for initial operational checks (standard accessory)
Battery life: Approx. 7,000 hours of continuous use
Dust/Water protection level: IP42

Functions

Preset, Zeroset, GO/NG judgment, Counting direction switching, Power ON/OFF, Simplified calculation, Function lock, Data hold, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error, Overflow error, Tolerance limit setting error

Optional Accessories

- Lifting lever:
No.21EZA198 (12.7mm/.5" ISO/JIS type)
No.21EZA199 (12.7mm/.5" ASME/ANSI/AGD type)
- Lifting knob:
No.21EZA105 (12.7mm/.5" ISO/JIS type)*
No.21EZA150 (12.7mm/.5" ASME/ANSI/AGD type)*
No.21EZA197 (25.4mm/1" models)
No.21EZA200 (50.8mm/2" models)
- Lifting cable: **No.540774**
Lifting lever: **No.137693** (for measuring range: 25.4 and 50.8mm) (supplied with 25.4mm and 50.8mm models as standard.)
- Auxiliary spindle spring:
No.02ACA571 (25.4mm/1" models)**
No.02ACA773 (50.8mm/2" models)**
- Lug-on-senter back:
No.101040 (25.4mm/1" and 50.8mm/2", ISO/JIS type)
No.101306 (25.4mm/1" and 50.8mm/2", ASME/ANSI/AGD type)
- * Not available for low measuring force models.
- **Required when orienting the indicator upside down.
- SPC Cable:
No.905338 (1m)
No.905409 (2m)
- USB Input Tool Direct (2m): **06ADV380F**
- Connecting Cables for U-WAVE-T (160mm):
No.02AZD790F
For footswitch (**02AZE140F**)
Refer to page F-46 for details.
- Digimatic Mini-Processor **DP-1VR: 264-504**
- Contact points for Mitutoyo's dial indicators (Refer to pages F-33 for details.)
Interchangeable backs for 2 series (Refer to page F-32 for details.)
- Measuring stands (Refer to page F-61 for details.)



Refer to the ABS Digimatic Indicator ID-CX brochure (MAP1271) for details.

Setting measuring force on low measuring force models

• 543-404/404B/405/405B/406/406B

Spindle orientation	Spring	Weight (approximately 0.1N)	Maximum measuring force
Pointing vertically downward	Yes	Yes	0.5N or less
	Yes	No	0.4N or less
	No	Yes	0.3N or less
Horizontal	No	No	0.2N or less
	Yes	No	0.3N or less

Note) Operation using configurations other than shown above is not guaranteed.

• 543-394/394B/395/395B/396/396B

Spindle orientation	Spring	Weight (approximately 0.1N)	Maximum measuring force
Pointing vertically downward	Yes	Yes	0.7N or less
	Yes	No	0.6N or less
	No	Yes	0.4N or less
Horizontal	No	No	Not guaranteed
	Not guaranteed		

Note) Operation using configurations other than shown above is not guaranteed.

SPECIFICATIONS

Metric						
Order No. (w/ lug, flat-back)		Range	Resolution	Overall accuracy*	Measuring force	Remarks
543-390	543-390B	12.7mm	0.001mm	0.003mm	1.5N or less	—
543-394	543-394B	25.4mm			0.4N - 0.7N	Low measuring force
—	543-470B	50.8mm			1.8N or less	—
—	543-490B	50.8mm	0.01mm	0.005mm	2.3N or less	—
543-400	543-400B	12.7mm		0.02mm	0.9N or less	—
543-404	543-404B	25.4mm			0.2N - 0.5N	Low measuring force
—	543-474B	50.8mm			1.8N or less	—
—	543-494B	50.8mm		0.04mm	2.3N or less	—

* Hysteresis: 0.001mm/0.01mm Resolution Type: 0.002mm
0.01mm Resolution Type: 0.02mm

* Repeatability: 0.001mm/0.01mm Resolution Type: 0.002mm
0.01mm Resolution Type: 0.02mm

Inch/Metric						
Order No. (w/ lug, flat-back)		Range	Resolution	Overall accuracy*	Measuring force	Remarks
543-391	543-391B	.5"	.0005"/.0001"/ .00005"/.001mm / 0.01mm	.0001"	1.5N or less	—
543-392	543-392B				1.5N or less	—
543-395	543-395B				0.4N - 0.7N	Low measuring force
543-396	543-396B				0.4N - 0.7N	Low measuring force
—	543-471B	1"		.0002"	1.8N or less**	—
—	543-472B				1.8N or less**	—
—	543-491B	2"			2.3N or less**	—
—	543-492B				2.3N or less**	—
543-401	543-401B	.5"	.0005"/0.01mm	.001"	0.9N or less	—
543-402	543-402B				0.9N or less	—
543-405	543-405B				0.2N - 0.5N	Low measuring force
543-406	543-406B				0.2N - 0.5N	Low measuring force
—	543-475B	1"		.0015"	1.8N or less**	—
—	543-476B				1.8N or less**	—
—	543-495B	2"			2.3N or less**	—
—	543-496B				2.3N or less**	—

* Hysteresis: .0005"/.0001"/.0005"/0.001mm/0.01mm
Resolution Type: .0001"/0.002mm
.0005"/0.01mm Resolution Type: .0010"/0.02mm

* Repeatability: .0005"/.0001"/.0005"/0.001mm/0.01mm
Resolution Type: .0001"/0.002mm
.0005"/0.01mm Resolution Type: .0005"/0.02mm

* Quantizing error of ± 1 count is excluded

** Applies for a spindle orientation between the spindles

Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

ABSOLUTE Digimatic Indicator ID-N/B SERIES 543 — with Dust/ Water Protection Conforming to IP66

- Our unique ABS sensor restores the last origin position automatically when the indicator is turned on.
- The chance of overspeed errors has been eliminated thanks to the ABS sensor.
- Rated to IP66: can be used satisfactorily even in adverse environments where the indicator is subject to splashing by cutting fluid or coolant.
- Slim body design (body width: only 35mm) is advantageous in multipoint measurement situations where space is restricted. The LCD readout can also be rotated 180° to allow reading from the most convenient direction.
- Succeeded in digitalization of the Back Plunger type widely used for dial indicators for ID-B. A 5mm-stroke plunger with a higher degree of accuracy has been implemented by adopting a direct reading scale for plunger displacement.
- Built-in tolerance judgment function provides OK, +NG, or -NG judgment of measurement with respect to the preset upper and lower limit values, indicating the status of a measurement with the appropriate symbol. The symbols can be displayed much larger.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.
- There is a choice of convenient Interface Input Tools which enable the conversion of measurement data to keyboard signals and directly input them to cells in off-the-shelf spreadsheet software such as Excel.

543-575



543-585



IP66



IP66



Rated to IP66 water- and dust-proofing standard and oil resistance improved.



Body width 35mm



LCD readout reversal function

ABSOLUTE™

Technical Data

Display: 6-digit LCD and sign
Scale type: ABSOLUTE electrostatic linear encoder
Max. response speed: Unlimited (Measurement by scanning cannot be performed)
Measuring force: 2.5N or less (ID-N)
2.0N or less (ID-B)
Stem dia: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
Standard contact point: **901312** (ISO/JIS type)
21BZB005 (ANSI/AGD type)
Battery SR44 (1pc.) : **938882** for initial operational checks (standard accessory)
Battery life: Approx. 7,000 hours of continuous use

Functions

Zero-setting, Presetting, Direction switching, Tolerance judgment, Display hold, Data output, inch/mm conversion (inch/mm models), LCD readout reversal
Alarm: Low voltage, Counting value composition error, Overflow error, Tolerance limit setting error

Optional accessories

- Lifting knob (only for ID-N)
No.21EZA105 (ISO/JIS type)*
No.21EZA150 (ASME/ANSI/AGD type)*
Spindle can be manually lifted. Remove the spindle cap for ID-N and attach the lifting knob to the spindle. Note that water resistance is not maintained in this configuration.

Using the lifting knob



- Lug
No.21EZA145 (ISO/JIS type)
No.21EZA146 (ASME/ANSI/AGD type)
- Arm for ID-B (mode-to-order)
- Rubber boot
For oil resistance (NBR) **No.02ACA376** (for ID-N)
No.125317 (for ID-B)
For durability (silicon) **No.238774** (for ID-N)
No.21EAA212 (for ID-B)
- SPC cable:
No.21EAA194 (1m)
No.21EAA190 (2m)
- USB Input Tool Direct (2m): **No.06ADV380G**
- Connecting Cables for U-WAVE-T (160mm)
: **No.02AZD790G**
For footswitch: **No.02AZE140G**
Refer to page F-46 for details.
- Bifurcated connecting cable with zero-setting terminal:
No.21EAA210 (1m)
No.21EAA211 (2m)
Two of the wires inside the cable are separated for zero setting without touching the SET switch on the main body. Use these cables in combination with commercially available switches. Zero setting is performed by briefly connecting these two wires together (less than a second), and ABS preset & recall by connecting for a second or more.
- Contact points for Mitutoyo's dial indicators (Refer to pages F-39 to F-32 for details.)

SPECIFICATIONS

Metric					ISO/JIS type	ASME/ANSI/AGD type
Order No.	Range	Resolution	Accuracy*	Remarks		
543-570	12.7mm	0.01mm	0.02mm	Slim type ID-N		
543-580	5.0mm			Back plunger type ID-B		
543-575	12.7mm	0.01mm / 0.001mm	0.01mm / 0.003mm	Slim type ID-N		
543-585	5.0mm			Back plunger type ID-B		

Inch/Metric						
Order No.	Range	Resolution	Accuracy*	Remarks		
543-571	.5"	.0005", 0.01mm	.001"	Slim type ID-N		
543-581	.2"			Back plunger type ID-B		
543-576	.5"	0.01mm / 0.001mm .0005" / .00005"	.00012"	Slim type ID-N		
543-586	.2"			Back plunger type ID-B		

*Quantizing error of ± 1 count is excluded

Usage examples



SPC cable



Bifurcated connecting cable with zero-setting terminal



Refer to the ABS Coolantproof Digimatic Indicator ID-N/ID-B brochure (MAP1255) for details.

Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

ABSOLUTE Digimatic Indicator ID-C SERIES 543 — Peak-Value Hold Type

- Run-out/MAX/MIN Hold function enables GO/±NG judgement for peak or difference values.
- Simple operation of many functions with five buttons and status icons.
- Wide LCD and new analog bar graph are now standard on all models.
- Sampling is performed fifty times per second for accurate detection of maximum and minimum values.



543-302/543-302B

SPECIFICATIONS

Metric								
Order No. (w/lug, flat-back)	Range	Resolution	Accuracy*1	Hysteresis*1	Repeatability*1	Power supply	Battery life (normal use)*2	Net weight
543-300	12.7mm	0.001/0.01mm	0.003mm	0.002mm	0.002mm	CR2032 x 1 pc.	Approx. 1 year	180 g
543-300B								170 g

Inch/Metric								
Order No. (w/lug, flat-back)	Range	Resolution	Accuracy*1	Hysteresis*1	Repeatability*1	Power supply	Battery life (normal use)*2	Net weight
543-301	.5"/12.7mm	.00005"/.0001"/.0005"/ 0.001/0.01mm	±.00010" / 0.003mm	.00010" / 0.002mm	.00010" / 0.002mm	CR2032 x 1 pc.	Approx. 1 year	180 g
543-301B								170 g
543-302								195 g
543-302B								170 g

Notes:

1) GO/±NG judgment result is visual and cannot be output.

2) Max./Min. hold: Sample rate is 50 readings per sec.

Maximum trackable rate of change is 50μm per sec.

3) Order numbers suffixed "B" have a plain back.

*1 Does not include quantizing error (±1 count). Valid for resolution set to 0.001mm/0.0005" and coefficient A=1.

*2 Applies only if not connected to a data processor. Battery life depends on use of the indicator. Use the above value as a guide only. (TIP) Battery life with Peak detection mode and FAST mode ON is about 4.5 months.



Refer to the ABS Coolantproof Digimatic Indicator ID-N/ID-B brochure (MAP1395) for details.

ABSOLUTE™



An inspection certificate is supplied as standard.

Functions

Peak value hold function (maximum and minimum value)
Runout value Hold function
(difference between maximum/minimum values)
Zerose function (INC system)
Preset function (ABS system)
Counting direction switching function
Tolerance judgement function (P1, P2, P3, and INC can be stored)
Resolution selection function
Simple calculation function $f(x)=Ax$
Analog bar resolution selection function
Key lock function
in/mm conversion (inch/mm models)
Display hold function (when external device is connected)
Data output function
External PC setting input function
Display rotation function (330°)
Low battery/voltage alarm display
Error alarm display

Optional Accessories

- Lifting
Lifting lever
No.21EZA198 (ISO/JIS/DIN Type),
No.21EZA199 (ASME/ANSI/ AGD Type)
Lifting knob
No.21EZA105 (ISO/JIS/DIN Type),
No.21EZA150 (ASME/ANSI/ AGD Type)
Lifting cable **No. 540774**
- SPC Cable:
No.905338 (1m)
No.905409 (2m)
- USB Input Tool Direct (2m) : **No.06ADV380F**
- Connecting Cables for U-WAVE-T (160mm):
No.02AZD790F
For footswitch: **No.02AZE140F**
Refer to page F-46 for details.
- Digimatic Mini-Processor DP-1VR: **264-504**
- Parameter setup kit: 21EZA313
Note: Parameter setting software (can be downloaded freely from Mitutoyo website) is also required.



Parameter setup kit

Parameter setting software



- Contact points for Mitutoyo's dial indicators
(Refer to pages F-39 to F-32 for details.)
- Interchangeable backs for 2 series
(Refer to page F-39 for details.)
- Measuring stands.
(Refer to page F-61 to F-66 for details.)



An inspection certificate is supplied as standard.

Functions

Minimum value detection function
Preset function (3 Preset values can be stored)
Tolerance judgement function (3 sets of upper and lower limits can be stored)
Resolution selection function
Analog bar resolution selection function
Key lock function
in/mm conversion (when external device is connected)
Display hold function (when external device is connected)
Data saving/calling function (when external device is connected)
Data output function
External PC setting input function
Display rotation function
Low battery/voltage alarm display
Error alarm display

Optional Accessories

- SPC Cable:
No.905338 (1m)
No.905409 (2m)
 - USB Input Tool Direct (2m) : No.06ADV380F
 - Connecting Cables for U-WAVE-T (160mm) :
No.02AZD790F
For footswitch : No.02AZE140F
Refer to page F-46 for details.
 - Digimatic Mini-Processor DP-1VR: 264-504
 - Parameter setup kit : No.21EZA313
- Note: Parameter setting software (can be downloaded freely from Mitutoyo website) is also required.

The ABSOLUTE Digimatic Bore Gage



ABSOLUTE Digimatic Bore Gages, which integrate the display with a bore gage measuring unit, are also available.
Refer to pages C-33 and C-34 for details.



ABSOLUTE Digimatic Indicator ID-C SERIES 543 — Bore Gage Type

- Dedicated to inside measurement with minimum-value Hold and tolerance judgement functions.
- Measurement data memory function (9 measurement results can be stored)
- Simple operation of many functions with five buttons and status icons.
- Wide LCD and new analog bar graph are now standard on all models.
- Sampling is performed fifty times per second for accurate detection of maximum and minimum values.



543-312B

SPECIFICATIONS

Metric								ISO/JIS type	ASME/ANSI/AGD type
Order No.*	Range	Resolution	Accuracy* ¹	Hysteresis* ¹	Repeatability* ¹	Power supply	Battery life (normal use)* ²	Net weight	
543-310B	12.7mm	0.001/0.01mm	0.003mm	0.002 mm	0.002 mm	CR2032 x 1 pc.	Approx. 1 year	170 g	

*Flat back only

Inch/Metric									
Order No.*	Range	Resolution	Accuracy* ¹	Hysteresis* ¹	Repeatability* ¹	Power supply	Battery life (normal use)* ²	Net weight	
543-311B	.5"/12.7mm	.00005/.0001/.0005"	±.00010" / 0.003 mm	.00010" / 0.002 mm	.00010" / 0.002 mm	CR2032 x 1 pc.	Approx. 1 year	170 g	
543-312B		0.001/0.01 mm							

*Flat back only

*¹ Does not include quantizing error (±1 count). Valid for resolution set to 0.001mm/.00005"

*² Applies only if not connected to a data processor. Battery life depends on use of the indicator. Use the above value as a guide only. (TIP) Battery life with Peak detection mode and FAST mode ON is about 4.5 months.

Notes:

1) Min. hold: sample rate is 50 readings/sec; maximum trackable rate of change is 50µm/sec.

2) All instruments in this series are of the flat back type.

3) All instruments in this series can be only used for inside diameter measurement.

Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

ABSOLUTE Digimatic Indicator ID-C SERIES 543 — Calculation Type

- Calculation function operates on spindle displacement.
- Entering the appropriate formula factors for a fixture dedicated to the application enables direct measurement readout, thereby eliminating any need for the conversion tables previously needed for those applications where fixtures are typically used.
- Peak-Value Run-out/MAX/MIN Hold enables GO/±NG judgement for peak value.
- Simple operation of many functions with five buttons and status icons.
- Wide LCD and new analog bar graph are now standard on all models.
- Sampling can be performed fifty times per second for accurate detection of maximum, minimum and run-out values.



543-342B

SPECIFICATIONS

Metric									
Order No.*	Range	Resolution (selectable)	Accuracy* ¹	Hysteresis* ¹	Repeatability* ¹	Measuring force	Power supply	Battery life (normal use)* ²	Net weight
543-340B	12.7mm	12 steps* ⁵	0.003mm	0.002 mm	0.002 mm	1.5N or less	CR2032 x 1 pc.	Approx. 1 year	170 g
543-590B	25.4mm		0.003mm			1.8N or less* ³			190 g
543-595B	50.8mm		0.006mm			2.3N or less* ³			260 g

* Flat back only

Inch/Metric									
Order No.*	Resolution (selectable)	Range	Accuracy* ¹	Hysteresis* ¹	Repeatability* ¹	Measuring force	Power supply	Battery life (normal use)* ²	Net weight
543-341B	12 steps* ⁵	.5"/12.7mm	±.00010" / 0.003 mm	.00010" / 0.002 mm	0.0010" / 0.002 mm	1.5N or less	CR2032 x 1 pc.	Approx. 1 year	170 g
543-342B									
543-591B		1"/25.4mm				1.8N or less* ³			190 g
543-592B									
543-596B		2"/50.8mm	±.00025" / 0.006 mm			2.3N or less* ³			260 g
543-597B									

* Flat back only

Note: All instruments in this series are of the flat back type.
The back is interchangeable with the standard backs for Series 2.
Refer to page F-39 for details of the optional backs.

*¹ Does not include quantizing error (±1 count). Valid for resolution set to 0.001mm/.00005" and coefficients A=1, B=0 and C=0.

*² Applies only if not connected to a data processor. Battery life depends on use of the indicator. Use the above value as a guide only. (TIP) Battery life with Peak detection mode and FAST mode ON is about 10 months.

*³ Applies for a spindle orientation between the spindle pointing vertically downward to the spindle horizontal.

*⁴ The resolution can be selected from one of 12 steps (Refer to table right).

ABSOLUTE™



An inspection certificate is supplied as standard.

Functions

Calculation function $f(x') = Ax' + B + Cx'^{-1}$
($x' = x + \text{offset}$)

Peak detection function (Max/Min)

Runout value Hold function (difference between max. and min. value motion)

Peak detection sampling rate (Switchable)

10 times/sec. (FAST Mode OFF)

50 times/sec. (FAST Mode ON)

Zeroset function (INC system)

Preset function (ABS system)

Tolerance judgement function (P1, P2, P3, and INC can be stored)

Analog bar resolution selectable function

Key lock function

Display hold function (when external device is connected)

Data output function

External PC setting input function (330°)

Low battery/voltage alarm display

Error alarm display

Resolution switching function*⁵

Resolution (mm)			Resolution (inch)		
0.0002	0.005	0.1	0.00001	0.0002	0.005
0.0005	0.01	0.2	0.00002	0.0005	0.01
0.001	0.02	0.5	0.00005	0.001	0.02
0.002	0.05	1	0.0001	0.002	0.05

*⁵: Since the calculation resolution is one micrometer (0.001mm), using sub-micrometer resolution settings may result in the 4th-place digit being unreliable, particularly when B is set to a very low value and C = 0. It does not change at all with certain combinations of calculation coefficient (for example, A = 1, B = C = 0). The 3rd-place digit representing micrometers (if displayed) is always reliable.

Optional Accessories

• Lifting

Lifting lever:

No.21EZA198 (ISO/JIS/DIN Type),

No.21EZA199 (ASME/ANSI/ AGD Type)

Lifting knob:

No.21EZA105 (ISO/JIS/DIN Type),

No.21EZA150 (ASME/ANSI/ AGD Type)

Lifting cable : **No. 540774**

• SPC Cable:

No.905338 (1m)

No.905409 (2m)

• USB Input Tool Direct (2m) : **No.06ADV380F**

• Connecting Cables for U-WAVE-T (160mm) :

No.02AZD790F

For footswitch : **No.02AZE140F**

Refer to page F-46 for details.

• Digimatic Mini-Processor DP-1VR : **264-504**

• Parameter setup kit : **No.21EZA313**

Note: Parameter setting software (can be downloaded freely from Mitutoyo website) is also required.

• Contact points for Mitutoyo's dial indicators (Refer to pages F-39 to F-32 for details.)

• Measuring stands

(Refer to page F-61 to F-66 for details.)

Fixture examples

Ball diameter



Outside diameter






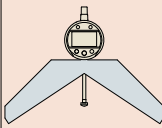
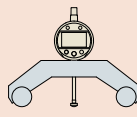
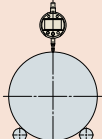
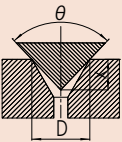
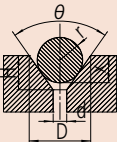
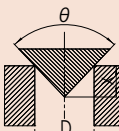
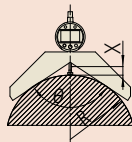
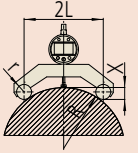
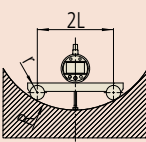
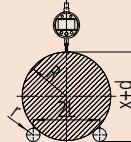
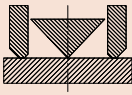

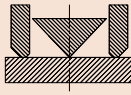
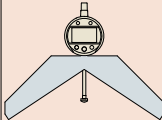
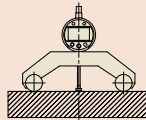
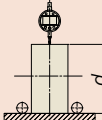
Outside radius



Countersink diameter



Examples of measuring various features

Item	D = Countersink diameter / Groove width; H = Countersink depth / Groove depth			R = Outside radius of round object		R = Inside radius of round object	R = Outside radius of round object	
Fixture type*								
Contact point	Cone	Ball	Cone	Flat or radius to suit feature				
x = Spindle displacement from ORIGIN set position (retraction is the positive-going direction)								
Calculation (x' = x + d)	D = Ax	D = Ax' + B	H = Ax' + B	D = Ax'	R = Ax'	R = Ax' + B + C/x'	R = A(x') + B + C/(x')	
Coefficient values	A	$-2 \tan \frac{\theta}{2}$	$-2 \tan \frac{\theta}{2}$	-1	$-2 \tan \frac{\theta}{2}$	$-\frac{\sin \frac{\theta}{2}}{1 - \sin \frac{\theta}{2}}$	$\frac{1}{2}$	$-\frac{1}{2}$
	B	0	$2r \left(\frac{1}{\cos \frac{\theta}{2}} - \tan \frac{\theta}{2} \right)$	$r \left(\frac{1}{\cos \frac{\theta}{2}} - 1 \right) \frac{d}{2 \tan \frac{\theta}{2}}$	0	0	-r	r
	C	0	0	0	0	0	$\frac{L^2}{2}$	$-\frac{L^2}{2}$
Origin offset value	d	0	0	0	0	0	0	0
ORIGIN-set position of spindle *								
Displayed measurement value at ORIGIN-set position of spindle	0	Value of coefficient B	0	0	0	Err 30 ** (Overflow error of Display value)	Depends on value of d ***	

* The spindle position at which the ORIGIN is set. This is when the contact point is touching either the reference plane or the calibrated artefact, as shown.

** The 'Err30' message shown in the display is extinguished when the spindle is moved into the measurement range.

*** The value of d is chosen to suit the radius range to be measured, the stroke of the indicator and the best spindle position for the ORIGIN. Note that the value of x' should not be allowed to approach zero as this is a highly non-linear region of the equation and measurement accuracy will deteriorate rapidly. A spreadsheet simulation will aid selection of the best value of d for particular r, L and R values.

Notes

1. Fixtures suited to individual workpieces can be made to order.
2. Measuring accuracy is subject to fixture accuracy and workpiece form accuracy.

Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

ABSOLUTE Digimatic Indicator ID-C SERIES 543 — Signal Output Function Type

- Enables a tolerance judgment to be output to external equipment for a measurement result against user-defined limits. Solid-state switching provides high reliability by avoiding metallic switch contacts.
- Output is enabled by directly connecting to external devices (sequencers, etc., for which a logical invert is available if required). The measurement and judgment results are displayed on the LCD. The judgment result is also indicated by 2 LEDs.
- A peak-detection function is equipped for measuring and judging peak values, such as runout.
- Measurements are absolute (ABS system) relative to an origin point*¹ as set by the user, which holds indefinitely so does not require resetting at every power-on.
- Provided with a 4m cable.
- External power required is 5 - 24VDC.
- Dust-water protection level: Conforms to IP54.

*¹ Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-16.



543-350



SPECIFICATIONS

Metric		<input type="checkbox"/> ISO/JIS type <input type="checkbox"/> ASME/ANSI/AGD type			
Order No. (w/ lug, flat-back)		Range	Resolution	Accuracy* ²	Measuring force
543-350	543-350B	12.7mm	0.001/0.01mm	0.003mm or less	2.5N or less

Inch/Metric					
Order No. (w/ lug, flat-back)		Range	Resolution	Accuracy* ²	Measuring force
543-351	543-351B	.5" / 12.7mm	.00005/.0001/.0005"/ 0.001/0.01mm	±.00010" / 0.003mm or less	2.5N or less
543-352	543-352B				

Notes:

- 1) LCD readout does not rotate.
- 2) Max./min. holding: sample rate is 100 readings/sec; max. rate of change of reading is 100µm/sec.
- 3) Products with an Order No. suffixed "B" have a flat back
- 4) Standard contact point: **901312** (ISO/JIS type), **21BZB005** (ANSI/AGD type)

*² Quantizing error of ±1 count is excluded.

ABSOLUTE™



An inspection certificate is supplied as standard.

Functions

Signal output (–NG/OK/+NG, N-ch open drain, logical invert is available),
Remote control (peak start preset/zero-set),
Preset, Zero-set, GO/±NG judgment (3 pairs of ABS, INC memory function)
Max/Min/Runout value holding, Measurement direction switching, Power ON/OFF, inch/mm conversion (inch/mm models), Resolution switching, Scaling function f(x)=Ax, Key lock, Calibration mode (Signal output in Digimatic code format).
Alarm: Counting value composition error, Overflow error, Tolerance limit setting error

Optional accessories

- Lifting*³
Lifting lever **No.21EZA198** (ISO/JIS/DIN Type),
No.21EZA199 (ASME/ANSI/ AGD Type)
Lifting knob **No.21EZA105** (ISO/JIS/DIN Type),
No.21EZA150 (ASME/ANSI/ AGD Type)
Lifting cable **No.540774**
- Digimatic power unit: **21EZA345**
Note: To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for KC. No suffix is required for JIS/100VAC.
- Used in the calibration mode when executing automatic inspection using i-Checker.
In such a case, please purchase connecting cable **21EAA194** (1m), or **21EAA190** (2m).
- Contact points for Mitutoyo's dial indicators.*⁴
- Interchangeable backs for Series 2 models. Dust-water protection is not guaranteed. Use the waterproof types of Series 2 for plain backs if required.*⁵
- Measuring stands (Refer to page F-75 to F-61 for details).

*³ Dust-water protection is not guaranteed.

*⁴ Refer to pages F-33 for details.

*⁵ Refer to page F-32 for details.

Output signals and LCD display

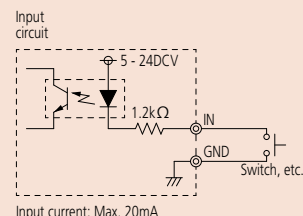
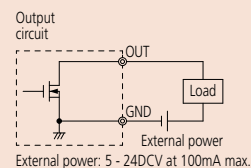
Wire	– NG	OK	+ NG	Composition error
Orange (– NG)	Low	High	High	High
Green (OK)	High	Low	High	High
Brown (+ NG)	High	High	Low	High
LCD	◀	○	▶	"x.xx" indication

* Logical invert is available.

I/O Specifications

Wire	Signal	I/O	Description
Black	– V (GND)	—	Connected to minus (–) terminal
Red	+ V	—	Power supply (5 - 24VDC)
Orange	– NG	O	Tolerance judgment
Green	OK	O	result output: Only the terminal corresponding to a judgment result is set to the low level.
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	PEAK_START	I	
Shield	FG	—	Connected to GND (Earth)

Note: Measurement data cannot be output.



Technical Data

Accuracy: Refer to the list of specifications
(Excluding quantizing error of ± 1 count)
Resolution: 0.01mm, .0005"/0.01mm
Display: 5-digit and sign
Scale type: ABSOLUTE electrostatic linear encoder
Max. response speed: Unlimited (Measurement by scanning cannot be performed)
Measuring force: Refer to the list of specifications
Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
Standard contact point: **901312** (ISO/JIS type)
21BZB005 (ANSI/AGD type)
Battery: SR44 (1 pc.), **938882** for initial operational checks (standard accessory)
Battery life: Approx. 20,000 hours of continuous use
Dust/Water protection level: IP42
Lifting lever: **137693**

Function

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

Optional Accessories

- Spindle lifting cable (stroke: 10mm) : **No.540774**
- SPC Cable:
No.905338 (1m)
No.905409 (2m)
- USB Input Tool Direct (2m) : **No.06ADV380F**
- Connecting Cables for U-WAVE-T (160mm):
No.02AZD790F
For footswitch : **No.02AZE140F**
Refer to page F-46 for details.
- Digimatic Mini-Processor DP-1VR: **264-504**
- Contact points for Mitutoyo's dial indicators
(Refer to pages F-33 for details.)
- Measuring stands
(Refer to page F-61 to F-66 for details.)

ABSOLUTE Digimatic Indicator ID-U SERIES 575 — Slim and Economical Design

- General purpose indicator with the measuring range of 25.4mm/ 1".
- Cost-effective and user-friendly type which is equipped with the basic functions necessary.
- The ABS (absolute) sensor restores the last origin position automatically when the indicator is turned on, and realizes high reliability by eliminating over-speed errors. Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-16.
- Battery life of 20,000 hours in continuous use has been achieved.
- Easy-to-read large LCD readout with the character height of 8mm.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

General-purpose type



575-121

SPECIFICATIONS

Metric		ISO/JIS type				ASME/ANSI/AGD type			
Order No. (w/ lug, flat-back)		Range	Resolution	Accuracy*	Measuring force	Order No. (w/ lug, flat-back)		Range	Resolution
—	575-121	25.4mm	0.01mm	0.02mm	1.8N or less	—	575-122	1" / 25.4mm	.0005"/0.01mm
—	575-123					—	575-123		.001" / 0.02mm

*Quantizing error of ± 1 count is excluded

*Flat back only

Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Digimatic Indicator ID-H SERIES 543 — High Accuracy and High Functionality Type

- This new-generation digital indicator offers the excellent accuracy and functionality expected from the top class of indicator.
- Take advantage of its high accuracy backed up by $0.5\mu\text{m}/.00002''$ resolution, remote control functionality via a handheld controller (or an RS-232C interface) and easy runout measurements with the well-established analog bar display.
- Functionality meets the needs of diverse measurement applications.

Tolerance judgment



- Measuring maximum value, minimum value and runout (difference between a maximum and a minimum value)

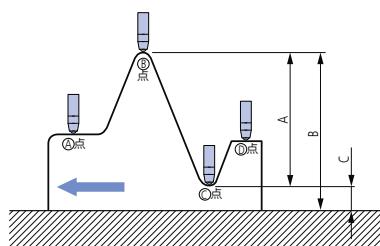
Maximum value / minimum value measurement



Difference/runout measurement



Example: Indicator traces between points <A> to <D>
Difference (or Total Runout) is displayed as <A>. Dimensions (maximum value) and <C> (minimum value) can be recalled from memory with a simple key sequence.



- With the optional remote controller, operations such as zero-setting and presetting can be made without touching the indicator body, thereby avoiding disturbance to the set-up.
- An advanced, remote control system can be implemented with the built-in RS-232C interface and a PC.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.



Remote controller (optional)



An inspection certificate is supplied as standard.

Technical Data

Display: 7-digit LCD, sign, and analog bar with 2-color backlight
Power supply: 6V DC (via AC adaptor) **06AEG180**
* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V
Positional detection method: Photoelectric-type reflection linear encoder
Maximum response speed: 1000mm/sec
Measuring force: 2.0N or less (30.4mm/1.2" type)
2.5N or less (60.9mm/2.4" type)
Spindle orientation: Between the spindle pointing vertically downward to the spindle horizontal
Standard contact point: **901312** (ISO/JIS type)
21BZB005 (ANSI/AGD type)
Lifting lever: **No.137693**

Functions

Zero set, Preset, GO/NG judgement
Max/Min value hold, Runout measurement
Resolution switching
Counting direction switching
Data output, Data hold, Function lock
inch/mm conversion (inch/mm models)
Alarm: Over speed error, Setting error, Overflow error

Optional accessories

- Lifting
Lifting knob : **No.21EZA101**
Lifting cable : **No.540774** (stroke 30 mm)
- Lug-on-center back:
No.101040 (ISO/JIS type)
No.101306 (ASME/ANSI/AGD type)
- Remote controller : **No.21EZA099**
- RS-232 Connecting cable (2m) : **No.21EAA131**
- SPC Cable:
No.936937 (1m)
No.965014 (2m)
- USB Input Tool Direct (2m) : **No.06ADV380D**
- Connecting Cables for U-WAVE-T (160mm) : **No.02AZD790D**
For footswitch : **No.02AZE140D**
Refer to page F-46 for details.
- Digimatic Mini-Processor DP-1VR: **264-504**
- Contact points for Mitutoyo's dial indicators (Refer to pages F-33 for details.)
- Granite comparator stand: **215-156-10**
- Comparator stand: **215-505-10**

Comparator stand
215-505-10



Digimatic
Mini-Processor
DP-1VR

SPECIFICATIONS

Metric			
Order No.*	Range	Resolution	Accuracy**
543-561	30.4mm	0.0005mm,	0.0015mm
543-563	60.9mm	0.001mm	0.0025mm

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V

** Quantizing error of ± 1 count is excluded.



543-561



543-563

Inch/Metric			
Order No.*	Range	Resolution	Accuracy**
543-562	1.2" / 30.4mm	.00002", .00005", .0001"	.00006" / 0.0015mm
543-564	2.4" / 60.9mm	0.0005mm, 0.001mm	.0001" / 0.0025mm

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V

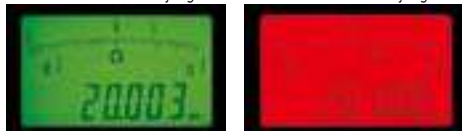
Digimatic Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

ABSOLUTE Digimatic Indicator ID-F SERIES 543 — with Back-light LCD Screen

- GO/±NG judgment function: If a judgment result shows an out of tolerance condition, the display backlighting changes from green to red.
- An analog bar indicator has been integrated to make upper/lower limit and turnover point reading more comfortable.
- Easy-to-read large LCD readout with the character height of 8.5mm.
- External power supply type: battery change is not necessary. Power can also be supplied via the AC adapter supplied as a standard accessory.
- The resolution can be switched between 0.001mm / 0.01mm (or .001" / .0005" / .0001" / .00005").
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

Green indication for GO judgment Red indication for ±NG judgment



- With Mitutoyo's ABSOLUTE Linear Encoder technology, once the measurement reference point has been set it will not be lost when the power is turned off. Also, reliability has been increased due to the elimination of over-speed errors.

Note: Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-16.

Multi-functional model



543-551



543-553

SPECIFICATIONS

Metric			
Order No.*	Range	Resolution	Accuracy**
543-551	25mm		0.003mm
543-557	50mm	0.001mm, 0.01mm	0.003mm
543-553	50mm		0.006mm

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V

**Quantizing error of ±1 count is excluded.

Inch/Metric			
		ISO/JIS type	ASME/ANSI/AGD type
Order No.*	Range	Resolution	Accuracy**
543-552	1" / 25.4mm	.00005", .0001", .0005", .001", .001mm, 0.01mm	.00012" / 0.003mm
543-558	2" / 50.8mm		.00012" / 0.003mm
543-554	2" / 50.8mm		.00024" / 0.006mm

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V

**Quantizing error of ±1 count is excluded.

ABSOLUTE™

Technical Data

Resolution: 0.01mm/0.001mm or .0005"/.0001"/.0005"/.001"/0.001mm/0.01mm
 Display: 6-digit LCD, sign, and analog bar with 2-color backlight
 Scale type: ABSOLUTE electrostatic linear encoder
 Max. response speed: Unlimited
 Measuring force: 1.8N or less (25.4mm models)
 2.3N or less (50.8mm models)
 Spindle orientation: Between the spindle pointing vertically downward to the spindle horizontal
 Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
 Power supply: 9V DC (via AC adaptor) **06AEG302**
 Lifting lever: **137693**
 * To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for KC, **No suffix** is required for JIS/100V

Functions

Preset, Zero set, 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: Counting value composition error, Overflow error, Tolerance limit setting error

Optional Accessories

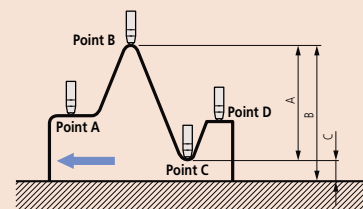
- Lifting cable: **No.540774** (stroke 25.4mm)
- Auxiliary spindle spring:
No.02ACA571 (25.4mm/1" models)*
No.02ACA773 (50.8mm/2" models)*
- Lug-on-center back:
No.101040 (ISO/JIS type)
No.101306 (ASME/ANSI/AGD type)
 * Required when orienting the indicator upside down.
- SPC cable:
No.936937 (1m)
No.965014 (2m)
- USB Input Tool Direct (2m) : **No.06ADV380F**
- Connecting Cables for U-WAVE-T (160mm) :
No.02AZD790D
 For footswitch: **No.02AZE140D**
 Refer to page F-46 for details.
- Digimatic Mini-Processor DP-1VR: **264-504**
- Contact points for Mitutoyo's dial indicators *4
- Interchangeable backs for Series 2 models*5
- Measuring stands
 * 4 Refer to pages F-33 for details.
 * 5 Refer to page F-32 for details.

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.



Supplemental information on Digimatic Indicators

Origin setting of Digimatic Indicators



EC Counter SERIES 542 — Low-cost, Modular Type Display Unit



542-007

- 3 steps of limit setting value can be displayed.
- Can be set to produce either tolerance judgment output or Digimatic output.
- Small size (96 x 48mm) which conforms to DIN standards.

F

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Dial Indicators

Mitutoyo's dial indicators have long been used by many of our customers. In full recognition of their needs, we have devoted ourselves to the research and development necessary to produce high-quality and high-accuracy dial indicators. Due to the recent re-acknowledgement of the importance of measurement technologies, the demands on dial indicators are many and varied: installation in measuring jigs, mounting in countless types of precision equipment, etc. We offer numerous models with various types of dial faces, measuring ranges, graduation styles and environmental resistance ratings. The stems, which ensure the fixture reliability, and the spindles, which are the basis of accuracy, have excellent resistance against hard use thanks to the hardened stainless steel construction. 0.01mm resolution dial indicators have a grand gear made of stainless steel with high resistance to wear and deformation. 0.001mm graduation dial indicators employ a sector gear made of a special alloy in order to further increase the resistance to wear. S-type dial indicators employ an O-ring to ensure the air tightness between the outer frame and the crystal case in order to prevent water or oil penetration. Important factors in choosing a dial indicator: the size (bezel diameter), resolution (graduation) and measuring range. Use the table on the right to help choose a suitable model for your application.



Parts of a dial indicator

Feature icons

Icon	Feature description
	Continuous scale
	Balanced scale
	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
	Waterproof (IP63)
	Waterproof (IP64)
	With damper at lowest rest point
	Jeweled bearing
	Peak retaining
	Dustproof
	With coaxial revolution counter
	Back plunger
	Adjustable hand

*Mitutoyo produces ASME-compatible products. Contact us for details.

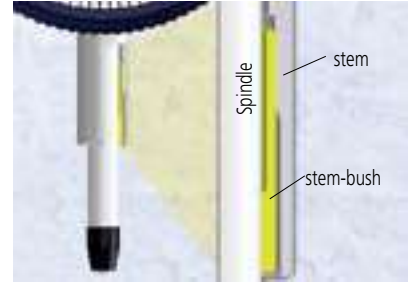
FEATURES: S Series (Series 2, 3, 4)



- No through screw-holes on the frame for high oil- and dust-resistance. The bezel clamp can be attached either to the right or left side.
- Improved Impact- and oil-resistant materials are employed in the outer frame. Easier reading is due to the improved shape of the crystal face.



- The spindle lifting lever (optional: 21AZB149) can be attached to either the right or left side providing high operability and smooth movement. This lever can be easily installed and removed without tools.



- Revolutionary stem-bush design for trouble-free stem clamping (longer clamping range; maximum tightening torque at the clamping point with M5 screw: 150N-cm).



- Limit markers (1) can be moved without interfering with the clamp (2).



- Greater rigidity in the bearing plate for reduced retrace error (20%) and 4-screw mounting for increased impact resistance.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.



An inspection certificate is supplied as standard.

SERIES 2 — Standard Type, 0.01mm Graduation

- Standard 0.01mm graduation dial gages having a bezel with an outside diameter of 57mm. All types come with limit markers and a bezel clamp as standard.
- The bezel 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.
- Secure adhesion between the bezel and crystal as well as the use of an O-ring prevents water or oil penetration.
- The spindle is made of high-strength quench-hardened stainless steel suitable for heavy-duty use.
- A carbide contact point is used.
- The grand gear is made of stainless steel with high resistance to wear and deformation.
- Application of a hard coating on the surface of the crystal makes the gage highly scratch- and chemical-resistant.



20465



Continuous scale



Graduation: 0.01mm,
Measuring range: 10mm

20465

20465-09

Shockproof type



Balanced scale



Graduation: 0.01mm,
Measuring range: 10mm

20475



Reverse reading type. Suitable for depth and step measurement.



Graduation: 0.01mm,
Measuring range: 10mm

29025



Continuous scale



Graduation: 0.01mm,
Measuring range: 10mm

2310S-10

With coaxial revolution counter

Jeweled bearing type



Continuous scale



Graduation: 0.01mm,
Measuring range: 5mm

20445

20445-09

Shockproof











Balanced scale



Graduation: 0.01mm,
Measuring range: 5mm

20455

FEATURES

Metric									
Order No.									
w/ lug	Flat-back								
2046S	2046SB	✓	—	—	—	—	—	—	—
2046S-09	2046SB-09	✓	—	—	✓	—	—	—	—
2047S	2047SB	—	✓	—	—	—	—	—	—
2902S	2902SB	—	—	✓	—	—	—	—	✓
2310S-10	2310SB-10	✓	—	—	—	—	✓	✓	—
2044S	2044SB	✓	—	—	—	—	—	—	—
2044S-09	2044SB-09	✓	—	—	✓	—	—	—	—
2045S	2045SB	—	✓	—	—	—	—	—	—

SPECIFICATIONS

Metric											ISO/JIS type
Order No.		Graduation	Range (range/rev)	Accuracy				Repeat- ability	Dial reading	Measuring force	
w/ lug	Flat-back			Overall	Retrace	1/10 Rev	1 Rev				
2046S	2046SB	0.01mm	10mm (1mm)	13μm	3μm	5μm	10μm	3μm	±0-100	1.4N or less	
2046S-09	2046SB-09	0.01mm	10mm (1mm)	15μm	3μm	5μm	10μm	3μm	±0-100	1.4N or less	
2047S	2047SB	0.01mm	10mm (1mm)	13μm	3μm	5μm	10μm	3μm	0-50-0	1.4N or less	
2902S	2902SB	0.01mm	10mm (1mm)	13μm	3μm	5μm	10μm	3μm	100-0	1.4N or less	
2310S-10	2310SB-10	0.01mm	10mm (1mm)	15μm	3μm	5μm	10μm	3μm	±0-100	1.4N or less	
2044S	2044SB	0.01mm	5mm (1mm)	12μm	3μm	5μm	10μm	3μm	±0-100	1.4N or less	
2044S-09	2044SB-09	0.01mm	5mm (1mm)	12μm	3μm	5μm	10μm	3μm	±0-100	1.4N or less	
2045S	2045SB	0.01mm	5mm (1mm)	12μm	3μm	5μm	10μm	3μm	0-50-0	1.4N or less	

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.



An inspection certificate is supplied as standard.

SERIES 2 — Standard Type, 0.001mm & 0.005mm Graduation

- Standard 0.001mm and 0.005mm graduation dial indicators having a bezel with an outside diameter of $\varnothing 57\text{mm}$. All types come with limit markers and a bezel 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.
- Secure adhesion between the bezel and crystal as well as the use of an O-ring prevents water or oil penetration.
- The spindle is made of high-strength quench-hardened stainless steel which resists arduous use.
- A carbide contact point is used.
- A special alloy is used for the sector gears to provide improved wear resistance.
- The indicator uses jeweled bearings, providing excellent indication sensitivity and durability.
- Application of a hard coating on the surface of the crystal makes the gauge highly scratch- and chemical-resistant.



2109S-10



Balanced scale



Graduation: 0.001mm,
Measuring range: 1mm

2109S-10
Shockproof type
Jeweled bearing type



Continuous scale

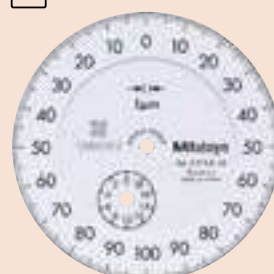


Graduation: 0.001mm,
Measuring range: 1mm

2110S-10
Double scale spacing type
Shockproof type
Jeweled bearing type



Balanced scale



Graduation: 0.001mm,
Measuring range: 2mm

2113S-10
Shockproof type
Jeweled bearing type



Continuous scale



Graduation: 0.001mm,
Measuring range: 5mm

2118S-10
Jeweled bearing



Balanced scale



Graduation: 0.001mm,
Measuring range: 5mm

2119S-10
Jeweled bearing



Continuous scale



Graduation: 0.005mm,
Measuring range: 5mm

2124S-10
Jeweled bearing

FEATURES

Metric							
Order No.							
w/ lug	Flat-back						
2109S-10	2109SB-10	—	✓	✓	—	✓	—
2110S-10	2110SB-10	✓	—	✓	—	✓	✓
2113S-10	2113SB-10	—	✓	✓	—	✓	—
2118S-10	2118SB-10	✓	—	—	—	✓	—
2119S-10	2119SB-10	—	✓	—	—	✓	—
2124S-10	2124SB-10	✓	—	—	—	✓	—

SPECIFICATIONS

Metric											
Order No.		Graduation	Range (range/rev)	Accuracy			Repeat-ability	Dial reading	Measuring force		
w/ lug	Flat-back			Overall	Retrace	1/10 Rev				ISO/JIS type	
2109S-10	2109SB-10	0.001mm	1mm (0.2mm)	5 μm	2 μm	2 μm	4 μm	0.5 μm	0-100-0	1.5N or less	
2110S-10	2110SB-10	0.001mm	1mm (0.1mm)	5 μm	2 μm	2 μm	4 μm	0.5 μm	$\pm 0-100$	1.8N or less	
2113S-10	2113SB-10	0.001mm	2mm (0.2mm)	7 μm	2 μm	2 μm	5 μm	0.5 μm	0-100-0	1.5N or less	
2118S-10	2118SB-10	0.001mm	5mm (0.2mm)	10 μm	3 μm	3.5 μm	6 μm	1 μm	0-100-100	1.5N or less	
2119S-10	2119SB-10	0.001mm	5mm (0.2mm)	10 μm	3 μm	3.5 μm	6 μm	1 μm	0-100-0	1.5N or less	
2124S-10	2124SB-10	0.005mm	5mm (0.5mm)	12 μm	3 μm	5 μm	9 μm	3 μm	$\pm 0-50$	1.5N or less	

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.



An inspection certificate is supplied as standard.

SERIES 2 — Waterproof Type, 0.01mm & 0.001mm Graduation

- Waterproof type dial gages having a bezel with an outside diameter of 57mm. All types come with limit markers and a bezel clamp as standard.
- The bezel clamp can be attached to either the right or left side. These parts can be easily installed and removed without tools.
- The stem and spindle are made of high-strength quench-hardened stainless steel suitable for heavy-duty use.
- A carbide contact point is used.
- Application of a hard coating on the surface of the crystal makes the gage highly scratch- and chemical-resistant.



2046S-60



Continuous scale



Graduation: 0.01mm,
Measuring range: 10mm

2046S-60
Waterproof



Continuous scale



Graduation: 0.01mm,
Measuring range: 5mm

2044S-60
Waterproof



2109S-70



Balanced scale



Graduation: 0.001mm,
Measuring range: 1mm

2109S-70
Waterproof
Shockproof
Jeweled bearing



Continuous scale



Graduation: 0.001mm,
Measuring range: 1mm

2110S-70
Waterproof
Double scale spacing
Shockproof
Jeweled bearing

FEATURES

Metric							
Order No.	Flat-back	50 0 10	10 0 10	3	64	10	10
2046S-60	2046SB-60	✓	—	—	✓	—	—
2044S-60	2044SB-60	✓	—	—	✓	—	—
2109S-70	2109SB-70	—	✓	✓	✓	✓	—
2110S-70	2110SB-70	✓	—	✓	✓	✓	✓

SPECIFICATIONS

Metric										ISO/JIS type
Order No.		Graduation	Range (range/rev)	Accuracy				Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			Overall	Retrace	1/10 Rev	1 Rev			
2046S-60	2046SB-60	0.01mm	10mm (1mm)	13μm	3μm	5μm	10μm	3μm	±0-100	2.5N or less
2044S-60	2044SB-60	0.01mm	5mm (1mm)	12μm	3μm	5μm	10μm	3μm	±0-100	2.5N or less
2109S-70	2109SB-70	0.001mm	1mm (0.2mm)	5μm	2μm	2μm	4μm	0.5μm	0-100-0	2.0N or less
2110S-70	2110SB-70	0.001mm	1mm (0.1mm)	5μm	2μm	2μm	4μm	0.5μm	±0-100	2.0N or less

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.



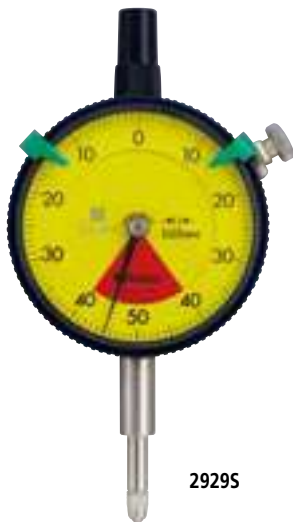
An inspection certificate is supplied as standard.

SERIES 2 — Standard One Revolution Type for Error-free Reading

- Mitutoyo's unique shock-proof mechanism is incorporated, providing improved resistance to shock due to sudden spindle retraction caused by impact.
- This series has been developed to eliminate the possibility of reading errors due to miscounting multiple revolutions.
- The dead zone in red indicates "accuracy not guaranteed".



2900S-10



2929S



Balanced scale



Graduation: 0.001mm,
Measuring range: 0.08mm

2900S-10

One revolution

Shockproof

Jeweled bearing

2900S-72

One revolution

Shockproof

Dustproof

Jeweled bearing



Balanced scale



Graduation: 0.001mm,
Measuring range: 0.16mm

2901S-10

One revolution

Shockproof

Jeweled bearing



Balanced scale



Graduation: 0.1mm,
Measuring range: 4mm

2928S

One revolution

Shockproof



Balanced scale



Graduation: 0.01mm,
Measuring range: 0.8mm

2929S

One revolution

Shockproof

2929S-62

One revolution

Shockproof

Dustproof



Balanced scale



Graduation: 0.01mm,
Measuring range: 1.6mm

2959S

One revolution

Shockproof

FEATURES

Metric							
Order No.							
w/ lug	Flat-back						
2928S	2928SB	✓	—	—	—	—	—
2929S	2929SB	✓	—	—	—	—	—
2929S-62	2929SB-62	✓	—	✓	—	—	—
2959S	2959SB	✓	—	—	—	—	—
2900S-10	2900SB-10	✓	—	—	✓	—	—
2900S-72	2900SB-72	✓	—	✓	✓	—	—
2901S-10	2901SB-10	✓	—	—	✓	—	—

SPECIFICATIONS

Metric												
Order No.												
w/ lug	Flat-back	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Dial reading	Measuring force		
				Overall	Retrace	1/10 Rev	1 Rev					
2928S	2928SB	0.1mm	4mm (5mm)	40μm	20μm	20μm	—	20μm	2-0-2	1.4N or less		
2929S	2929SB	0.01mm	0.8mm (1mm)	8μm	3μm	5μm	—	3μm	40-0-40	1.4N or less		
2929S-62	2929SB-62	0.01mm	0.8mm (1mm)	8μm	3μm	5μm	—	3μm	40-0-40	2.0N or less		
2959S	2959SB	0.01mm	1.6mm (2mm)	10μm	3μm	5μm	—	3μm	80-0-80	1.4N or less		
2900S-10	2900SB-10	0.001mm	0.08mm (0.1mm)	3μm	2μm	2μm	—	0.5μm	40-0-40	1.5N or less		
2900S-72	2900SB-72	0.001mm	0.08mm (0.1mm)	3μm	2μm	2μm	—	0.5μm	40-0-40	2.0N or less		
2901S-10	2901SB-10	0.001mm	0.16mm (0.2mm)	4μm	2μm	2μm	—	0.5μm	80-0-80	1.5N or less		

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.



An inspection certificate is supplied as standard.

SERIES 2 — Standard One Revolution Type for Error-free Reading, Waterproof Type

- Mitutoyo's unique shock-proof mechanism is incorporated, providing improved resistance to shock due to sudden spindle retraction caused by impact.
- This series has been developed to eliminate the possibility of reading errors due to miscounting multiple revolutions.
- The dead zone in red indicates "accuracy not guaranteed".
- One revolution type Back plunger dial gages are also available. (Refer to page F-34 for details.)



2929S-60

Balanced scale



Graduation: 0.01mm,
Measuring range: 0.8mm

2929S-60

- One revolution
- Shockproof
- Waterproof



2900S-70

Balanced scale



Graduation: 0.001mm,
Measuring range: 0.08mm

2900S-70

- One revolution
- Shockproof
- Waterproof
- Jeweled bearing

FEATURES

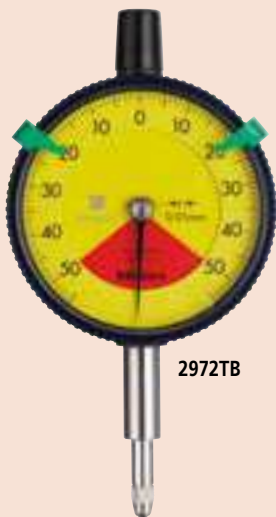
Metric							
Order No.	Flat-back						
2929S-60	2929SB-60	✓	✓	—	—	—	—
2900S-70	2900SB-70	✓	✓	—	✓	—	—

SPECIFICATIONS

Metric		Graduation	Range (range/rev)	Accuracy				Repeat-ability	Dial reading	Measuring force
Order No.	Flat-back			Overall	Retrace	1/10 Rev	1 Rev			
2929S-60	2929SB-60	0.01mm	0.8mm (1mm)	8μm	3μm	5μm	—	3μm	40-0-40	2.0N or less
2900S-70	2900SB-70	0.001mm	0.08mm (0.1mm)	3μm	2μm	2μm	—	0.5μm	40-0-40	2.0N or less

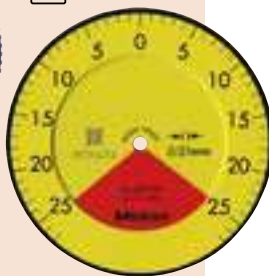
* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

SERIES 2 — Standard One Revolution Type for Error-free Reading, Lightweight Type



2972TB

Balanced scale



Graduation: 0.01mm,
Measuring range: 0.5mm

2971TB

- One revolution
- Shockproof
- Dustproof

Balanced scale



Graduation: 0.01mm,
Measuring range: 1mm

2972TB

- One revolution
- Shockproof
- Dustproof

Balanced scale



Graduation: 0.02mm,
Measuring range: 1.6mm

2973TB

- One revolution
- Shockproof
- Dustproof

- Excellent water- and drip-proof characteristics (IP43).
- Smooth movement thanks to the improved design of bush and stem.
- Application of a hard coating on the surface of the crystal makes the gage scratch- and oil-resistant.
- Lightweight type (70g).

FEATURES

Metric					
Order No.	Flat-back				
—	2971TB	✓	✓	✓	✓
—	2972TB	✓	✓	✓	✓
—	2973TB	✓	✓	✓	✓

SPECIFICATIONS

Metric		Graduation	Range (range/rev)	Accuracy				Repeat-ability	Dial reading	Measuring force
Order No.	Flat-back			Overall	Retrace	1/10 Rev	1 Rev			
—	2971TB	0.01mm	0.5mm (0.7mm)	8μm	3μm	5μm	—	3μm	25-0-25	1.4N or less
—	2972TB	0.01mm	1mm (1.4mm)	8μm	3μm	5μm	—	3μm	50-0-50	1.4N or less
—	2973TB	0.02mm	1.6mm (2mm)	16μm	6μm	8μm	—	5μm	80-0-80	1.4N or less

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 2 — Long Stroke Type

- Long stroke dial indicators with a $\varnothing 57\text{mm}$ outer frame. All the models are equipped with limit markers and a bezel clamp as standard.
- An O-ring is employed to ensure air-tightness between the outer frame and the crystal case to prevent water or oil penetration.
- Both the stem and the spindle are made of high-strength quench-hardened stainless steel suitable for heavy-duty use.

- A carbide contact point is employed.
- The grand gear is made of stainless steel with high resistance to wear and deformation.
- Application of a hard coating on the surface of the crystal makes the gauge highly scratch- and chemical-resistant.
- The bezel clamp and lifting lever* (optional) can be attached to either the right or left side. These parts can be easily installed and removed without any tools.

* Not available for waterproof type.



An inspection certificate is supplied as standard.



2050S



2050S-60



Continuous scale



Graduation: 0.01mm,
Measuring range: 20mm

2050S

With damper at lowest rest point

2050S-19

Shockproof
Jeweled bearing
With damper at lowest rest point

2050S-60

Waterproof



Continuous scale



Graduation: 0.01mm,
Measuring range: 30mm

2052S

With damper at lowest rest point

2052S-19

Shockproof
Jeweled bearing
With damper at lowest rest point



Continuous scale



Graduation: 0.01mm,
Measuring range: 30mm

2330S-10

With coaxial revolution counter

With damper at lowest rest point
Jeweled bearing



Continuous scale



Graduation: 0.01mm,
Measuring range: 20mm

2320S-10

With coaxial revolution counter

With damper at lowest rest point
Jeweled bearing



Reverse reading



Graduation: 0.01mm,
Measuring range: 30mm

2952S

With damper at lowest rest point

FEATURES

Metric									
Order No.									
w/ lug	Flat-back								
2050S	2050SB	✓	—	—	—	—	✓	—	—
2050S-60	2050SB-60	✓	—	—	—	✓	—	—	—
2050S-19	2050SB-19	✓	—	—	✓	—	✓	✓	—
2320S-10	2320SB-10	✓	—	—	—	—	✓	✓	✓
2052S	2052SB	✓	—	—	—	—	✓	—	—
2052S-19	2052SB-19	✓	—	—	✓	—	✓	✓	—
2330S-10	2330SB-10	✓	—	—	—	—	✓	✓	✓
2952S	2952SB	—	—	✓	—	—	✓	—	—

SPECIFICATIONS

Metric												
Order No.					Accuracy							
w/ lug	Flat-back	Graduation	Range (range/rev)	Overall	Retrace	1/10 Rev	1 Rev	Repeat-ability	Dial reading	Measuring force		
2050S	2050SB	0.01mm	20mm (1mm)	20μm	5μm	8μm	15μm	4μm	±0-100	2.0N or less		
2050S-60	2050SB-60	0.01mm	20mm (1mm)	20μm	5μm	8μm	15μm	4μm	±0-100	2.5N or less		
2050S-19	2050SB-19	0.01mm	20mm (1mm)	20μm	5μm	8μm	15μm	4μm	±0-100	2.0N or less		
2320S-10	2320SB-10	0.01mm	20mm (1mm)	20μm	5μm	8μm	15μm	4μm	±0-100	2.0N or less		
2052S	2052SB	0.01mm	30mm (1mm)	25μm	7μm	10μm	15μm	5μm	±0-100	2.5N or less		
2052S-19	2052SB-19	0.01mm	30mm (1mm)	25μm	7μm	10μm	15μm	5μm	±0-100	2.5N or less		
2330S-10	2330SB-10	0.01mm	30mm (1mm)	25μm	7μm	10μm	15μm	5μm	±0-100	2.5N or less		
2952S	2952SB	0.01mm	30mm (1mm)	25μm	7μm	10μm	15μm	5μm	100-0	2.5N or less		

*1 2050S-60 and 2050SB-60 are waterproof types that use a rubber bellows to cover the spindle.

Please note that the outer diameter of the bellows (ø9.5) is larger than that of the stem (ø8).

*2 Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

SERIES 1 — Compact Type, Small Diameter

- Compact dial indicators with bezel diameters of ø31 or ø36mm for restricted-space applications in gaging jigs.



1911T-10



1003T



Balanced scale



Graduation: 0.01mm,
Measuring range: 2.5mm

1911T-10

Jeweled bearing



Balanced scale



Graduation: 0.02mm,
Measuring range: 0.5mm

1913T-10

Jeweled bearing



Balanced scale



Graduation: 0.01mm,
Measuring range: 4mm

1003T

SPECIFICATIONS

Metric											
Order No.					Accuracy						
w/ lug	Flat-back	Graduation	Range (range/rev)	Overall	Retrace	1/10 Rev	1 Rev	Repeat-ability	Dial reading	Measuring force	
1911T-10	1911TB-10	0.01mm	2.5mm (1mm)	12μm	4μm	8μm	10μm	3μm	0-50-0	1.8N or less	
1913T-10	1913TB-10	0.002mm	0.5mm (0.2mm)	6μm	2.5μm	2.5μm	5μm	1μm	0-100-0	1.8N or less	
1003T	1003TB	0.01mm	4mm (1mm)	13μm	4μm	8μm	11μm	3μm	0-50-0	1.4N or less	

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 1 — Compact Type, Small Diameter

- Compact dial indicators with bezel diameters of $\varnothing 40\text{mm}$ for restricted-space applications in gaging jigs.



An inspection certificate is supplied as standard.



1044S



Continuous scale



Graduation: 0.01mm,
Measuring range: 3.5mm

1040S

Double scale
spacing



Balanced scale



Graduation: 0.01mm,
Measuring range: 3.5mm

1041S

Double scale
spacing



Continuous scale



Graduation: 0.01mm,
Measuring range: 5mm

1044S

1044S-15

Jeweled bearing



Balanced scale



Graduation: 0.01mm,
Measuring range: 5mm

1045S



Balanced scale



Graduation: 0.001mm,
Measuring range: 1mm

1109S-10

Shockproof
 Jeweled
bearing



Balanced scale



Graduation: 0.002mm,
Measuring range: 1mm

1013S-10

Shockproof
 Jeweled
bearing



Continuous scale



Graduation: 0.005mm,
Measuring range: 3.5mm

1124S



1109S-10



1044S-60




Continuous scale



Graduation: 0.01mm,
Measuring range: 5mm

1044S-60

 Waterproof

FEATURES

Metric				
Order No.				
w/ lug	Flat-back			
1013S-10	1013SB-10	—	✓	—
1040S	1040SB	✓	—	—
1041S	1041SB	✓	—	—
1044S	1044SB	—	—	—
1044S-15	1044SB-15	—	✓	—
1044S-60	1044SB-60	—	—	✓
1045S	1045SB	—	—	—
1109S-10	1109SB-10	—	✓	—
1124S	1124SB	—	—	—

SPECIFICATIONS

Metric		ISO/JIS type								
Order No.		Graduation	Range (range/rev)	Accuracy				Repeat- ability	Dial reading	Measuring force
w/ lug	Flat-back			Overall	Retrace	1/10 Rev	1 Rev			
1013S-10	1013SB-10	0.002mm	1mm (0.2mm)	6μm	2.5μm	2.5μm	5μm	1μm	0-100-0	1.5N or less
1040S	1040SB	0.01mm	3.5mm (0.5mm)	13μm	4μm	8μm	11μm	3μm	±0-50	1.4N or less
1041S	1041SB	0.01mm	3.5mm (0.5mm)	13μm	4μm	8μm	11μm	3μm	0-25-0	1.4N or less
1044S	1044SB	0.01mm	5mm (1mm)	13μm	4μm	8μm	11μm	3μm	±0-100	1.4N or less
1044S-15	1044SB-15	0.01mm	5mm (1mm)	13μm	4μm	8μm	11μm	3μm	±0-100	0.4N or less*
1044S-60	1044SB-60	0.01mm	5mm (1mm)	13μm	4μm	8μm	11μm	3μm	±0-100	2.0N or less
1045S	1045SB	0.01mm	5mm (1mm)	13μm	4μm	8μm	11μm	3μm	0-50-0	1.4N or less
1109S-10	1109SB-10	0.001mm	1mm (0.2mm)	5μm	2μm	2.5μm	4.5μm	1μm	0-100-0	1.5N or less
1124S	1124SB	0.005mm	3.5mm (0.5mm)	12μm	3.5μm	6μm	10μm	3μm	±0-50	1.4N or less

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 1 — Compact One Revolution Type for Error-free Reading

- Mitutoyo's unique shock-proof mechanism is incorporated, providing improved resistance to shock due to sudden spindle retraction caused by impact.
- This series has been developed to eliminate the possibility of reading errors due to miscounting multiple revolutions.
- The dead zone in red indicates "accuracy not guaranteed".
- One revolution type Back plunger dial gages are also available. (Refer to pages F-37 to F-38 for details.)



1929S



Balanced scale



Graduation: 0.01mm,
Measuring range: 1mm

1929S

One revolution

Shockproof

1929S-62

One revolution

Shockproof

Dustproof



1900S-10



An inspection certificate is supplied as standard.

One revolution type Back plunger dial gages are also available. (Refer to pages F-37 to F-38 for details.)



2990T-10



Balanced scale



Graduation: 0.001mm,
Measuring range: 0.1mm

1900S-10

One revolution

Shockproof

Jeweled bearing

1900S-72

One revolution

Shockproof

Dustproof

Jeweled bearing

FEATURES

Metric				
Order No.				
w/ lug	Flat-back			
1929S	1929SB	—	—	✓
1929S-62	1929SB-62	—	✓	✓
1900S-10	1900SB-10	✓	—	✓
1900S-72	1900SB-72	✓	✓	✓

SPECIFICATIONS

Metric											
Order No.											
w/ lug	Flat-back	Graduation	Range (range/rev)	Overall	Retrace	1/10 Rev	1 Rev	Repeat-ability	Dial reading	Measuring force	
1929S	1929SB	0.01mm	1mm (1.4mm)	11μm	4μm	7μm	—	3μm	50-0-50	1.4N or less	
1929S-62	1929SB-62	0.01mm	1mm (1.4mm)	11μm	4μm	7μm	—	3μm	50-0-50	1.4N or less	
1900S-10	1900SB-10	0.001mm	0.1mm (0.14mm)	5μm	2μm	2.5μm	—	1μm	50-0-50	1.5N or less	
1900S-72	1900SB-72	0.001mm	0.1mm (0.14mm)	5μm	2μm	2.5μm	—	1μm	50-0-50	1.5N or less	

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.



An inspection certificate is supplied as standard.

SERIES 2 — Special Dial Indicators

Adjustable hand dial gauge

- The hand position can be adjusted independently of the position of the spindle by rotating the top knob.



2048S-10

FEATURES

Metric						
Order No.						
w/ lug	Flat-back				—	—
2048S-10	2048SB-10	✓	—	✓	—	—

SPECIFICATIONS

Metric				Accuracy				Repeat-	Dial	Measuring
Order No.		Graduation	Range (range/rev)	Overall	Retrace	1/10 Rev	1 Rev	ability	reading	force
w/ lug	Flat-back									
2048S-10	2048SB-10	0.01mm	10mm (1mm)	15µm	3µm	5µm	10µm	3µm	±0-100	1.4N or less

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

SERIES 2 — Special Dial Indicators

Peak hold type dial gauge

- A mechanism holds the pointer and the spindle at the position of maximum depression and hence displays the maximum value.

* Clearance of peak hold: push the nut in the direction of the arrow indicated in the dimensional drawing below.



2046S-80

FEATURES

Metric						
Order No.						
w/ lug	Flat-back				—	—
2046S-80	2046SB-80	—	✓	—	—	—

SPECIFICATIONS

Metric				Accuracy				Repeat-	Dial	Measuring
Order No.		Graduation	Range (range/rev)	Overall	Retrace	1/10 Rev	1 Rev	ability	reading	force
w/ lug	Flat-back									
2046S-80	2046SB-80	0.01mm	10mm (1mm)	15µm	—	5µm	10µm	—	±0-100	5.0N or less

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 3, 4 — Long StrokeType, Large Diameter


- Dial indicators with a large-diameter dial face for easy reading.
- Models with longer measuring ranges are also available.
- All types are supplied with limit markers and a bezel clamp as standard.
- Both the stem and the spindle are made of high-strength quench-hardened stainless steel suitable for heavy-duty use.
- The bezel clamp and lifting lever (optional)*1 can be attached to either the right or left side. These parts can be easily installed and removed without tools.

*1: Can be attached only to Code No.


3046S, 3047S, 3050S, 3109S-10
and **4046S**.




An inspection certificate is supplied as standard.





3109S-10

 Continuous scale




Graduation: 0.01mm, Measuring range: 30mm


 Continuous scale




Graduation: 0.01mm, Measuring range: 100mm





3058S-19

 Balanced scale





Graduation: 0.01mm, Measuring range: 10mm

 Continuous scale




Graduation: 0.01mm, Measuring range: 50mm


 Balanced scale





Graduation: 0.001mm, Measuring range: 1mm




4046S


 Continuous scale

 Balanced scale





Graduation: 0.01mm, Measuring range: 10mm

 Continuous scale





Graduation: 0.01mm, Measuring range: 20mm

 Continuous scale









Graduation: 0.01mm, Measuring range: 80mm

 Continuous scale



Graduation: 0.01mm, Measuring range: 10mm

FEATURES

Metric							
Order No.							
w/ lug	Flat-back						
3046S	3046SB	—	—	—	—	—	—
3047S	3047SB	—	—	—	—	—	—
3050S	3050SB	—	✓	—	—	—	—
3052S-19	3052SB-19	✓	—	✓	✓	—	—
3058S-19	3058SB-19	✓	—	✓	✓	—	—
3060S-19*	3060SB-19*	✓	—	✓	✓	—	—
3062S-19*	3062SB-19*	✓	—	✓	✓	—	—
3109S-10	3109SB-10	✓	—	✓	—	—	—
4046S	4046SB	—	—	—	—	—	—

SPECIFICATIONS

Metric										ISO/JIS type
Order No.		Graduation	Range (range/rev)	Accuracy				Repeat- ability	Dial reading	Measuring force
w/ lug	Flat-back			Overall	Retrace	1/10 Rev	1 Rev			
3046S	3046SB	0.01mm	10mm (1mm)	15μm	3μm	5μm	10μm	3μm	±0-100	1.4N or less
3047S	3047SB	0.01mm	10mm (1mm)	15μm	3μm	5μm	10μm	3μm	0-50-0	1.4N or less
3050S	3050SB	0.01mm	20mm (1mm)	20μm	5μm	8μm	15μm	4μm	±0-100	2.0N or less
3052S-19	3052SB-19	0.01mm	30mm (1mm)	25μm	7μm	10μm	15μm	5μm	±0-100	2.5N or less
3058S-19	3058SB-19	0.01mm	50mm (1mm)	30μm	8μm	10μm	15μm	5μm	±0-100	3.0N or less
3060S-19*	3060SB-19*	0.01mm	80mm (1mm)	45μm	9μm	12μm	20μm	5μm	±0-100	3.0N or less
3062S-19*	3062SB-19*	0.01mm	100mm (1mm)	50μm	9μm	12μm	20μm	5μm	±0-100	3.2N or less
3109S-10	3109SB-10	0.001mm	1mm (0.2mm)	5μm	2μm	2μm	4μm	0.5μm	0-100-0	1.5N or less
4046S	4046SB	0.01mm	10mm (1mm)	15μm	3μm	5μm	10μm	3μm	±0-100	1.4N or less

ISO/JIS type

*1 Use in a vertical position (contact point downward) for the long stroke model.

*2 Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Back Plunger Type Dial Indicator SERIES 2

- 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.
- Models 2960T, 2961T, 2990T-10 and 2991T-10, which use Mitutoyo's proprietary shock-proofing mechanism, have excellent durability and shock resistance.
- Model 2990T-10 provides 0.001mm graduation.



2960T



Balanced scale



Graduation: 0.01mm,
Measuring range: 1mm

2960T

- One revolution
- Shockproof
- Back plunger



Balanced scale



Graduation: 0.01mm,
Measuring range: 1mm

2990T-10

- One revolution
- Shockproof
- Back plunger
- Jeweled bearing

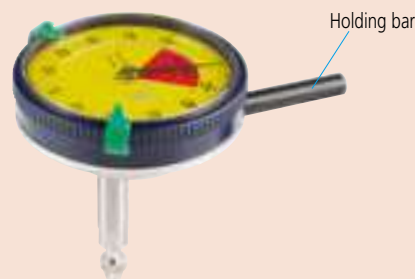
SPECIFICATIONS

Metric		Range (range/rev)	Accuracy				Repeatability	Dial reading	Measuring force
Order No.	Graduation		Overall	Retrace	1/10 Rev	1 Rev			
2960T	0.01mm	1mm (1.27mm)	14µm	4µm	8µm	—	3µm	50-0-50	1.4N or less
2990T-10	0.001mm	0.1mm (0.14mm)	5µm	2µm	2.5µm	—	1µm	50-0-50	1.5N or less

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.



An inspection certificate is supplied as standard.



Holding bar

Holding bar (optional)

Order No.	øD	L
21AAA166	ø6mm	42mm
136567	ø6mm	81mm
124625	ø6.35mm	81mm
21AAA167	ø6.35mm	42mm
21AAA168	ø8mm	42mm
136568	ø8mm	81mm

* øD and L: detail shown in drawing below.

FEATURES

Metric						
Order No.	One revolution	Shockproof	Jeweled bearing	—	—	—
2960T	✓	✓	—	—	—	—
2990T-10	✓	✓	✓	—	—	—



An inspection certificate is supplied as standard.



Holding bar (optional)

Order No.	øD	L
21AAA166	ø6mm	42mm
136567	ø6mm	81mm
124625	ø6.35mm	81mm
21AAA167	ø6.35mm	42mm
21AAA168	ø8mm	42mm
136568	ø8mm	81mm

* øD and L: detail shown in drawing below.

Back Plunger Type Dial Indicator SERIES 1

- Back plunger type dial gauges are suitable for mounting onto leveling machine tool tables or inspection jigs, and for use in situations where standard dial gauges are difficult to read.
- Model 1960T and 1961T, which uses Mitutoyo's proprietary shock-proofing mechanism, has excellent durability and shock resistance.



1160T



Continuous scale



Graduation: 0.01mm,
Measuring range: 5mm

1160T



Reverse reading



Graduation: 0.01mm,
Measuring range: 5mm

1162T

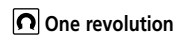


Balanced scale



Graduation: 0.01mm,
Measuring range: 1mm

1960T



FEATURES

Order No.	Metric	Shockproof	Shockproof	Shockproof	Shockproof	Shockproof
1960T	✓	✓	—	—	—	—
1160T	—	—	—	—	—	—
1162T	—	—	✓	—	—	—

SPECIFICATIONS

Metric		Accuracy								ISO/JIS type	
Order No.	Graduation	Range (range/rev)	Overall	Retrace	1/10 Rev	1 Rev	Repeatability	Dial reading	Measuring force		
1960T	0.01mm	1mm (1.27mm)	14μm	4μm	8μm	—	3μm	50-0-50	1.4N or less		
1160T	0.01mm	5mm (1mm)	16μm	4μm	8μm	14μm	3μm	±0-100	1.4N or less		
1162T	0.01mm	5mm (1mm)	16μm	4μm	8μm	14μm	3μm	100-0	1.4N or less		

* Completed products inspection is performed in the vertical position (contact point downward) and the stated accuracy is guaranteed.

Dial Indicators

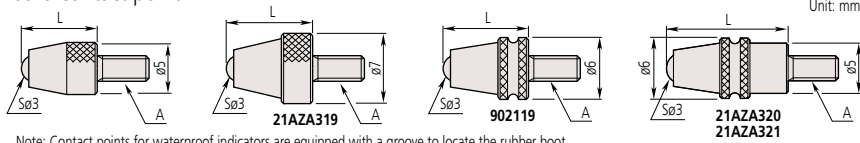
Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Contact Points

Optional Accessory for Digimatic and Dial Indicators and Linear Gages

Ball point

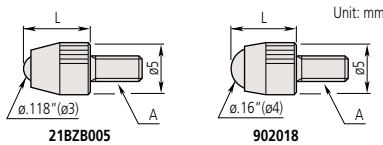
Standard contact point.



Note: Contact points for waterproof indicators are equipped with a groove to locate the rubber boot.

A: M2.5x0.45

L	Material	Carbide		Ruby	Plastic
		Without groove	With groove (waterproof type)	Without groove	Without groove
7.3		901312	—	120047	901994
8.3		21AZA319	902119	—	—
12.1		—	21AZA320	—	—
14		21JAA225	—	—	—
15		120049	—	120051	—
17		21JAA224	—	—	—
19.3		—	21AZA321	—	—
20		137391	—	137392	—
22		21JAA226	—	—	—
25		120053	—	120055	—
30		21AAA252	—	21AAA253	—

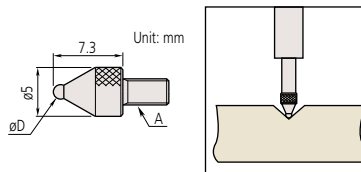


A: 4-48UNF

L	Material	Carbide	Plastic
1/4"		21BZB005	902018

Ball point

Optimal for workpieces with deep indentations.

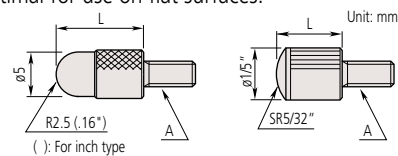


A: M2.5x0.45

Order No.	SøD	øD
21AAA349	1mm, carbide	5mm
21AAA350	1.5mm, carbide	5mm
101122	1.8mm, steel	5mm
21AAA351	2.5mm, carbide	5mm
21AAA352	4mm, carbide	5mm

Shell Type Point

Contact point with a large radius.
Optimal for use on flat surfaces.



A: M2.5x0.45

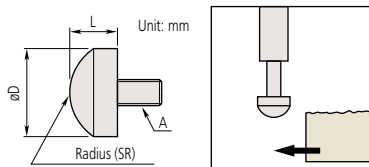
Order No.	L
101386	5
101118	10
137393	15
101387	20
101388	25
21AAA254	30

A: 4-48UNF

Order No.	L
193697	3/32"
101184	5/32"
21AAA031	1/4"
21AAA032	3/8"
101185	1/2"
21AAA033	5/8"
101186	3/4"
21AAA034	7/8"
101187	1"
21AAA035	1 1/4"
21AAA036	1 1/2"
21AAA037	1 3/4"
21AAA038	2"
21AAA039	2 1/4"
21AAA040	2 1/2"
21AAA041	2 3/4"
21AAA042	3"

Spherical Point

A large radius makes this contact point optimal for use where the workpiece needs to slide from the side.



A: M2.5x0.45

Order No.	D	L	SR
111460	5.5	3	5
125258	7.9	5	5
101119	10	5	7

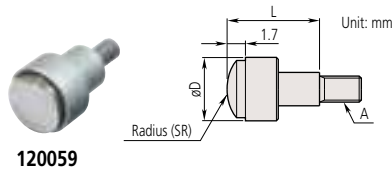
A: 4-48UNF

Order No.	D	L	SR
101205	1/2"	1/8"	.35"
101204	3/8"	3/32"	.28"

Contact Points Optional Accessory for Digimatic and Dial Indicators and Linear Gages

Spherical Point (Carbide)

A large radius makes this contact point optimal for use where the workpiece needs to slide from the side.



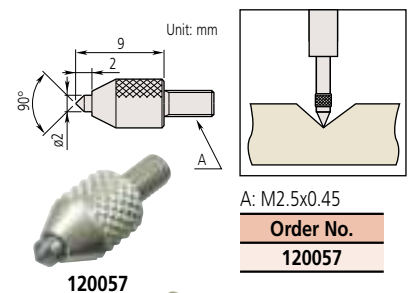
120059

A: M2.5x0.45

Order No.	D	L	SR
120058	5.2	5	5
120059	7.5	10	7
120060	10.5	10	10

Conical Point (Carbide)

Used for positioning the measurement point. Since it can damage a workpiece easily, it is not suitable for use on soft materials.



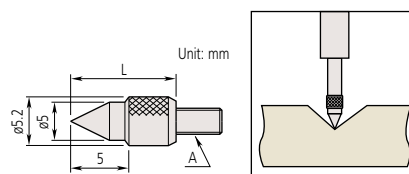
120057

A: M2.5x0.45

Order No.
120057

Conical Point

Used for positioning the measurement point. Since it can damage a workpiece easily, it is not suitable for use on soft materials.



A: M2.5x0.45

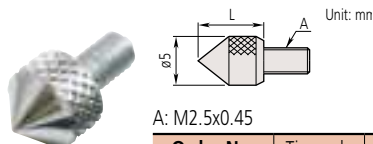
Order No.	Tip angle	L
101120	60°	10



101120

A: 4-48UNF

Order No.	L	A
101190	1/2"	.2"



101385

A: M2.5x0.45

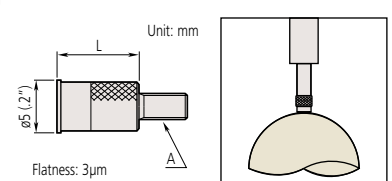
Order No.	Tip angle	L
101385	90°	5

A: 4-48UNF

Order No.	D	L
101191	.2"	1/4"

Flat Point

Optimal for use on convex surfaces.



A: M2.5x0.45

Order No.	L
131365	8
21AAA340	10



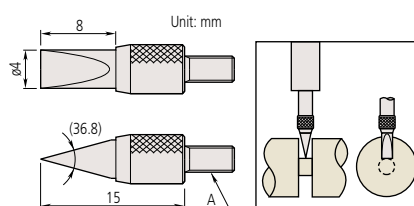
131365

A: 4-48UNF

Order No.	L
133017	5/16"
21AAA043	1/2"
21AAA044	3/4"
21AAA045	1"

Knife Edge Point (Carbide)

Suitable for measuring narrow groove diameter, etc.



A: M2.5x0.45

Order No.
120067



120067

A: M2.5x0.45

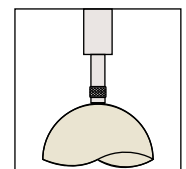
Order No.	D
101117	10
21AAA341	15
21AAA342	20
21AAA343	25
21AAA344	30



101117

A: 4-48UNF

Order No.	D
101188	1/2"
101189	3/8"



Dial Indicators

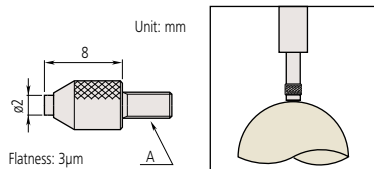
Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Contact Points

Optional Accessory for Digimatic and Dial Indicators and Linear Gages

Flat Point (Carbide)

Optimal for use on convex surfaces.



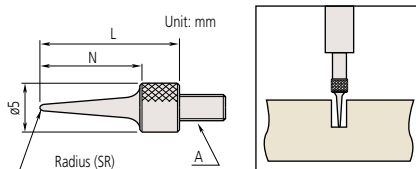
A: M2.5x0.45

Order No.

120056

Needle Point

Suitable for probing the bottom of a groove or hole.

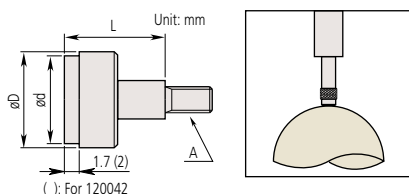


A: M2.5x0.45

Order No.	N	L	SR
101121	11	15	0.4
137413	13	17	0.2
21AAA255	21	25	0.4
21AAA256	31	35	0.4

A: 4-48UNF

Order No.	L	SR
21AAA030	.6"	.016"
21AAA046	1"	.016"
21AAA047	1 1/2"	.016"
21AAA048	2"	.016"

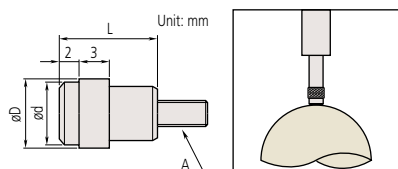


120043

A: M2.5x0.45

Order No.	D	d	L
120041	5.2	4.3*	5
120042	7	6.5*	10
120043	10.5	9.5*	10
21AAA345	17	15**	10
21AAA346	22	20**	10
21AAA347	27	25**	10
21AAA348	32	30**	10

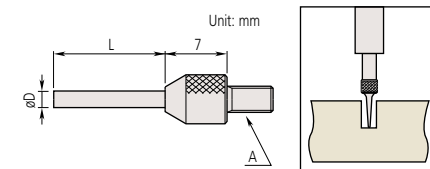
Flatness: *3µm, **5µm



137255

A: M2.5x0.45

Order No.	D	d	L
137255	7	6.4	10
137399	9	8	10



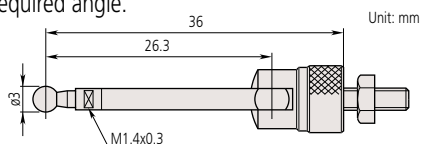
137257

A: M2.5x0.45

Order No.	D	L
120066	0.45	3
21AAA329	0.45	5
120065	1	3
21AAA330	1	5
21AAA331	1	8
21AAA332	1	10
21AAA333	1	20
21AAA334	1	40
21AAA335	1.5	5
21AAA336	1.5	10
120064	1.5	13
21AAA337	1.5	20
21AAA338	1.5	40
137257	2	8
21AAA257	2	18
21AAA258	2	28
21AAA339	2	40

Lever Point

Suitable for use on perpendicular faces, such as those within mold cavities. Lever can be adjusted to the required angle.



900391

A: M2.5x0.45

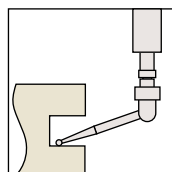
Order No.

900391

A: 4-48UNF

Order No.

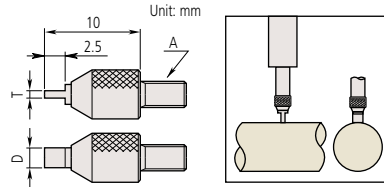
900393



Contact Points Optional Accessory for Digimatic and Dial Indicators and Linear Gages

Blade Point (Carbide)

Suitable for use on convex surfaces, especially those with shallow grooves.



A: M2.5x0.45

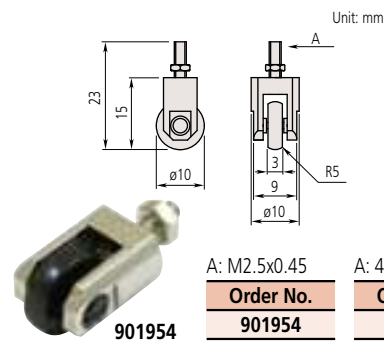
Order No.	T	D
120061	0.4	2
120062	0.6	2
120063	1	4



120062

Roller Point

Suitable for use on a moving workpiece surface, or where the workpiece needs to slide from the side.



A: M2.5x0.45

Order No.
901954

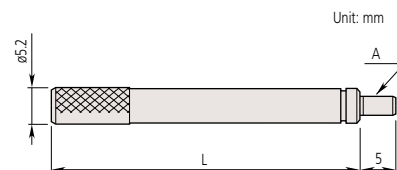
A: 4-48UNF

Order No.
901991

Extension Rod



303613



A: M2.5x0.45

Order No.	L
303611	10
21AAA259A	15
303612	20
21AAA259B	25
303613	30
21AAA259C	35
21AAA259D	40
21AAA259E	45
21AAA259F	50
21AAA259G	55
304146	60
21AAA259H	65
21AAA259J	70
21AAA259L	75
21AAA259M	80
304147	90
303614	100

A: 4-48UNF

Order No.	L
139167	1/2"
301655	1"
301657	2"
301659	4"

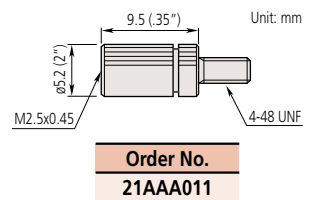
Interchangeable Contact Point Set

This set consists of six types of popular contact point for extending the use of an indicator to many applications.

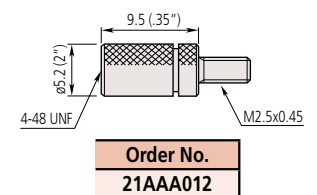


A: M2.5x0.45

Order No.	Contact points included
7822	Flat Point (131365, 5mm)
	Flat Point (101117, 10mm)
	Needle Point (101121)
	Spherical Point (101119)
	Shell Type Point (101118)
	Shell Type Point (101387)



Order No.
21AAA011




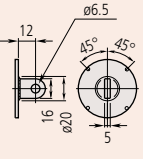

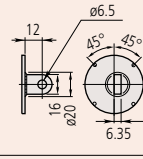

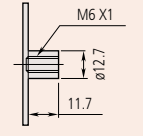

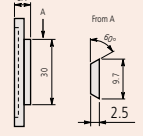

Order No.
21AAA012

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Interchangeable Backs Optional Accessory for Digimatic and Dial Indicators

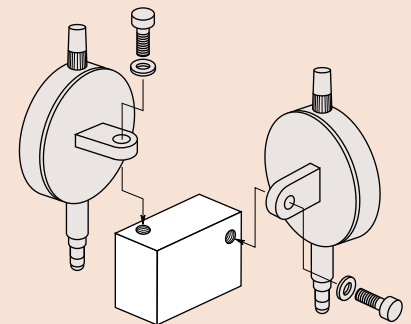
SPECIFICATIONS

Description		Order No.		
		Series 1 (ø31, ø36, ø40mm)	Series 2(ø57mm)	Series 3, 4 (ø78, 91mm)
Flat Back	 Unit: mm	101211 : a=2.2 136872 : for water-proof type 191559 : for 1911TB-10, 1913TB-10, 1921TB-10, 1923TB-10, 1925TB-10 137906 : for 1003TB	101039 : a=2.5 21AZB231 : for water-proof of S type 192910 : (F type waterproof model)	100836 : a=3.0
Lug-on-Center Back	 Unit: mm	101210 : metric type 101307 : inch type 190561 : for 1911T-10, 1913-10 190139 : 1921T-10, 1923T-10, 1925T-10 137905 : for 1003T	101040 : metric type 101306 : inch type 21AZB230 : for water-proof of S type (mm) 21BZB104 : for water-proof of S type (inch)	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 Custom made	101169	100839
Back with Screw Mount	 Unit: mm	193173 : M6x1, Custom made 193174 : #1/4-28UNF, Custom made	136023 : M6x1 101170 : #1/4-28UNF	136024 : M6x1 100840 : #1/4-28UNF
Adjustable Back	 Unit: mm	136025 : M6x1 129721 : #1/4-20UNC	136026 : M6x1 101168 : #1/4-20UNC	136027 : M6x1 100838 : #1/4-20UNC
Back with Dovetail	 Unit: mm	—	900008	Special order
Back with Adjustable Bracket	 Unit: mm	—	901963	—

When installing to 297*TB series, please separately prepare 4 fixing screws (Order No.546666 Self-tapping screw only for resin). Do not apply a tightening torque of more than 20N-cm in order to avoid stripping the screw threads.

A dial or Digimatic indicator may be held in position by clamping on either the stem or the lug on the back of the indicator. The back of the indicator may need to be interchanged with another type for special applications. A wide variety of backs are available for Mitutoyo Digimatic and dial indicators.

Application



Spindle Lifting Lever and Cable Optional Accessories 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.

902100

Use for S type Series 1 and F type Series 2 (up to 10mm/.4" range) dial indicators.



21AZB149

Use for S type Series 2, 3, and 4 dial indicators (up to 10mm/.4").

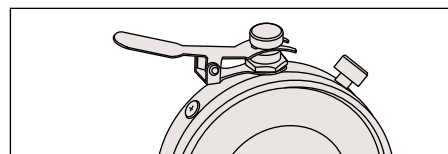
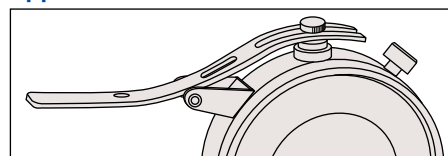


21AZB150

Use for S type Series 2 and 3 dial indicators (from 10mm/.4" up to 20mm/.8").



Application



21BZA205

Use for F type Series 1 dial indicators.



900527: Lever
101171: Screw

902011

Use for F type Series 2 dial indicators (up to 10mm/.4" range).



903424

Use for F type Series 2 dial indicators (up to 20mm/.8" range) and Series 3 and 4 indicators (up to 10mm/.4" range).



903307: Lever
192686: Screw

21EZA198

Use for ID-SS, ID-SX, ID-CX



21AZB149: Lever
101171: Screw

* If the spindle lifting lever is installed on a water/dustproof type, waterproof performance is not guaranteed.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Spindle Lifting Cable

901975: with auto-stop function



Note: This accessory is not applicable to range of 20mm or more, 2048S(B)-10, 2046S(B)-80, 1911T-10, 1913T-10, 1921T-10, 1923T-10, 1925T-10, and 2971TB to 2978TB.

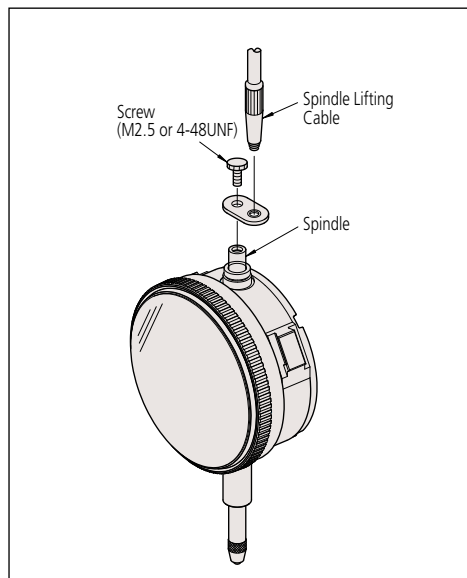
Spindle Lifting Lever

137693

Suitable for 4.8mm spindle diameter.



Application



Limit Stickers

- These are stuck onto the dial face or crystal of a Series 2 dial indicator (55.6mm or 57mm bezel diameter) to indicate tolerance limits.



Red

Green

Yellow



No.136420
(10 sheets/set)



No.136421
(10 sheets/set)



No.136422
(10 sheets/set)

Color-coded Spindle Caps

- 9 color-coded spindle caps are available for dial indicators with a range of 10mm or less.



Color	Order No.	
	Standard	Waterproof
Black	193051	193595
White	193051W	193595W
Red	193051R	193595R
Green	193051G	193595G
Blue	193051B	193595B
Yellow	193051Y	193595Y
Orange	193051D	193595D
Pink	193051P	193595P
Navy	193051S	193595S

Note: This accessory is not applicable to 1003T 1911T-10 1913T-10 1921T-10 1923T-10 1925T-10 and 2971TB to 2978TB.

Note: When attaching to small dial indicators, the overall height will be 8mm taller.

Dial Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Dial Indicator Repair Tool Kit



Set 7823

Set Configuration

- (1) Spindle rest (**129730**)
- (2) Pin remover (**129732**)
- (3) Punch (**129733**)
- (4) Bearing adjuster (**129734**)
- (5) Pinion set (**129735**)
- (6) Reamer $\varnothing 1$ (**129736**)
- (7) Reamer $\varnothing 0.6$ (**193702**)
- (8) Reamer for pointer ($\varnothing 0.5$: 1/20 taper) (**21JAA273**)
- (9) Pointer removing tool (**126628**)
- (10) Pliers (**901180**)
- (11) Nippers (**901179**)
- (12) Pin rest (**129731**)
- (13) Grease (**901171**)
- (14) Hammer (**901178**)
- (15) Stick (**21JAA314**)
- (16) Brush (**901177**)
- (17) Brush (**901176**)
- (18) Pin-vise (**901175**)
- (19) Screwdriver (Phillips/flat blade) (**901174**)
- (20) Tweezers (**129729**)
- (21) Screwdriver (Phillips) (**901173**)
- (22) Lubricating oil (**21JAA313**)
- (23) Pointer removing tip ($\varnothing 0.8$) (**126630**)
- (24) Pointer removing tip ($\varnothing 0.5$) (**126630B**)
- (25) Pointer removing tip ($\varnothing 1.6$) (**126630C**)
- (26) Adjustable nut (**100699**)
- (27) Case (**901182**)

Application examples

Lubricate bezel to restore smooth operation

Apply the grease (No. 13) to the entire groove of the bezel with the brush (No. 16).

Renew lubricant in bearing

Apply the lubrication oil (No. 22) to the pinion bearing with the stick (No. 15).

Remove the long hand

Position the pointer removing tool (No. 9) on the hole diameter of the minute hand. Push the pivot with the pointer removing tool to remove the long hand.

Remove the little hand

Remove the little hand with the nippers (No. 11).

Adjust a bearing

Press the steel or jeweled bearing into its housing using the bearing adjuster (No. 4).

Remove or replace a pin

Place the spindle on the groove of the spindle rest (No. 1). Remove the pin with the pin remover (No. 2) and the hammer (No. 14). Tap the pin directly with the hammer (No. 14) to replace the pin.

Replace the long or little hand

Screw the pinion rest (No. 5) into the pin rest (No. 12). Support the pinion with the fixed pinion rest, and replace the hand with the punch (No. 3) and hammer (No. 14). Reaming is necessary in order to use a new hand. Use the reamer $\varnothing 1$ (No. 6) or reamer $\varnothing 0.6$ (No. 7) for F-type dial indicators and dial test indicators. Use the reamer for hands ($\varnothing 0.5$ 1/20 taper) (No. 8) on S type and T type dial indicators.

Dial Indicator Crystal Setter



7000

- Used for fitting a crystal on dial indicators (Series 1 and 2), dial test indicators, and dial calipers. (Integrated molded crystals are excluded.)
- 8 sizes of crystal setting pads are supplied as standard.
- Application examples
 - Nos. 2 and 3: Pocket-type dial test indicators
 - Nos. 3 and 4: Dial test indicators, universal-type test indicators, full-range of Series 1 dial indicators, full range of dial calipers
 - Nos. 7 and 8: full-range of Series 2 dial indicators, dial height gage with counter
- Size of crystal setting pads (mm)

(1) $\varnothing 19.5$	(2) $\varnothing 22.5$	(3) $\varnothing 25.5$	(4) $\varnothing 28.5$
(5) $\varnothing 32.5$	(6) $\varnothing 35$	(7) $\varnothing 38$	(8) $\varnothing 50$
- Crystal setting pads set (including No. 1 to No. 8): 21JAA032

Note: Crystal setting pads for large dial indicators (Series 3 and 4) are available by special order.

Replacing bezels and graduation plates

A bezel and graduation plate must be swaged together so that the graduation plate always rotates with the bezel. Assemblies comprised of a swaged bezel and graduation plate are available for some models.

Code No. of dial indicators	Code No. of swaged assemblies
2046S	21AZB132
2109S-10	21AZB138
2046F	903457
2109F	903464

Introduction for Measurement data recording tools for Digimatic Indicators (optional)

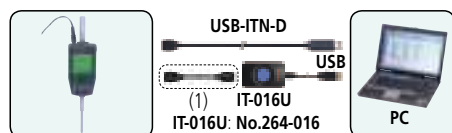
For Digimatic Indicators ID-H and ID-F (Connector type D)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- **PC connection (wired system) ... USB Input Tool**
(refer to page A-3/A-4)

USB-ITN-D (2m): No.06ADV380D

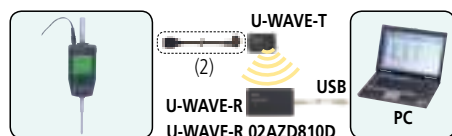


Dedicated cable for models with SPC data output

- (1) 1m: **No.936937**
2m: **No.965014**

- **PC connection (wireless system) ... U-WAVE**
(refer to page A-5)

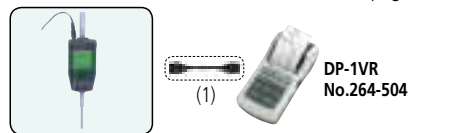
U-WAVE-T (IP67): No.02AZD730D
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790D**
For footswitch: **No.02AZE140D**

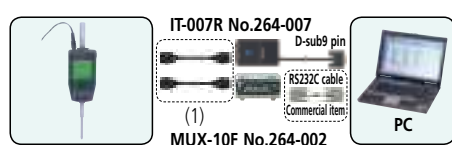
- **Dedicated printer connection (only for wired system)**
... **DP-1VR** (refer to page A-11)



Dedicated cable for models with SPC data output

- (1) 1m: **No.936937**
2m: **No.965014**

- **Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)**
... **IT-007R** (refer to page A-4), **MUX-10F** (refer to page A-12)



Dedicated cable for models with SPC data output

- (1) 1m: **No.936937**
2m: **No.965014**

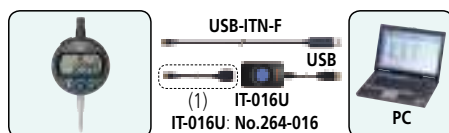
For Digimatic Indicators other than ID-H/ID-F/ID-N/ID-B (Connector type F)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- **PC connection (wired system) ... USB Input Tool**
(refer to page A-3/A-4)

USB-ITN-F (2m): No.06ADV380F

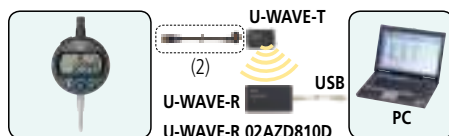


Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
2m: **No.905409**

- **PC connection (wireless system) ... U-WAVE**
(refer to page A-5)

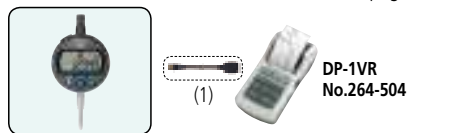
U-WAVE-T (IP67): No.02AZD730D
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790F**
For footswitch: **No.02AZE140F**

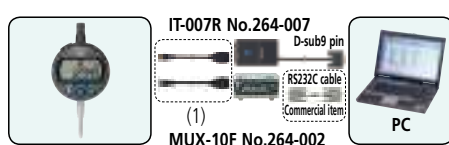
- **Dedicated printer connection (only for wired system)**
... **DP-1VR** (refer to page A-11)



Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
2m: **No.905409**

- **Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)**
... **IT-007R** (refer to page A-4), **MUX-10F** (refer to page A-12)



Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
2m: **No.905409**

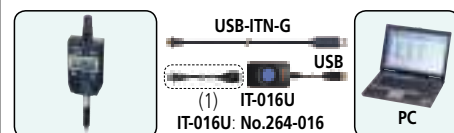
For Digimatic Indicators ID-N and ID-B (Connector type G)

■ Dedicated connecting cables (optional)

Interface for connecting to PC or PLC, and dedicated printer and its connecting cable.

- **PC connection (wired system) ... USB Input Tool**
(refer to page A-3/A-4)

USB-ITN-G (2m): No.06ADV380G

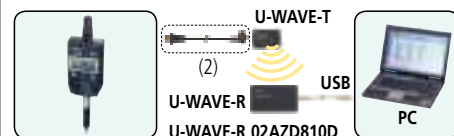


Dedicated cable for models with SPC data output

- (1) 1m: **No.21EAA194**
2m: **No.21EAA190**

- **PC connection (wireless system) ... U-WAVE**
(refer to page A-5)

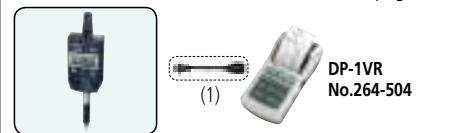
U-WAVE-T (IP67): No.02AZD730D
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790G**
For footswitch: **No.02AZE140G**

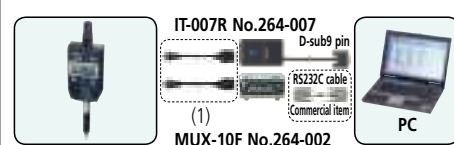
- **Dedicated printer connection (only for wired system)**
... **DP-1VR** (refer to page A-11)



Dedicated cable for models with SPC data output

- (1) 1m: **No.21EAA194**
2m: **No.21EAA190**

- **Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)**
... **IT-007R** (refer to page A-4), **MUX-10F** (refer to page A-12)



Dedicated cable for models with SPC data output

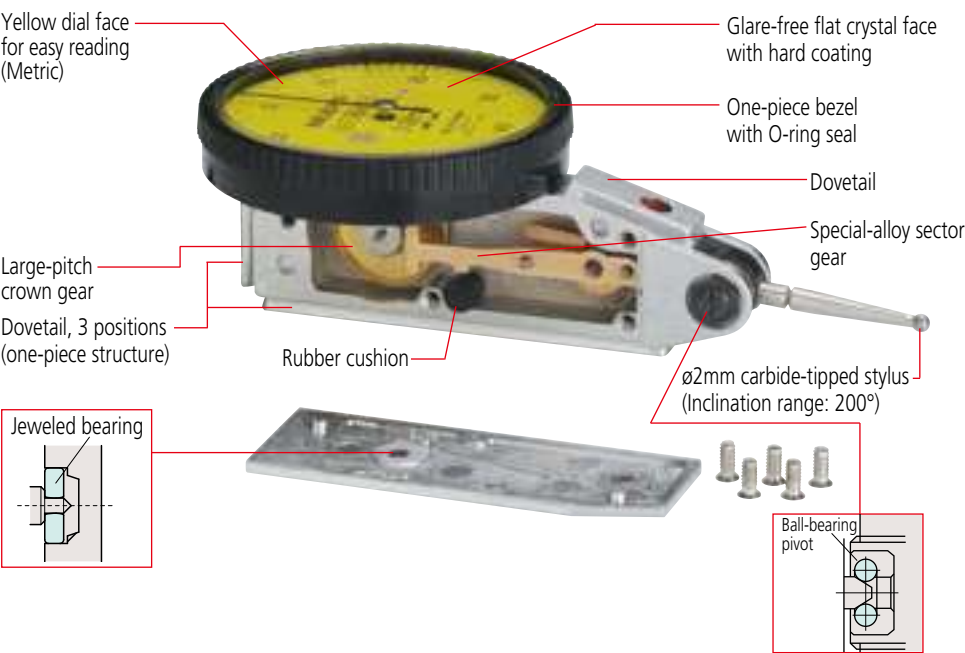
- (1) 1m: **No.21EAA194**
2m: **No.21EAA190**

Dial Test Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 513 — Lever-Type Dial Indicators

- Designed to probe surfaces that cannot be reached with a normal dial gauge. Useful both for alignment and for measurement purposes.
- Mitutoyo's proprietary new design permits smooth pointer operation.
- Strong frame provides excellent rigidity and durability.
- Non-magnetic pointer and contact point permit reliable operation even in magnetic environments.
- Clear and concise wide dial face allows excellent visibility.
- The surface of the crystal is hard-coated for excellent scratch resistance.
- Flat crystal makes graduations easy to read. Moreover, the O-ring sealing method used for the bezel prevents water or oil penetration. (Note that this type is NOT waterproof.)
- Six types are available: horizontal, horizontal (20° tilted face) vertical, parallel, universal, and pocket, allowing users to select the model most suited to their needs.
 - Horizontal: Standard
 - Horizontal (20° Tilted Face): Dial face inclined 20°, compared with the vertical type, allows easy reading.
 - Vertical: Best suited for centering holes under the spindle of a machine tool.
 - Parallel: The scale can be read from the front, with the stylus pivoting in a plane parallel to that of the dial face.
 - Universal: The direction of the probe movement can be freely changed.
 - Pocket: Compact type



- Dial test indicators with a ruby contact point are available in the horizontal (standard) type.
- Benefits of ruby contact points:
 - Several times more resistant to wear than carbide.
 - Can be used on electrical discharge machines without special precautions.

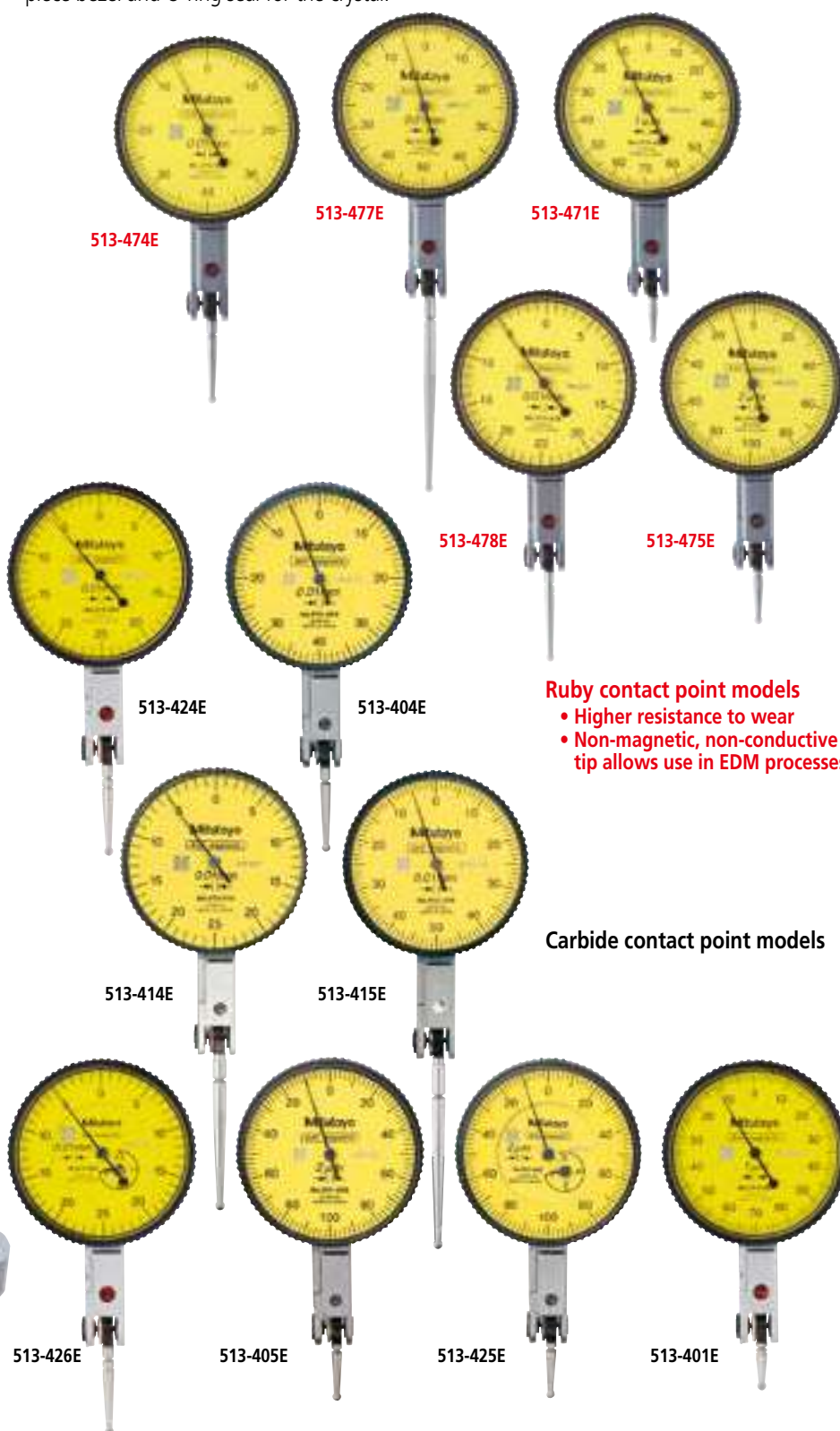


Feature icons

Icon	Feature description
	With revolution counter
	Long stylus
	Jeweled bearing
	Double scale spacing type, easy-on-the-eyes
	Compact
	Dustproof
	Anti-magnetic

Dial Test Indicator SERIES 513 — Horizontal Type

- Provides easy access to shrouded surfaces that cannot be reached with conventional dial indicators.
- No-clutch structure for automatic reversal of measuring direction.
- Resistant to water and dust thanks to the one-piece bezel and O-ring seal for the crystal.
- The glare-free flat crystal face has a scratch-resistant coating.
- High sensitivity and quick response due to low-friction jeweled bearings.



Special Set: No. 513-908 (mm)

513-404E: Dial test indicator
7014: Mini magnetic stand



Dial Test Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.



Anti-magnet



Double scale spacing



Long stylus



Jeweled bearing



Compact



With revolution counter



513-466E



513-464E







513-465E

SPECIFICATIONS

Metric			Graduation	Range	Accuracy	Dial reading	Measuring force						
Order No.													
Basic set	Plus set	Full set											
513-424E	513-424A	513-424T	0.01mm	0.5mm	5µm	0-25-0	0.3N or less	✓	✓	—	✓	—	—
513-478E	—	—	0.01mm	0.5mm	5µm	0-25-0	0.3N or less	✓	✓	—	✓	—	—
513-414E	513-414A	513-414T	0.01mm	0.5mm	10µm	0-25-0	0.2N or less	✓	✓	✓	✓	—	—
513-466E	—	—	0.01mm	0.5mm	5µm	0-25-0	0.3N or less	✓	✓	—	✓	✓	—
513-404E	513-404A	513-404T	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✓	—	—	✓	—	—
513-474E	—	—	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✓	—	—	✓	—	—
513-464E	—	—	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✓	—	—	✓	✓	—
513-415E	513-415A	513-415T	0.01mm	1mm	10µm	0-50-0	0.2N or less	✓	—	✓	✓	—	—
513-477E	—	—	0.01mm	1mm	10µm	0-50-0	0.2N or less	✓	—	✓	✓	—	—
513-426E	513-426A	—	0.01mm	1.5mm	8µm	0-25-0	0.4N or less	✓	✓	—	✓	—	✓
513-405E	513-405A	513-405T	0.002mm	0.2mm	3µm	0-100-0	0.3N or less	✓	—	—	✓	—	—
513-475E	—	—	0.002mm	0.2mm	3µm	0-100-0	0.3N or less	✓	—	—	✓	—	—
513-465E	—	—	0.002mm	0.2mm	3µm	0-100-0	0.3N or less	✓	—	—	✓	✓	—
513-425E	513-425A	—	0.002mm	0.6mm	6µm	0-100-0	0.4N or less	✓	—	—	✓	—	✓
513-401E	—	—	0.001mm	0.14mm	3µm	0-70-0	0.3N or less	✓	—	—	✓	—	—
513-471E	—	—	0.001mm	0.14mm	3µm	0-70-0	0.3N or less	✓	—	—	✓	—	—

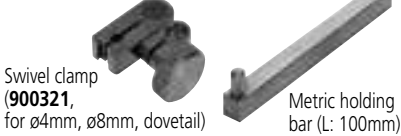
Provided with a ø2mm ruby contact point as a substitute for ø2mm carbide contact point.

Metric/inch			Graduation	Range	Accuracy	Dial reading	Measuring force			—	—	—	—
Order No.													
Basic set	Plus set	Full set											
513-409	—	513-409T	0.002mm, .0001"	0.2mm, .0075"	3µm	0-10-0, 0-3.8-0	0.3N or less	✓	✓	—	—	—	—

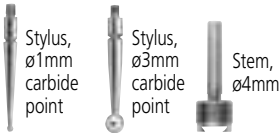
Inch/Metric			Graduation	Range	Accuracy	Dial reading	Measuring force			—	—	—	—
Order No.													
Basic set	Plus set	Full set											
513-406	—	513-406T	.0005", 0.01mm	.03", 0.7mm	±.0005"	0-15-0, 0-35-0	0.3N or less	✓	✓	—	—	—	—

Set Configuration: Metric and Metric/Inch

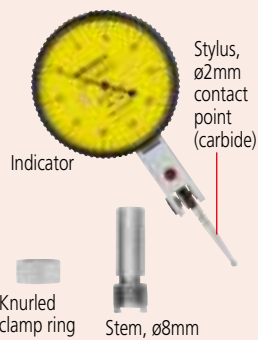
Full set



Plus set

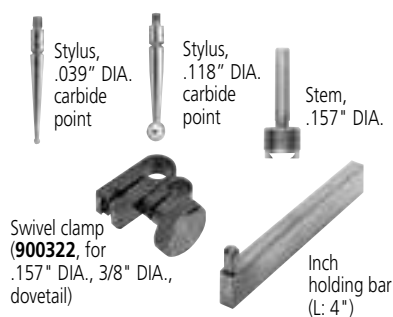


Basic set

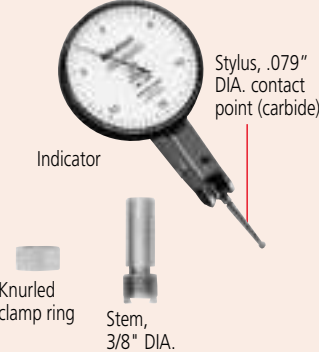


Set Configuration: Inch and Inch/Metric

Full set



Basic set



Dial Test Indicator SERIES 513 — Horizontal (20° Tilted Face), Vertical, and Parallel Types

- Specially designed for easy viewing of dial.



513-444E



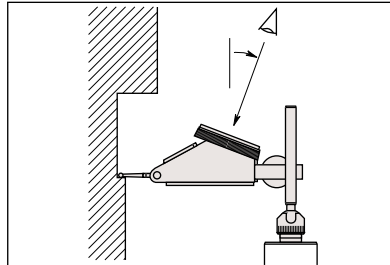
513-445E



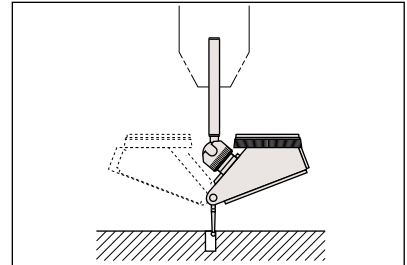
513-454E
513-284GE



513-455E



- The dial face obliquely faces upward, allowing users to read the graduations from the user's side. It is convenient when probing 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



513-284GE



513-452

Optional Accessories

- : Swivel clamps (See page F-47.)
- : Holding bars (See page F-47.)
- : Stems (See page F-47.)
- : Styli (See page F-47.)

Dial Test Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.



Anti-magnet



With revolution counter



Jeweled bearing



Long stylus

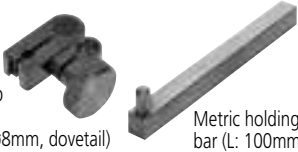
SPECIFICATIONS

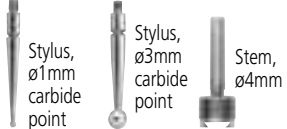
Metric			Horizontal (20° tilted face) type									
Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force				—	—
Basic set	Plus set	Full set										
513-444E	513-444A	513-444T	0.01mm	1.6mm	10µm	0-40-0	0.3N or less	✓	✓	✓	—	—
513-445E	513-445A	513-445T	0.002mm	0.4mm	5µm	0-100-0	0.3N or less	✓	✓	✓	—	—

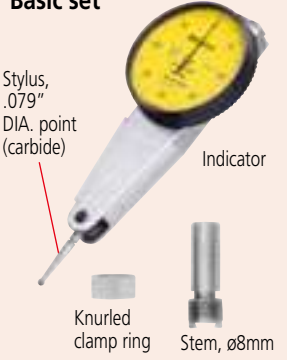
Metric			Vertical type									
Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force			—	—	—
Basic set	Plus set	Full set										
513-454E	513-454A	513-454T	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✓	✓	—	—	—
513-455E	513-455A	513-455T	0.002mm	0.2mm	3µm	0-100-0	0.3N or less	✓	✓	—	—	—

Metric			Parallel type									
Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force		—	—	—	—
Basic set	Plus set	Full set										
513-284GE	513-284GA	513-284GT	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✓	—	—	—	—

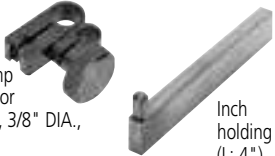
Set Configuration: Metric


Full set

Swivel clamp (900321, for ø4mm, ø8mm, dovetail) Metric holding bar (L: 100mm)

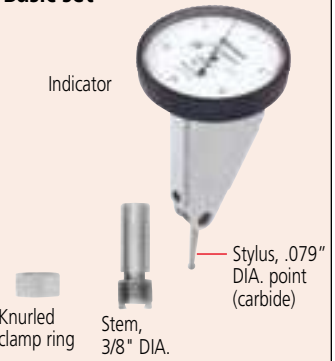
Plus set

Stylus, ø1mm carbide point Stylus, ø3mm carbide point Stem, ø4mm

Basic set

Indicator Stylus, .079" DIA. point (carbide) Knurled clamp ring Stem, ø8mm

Set Configuration: Inch

Full set

Swivel clamp (900322, for .157" DIA., 3/8" DIA., dovetail) Inch holding bar (L: 4")

Plus set

Stylus, .039" DIA. carbide point Stylus, .118" DIA. carbide point Stem, .157" DIA.

Basic set

Indicator Stylus, .079" DIA. point (carbide) Knurled clamp ring Stem, 3/8" DIA.

Set Configuration: Metric

Full set

Swivel clamp (900321 for ø4mm stem, ø8mm stem, dovetail)

Stylus, ø1mm carbide point

Stylus, ø3mm carbide point

Stem, ø4mm

Metric holding bar (L: 100mm)

Spare stylus, ø2mm carbide point

Basic set

Stylus, ø2mm carbide point (102825)

Indicator

Knurled clamp ring

Spanner (102037)

ø8mm stem

Set Configuration: Inch

Full set

(900322 for .157" DIA stem, 3/8" DIA. stem, dovetail)

Stylus, .039" DIA. carbide point

Stylus, .118" DIA. carbide point

Stem, .157" DIA.

Inch holding bar (L: 4")

Spare stylus, .079" DIA. carbide point

Basic set

Stylus, .079" DIA. carbide point (102825)

Indicator

Knurled clamp ring

Spanner (102037)

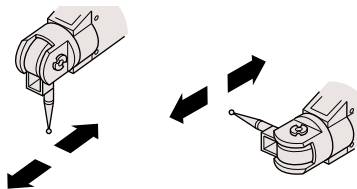
3/8" DIA. stem

Optional Accessories

- : Swivel clamps (See page F-47.)
- : Holding bars (See page F-47.)
- : Stems (See page F-47.)
- 102824: Stylus, ø1mm ball contact (carbide)
- 102825: Stylus, ø2mm ball contact (carbide)
- 102826: Stylus, ø3mm ball contact (carbide)

Dial Test Indicator
SERIES 513 — Universal Type

- 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								Jeweled bearing				
Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force						
Basic set	Full set											
513-304GE	513-304GT	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✓	—	—	—	—	—



Dial Test Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Pocket Type Dial Test Indicator SERIES 513

- Jeweled bearings assure higher sensitivity and accuracy.
Indicator can be mounted by clamping the stem or the body (except for 513-517WE and 513-517WT).
- Reversible measuring direction (Clutch type).
- Two holding bars are supplied. (Full sets only.)
- Fully adjustable bezel/dial face.
- Stylus is adjustable within 220°.
- Bezel is sealed with an O-ring to keep out water and oil.



513-518



513-528



513-512



513-504



513-517E
513-517WE



513-515T



513-514E



513-503E



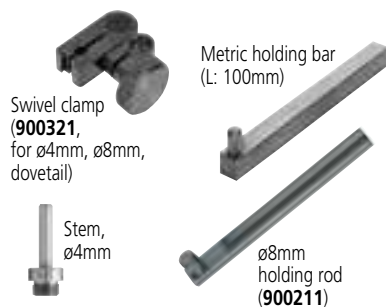
513-501E

Optional Accessories

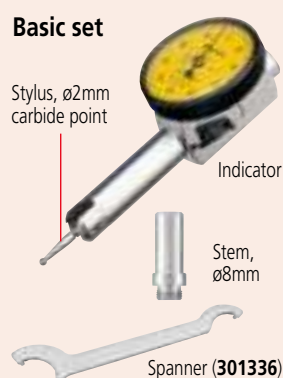
- : Swivel clamps (See page F-64.)
- : Holding bars (See page F-64.)
- : Stems (See page F-64.)
- : Stylus (See page F-64.)

Set Configuration: Metric

Full set

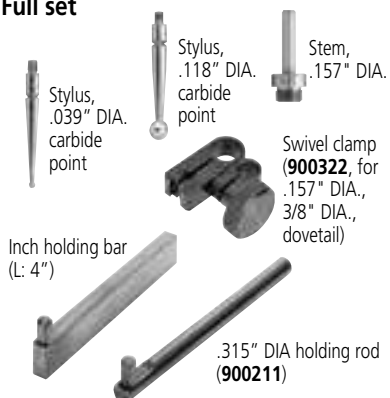


Basic set

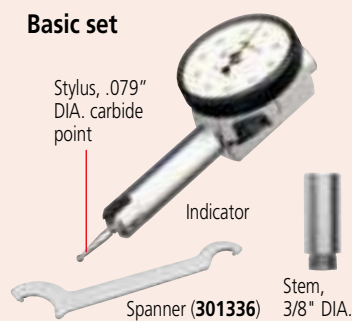


Set Configuration: Inch

Full set



Basic set



Long stylus



Jeweled bearing



Dustproof



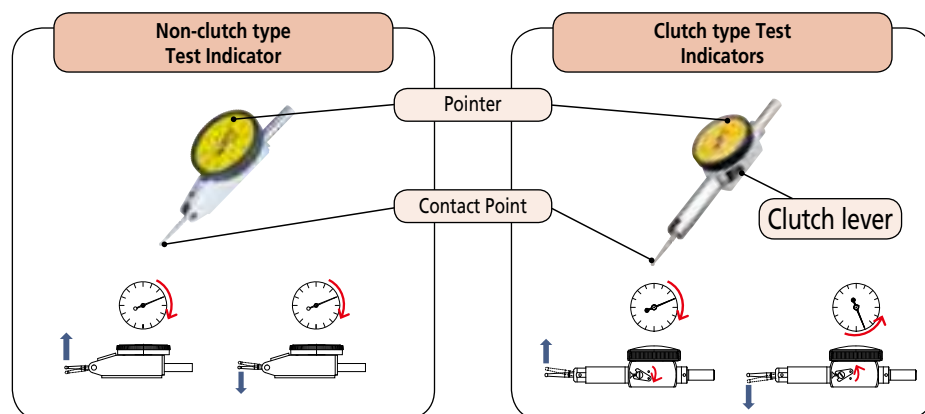
Compact

SPECIFICATIONS

Metric		Graduation	Range	Accuracy	Dial reading	Measuring force					—	—
Order No.	Order No.											
Basic set	Full set											
513-514E	513-514T	0.01mm	0.5mm	10μm	0-25-0	0.3N or less	✓	✓	—	—	—	—
513-517E	513-517T	0.01mm	0.8mm	8μm	0-40-0	0.3N or less	—	✓	—	—	—	—
513-517WE	513-517WT	0.01mm	0.8mm	8μm	0-40-0	0.3N or less	—	✓	—	✓	—	—
513-527E	513-527T	0.01mm	0.8mm	8μm	0-40-0	0.3N or less	—	✓	✓	—	—	—
—	513-515T	0.01mm	1mm	10μm	0-50-0	0.3N or less	✓	✓	—	—	—	—
513-503E	513-503T	0.002mm	0.2mm	3μm	0-100-0	0.3N or less	—	✓	—	—	—	—
513-501E	513-501T	0.001mm	0.14mm	3μm	0-70-0	0.4N or less	—	✓	—	—	—	—

There are two types of Mitutoyo Dial Test Indicator:

The non-clutch type (without a clutch lever) and the clutch type (with a two-position clutch lever)



In the non-clutch type, although the contact point may move either in the upward or downward direction, the pointer always rotates clockwise.

In the clutch type, if the clutch lever is set in one position the contact point moves in the upward direction and the pointer rotates clockwise. Conversely, if the lever is set in the other position the contact point moves in the downward direction and the pointer rotates counterclockwise.

Dial Test Indicators

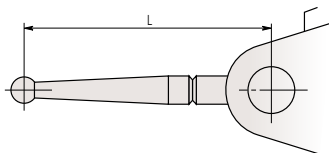
Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Styli, Stems and Holders Optional Accessories for Dial Test Indicators

Styli (for Metric Models Only*)

* Except for universal type dial test indicator (513-304G).

- Stylus length affects the scale factor of an indicator. The styli provided as standard give a scale factor of unity.



ø0.5mm ball-point



190547 (L=14.7mm)
190549 (L=20.9mm)
190654 (L=22.3mm)
190656 (L=44.5mm)

ø0.7mm ball-point



190548 (L=14.7mm)
190550 (L=20.9mm)
190653 (L=22.3mm)
190655 (L=44.5mm)

ø1mm ball-point (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-point (Carbide)



21CZA036 (L=12.8mm)
103010 (L=14.7mm)
103006 (L=20.9mm)
137557 (L=22.3mm)
129949 (L=36.8mm)
136013 (L=44.5mm)

ø2mm ball-point (Ruby)



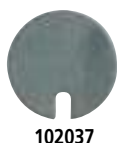
21CZA212 (L=12.8mm)
21CZA209 (L=14.7mm)
21CZA201 (L=20.9mm)
21CZA210 (L=22.3mm)
21CZA211 (L=44.5mm)

ø3mm ball-point (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 ø6mm stem, ø8mm stem, and dovetail



902053

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 (.315" DIA)

900211 (Length: 115mm/ 4.528")

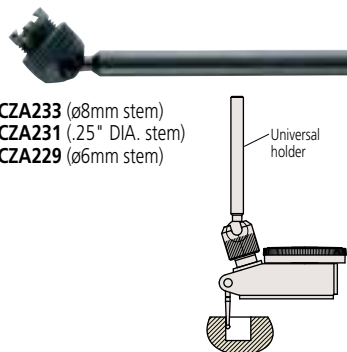


.25" x .5"

953639 (Length: 2")
900306 (Length: 4")

Universal Holder

- Allows the indicator to be set at the desired attitude to the workpiece.



21CZA233 (ø8mm stem)
21CZA231 (.25" DIA. stem)
21CZA229 (ø6mm stem)

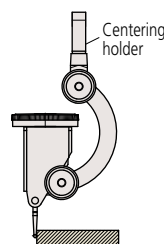
Universal holder

Centering Holder

- Allows large diameter cylinders or holes to be centered on a machine tool.



901959 (ø8mm stem)
901997 (.25" DIA. stem)

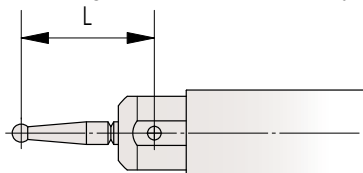


Centering holder

Styli, Stems and Holders Optional Accessories for Pocket Type Dial Test Indicators

Styli (for Metric Models Only)

- Stylus length affects the scale factor of an indicator. The styli provided as standard give a scale factor of unity.



ø0.5mm ball-point



190547 (L=14.7mm)
190549 (L=20.9mm)
190656 (L=44.5mm)

ø0.7mm ball-point



190548 (L=14.7mm)
190550 (L=20.9mm)
190655 (L=44.5mm)

ø1mm ball-point
(Carbide)



136756 (L=12.1mm)
103017 (L=14.7mm)
103013 (L=20.9mm)
137746 (L=36.8mm)
136235 (L=44.5mm)

ø2mm ball-point
(Carbide)



136104 (L=12.1mm)
103010 (L=14.7mm)
103006 (L=20.9mm)
129949 (L=36.8mm)
136013 (L=44.5mm)

ø2mm ball-point
(Ruby)



21CZA209 (L=14.7mm)
21CZA201 (L=20.9mm)
21CZA211 (L=44.5mm)

ø3mm ball-point
(Carbide)



136758 (L=12.1mm)
103018 (L=14.7mm)
103014 (L=20.9mm)
137747 (L=36.8mm)
136236 (L=44.5mm)

Stems

ø4mm (.157" DIA.)



102036

ø8mm



102822

3/8" DIA.



102081

Swivel Clamps

- Can be used with Holding Bars.

For ø6mm stem, ø8mm stem, and dovetail



902053

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 (.315" DIA)

900211 (Length: 115mm)



.25" x .5"

953639 (Length: 2")
900306 (Length: 4")

Spanner



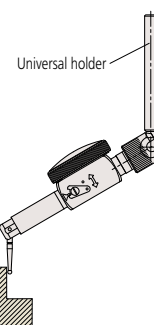
301336

Universal Holder

- Allows the indicator to be set at the desired attitude to the workpiece.



21CZA234 (ø8mm stem)
21CZA232 (.25" DIA. stem)
21CZA230 (ø6mm stem)



Inspection Instrument for Indicators

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 170 — UDT-2 Dial Indicator Tester

- UDT-2 is the accuracy tester for 0.01mm resolution/graduation dial indicators, dial test indicators and bore gages.
- Stem mounting hole: $\varnothing 6$, $\varnothing 8$ mm (Metric)



170-102-10

SPECIFICATIONS

Metric			
Order No.	Range	Graduation	Accuracy
170-102-12	0 - 25mm	0.001mm	$\pm 2\mu\text{m}$



An inspection certificate is supplied as standard.

Optional accessory

Stand for bore gage inspection (**12AAK824**)
Can be used for the inspection of bore gages 511 series standard type and with micrometer head up to 400mm. (Refer to pages C-33 and C-39 for details.)



Application example of the stand

Stand for bore gage inspection (No. 12AAK824)

SERIES 521 — Calibration Tester

- The Calibration Tester is specially designed to calibrate short range dial indicators, dial test indicators, and electronic gage heads.
- Universal bracket accepts any dial indicator, dial test indicator or electronic gage without any additional accessory.
- Clamping capacity: $\varnothing 4$ mm to $\varnothing 10$ mm



Calibrating a dial test indicator



521-103

SPECIFICATIONS

Metric			
Order No.	Range	Graduation	Accuracy
521-103	0 - 1mm	0.0002mm	$\pm 0.2\mu\text{m}$
521-105	0 - 5mm	0.0002mm	$\pm 0.8\mu\text{m}$

Dial Indicator Applications

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Thickness Gages SERIES 547, 7

- Dial thickness gages can quickly measure the thickness of thin products such as paper and felt.
- Contact point and anvil are both made of ceramic: rust-free (**547-401** is excluded.)
- Integrated molding of the bezel and crystal ensures protection against water and oil penetration via the front face.

Usage examples

Measuring paper thickness



Measuring thickness of a human hair



Standard Type



547-301



547-321

High Accuracy Type



547-401

Standard Type



7301

Lightweight Type (integrated molding of the bezel)



73315



7321

Optional Accessories

905338: SPC cable (1m) for digital models

905409: SPC cable (2m) for digital models

02AZD790F: SPC cable for U-WAVE (160mm)

Digimatic Mini-Processor DP-1VR

Refer to page A-11 for details.

Input Tool

Convenient Interface Input Tools which enable the conversion of measurement data to keyboard signals and directly input them to cells in off-the-shelf spreadsheet software such as Excel.

(Refer to pages A-3 to A-4 for details.)

Lens thickness measurement

- Thickness of concave-convex lenses and surfaces can be measured.
- Anvils and contact points are interchangeable to enable concave surfaces to be measured.



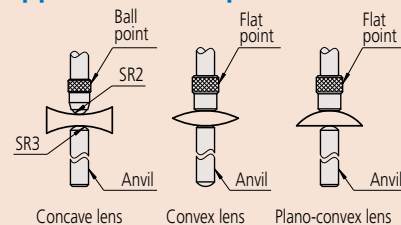
547-313



7313

- Provided with a ball point.

Application examples



Concave lens Convex lens Plano-convex lens

Note: Parallelism between the flat point and anvil
547-313: 10μm
7313: 5μm

Tube thickness measurement

- Pipe wall thickness, thickness of curved boards can be measured.



547-360



7360

Groove depth measurement

- Suitable for measuring narrow grooves.
- Measuring face of the contact point and anvil are blade-shaped (thickness: 1mm).



547-315



7315

Thickness Gages SERIES 547, 7

SPECIFICATIONS

Metric					
Order No.	Range	Resolution	Accuracy	Measuring force	Remarks
547-401	0-12mm	0.001mm	±3µm	3.5N or less	High accuracy, carbide point anvil
547-301	0-10mm	0.01mm	±20µm	1.5N or less	Standard, ceramic point/anvil
547-321	0-10mm	0.01mm	±20µm	1.5N or less	Deep throat, ceramic point/anvil
547-313	0-10mm	0.01mm	±20µm	1.5N or less	Lens thickness
547-315	0-10mm	0.01mm	±20µm	1.5N or less	Groove depth
547-360	0-10mm	0.01mm	±20µm	1.5N or less	Tube thickness

Inch/Metric					
Order No.	Range	Resolution	Accuracy	Measuring force	Remarks
547-400S/ -	0-.47"	.00005"/0.001mm	±.0001"/±3µm	3.5N or less	High accuracy, carbide point anvil
- / 547-526S*	0-.47"	.0001"/0.001mm	±.0002"/±5µm	1.5N or less	Standard, ceramic point/anvil
547-300S / 547-500S*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20µm	1.5N or less	Standard, ceramic point/anvil
547-320S / 547-520S*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20µm	1.5N or less	Deep throat, ceramic point/anvil
547-312S / 547-512S*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20µm	1.5N or less	Lens thickness
547-316S / 547-516S*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20µm	1.5N or less	Groove depth
547-361S / 547-561S*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20µm	1.5N or less	Tube thickness

* using ID-SX Digimatic indicator.

Metric					
Order No.	Range	Graduation	Accuracy	Measuring force	Remarks
7327	0-1mm	0.001mm	±5µm	1.4N or less	Fine dial reading, ceramic point/anvil
7301	0-10mm	0.01mm	±15µm	1.4N or less	Standard, ceramic point/anvil
7305	0-20mm	0.01mm	±20µm	2.0N or less	Standard, ceramic point/anvil
7321	0-10mm	0.01mm	±15µm	1.4N or less	Deep throat, ceramic point/anvil
7323	0-20mm	0.01mm	±22µm	2.0N or less	Deep throat, ceramic point/anvil
7313	0-10mm	0.01mm	±15µm	1.4N or less	Lens thickness
7315	0-10mm	0.01mm	±15µm	1.4N or less	Groove depth
7360	0-10mm	0.01mm	±15µm	1.4N or less	Tube thickness
7331S (lightweight type)	0-10mm	0.01mm	±20µm	1.4N or less	Integrated molded bezel

Dial Indicator Applications

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Contact Force Gage SERIES 546

- Contact Force Gages are widely used to determine the measuring force applied by an instrument to a workpiece, as well as contact forces of electrical relays, micro-switches, valves and precision springs.
- Thanks to the miniature anti-friction bearing in the fulcrum, stable measurement is guaranteed.
- 2 types are available: Standard and peak hold.



Standard type
546-112



Standard type
546-119



Peak hold type
546-137

Measuring contact force on a relay



SPECIFICATIONS

Standard			
Order No.	Graduation	Range	Accuracy
546-112	2mN	6mN - 50mN	±0.5 (division)
546-113	5mN	10mN - 100mN	
546-114	10mN	30mN - 300mN	
546-115	0.02N	0.06N - 0.5N	
546-116	0.05N	0.1N - 1N	
546-117	0.05N	0.15N - 1.5N	
546-118	0.1N	0.3N - 3N	
546-119	0.2N	0.6N - 5N	

Peak hold			
Order No.	Graduation	Range	Accuracy
—	—	—	—
546-133	5mN	10mN - 100mN	±0.5 (division)
546-134	10mN	30mN - 300mN	
546-135	0.02N	0.06N - 0.5N	
546-136	0.05N	0.1N - 1N	
546-137	0.05N	0.15N - 1.5N	
546-138	0.1N	0.3N - 3N	
546-139	0.2N	0.6N - 5N	

Dial Caliper gage SERIES 209 — Internal Measurement Type

- Dial caliper gages are inside diameter measurement tools, which have a broader range of applications including the measurement of hole diameter and internal measurement of special shapes (grooves).

Internal measurement



SPECIFICATIONS

Metric

Order No.	Range	Graduation	Range of opening*1	Dial face	Accuracy	Measuring force
209-125	6 - 18mm	0.01mm	5.8 - 18.2mm	0-100-100	±40μm	2.0N or less
209-126	10 - 22mm	0.01mm	9.8 - 22.2mm	0-100-100	±40μm	2.0N or less
209-127	20 - 32mm	0.01mm	19.8 - 32.2mm	0-100-100	±40μm	2.0N or less
209-155	5 - 15mm	0.01mm	4.8 - 15.2mm	0-100	±30μm	2.0N or less
209-156	10 - 20mm	0.01mm	9.8 - 20.2mm	0-100	±30μm	2.0N or less
209-175	10 - 30mm	0.01mm	9.8 - 30.2mm	0-100-100	±40μm	2.0N or less
209-176	20 - 40mm	0.01mm	19.8 - 40.2mm	0-100-100	±40μm	2.0N or less

*1: Datum point setting is required (Reference gage available as an optional accessory).

*2: Range of opening is a value for reference. Accuracy is not guaranteed if the Dial Caliper Gage is used beyond the measuring range.

* Please note that this Dial Caliper Gage is only provided with standard models. Special size and special specification models are not supported.

Optional accessories

Dial indicator

Dial protection cover: **No.21DZA000**

Refer to page C-39 for details.

Recommended dial indicators

No.2046SB: Dial indicator (Graduation: 0.01mm)

No.2109SB-10: Dial indicator (Graduation: 0.001mm)

Dial Snap Gage

- Designed for quick GO/NG judgment of diameters of cylinders and shafts in machining processes.
- Wide (13.5 x 12mm/ 1.53 x 47"), flat carbide anvils.
- Anvil retracting stroke: 2mm/.080"
- Anvil positioning range: 25mm/ 1"
- Adjustment nut: adjusts the measuring range.
- Clamp: adjustment nut
- Flatness of measuring face: 1μm
- Stability of indication: 2μm or less (stability of indicators is not included)
- The dial indicator and protection cover are optional. Also, some dial indicators and protection covers cannot be used with the dial snap gage. Consult Mitutoyo if intending to use dial indicators which are not recommended.



201-101

Note: The dial indicator and protection cover are optional.

SPECIFICATIONS

Metric

Order No.	Range	Parallelism	Measuring force	Recommended dial indicator (optional)
201-101	0 - 25mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-102	25 - 50mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-103	50 - 75mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-104	75 - 100mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-105	100 - 125mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-106	125 - 150mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-107	150 - 175mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-108	175 - 200mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-109	200 - 225mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-110	225 - 250mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-111	250 - 275mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-112	275 - 300mm	5μm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)

Stands

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 7 — Magnetic Stands

- Mitutoyo's Magnetic Stands accept all dial indicators and dial test indicators (with stem $\varnothing 6$ or $\varnothing 8$) and clamp to iron or steel surfaces with a strong magnetic force.
- **7014-10**, **7031**, **7032** and **7033B** have a dovetail groove.



7010-10



7011-10



7012-10



7014-10
(without ON/OFF switching of magnetic clamping)



7033B



7031B



7032B

SPECIFICATIONS

Order No.	Description	Applicable holding stem dia.	Magnetic force	Remarks
7010-10	Magnetic stand	$\varnothing 6\text{mm}$, $\varnothing 8\text{mm}$	Approx. 600N	—
7010S-10	Magnetic stand	$\varnothing 4\text{mm}$, $\varnothing 8\text{mm}$, $\varnothing 9.53\text{mm}$ (3/8")	Approx. 600N	—
7011-10	Magnetic stand	$\varnothing 6\text{mm}$, $\varnothing 8\text{mm}$	Approx. 600N	With fine adjustment
7011S-10	Magnetic stand	$\varnothing 4\text{mm}$, $\varnothing 8\text{mm}$, $\varnothing 9.53\text{mm}$ (3/8")	Approx. 600N	With fine adjustment
7012-10	Magnetic stand	$\varnothing 6\text{mm}$, $\varnothing 8\text{mm}$, $\varnothing 9.53\text{mm}$ (3/8")	Approx. 600N	—
7014-10	Mini magnetic stand	$\varnothing 6\text{mm}$, $\varnothing 8\text{mm}$	Approx. 150N	Without magnet ON/OFF
7014E-10	Mini magnetic stand	$\varnothing 4\text{mm}$, $\varnothing 9.53\text{mm}$ (3/8")	Approx. 150N	Without magnet ON/OFF
7033B	Universal magnetic stand	$\varnothing 6$, $\varnothing 8\text{mm}$, $\varnothing 9.53\text{mm}$ (3/8")	Approx. 600N	With mechanical locking system
7031B	Universal magnetic stand	$\varnothing 6$, $\varnothing 8\text{mm}$, $\varnothing 9.53\text{mm}$ (3/8")	Approx. 300N	With mechanical locking system
7032B	Universal magnetic stand	$\varnothing 6$, $\varnothing 8\text{mm}$, $\varnothing 9.53\text{mm}$ (3/8")	Approx. 600N	With mechanical locking system

Dial Gage Stands SERIES 7

- Dial Gage Stands are designed for comparison measurements of size using a dial indicator or Digimatic Indicator.
- Anvil of 7001-10 and 7002-10: ø58mm
Anvil of 7007-10: 90mm square
- Vertical fine adjustment is available with one-touch control thanks to the parallel spring suspension.



7001-10
(with ø58mm serrated anvil)



7002-10
(with ø58mm flat anvil)



7007-10
(with 90mm square anvil)

SPECIFICATIONS

Metric		
Order No.	Stem hole	Remarks
7001-10	ø8mm, ø9.53mm	With serrated anvil
7002-10	ø8mm, ø9.53mm	With flat anvil
7007-10	ø8mm, ø9.53mm	With square anvil

* Perpendicularity of the mounting hole to the anvil: less than 0.4mm/100mm
 * Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1µm or less) to these stands, it may affects the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

Optional Accessories

101462: Hardened steel serrated anvil




No. 101462

Hardened steel



101461: Hardened steel flat anvil



No. 101461

Hardened steel



101463: Hardened steel domed anvil*

*Not available for 7007-10.



No. 101463

Hardened steel

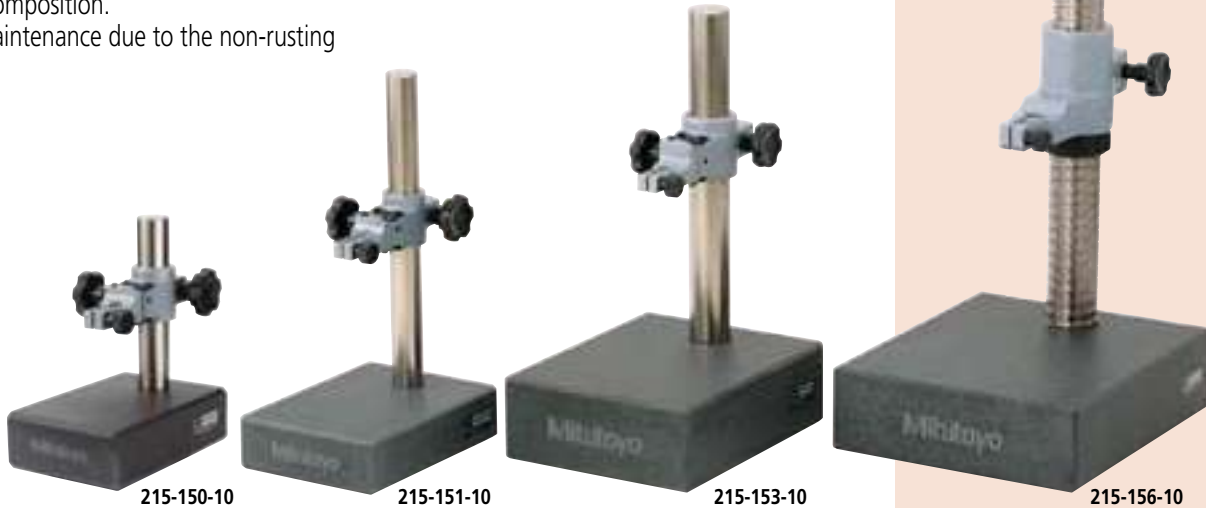


Stands

Comparison measuring instruments which ensure high quality, high accuracy and reliability.

SERIES 215 — Granite Comparator Stands

- The base is made of black granite that stays free of burrs and build-ups due to its fine-grain composition.
- Easy maintenance due to the non-rusting base.



SPECIFICATIONS

Order No.	Granite base size (W x D x H)	Column travel	Stem hole	Remarks
215-150-10	120 x 180 x 50mm	110mm	ø8mm, ø9.53mm	With fine adjustment of 1mm range
215-151-10	150 x 200 x 50mm	250mm	ø8mm, ø9.53mm	With fine adjustment of 1mm range
215-153-10	200 x 250 x 80mm	260mm	ø8mm, ø9.53mm	With fine adjustment of 1mm range
215-156-10	300 x 250 x 80mm	275mm	ø8mm, ø9.53mm, ø20mm	With fine adjustment over the entire travel

* Perpendicularity of the mounting hole to the anvil: less than 0.2mm/100mm.

* Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1µm or less) to these stands, it may affect the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

SERIES 215 — Comparator Stands

- Comparator Stands have a very stable cast-iron base that enables precise measurement.
- The partially serrated anvil prevents very flat workpieces from wringing to it and the 2.3µm flatness (or better) promotes accurate measurement.
- The **215-505-10** model has a threaded column which enables easy and precise coarse adjustment.
- Serrated anvils 110x110mm are supplied with **215-405-10**, and 150x150mm with **215-505-10** models.



SPECIFICATIONS

Order No.	Square anvil size (W x D)	Column travel	Stem hole	Remarks
215-405-10	110 x 110mm	235mm	ø8mm, ø9.53mm	With fine adjustment of 1mm range
215-505-10	150 x 150mm	275mm	ø8mm, ø9.53mm, ø20mm	With fine adjustment over the entire travel

* Perpendicularity of the mounting hole to the anvil: less than 0.4mm/100mm

* Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1µm or less) to these stands, it may affect the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

Optional Accessories

21JAA329: ø8mm bush
21JAA330: ø9.53mm bush
21JAA331: ø15mm bush
 only available for **215-156-10**



Application example using Digimatic Indicator ID-H.

Optional Accessories

21JAA329: ø8mm bush*
21JAA330: ø9.53mm (3/8") bush*
21JAA331: ø15mm bush*
 * Only available for **215-505-10**.

Optional Accessories

101462: Hardened steel Serrated anvil

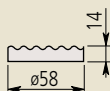
101461: Hardened steel flat anvil

101463: Hardened steel domed anvil



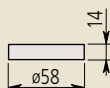
No.101462

Hardened steel



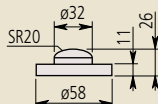
No.101461

Hardened steel



No.101463

Hardened steel



SERIES 519 — Transfer Stand

- Transfer Stands are designed for comparison measurements of size using a dial indicator or Digimatic Indicator.



519-109-10
(with a serrated anvil)

SPECIFICATIONS

Metric		
Order No.	Stem hole	Remarks
519-109-10	ø8mm, ø9.53mm	With serrated anvil

* Perpendicularity of the mounting hole to the anvil: less than 0.4mm/100mm

* Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1µm or less) to these stands, it may affect the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

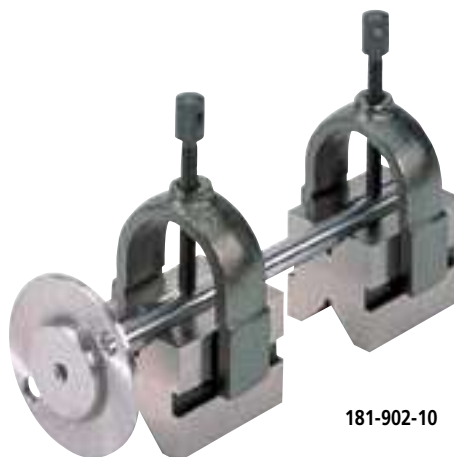
Accuracy

	Mitutoyo	Reference JIS B 7540 Grade 1, 100mm or less
Bottom-surface flatness	2µm or less	10µm or less
V-surface flatness	2µm or less	10µm or less
Parallelism between the bottom-surface and the cylinder on the V-surface	7.5µm or less	10µm or less
Inclination of the V-anvil against the bottom-surface	10µm or less	10µm or less
Parallelism between the side surface and the cylinder on the V-surface	7.5µm or less	20µm or less
Difference in the height of a pair of V-Blocks	9µm or less	10µm or less

Optional Accessories

No.101462 Serrated anvil (standard accessory)

V-Block Set SERIES 181



181-902-10

SPECIFICATIONS

Metric		
Order No.	Max. workpiece dia.	Remarks
181-902-10	25mm	With clamp

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 — Slim Type Gage Head LGB

- Compact form (ø8mm straight stem) is an optimal choice as a built-in type sensor.
- The spindle guide uses high precision linear ball bearings for extremely smooth movement and exceptional durability.
- Nut clamp type is also available.

542-204

IP54



542-222, 542-222H,
542-224

IP54



542-230

IP54



SERIES 318 Litematic VL-50-B/50S-B

- The Litematic is designed for measuring easily-deformed workpieces and high-precision parts, with extra-low measuring force of 0.01N.
- 0.15N and 1N types are capable of measuring at a certain measuring force by using a Litematic feature, while the 0.01N type is suitable for measuring delicate workpieces.
- The motor-driven spindle moves up/down and stops when the contact point touches the workpiece. Then the maximum, minimum values, and runout value are measured under a constant force.
- High resolution of 0.01μm, and wide measuring range of 50mm.
- The measuring table supplied with VL-50-B is ceramic, corrosion-free for easier maintenance and storage.
- The spindle is made of low thermal expansion material.
- Motor life is approximately 100,000 operations, after which replacement is advisable.

*1: 0.15N, 1N types are factory-installed option.

This machine is not suitable for continuous use, such as on a production line.



318-221



318-226



Refer to the Linear Gage (Catalog No. MAP1373) for more details.



Refer to the Linear Gage (Catalog No. MAP1366) for more details.

Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer LSM-902/6900

- Non-contact laser-based measuring system, mainly for outside diameter measurement. Suitable for delicate or moving workpieces.
- Accuracy of $\pm 0.5\mu\text{m}$ in the $\varnothing 0.1 - \varnothing 25\text{mm}$ range can be achieved. It is highly suitable for pin gage measurement.
- Narrow range accuracy of $\pm(0.3+0.1\Delta D)\mu\text{m}$ for high precision measurement.
- Ultra-high repeatability of $\pm 0.05\mu\text{m}$.
- The system consists of a measuring unit (LSM-902) and a display unit (LSM-6900).



Refer to the Laser Scan Micrometer
(Catalog No. E13004) for more details.



SERIES 544 Laser Scan Micrometer (Display Unit Integrated Model) LSM-9506

- High accuracy of $\pm 2.5\mu\text{m}$, integrated display unit with many functions equivalent to the multi-function display unit.



Linear Scales

Designed to capture positional coordinates from slides on machine tools and precision instruments including semiconductor production equipment

Linear Scales ABS AT715 SERIES 539 — Slim Type



ABSOLUTE™



An inspection certificate is supplied as standard.

ABS AT715		Effective range L0 (mm)	Signal cable length (m)
Order No.	Model		
539-801	ABS AT715-100	100 (4")	3.5
539-802	ABS AT715-150	150 (6")	
539-803	ABS AT715-200	200 (8")	
539-804	ABS AT715-250	250 (10")	
539-805	ABS AT715-300	300 (12")	
539-806	ABS AT715-350	350 (14")	
539-807	ABS AT715-400	400 (16")	
539-808	ABS AT715-450	450 (18")	
539-809	ABS AT715-500	500 (20")	
539-811	ABS AT715-600	600 (24")	
539-813	ABS AT715-700	700 (28")	
539-814	ABS AT715-750	750 (30")	
539-815	ABS AT715-800	800 (32")	
539-816	ABS AT715-900	900 (36")	
539-817	ABS AT715-1000	1000 (40")	5
539-818	ABS AT715-1100	1100 (44")	
539-819	ABS AT715-1200	1200 (48")	
539-820	ABS AT715-1300	1300 (52")	
539-821	ABS AT715-1400	1400 (56")	
539-822	ABS AT715-1500	1500 (60")	
539-823	ABS AT715-1600	1600 (64")	
539-824	ABS AT715-1700	1700 (68")	
539-825	ABS AT715-1800	1800 (72")	
539-860	ABS AT715-2000	2000 (80")	7*
539-861	ABS AT715-2200	2200 (88")	
539-862	ABS AT715-2400	2400 (96")	
539-863	ABS AT715-2500	2500 (100")	
539-864	ABS AT715-2600	2600 (104")	
539-865	ABS AT715-2800	2800 (112")	
539-866	ABS AT715-3000	3000 (120")	

*: Combination of a 5m signal cable and a 2m extension cable



Refer to the Linear Scale DRO Systems
(Catalog No.MAP1334) for more details.

Optional Accessories

- Code out unit: **No.06AET993**
- Extension cable: **No.06ACF941**
- Foot switch for USB: **No.937179T**

KA-200 Counter SERIES 174 — Standard Type

- The KA-200 Counter has a lathe function, as well as standard functions (parameter selection).
- Compact, light and multifunctional.
- Sub-display enables easy setting.
- The RS-232C interface enables connection to a PC or printer.
- Text data can be output using the USB interface (optional).



174-185
KA-213

Order No.	174-183E	174-185E
Model	KA-212	KA-213
Number of axes to be displayed	2 axes	3 axes

KLD-200 Counter SERIES 174 — Special Purpose Type with Limit Signal Output

- Counter designed to signal when a linear scale displacement value and a preset limit value coincide.
- Two types of limit settings are available: 2-step (**KLD-212**) and 4-step (**KLD-214**).



174-147
KLD-214

Order No.	174-146E	174-147E
Model No.	KLD-212	KLD-214
Number of axes to be displayed	1 axis	
Number of limit values to be set	2	4

Optional Accessories

- External zero-set box (1 axis): **No.936551**
- External load box (1 axis, for the RS-232C output): **No.937326**



Refer to the Linear Scale DRO Systems
(Catalog No.MAP1334) for more details.

Profile Projectors

For efficient measurement, inspection and observation of very small workpieces

PJ-A3000 series

SERIES 302 — Profile Projectors

- Each model has a digital counter and digital readout protractor screen to facilitate dimensional and angular measurement.
- High operability due to the layout of the built-in counter at an easily readable position.
- Large handwheel enables easy height adjustment of the stage for setting the best surface illumination conditions.
- Combination use with the optional 2-D Data Processor QM-Data200 facilitates a variety of dimensional measurement methods.



PJ-A3010F-200

PJ-H30 series

SERIES 303 — Profile Projectors

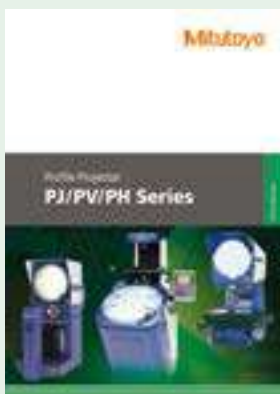
- ø306mm screen makes erect-unreversed images more visible.
- Newly developed transmitted-illumination optical system improves the illumination intensity for all types of projection lenses by 60% on average, compared to easy XY and angle readings.
- High-level visibility of digital display for all models allows easy XY and angle readings.
- Uses a 3-lens turret type bayonet mount with parfocal characteristics.
- Uses an elevating shaft mechanism.
- Quick-release control inside the XY handle can switch the stage feeding between the fine and coarse traverse.
- All models have a high-precision workstage with linear scales.
- All stage sizes achieve the high measuring accuracy of $(3+0.02L)\mu\text{m}$ for the X-and Y-axis directions.
- Models with the high-precision edge detector (OPTOEYE) are also available.
- Measuring range (300×170mm) is the widest in its class.



PJ-H30D3017B

PH-3515F, PH-A14 SERIES 172 — Profile Projector

- Bench-top model uses a horizontal optical system.
- Maximum loading of workstage (45kg) allows the measurement of heavy workpieces.
- Wide measuring range 254mm (X) × 152mm (Y) allows measurement of large workpieces. (**PH-3515F**)
- Digital display of protractor screen angle enables easy angular measurement. (**PH-3515F**)
- Combination use with the optional 2-D data processor **QM-Data200** facilitates a variety of dimensional measurement methods
- Provides transmitted illumination for inspecting workpiece contour, and oblique incident illumination for the observation of workpiece surfaces.



Refer to the Measuring Projector
(Catalog No.MAP1349) for more details.

Microscopes

Microscope lineups that systemize observation, measurement and processing

MF series

SERIES 176 — Measuring Microscopes

- Observation with a clear and flareless erect image along with a wide field of view.
- Measuring accuracy is the highest in its class (and conforms to JIS B 7153).
- ML series, high-NA objectives that are specially designed for the MF series (long working distance type).
- Illumination unit (reflected/transmitted) can be selected from a high-intensity LED or halogen bulb.
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction.
- Variety of standardized stages in sizes up to 400×200mm.
- Quick-release mechanism useful for moving the stage quickly when measuring workpieces that are large in size or quantity.
- Coarse/fine feed handles are as standard on both sides allowing precise focus and observation measurement regardless of handedness.
- High-magnification eyepiece observation up to 2000X.
- Standard measuring microscope that has a wide variety of optional accessories including a Vision Unit and various digital CCD cameras.



MF-B2017D

• The binocular tube (eyepiece) and illumination unit are optional accessories.



Refer to the MF /MF-U series
(Catalog No.MAP1348) for more details.

TM series SERIES 176 — Toolmakers' Microscopes

- Compact universal toolmakers' microscope that can be installed on any site.
- Newly designed LED illuminators provide enhanced observation for higher accuracy and resolution.
- Optional LED circular illuminator available for applications requiring all-round lighting.
- Achieves a maximum measuring height of 115mm despite the compact size.
- Installation of digimatic micrometer heads (MHD-50MB, option) facilitates makes measurement easy and precise.
- A vernier scale (Angle Index) built into the eyepiece mount enables accurate angular measurements.
- Overall magnification is 30X using the standard accessory lenses but can be changed to lie within the 20-200X range by using optional objectives and/or eyepieces.



TM-505B
* micrometer heads is option.



TM-1005B



Refer to the TM Series
(Catalog No.E14013) for more details.

Vision Measuring Systems

Vision measuring systems for multipurpose use

QS SERIES 359 — CNC Vision Measuring System

- This is a CNC vision measuring machine equipped with a color CCD camera.
- Ring fiber illumination along with transmitted illumination and coaxial reflected illumination is provided as standard to reproduce color images more clearly.
- A control box provides convenient access to frequently used functions including illumination, data input and zoom.
- This machine is equipped with a zoom lens (the zoom lens fitted offers 8-positions/7-steps and a 7:1 magnification ratio).
- This machine is equipped with the autofocus function, and is a Z-axis measurement accuracy guaranteed type.



QS250Z

QS-L/AFB SERIES 359 — Manual Vision Measuring System

- This is a manual vision measuring machine equipped with a color CCD camera.
- All models are equipped with coaxial reflected illumination, transmitted illumination, and ring fiber illumination as standard.
- This machine is equipped with a zoom lens (the zoom lens fitted offers 8 steps and a 7:1 magnification ratio).
- This machine is equipped with the autofocus function, and is a Z-axis measurement accuracy guaranteed type.



QS-L3017Z/AFB



Refer to the QUICK SCOPE
(Catalog No.MAP1346) for more details.

QI SERIES 361 — Non-contact 2D Vision Measuring System



Refer to the QUICK IMAGE
(Catalog No.MAP1363) for more details.

- A series of 2D vision measuring machines that offers high-efficiency measurement with a double telecentric optical system. QI-A models offer wide field of view (32×24mm). QI-B series (12.8×9.6mm) can offer easy dimensional measurement of micro-workpieces and workpieces with uneven surfaces.
- This series is equipped with a megapixel color camera. Even with low magnification, high repeatability can be obtained.
- Long focal depth and wide field of view. Easily change between long focal depth and switch to high resolution modes for increased accuracy.
- Several sizes of XY stage types are available including a large 400×200mm stage for large or multiple identical workpiece measurement.
- With the XY quick-release handles, the stage can be moved rapidly but with fine feed always available. This saves time when measuring between distant points and so dramatically improves productivity.



QI-A2010C

QV Active SERIES 363 — CNC Vision Measuring System

- These space-saving new entry models meet various needs with advanced functionality and easy operation.
- Two sizes, 250×200mm and 400×400mm are available to cover a wide range of workpiece types.
 - Newly designed objective lenses achieve a maximum zoom ratio of 14x, which covers the range from wide-view measurement at low magnification to micro-measurement under high magnification.
- Usability has been improved by adopting a high-resolution color camera. The images bear comparison with observation devices such as a microscope.
- A model is also available equipped with a touch probe that can be used for measuring three-dimensional objects that cannot be measured with a purely vision-based measuring system.



QV-L202Z1L-D

Surftest

Performs brilliantly in many situations such as in the quality control room, on the factory floor and on the production line.

Surftest SJ-210

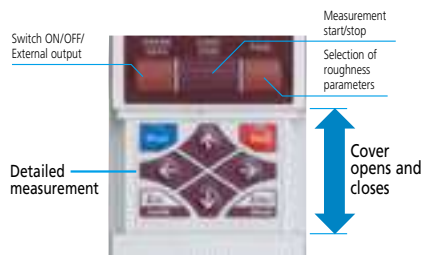
SERIES 178 — On-site Surface Roughness Tester



Refer to the Surftest SJ-210 series (Catalog No.MAP1289) for more details.

Compact type all-in-one surface roughness tester has evolved by meeting customer demands

- Color LCD can display not only calculation results and measurement conditions, but also surface roughness waveforms. In addition, bigger character size contributes to visibility.



- Supports a variety of roughness standards. Equipped with a variety of parameters and functions such as arbitrary length measurement. Facilitates the operation and settings using the buttons on the top and inside the openable cover of the main unit. Displays the result after a measurement when the measurement start button is pressed.

- Built-in rechargeable battery allows measurement without the power supply.
- Optional printer for SJ-210 allows the printing of calculation results and measured profiles.
- Outputs the alarm display when the accumulated measurement distance exceeds the threshold level that is set. (Useful for maintaining a stylus-tip replacement policy.)
- Three types of drive unit are available: Standard, Transverse tracing, and Retractable. Selectable depending on the workpiece.

Advanced handheld tester that is easy to operate and meets a variety of needs

- Equipped with a large, touch-screen color graphic LCD to achieve intuitive operation and excellent ease of use.
- Features new measurement assistance and analysis functions to improve ease of operation while maintaining the operability of previous models.
- The detector can be oriented to any position according to the workpiece: a horizontal, inclined, overhead or perpendicular surface can be tested. Many optional accessories are available to support this feature. (Common between SJ-310/210)

- The optional memory card can save a large amount of measurement data. In addition, Trace 10 is a convenient function to save 10 sets of recent measurement data.
- The statistical processing and GO/NG judgment functions facilitates data management.
- High-speed thermal printer (whose printing speed is approx. 1.5 times that of conventional models) is provided as standard. Printing of measurement results (including judgment results) and assessed profiles are available as well as BAC and ADC profiles. Allows landscape mode printing to match the display on the LCD.



Profile display: One parameter measurement result and the measured profile

Optional Accessories for SJ-310 Consumables

- Printer paper: Standard type (x5 packs): **No.270732**
- Printer paper: High-durability type (x5 packs): **No.12AAA876**
- Protective sheet for the touch panel (x10 sheets): **No.12AAN040**
- Memory card (4GB): **No.12AAL069**



Refer to the SurfTest SJ-310 series
(Catalog No.MAP1314) for more details.

SurfTest SJ-310 SERIES 178 — On-site Surface Roughness Tester



SurfTest SJ-410 SERIES 178 — Compact Surface Roughness Tester



Refer to the SurfTest SJ-410 series
(Catalog No.MAP1315) for more details.



Surface Roughness / Contour Analysis Software FORMTRACEPAK

Measurement data from the SJ-210/310/410 series can be imported into FORMTRACEPAK running on a desktop type surface roughness tester via an optional memory card to perform a more advanced analysis if required.



Dramatic improvement on compact type surface roughness testers

- Equipped with the touch-screen large color graphic LCD to achieve both of the intuitive operation and high operability
- Skidded and skidless measurement are switchable to perform the optimum evaluation according to the measurement condition.
- A wide-range, high-resolution detector and a drive unit provide superior high-accuracy measurement in its class.
 - **Detector**
Measuring range: 800 μ m
Resolution: 0.0001 μ m (at 8 μ m range)
 - **Drive unit**
Straightness/traverse length: 0.3 μ m/25mm (**SJ-411**)

- Simplified contour analysis (Step, Step quantity, Area, Coordinate difference) is available using the point cloud data collected to evaluate the surface roughness. Allows the evaluation of detailed shapes that cannot be achieved by contour measuring instruments.



(Coordinate difference)

- Allows the evaluation of surface roughness in a circumferential direction using the skidless measurement and R-surface compensation functions.
- Conforms to the latest ISO standard and ANSI/VDA standard in addition to the JIS standard (2001/1994/1982).
- Achieves the performance of a desktop type surface roughness tester in combination with the simplified stand and associated optional accessories.

Optional Accessories for SJ-410 Consumables

- Printer paper: Standard type (x5 packs): **No.270732**
- Printer paper: High-durability type (x5 packs): **No.12AAA876**
- Protective sheet for the touch panel (x10 sheets): **No.12AAN040**
- Memory card (2GB): **No.12AAL069**

Surftest

Performs brilliantly in many situations such as in the quality control room, on the factory floor and on the production line.

Surftest SV-3200 SERIES 178 — Desktop Surface Roughness Tester

Equipped to measure a variety of parameters.

A precision surface roughness tester supported by a wide range of optional accessories for a versatile benchtop surface-analysis solution.

- The analysis unit is equipped with the FORMTRACEPAK Surface Roughness / Contour analysis program.
- High-resolution type Z1-axis detector is provided as standard. The highest display resolution of the Z1 axis is $0.0001\mu\text{m}$ (when the measuring range is $8\mu\text{m}$.)
- X-axis drive unit is equipped with a built-in high-precision glass scale to achieve the highly accurate positioning for the travel direction (X axis). SV-3200 series employs a ceramic guide for the drive unit to enhance resistance to abrasion for a long service life.
- The resolution of the X axis is $0.05\mu\text{m}$.
- Detectors with standard or low measuring force, 4mN or 0.75mN , are selectable whether the instrument is equipped with the inclinable drive unit or not.
- The 700mm Z2-axis (column) range models are new to the lineup.



SV-3200



SV-3200L4 (with options)



Contracer CV-2100 SERIES 218 — Contour Measuring Instruments

Contour Measuring System enabling measurement that is fast, accurate, and easy.

- The operation flow is significantly shortened by arranging the controls for stylus position change, measurement start/stop and return on the front of the drive unit.
- Fine and coarse X-axis positioning can be performed easily by using the jog shuttle that covers the whole measuring range.
- The quick-vertical-motion stand allows operators to swiftly and easily move the drive unit to and from the measurement height without having to push or pull (only for CV-2100M4).
- The detector unit (Z1 axis) is equipped with a highly accurate arc scale. This scale directly tracks the arc locus of the stylus tip so that the most accurate compensation can be applied to the scale output, which leads to higher accuracy and resolution. Operators are free from bothersome operations such as measurement magnification switching and calibrating each magnification as required for analog instruments.



CV-2100M4



An inspection certificate is supplied as standard.



An inspection certificate is supplied as standard.

Roundtest

To realize efficient centering and leveling combined with high-precision measurement

Roundtest RA-1600

SERIES 211 — Roundness/Cylindricity Measuring System

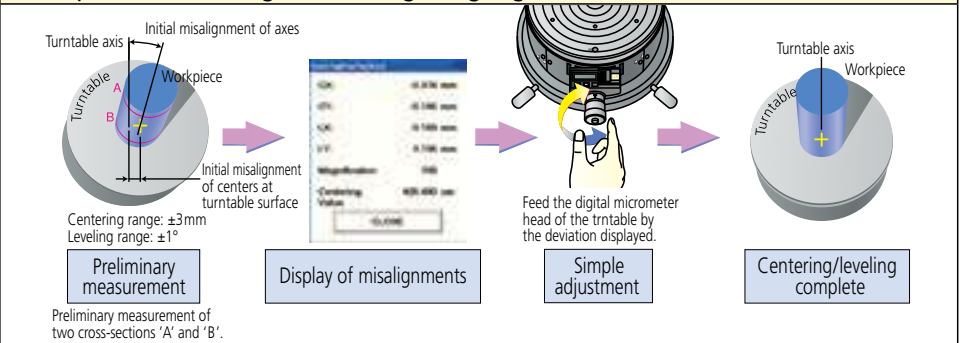
- Compact body and a wide measuring range assures precision that compares well with that of higher-grade models.
Maximum probing diameter: $\varnothing 280\text{mm}$
Vertical travel: 300mm
Maximum table loading: 25kg
Rotational accuracy in the radial direction: $(0.02+6H/10000)\mu\text{m}$
Rotational accuracy in the axial direction: $(0.02+6X/10000)\mu\text{m}$
- D.A.T. (Digital Adjustment Table) function aids manual workpiece centering and leveling.

- Safety mechanism provided in the detection section as a standard feature. A collision-sensing function is equipped in the detector (when it is in the vertical orientation) to prevent a damaging collision in the Z direction. Additionally, an overrun prevention function is equipped, which stops the system when the detector displacement exceeds its range.
- The measurement results are shown graphically if using the roundness/cylindricity analysis software (ROUNDPAK).



211-723 RA-1600

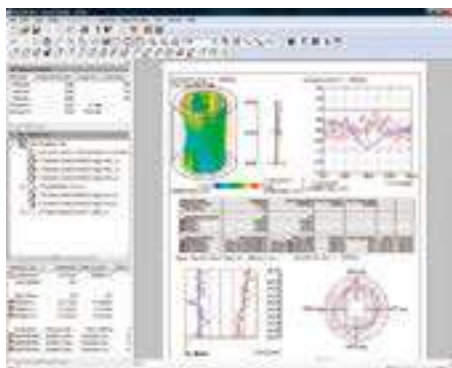
D.A.T. (Digimatic Adjustment Table): Description of centering and leveling using Digimatic micrometer



The measurement results are shown graphically if using the roundness/cylindricity analysis software (ROUNDPAK).



Refer to the Roundtest RA-1600
(Catalog No. MAP1351) for more details.



Result screen

Hardness Testing Machines

Start quality control from the material — Mitutoyo's hardness testing machines can handle it

HM-200

SERIES 810 — Micro Vickers Hardness Testing Machines

• Introduction of electromagnetic force generation into the loading mechanism

The latest electromagnetic force motor used in the loading mechanism enables the test force to be freely selected (see test force specifications) over the wide range of 0.4903mN to 19610mN. It is also possible to freely set the loading time and duration time. Now your desire for absolute control over the indentation size in Vickers hardness testing can be satisfied. The HM-200 series always offers the test force most appropriate for the specimen material and shape.

Note: Changing the test force may change the hardness value obtained due to material non-homogeneity. Surface treatment, such as Nitriding, can also produce the same effect because the material hardness changes with depth, and indentation depth depends on the test force.

• Newly-designed optical system

The new HM Plan series objective lenses are optimized for measuring characteristic indentation images. The lineup includes 6 types of long working distance objectives: 10X, 20X, 50X and 100X for measuring indentation images, and 2X and 5X for enabling wide-range measurement around

indentations. LEDs, which have a longer life, produce less heat, consume less power and are more energy efficient than incandescent bulbs, are employed for the illumination system.



System A (HM-210A/220A)



An inspection certificate is supplied as standard.

HM-100

SERIES 810 — Micro Vickers Hardness Testing Machines



810-124
HM-101

810-125
HM-102

810-959
HM-103



Refer to the Hardness Testing Machines (Catalog No. MAP1331) for more details.



An inspection certificate is supplied as standard.

wizhard HR-500 SERIES 810 — Rockwell Hardness Testing Machines

- With the HR-500, the hardness of even the inside wall of a pipe-shaped specimen can be tested without cutting the specimen in half. What is more, the HR-500 can perform 3 types of hardness tests, not only Rockwell

and Rockwell superficial but also Brinell, by introducing our proprietary electronic control technology and providing the Brinell hardness testing load sequence.



HV-100 SERIES 810 — Vickers Hardness Testing Machines

- Vickers hardness testers have a wide application in testing metals, especially small heat-treated parts, and are also suitable for making special-purpose tests such as carburized case hardness, maximum hardness of spot welds, high-temperature hardness, and fracture toughness of ceramic materials.
- Objective lenses specifically developed for hardness testing are supplied. A clear and natural view of an indentation is achieved by changing the light source of the illumination from halogen to LED.
- A new 2X lens for wide-angle observation has been added to the range. Now, magnifications of 10X, 20X, 50X and 100X for observation and gaging; and 5X and 2X for observation are available. Also, the working distance is doubled (5.9 to 11.8mm) for the 10X objective lens (in-house comparison) to minimize the risk of collision between the workpiece and the lens.

- In addition to Vickers hardness testing, fracture toughness tests (IF Method: JIS R 1607) and other tests can be performed with optional accessories such as a Knoop indenter and additional indenters and a weight for Micro Brinell testing.
- Four systems are available: Basic model A; model B equipped with automatic indentation reading function; model C equipped with automatic indentation reading function and automatic XY stage; model D equipped with automatic indentation reading function, automatic XY stage, and auto-focus stage.



System A (HV-110A/120A)



Refer to the Hardness Testing Machines (Catalog No. MAP1331) for more details.

Hardness Testing Machines

Start quality control from the material — Mitutoyo's hardness testing machines can handle it

HR-100/200/300/400

SERIES 963 — Rockwell Hardness Testing Machines

- This series is economy type Rockwell hardness testing machines. We have a lineup of 5 models consisting of a digital display type and an analog display type.



963-210
HR-110MR



963-220
HR-210MR



963-231
HR-320MS



963-240
HR-430MR



963-241
HR-430MS



An inspection certificate is supplied as standard.



Refer to the Hardness Testing Machines (Catalog No. MAP1331) for more details.

HARDMATIC HH-300 (Analog type) SERIES 811 — Durometers for Sponge, Rubber, and Plastics

- Hardness measurement by durometer is simply performed by holding the instrument against the surface of a specimen and reading the indicated value. This type of hardness tester is most widely used for hardness testing of sponge, rubber, plastic and other soft materials.

Compact type



811-329-10 HH-329
811-335-10 HH-335
811-337-10 HH-337
811-335-11 HH-335-01
811-337-11 HH-337-01

Long type



811-331-10 HH-331
811-333-10 HH-333

Order No.	811-329-10	811-331-10	811-333-10	811-335-10	811-335-11	811-337-10	811-337-11
Model No.	HH-329	HH-331	HH-333	HH-335	HH-335-01	HH-337	HH-337-01



Refer to the Hardness Testing Machines (Catalog No. MAP1331) for more details.

HARDMATIC HH-300 (Digital type) SERIES 811 — Durometers for Sponge, Rubber, and Plastics



Optional Accessories for Dual-purpose Stand CTS Series

Order No.	811-019	811-012	811-013
Model No.	CTS-101	CTS-102	CTS-103
Applicable model	HH-331, 332	HH-333, 334, 337, 338	HH-335, 336

Compact type



811-330-10 HH-330
811-336-10 HH-336
811-338-10 HH-338
811-336-11 HH-336-01
811-338-11 HH-338-01

Long type



811-332-10 HH-332
811-334-10 HH-334

Order No.	811-330-10	811-332-10	811-334-10	811-336-10	811-336-11	811-338-10	811-338-11
Model No.	HH-330	HH-332	HH-334	HH-336	HH-336-01	HH-338	HH-338-01

Coordinate Measuring Machines

Precision measuring technology with three dimensions

Standard CNC CMM

MICROCORD CRYSTA-Apex S500/700/900 Series

- The CRYSTA-Apex S500/700/900 series, CNC CMMs attain high accuracy ($1/7\mu\text{m}$), high speed, and high acceleration. This series offers flexibility with a wide variety of models for various workpiece sizes.
- The scale systems on Mitutoyo high-precision models utilizes a high-performance linear encoder (manufactured by Mitutoyo), for detecting axis position. In addition, various technologies have been utilized in the structure, part processing, and assembly to provide high accuracy measurement.
- Floor vibration at the installation location, can be a source of variations in measured values. The auto-leveling air spring vibration isolator is available as an option for CRYSTA-Apex S500/700/900 series. The vibration isolator insulates the main unit from floor vibrations and can quickly levels the CMM main unit, using a sensor that detects load fluctuations caused by axis movement of the CMM or workpiece loading.
- All CRYSTA-Apex S high-precision series CMM's are equipped with temperature compensation and therefore do not require a temperature controlled room. Accuracy is guaranteed within the range of 16 to 26°C.
- Refer to the CRYSTA-Apex S Series leaflet (Catalog No. MAP1318) for more details.



Refer to the CRYSTA-Apex S Series (Catalog No. MAP1318) for more details.

Items		Model	CRYSTA-Apex S 544	CRYSTA-Apex S 574	CRYSTA-Apex S 776	CRYSTA-Apex S 7106	CRYSTA-Apex S 9106 (Z600) / 9108 (Z800)	CRYSTA-Apex S 9166 (Z600) / 9168 (Z800)	CRYSTA-Apex S 9206 (Z600) / 9208 (Z800)
Measuring range	X axis		500mm		700mm		900mm		
	Y axis		400mm	700mm	700mm	1000mm	1000mm	1600mm	2000mm
	Z axis		400mm		600mm		600mm/800mm		

Note: While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

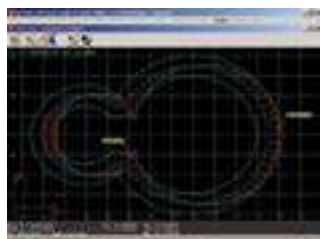
MCOSMOS software modules

	GEOPAK	CAT1000P	CAT1000S	SCANPAK
MCOSMOS-1	○	—	—	—
MCOSMOS-2	○	○	○	—
MCOSMOS-3	○	○	○	○

CAT1000S
[Curved surface evaluation program]



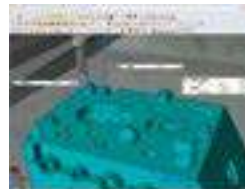
SCANPAK
[Contour measurement program]



GEOPAK
[General purpose measurement program]

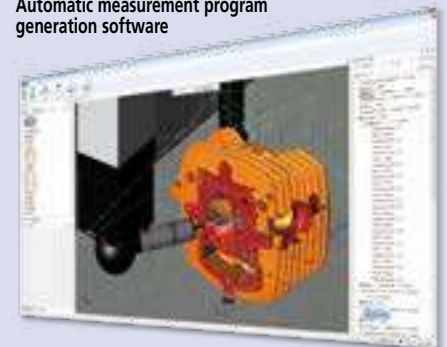


CAT1000P
[On-/Off-line teaching program]



MiCAT Planner

Automatic measurement program generation software



CAD data with tolerance information



Fixture System

To realize efficient centering and leveling combined with high-precision measurement

eco-fix Kit S



Code No. K551048

eco-fix Kit L



Code No. K551049



eco-fix
Demo video



eco-fix
Product Leaflet

Styli Kits

Probe components add the touch of perfection to quality assurance

Stylus tungsten carbide

base stainless steel
stem tungsten carbide
ball ruby



Cylinder stylus, ruby

base stainless steel
tip ruby



Stylus steel

base stainless steel
ball ruby



Disk stylus ruby

base stainless steel
stem tungsten carbide
disk ruby



Stylus tungsten carbide

base stainless steel
stem tungsten carbide
ball ruby



Stylus carbon fiber

base stainless steel
stem carbon fiber
ball ruby



Stylus ceramic

base stainless steel
stem ceramic
ball ruby



Cylinder stylus, ruby

base stainless steel
stem tungsten carbide
tip ruby



Styli and
Accessories
Product Leaflet



Refer to the Mitutoyo Fixtures
(Catalog No. MAP1342) for more details.



Refer to the Styli and Accessories
(Catalog No. MAP1318) for more details.



In the Spirit of Mitutoyo

To become a complete man, one must acquire Wisdom, Benevolence and Valor. With Wisdom only, one tends to be cold. Benevolence alone makes one weaker. With valor only, one may reach beyond his capabilities. When the three qualities are combined, however, one will become a complete man. Similarly, success in enterprise lies in the knowledge of Heaven, Earth and Man. Business will succeed only when these factors, "heavensent" chances, natural opportunities, and harmony of man are present. Without even one factor, success is remote. In Buddhism, Butsu (Buddha), Po (Doctrine) and So (Priest) are three principle treasures for its promotion of the teaching. In Christianity, God, Bible and Minister.

The word MITUTOYO signifies three abundances. "Mitsu" means three, while "Toyo" stands for a state of abundance. The name MITUTOYO was selected, with a sincere wish to see more complete men, to create a prosperous enterprise and to introduce righteous religion to all, along with the lasting wish for a peaceful world and fulfillment of meaningful life.

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