New Products

Digimatic Indicator

Refer to pages F-3 to F-20 for details.

Compact Type Dial Indicator

Refer to pages F-25 to F-26 for details.

Standard type Dial Indicator (0.01mm Resolution)

Refer to pages F-27 to F-28 for details.

Standard type Dial Indicator (0.001mm Resolution)

Refer to pages F-29 to F-30 for details.

Dial Test Indicator Ruby Contact Point Models

Refer to pages F-55 to F-58 for details.

Digimatic Indicators

Digimatic Indicator

Dial Indicators

Dial Indicators

Dial Test Indicators

Dial Test Indicators

Dial Indicator Applications and Stands

Dial Indicator Applications and Stands

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Digimatic Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

ABSOLUTE

(Refer to page VIII for details.)

ABS Solar-Powered Digimatic Indicator ID-SS SERIES 543

- Solar power supply
  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 of a warehouse.
- Built-in recharger
  The large-capacity capacitor built-in recharger 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 reproduced 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.

543-505

543-500

- 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

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
*A built-in recharger 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)
Standard contact point: **901312** (ISO/JIS type)
21BZB005 (ANSI/AGD type)

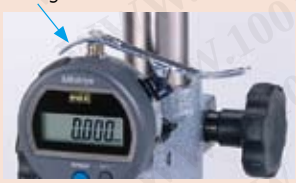
Functions

Origin set (zero-set)
Count direction switching
Data output
inch/mm conversion (inch/mm models)
Alarm: Counting value composition error
Insufficient illumination intensity or change

F

Optional accessories

Lifting lever



Lifting knob

Lifting release

Optional Accessories

21EZA198: Spindle lifting lever (ISO/JIS type)
21EZA199: Spindle lifting lever (ANSI/AGD type)
21EZA105: Spindle lifting knob (ISO/JIS type)*
21EZA150: Spindle lifting knob (ANSI/AGD type)*
540774: Spindle lifting cable 12.7mm and 25.4mm

- SPC Cable:
  1m (**905338**)
  2m (**905409**)
- Connecting Cables for **U-WAVE-T**:
  160mm (**02AZD790F**)
  For footswitch (**02AZE140F**)
  Refer to page A-15 for details.
- Digimatic Mini-Processor **DP-1VR**: **264-504**
- Contact points for Mitutoyo's dial indicators
  (Refer to pages F-46 to F-49 for details.)
  Interchangeable backs for 2 series
  (Refer to pages F-50 for details.)
- Measuring stands

Specifications are subject to change without notice.

Specifications

Metric

Order No.	Resolution	Range	Overall*	Hysteresis*	Repeatability*	Remarks
543-500	0.001mm	12.7mm	0.003mm	0.002mm	0.002mm	With lug
543-500B	0.001mm	12.7mm	0.003mm	0.002mm	0.002mm	Flat
543-505	0.01mm	12.7mm	0.02mm	0.02mm	0.01mm	With lug
543-505B	0.01mm	12.7mm	0.02mm	0.02mm	0.01mm	Flat

Inch/Metric

Order No.	Resolution	Range	Overall*	Hysteresis*	Repeatability*	Remarks
543-501	.00005"/0.001mm	.5"	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	With lug
543-501B	.00005"/0.001mm	.5"	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	Flat
543-502	.00005"/0.001mm	.5"	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	With lug
543-502B	.00005"/0.001mm	.5"	±.0001"/0.003mm	.0001"/0.002mm	.0001"/0.002mm	Flat
543-506	.0005/0.01mm	.5"	±.0010"/0.02mm	.0010"/0.02mm	.005"/0.01mm	With lug
543-506B	.0005/0.01mm	.5"	±.0010"/0.02mm	.0010"/0.02mm	.005"/0.01mm	Flat
543-507	.0005/0.01mm	.5"	±.0010"/0.02mm	.0010"/0.02mm	.005"/0.01mm	With lug
543-507B	.0005/0.01mm	.5"	±.0010"/0.02mm	.0010"/0.02mm	.005"/0.01mm	Flat

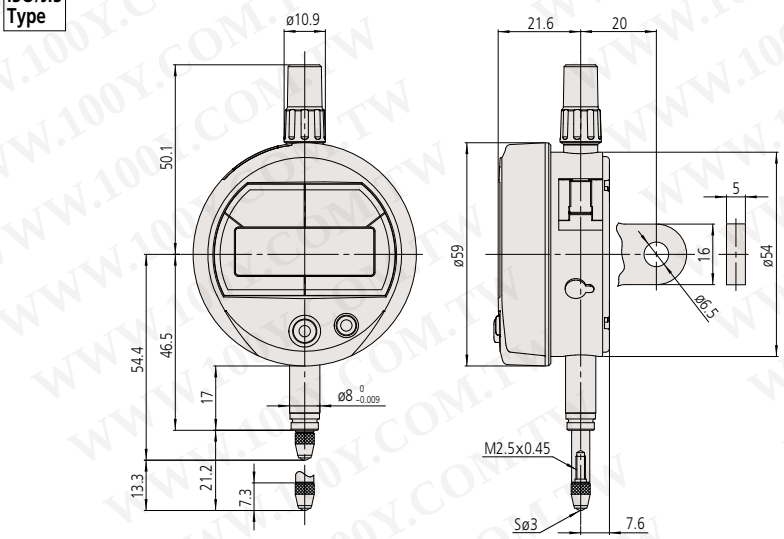
* Quantizing error of ±1 count is excluded.

ISO/JIS type ANSI/AGD type

Dimensions

Unit: mm

ISO/JIS Type



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

F

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.

Rated to IP66 water- and dust-proofing standard and oil resistance improved.

Body width 35mm

LCD readout rotation function

SPECIFICATIONS

Metric

Order No.	Resolution	Range	Accuracy*	Remarks
543-570	0.01mm	12.7mm	0.02mm	Slim type ID-N
543-580	0.01mm	5.0mm	0.02mm	Back plunger type ID-B
543-575	0.01mm / 0.001mm	12.7mm	0.01mm / 0.003mm	Slim type ID-N
543-585	0.01mm / 0.001mm	5.0mm	0.01mm / 0.003mm	Back plunger type ID-B

Inch/Metric

Order No.	Resolution	Range	Accuracy*	Remarks
543-571	.0005", 0.01mm	.5"	.0008"	Slim type ID-N
543-581		.2"	.0008"	Back plunger type ID-B
543-576	0.01mm / 0.001mm .0005" / .00005"	.5"	.0004" / .00012"	Slim type ID-N
543-586		.2"	.0004" / .00012"	Back plunger type ID-B

*Quantizing error of ±1 count is excluded

ISO/JIS type ANSI/AGD type

ABSOLUTE (Refer to page VIII for details.)

Technical Data

Display: 6-digit LCD and sign
Scale type: ABSOLUTE electrostatic line encoder
Max. response speed: Unlimited (Measurement by scanning can not 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)
21BZA005 (ANSI/AGD type)
Battery SR44(1pc.) : **938882**
Battery life: Approx. 7,000 hours under normal use

Functions

Zero-setting, Presetting, Direction switching, Tolerance judgment, Display hold, Data output, inch/mm conversion (inch/mm models) LCD readout rotation
Alarm: Low voltage, Counting value composition error, Overflow error, Tolerance limit setting error

Optional accessories

Lug (ISO/JIS type): **21EZA145**
Lug (ANSI/AGD type): **21EZA146**
Contact points for Mitutoyo's dial indicators (Refer to pages F-46 to F-49 for details.)
Arm for ID-B (made-to-order)
Lifting knob (ISO/JIS type): **21EZA105** (ID-N only)
Lifting knob (ANSI/AGD type): **21EZA150** (ID-N only)
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.

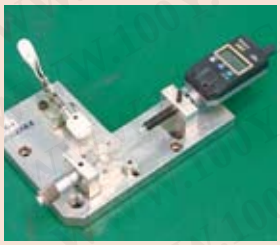
Using the lifting knob

Rubber boot for ID-N, NBR: **02ACA376**
Rubber boot for ID-B, NBR: **125317**
Rubber boot for ID-N, silicon: **238774**
Rubber boot for ID-B, silicon: **21EAA212**
SPC cable: 1m **21EAA194**
2m **21EAA190**
Connecting Cables for **U-WAVE-T**:
160mm: **02AZD790G**
For footswitch: **02AZE140G**
Bifurcated connecting cable with zero-setting terminal (1m): **21EAA210**
Bifurcated connecting cable with zero-setting terminal (2m): **21EAA211**
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.

Usage examples







SPC cable

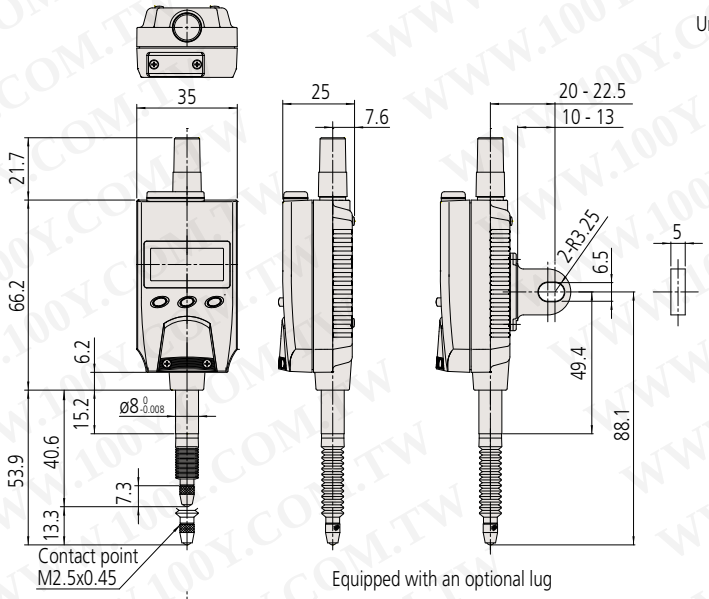
Bifurcated connecting cable with zero-setting terminal

Refer to Catalog **No. E4302-543** for details.

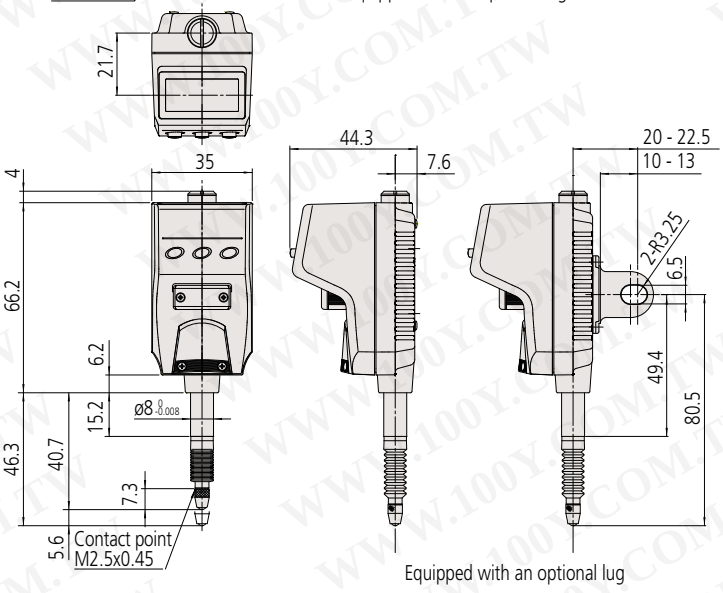
DIMENSIONS

ID-N

Unit: mm



ID-B



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

F

Mitutoyo

Digimatic Indicators

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

ABSOLUTE 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 0.5µm/.0002" 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

OK NG

Analog bar display

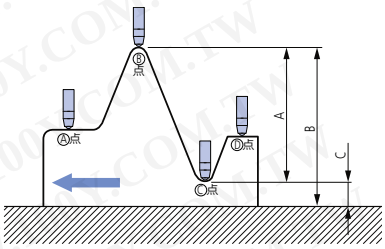
Resolution switching

- 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 <B> (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-232 interface and a PC.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

Remote controller (optional)

543-561

543-563

An inspection certificate is attached as standard.
Refer to page IX for details.

Technical Data

Display: 7-digit LCD, sign, and analog bar with 2-color backlight
Power supply: 6V DC(via AC adaptor)
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)
Plunger direction: Up to direction in which spindle is 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, Seting error, Overflow error

Optional accessories

Remote controller: **21EZA099**
Spindle lifting cable (stroke: 30mm): **540774**
Spindle lifting knob: **21EZA101**
SPC cable: 1m (**936937**)
2m (**965014**)
RS-232 Connecting cable 2m: **21EAA131**
Connecting Cables for **U-WAVE-T**:
160mm (**02AZD790D**)
For footswitch (**02AZE140D**)
Refer to page A-15 for details.
Center-lug back: **101040** (ISO/JIS tyep)
101306 (ANSI/AGD type)
Contact points for Mitutoyo's dial indicators
(Refer to pages F-46 to F-49 for details.)
Digimatic Mini-Processor DP-1VR: **264-504**
Granite comparator stand: **215-156-10**
Comparator stand: **215-505-10**

F

SPECIFICATIONS

Metric

Order No.*	Resolution	Range	Accuracy**
543-561	0.0005mm, 0.001mm	30.4mm	0.0015mm
543-563		60.9mm	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.

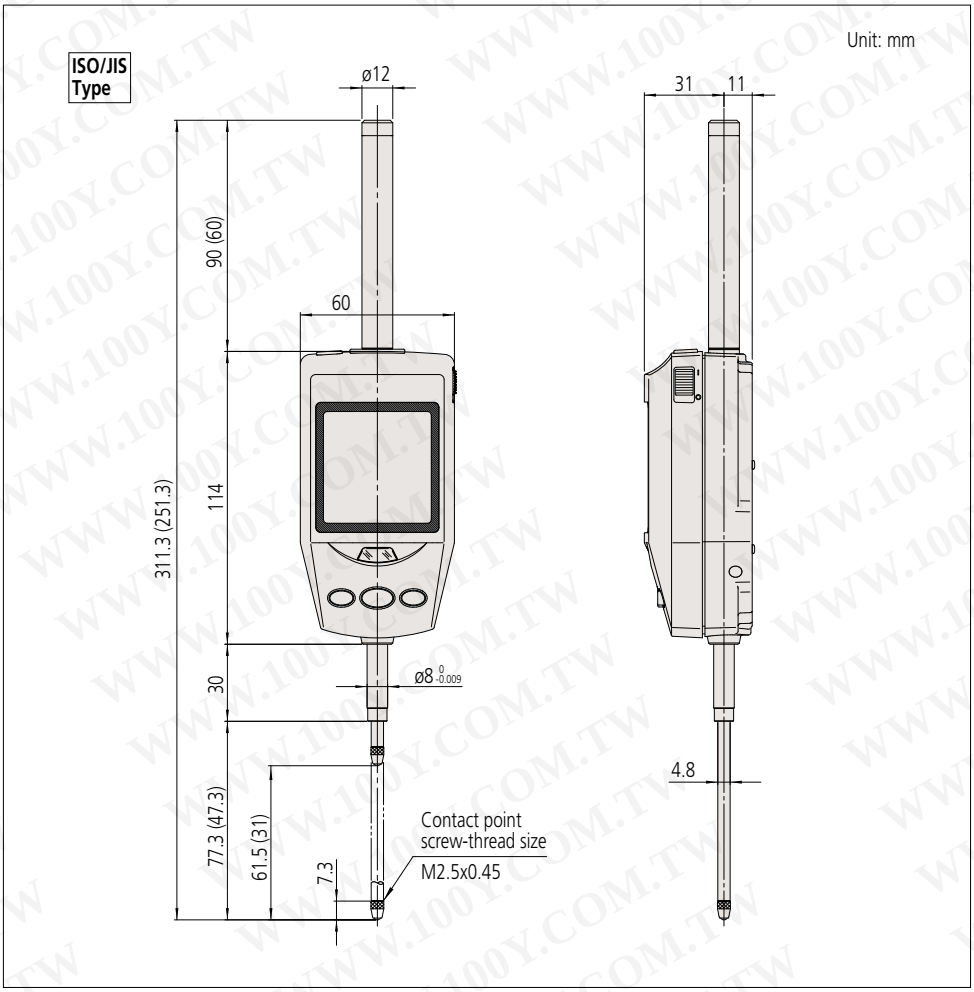
Inch/Metric

Order No.*	Resolution	Range	Accuracy**
543-562	.00002",	1.2"	.00006"
543-564	.00005", .0001", 0.0005mm, 0.001mm	2.4"	.0001"

* 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

ISO/JIS type ANSI/AGD type

DIMENSIONS



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.
( ): for 30.4mm model

F

Mitutoyo

Digimatic Indicators

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

ABLOLUTE Digimatic Indicator ID-CX SERIES 543 — Standard Type

- Employing the ABSOLUTE Linear Encoder, the Signal ID-C always displays the spindle "Absolute Position" from the origin at power-on.
  *1 Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-18.
- Thanks to the 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. Tolerance judgment result can be enlarged.
- Battery life of approx. 7,000 hours in continuous use has been achieved with only 1 pc of battery.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

Standard Type

Measuring range: 12.7mm
543-390B

• 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.

Actual size

• 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.

- Power switch
- Data output (when connected to an external device)
- Data hold (when no external device is connected)

Switches between the ABS (preset) and INC (zeroset) measurement modes

- Parameter setting mode
  Count direction switching, tolerance judgment setting, resolution switching, scale factor setting, and function lock setting
- inch/mm conversion (inch/mm models)

• 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 calculation factor (to any value) allows direct measurement without using a conversion table and 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

(Refer to page VIII for details.)

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is attached as standard.
Refer to page IX for details.

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 can not 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**
Battery life: Approx. 7,000 hours under normal 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

21EZA198: Spindle lifting lever (12.7mm/.5" ISO/JIS type)
21EZA199: Spindle lifting lever (12.7mm/.5" ANSI/AGD type)
21EZA105: Spindle lifting knob (12.7mm/.5" ISO/JIS type)*
21EZA150: Spindle lifting knob (12.7mm/.5" ANSI/AGD type)*
21EZA197: Spindle lifting knob (25.4mm/1")
21EZA200: Spindle lifting knob (50.8mm/2" models)
540774: Spindle lifting cable 12.7mm and 25.4mm
02ACA571: Auxiliary spindle spring (25.4mm/1" models)**
02ACA773: Auxiliary spindle spring (50.8mm/2" models)**
101040: Lug-on-center back (25.4mm/1" and 50.8mm/2", ISO/JIS type)
101306: Lug-on-center back (25.4mm/1" and 50.8mm/2", ANSI/AGD type)
* Not available for low measuring force models.
** Required when orienting the indicator upside down.
137693: Lifting lever (for measuring range: 25.4 and 50.8mm) (supplied with 25.4mm and 50.8mm models as standard.)

- SPC Cable:
  1m (**905338**)
  2m (**905409**)
- Connecting Cables for **U-WAVE-T**:
  160mm (**02AZD790F**)
  For footswitch (**02AZE140F**)
  Refer to page A-15 for details.
- Digimatic Mini-Processor **DP-1VR**: **264-504**
- Contact points for Mitutoyo's dial indicators
  (Refer to pages F-46 to F-49 for details.)
  Interchangeable backs for 2 series
  (Refer to pages F-50 for details.)
- Measuring stands
  Specifications are subject to change without notice.

Low measuring force type
543-394B

Measuring range 25.4mm
543-470B

Measuring range 50.8mm
543-490B

Setting measuring force on low measuring force models

• 543-404/404B/405/405B/406/406B

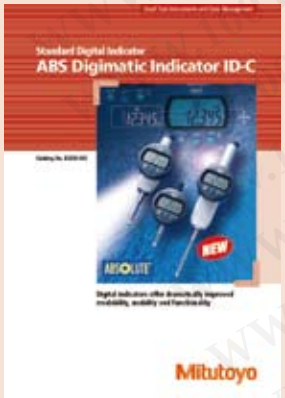
Spindle orientation	Spring	Weight (approximately 0.1N)	Maximum measuring force
Pointing vertically downward	Yes	Yes	0.5N or less
	Yes	No	0.4N or less
	No	Yes	0.3N or less
	No	No	0.2N or less
Horizontal	Yes	No	0.2N or less

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
	No	No	Not guaranteed
Horizontal	Not guaranteed		

Note) Operation using configurations other than shown above is not guaranteed.



Refer to **Catalog E4330-543** "ABS Digimatic Indicator ID-CX" for details.

SPECIFICATIONS

Metric

ISO/JIS type ANSI/AGD type

Order No. (w/ lug, flat-back)		Resolution	Range	Overall*	Measuring force	Remarks
543-390	**543-390B**	0.001mm	12.7mm	0.003mm	1.5N or less	—
543-394	**543-394B**	0.001mm	12.7mm	0.003mm	0.4N - 0.7N	Low measuring force
—	**543-470B**	0.001mm	25.4mm	0.003mm	1.8N or less	—
—	**543-490B**	0.001mm	50.8mm	0.005mm	2.3N or less	—
543-400	**543-400B**	0.01mm	12.7mm	0.02mm	0.9N or less	—
543-404	**543-404B**	0.01mm	12.7mm	0.02mm	0.2N - 0.5N	Low measuring force
—	**543-474B**	0.01mm	25.4mm	0.02mm	1.8N or less	—
—	**543-494B**	0.01mm	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)		Resolution	Range	Overall*	Measuring force	Remarks
543-391	**543-391B**	.00005"/0.001mm	.5"	.0001"	1.5N or less	—
543-392	**543-392B**	.00005"/0.001mm	.5"	.0001"	1.5N or less	—
543-395	**543-395B**	.00005"/0.001mm	.5"	.0001"	0.4N - 0.7N	Low measuring force
543-396	**543-396B**	.00005"/0.001mm	.5"	.0001"	0.4N - 0.7N	Low measuring force
—	**543-471B**	.00005"/0.001mm	1"	.0001"	1.8N or less**	—
—	**543-472B**	.00005"/0.001mm	1"	.0001"	1.8N or less**	—
—	**543-491B**	.00005"/0.001mm	2"	.0002"	2.3N or less**	—
—	**543-492B**	.00005"/0.001mm	2"	.0002"	2.3N or less**	—
543-401	**543-401B**	.0005"/0.01mm	.5"	.001"	0.9N or less	—
543-402	**543-402B**	.0005"/0.01mm	.5"	.001"	0.9N or less	—
543-405	**543-405B**	.0005"/0.01mm	.5"	.001"	0.2N - 0.5N	Low measuring force
543-406	**543-406B**	.0005"/0.01mm	.5"	.001"	0.2N - 0.5N	Low measuring force
—	**543-475B**	.0005"/0.01mm	1"	.001"	1.8N or less**	—
—	**543-476B**	.0005"/0.01mm	1"	.001"	1.8N or less**	—
—	**543-495B**	.0005"/0.01mm	2"	.0015"	2.3N or less**	—
—	**543-496B**	.0005"/0.01mm	2"	.0015"	2.3N or less**	—

Hysteresis*: .0005"/.0001"/.0005"/0.001mm/0.01mm
Resolution Type: .00010"/0.002mm
.0005"/0.01mm Resolution Type: .0010"/0.02mm

Repeatability*: .0005"/.0001"/.0005"/0.001mm/0.01mm
Resolution Type: .00010"/0.002mm
.0005"/0.01mm Resolution Type: .0005"/0.02mm

* Quantizing error of ±1 count is excluded
** Plunger direction is up to direction in which spindle is horizontal.

F

Mitutoyo

Digimatic Indicators

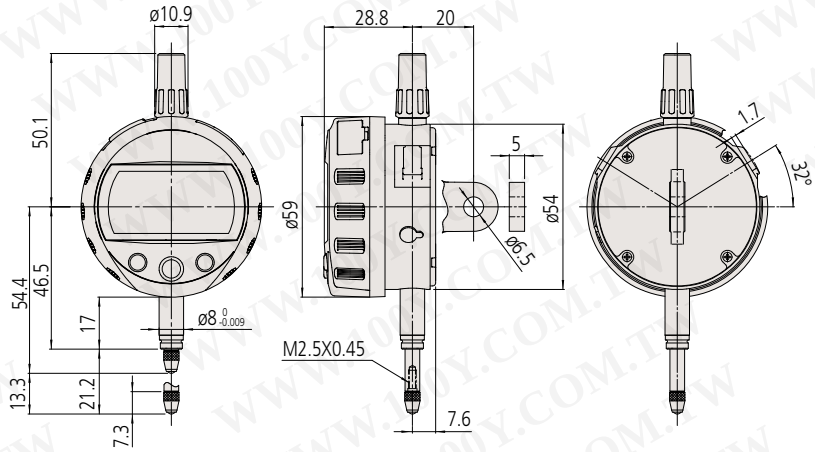
Comparison measuring instruments which ensure high quality, high accuracy and reliability.

DIMENSIONS

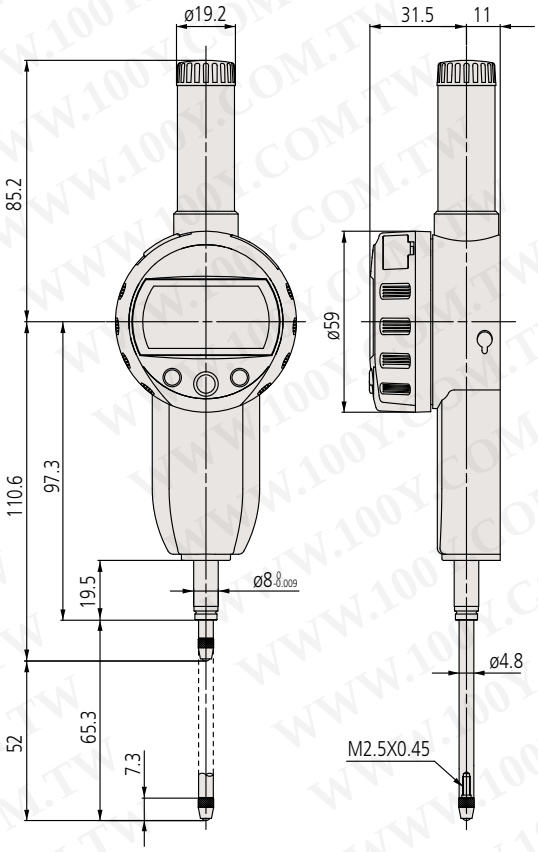
ISO/JIS Type

Unit: mm

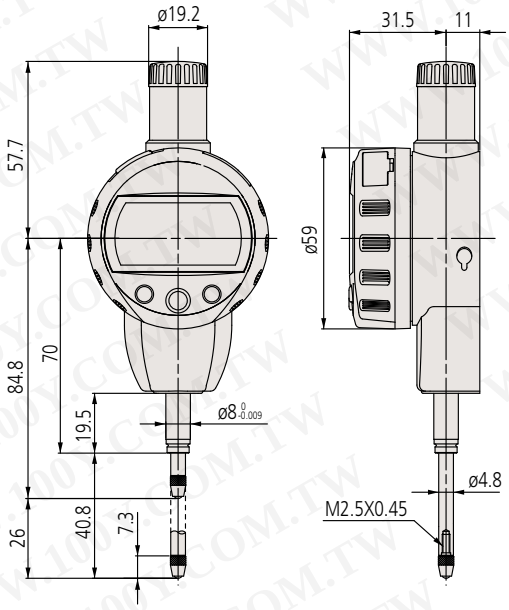
12.7mm range models



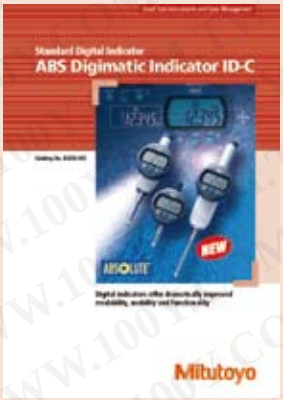
50.8mm range models



25.4mm range models



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.
Note 3: Products with an Order No. suffixed "B" have a plain back, and other models have a center lug back. Refer to pages F48 for details of the backs.



Refer to **Catalog E4330-543** "ABS Digimatic Indicator ID-CX" for details.

F

ABSOLUTE

(Refer to page VIII for details.)

Technical Data

Display: 6-digit LCD and sign
Scale type: ABSOLUTE electrostatic linear encoder
Measuring force: 1.5N or less
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(2pcs.) **938882**
Battery life: 6 months under normal use*
*Operation time par day: 8 hours

Functions

Preset, Zeroset, Max/Min value hold, Run out value hold, GO/±NG judgment, Counting
direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error, Overflow error, Tolerance limit setting error

Optional Accessories

902011: Spindle lifting lever (ISO/JIS type)
902794: Spindle lifting lever(ANSI/AGD type)
540774: Spindle lifting cable
905338: SPC cable (1m)
905409: SPC cable (2m)
Connecting Cables for **U-WAVE-T**:
160mm (**02AZD790F**)
For footswitch (**02AZE140F**)
Digimatic Mini-Processor **DP-1VR**: **264-504**
Contact points for Mitutoyo's dial indicators
(Refer to pages F-46 to F-49 for details.)
Interchangeable backs for 2 series
(Refer to pages F-50 for details.)
Measuring stands

ABSOLUTE Digimatic Indicator ID-C
SERIES 543 — Peak-Value Hold Type

- The maximum, minimum, or runout value can be measured and displayed during measurement.
- The ABS (ABSOLUTE) sensor restores the last origin position automatically when the indicator is turned on*1. It also realizes high reliability by eliminating over-speed errors.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.
- User friendly, battery-operated type.

* 1 Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-18

543-260

SPECIFICATIONS

Metric

Order No. (w/lug, flat-back)		Resolution	Range	Accuracy**
543-260	**543-260B**	0.001mm	12.7mm	0.003mm

ISO/JIS type ANSI/AGD type

Inch/Metric

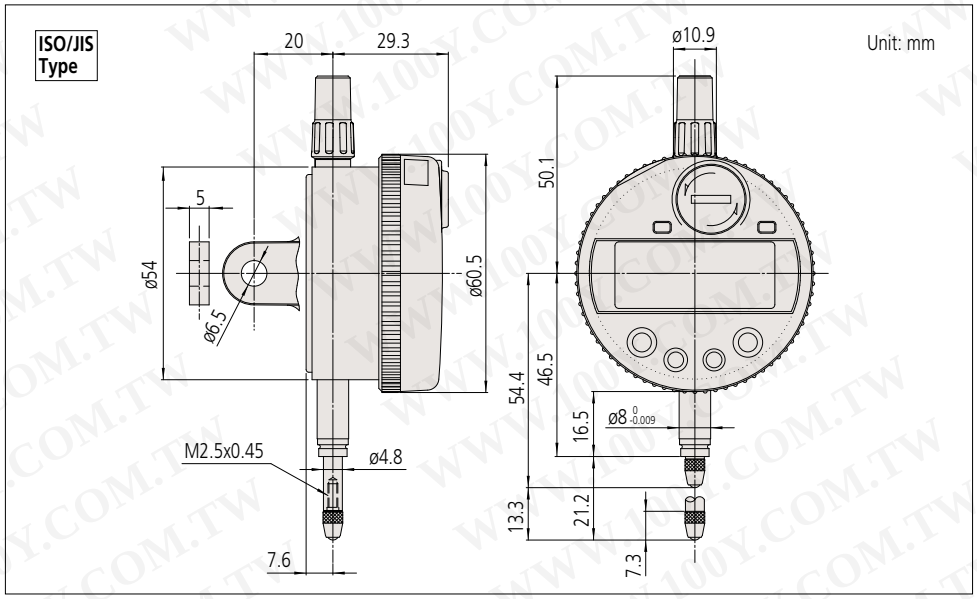
Order No. (w/lug, flat-back)		Resolution	Range	Accuracy**
543-261	**543-261B**	.00005" /0.001mm	.5"	.00012"
543-262	**543-262B**	.00005" /0.001mm	.5"	.00012"
543-263	**543-263B**	.0001" /0.001mm	.5"	.00012"

Notes:
1) GO/±NG judgment result cannot be output.
2) Max./Min. holding: Sample rate is 50 readings per sec.
Change rate of reading is 50µm per sec.
3) Order numbers suffixed "B" have a plain back.
** Quantizing error of ±1 count is excluded.

DIMENSIONS

ISO/JIS Type

Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

F

Mitutoyo

Digimatic Indicators

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

ABSOLUTE Digimatic Indicator ID-C SERIES 543 — Calculation Type

- The Calculation-Type Digimatic indicator incorporates an internal calculation function that operates from spindle displacement. With fixtures the measurement of outside and inside diameter, and radius of curvature, can easily be obtained without the hassle of conversion tables or equivalents.
- The ABS (ABSOLUTE) sensor restores the last origin position*1 automatically when the indicator is turned on.
- The chance of over-speed error has been avoided thanks to the ABS sensor.
- Tolerance judgment is available by presetting upper and lower limit values.
- 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.
  (Refer to page A-3 for details.)

*1 Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-18.

543-285B

SPECIFICATIONS

Metric

Order No.*	Resolution	Range	Accuracy*2	Measuring force
543-285B	0.001mm	12.7mm	0.003mm	1.5N or less
543-480B		25.4mm	0.003mm	1.8N or less*3
543-485B		50.8mm	0.006mm	2.3N or less*3

* Flat back

Inch/Metric

Order No.*	Resolution	Range	Accuracy*2	Measuring force
543-286B	.00005"/ 0.001 mm	.5"	.00012"	1.5N or less
543-287B		.5"	.00012"	1.5N or less
543-481B		1"	.00012"	1.8N or less*3
543-482B		1"	.00012"	1.8N or less*3
543-486B		2"	.00025"	2.3N or less*3
543-487B		2"	.00025"	2.3N or less*3

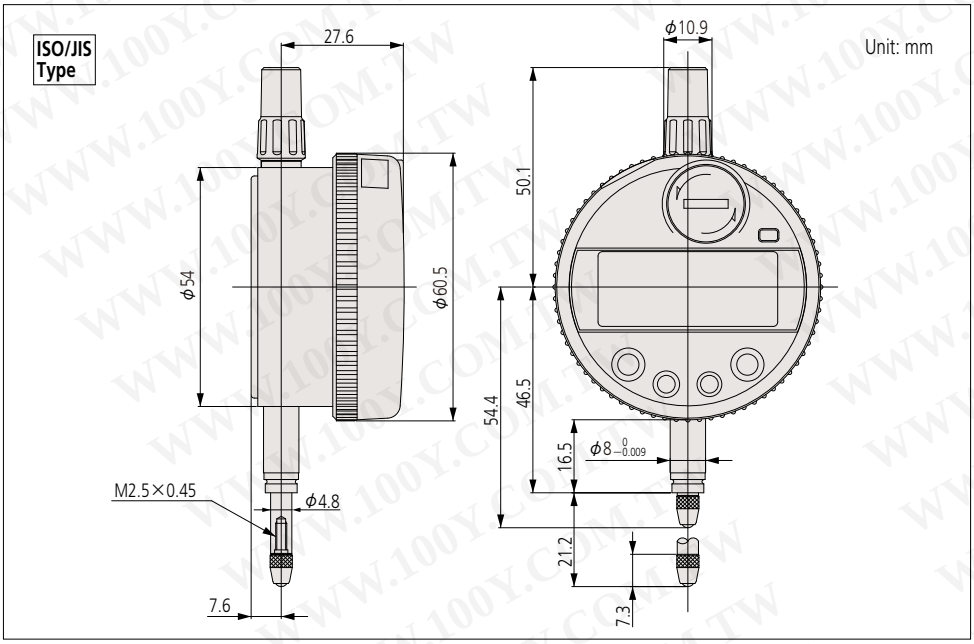
* Flat back ISO/JIS type ANSI/AGD type

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 pages F-50 for details of the optional backs.

*2 Depends on the values of the arithmetic coefficients currently set.
Quantizing error of ±1 count is excluded.

*3 Plunger direction is up to direction in which spindle is horizontal.

DIMENSIONS



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

ABSOLUTE

(Refer to page VIII for details.)

Technical Data

CDisplay: 6-digit LCD and sign
Scale type: ABSOLUTE electrostatic linear encoder
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 (2pcs.) **938882**
Battery life: 1 year under normal use
(Operation time par day: 8 hours)

Functions

Calculation fanction
$f(x) = Ax + B + Cx^{-1}$
Max./Min. value hold*5
Preset, Zeroset, GO/±NG judgment,
Power ON/OFF,
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
Resolution switching function*4
The resolution can be selected from one of 12 levels.

Resolution (mm)		
0.0002	0.005	0.1
0.0005	0.01	0.2
0.001	0.02	0.5
0.002	0.05	1

Resolution (inch)		
0.00001	0.0002	0.005
0.00002	0.0005	0.01
0.00005	0.001	0.02
0.0001	0.002	0.05

*4 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.

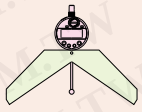
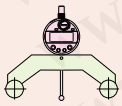
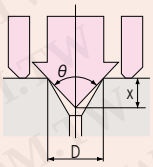
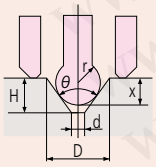
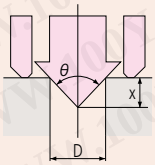
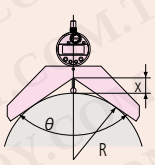
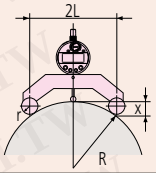
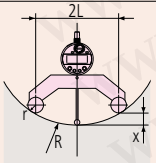
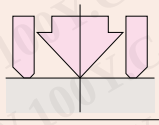
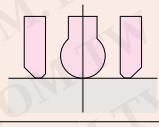
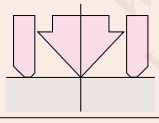
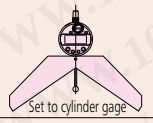
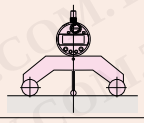
*5 Spindle speed exceeds 10μm/sec, the correct peak value may not be displayed.

Optional Accessories

902011: Spindle lifting lever (ISO/JIS type)
902704: Spindle lifting lever (ANSI/AGD type)
02ACA571: Auxiliary spindle spring (25.4mm/1"model)
02ACA773: Auxiliary spindle spring (50.8mm/2"model)
540774: Spindle lifting cable
905338: SPC cable (1m)
905409: SPC cable (2m)
Refer to page A-21 for details.
Connecting Cables for **U-WAVE-T**:
160mm (**02AZD790F**)
For footswitch (**02AZE140F**)
Refer to page A-15 for details.
Digimatic Mini-Processor **DP-1VR**: **264-504**
Contact points for Mitutoyo's dial indicators
(Refer to pages F-46 to F-49 for details.)
Interchangeable backs for 2 series
(Refer to pages F-50 for details.)
Measuring stands

Fixture example

Examples of measuring various features

Fixture type*4								
Contact point		Cone		Ball		Cone	Ball or Flat	Ball or Flat	Ball or Flat
x = Spindle displacement									
Feature measured		D = Diameter / Groove width		H = Countersink depth		D = Hole diameter / Groove width	2R = Outside diameter		2R = Inside diameter
Calculation formula		D = Ax		D = Ax+B	H = Ax+B	D = Ax	R = Ax		
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				0	0	$-r$	r
	C	0		0	0	0	0	$\frac{L^2}{2}$	$-\frac{L^2}{2}$
Origin setting position (generally the position when x = 0)									
Indicated value when origin setting (generally the indicated value when x = 0)		0		Value of coefficient B		0	0	E - - oF (Overflow)	

* 4 Fixtures suited to individual workpieces can be made-to-order.
Note: Measuring accuracy is subject to fixture accuracy and form accuracy of workpiece.

F

Mitutoyo

Digimatic Indicators

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

ABSOLUTE Digimatic Indicator ID-C
SERIES 543 — Signal Output Function Type

- With the max./min. value holding function, this indicator can output the signal of the GO/±NG judgement result against the peak value set. Substitute for the mechanical/ electrical contact, the judgement is carried out by calculating the measurement data obtained. This provides high reliability with no deterioration of the contact point and volume adjustment.
- Employing the ABSOLUTE Linear Encoder, the Signal ID-C always displays the spindle "Absolute Position" from the origin at power-on. Also, the reliability has been increased due to the elimination of over-speed errors.
- The judgment signal can be output to an external device, such as a sequencer
- Provided with a 4m cable.
- External power DC 12 – 24V.
- Dust-water protection level: Conforms to IP54

*1 Regarding the origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-18.

543-280

IP54

ABSOLUTE

(Refer to page VIII for details.)

SPECIFICATIONS

Metric — ISO/JIS type — ANSI/AGD type

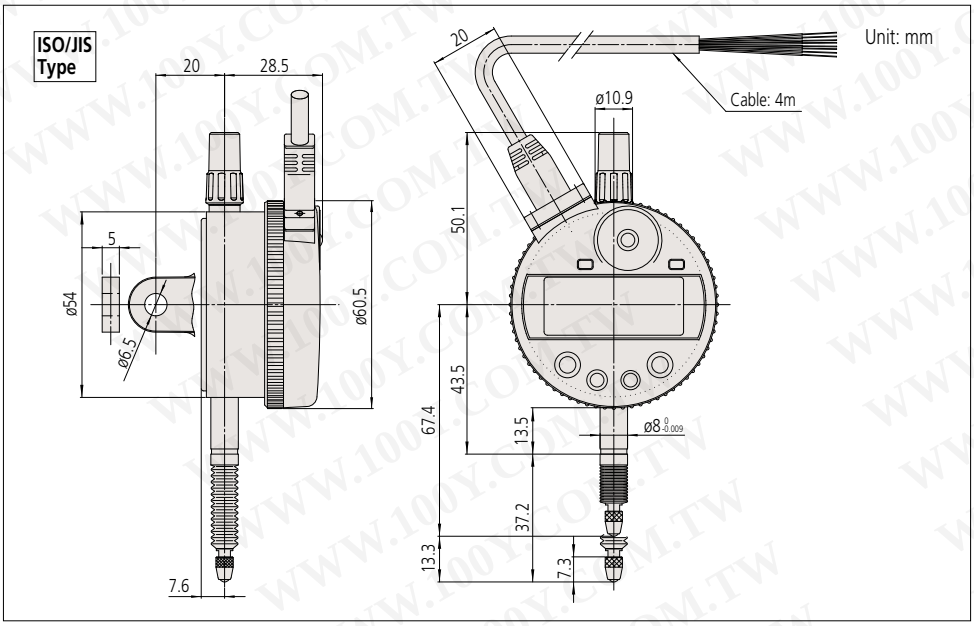
Order No. (w/ lug, flat-back)		Resolution	Range	Accuracy*	Measuring force	Remarks
543-280	543-280B	0.001mm	12.7mm	0.003mm	2.0N or less	—

Inch/Metric

Order No. (w/ lug, flat-back)		Resolution	Range	Accuracy*	Measuring force	Remarks
543-281	543-281B	.00005"/0.001mm	.5"	.00012"	2.0N or less	—
543-282	543-282B	.00005"/0.001mm	.5"	.00012"	2.0N or less	—
543-283	543-283B	.0005"/0.01mm	.5"	.00012"	2.0N or less	—

Notes:
1) LCD readout does not rotate.
2) Max./min. holding: sample rate is 50 readings/sec; max. rate of change of reading is 50µm/sec.
3) Products with an Order No. suffixed "B" have a flat back
4) Standard contact point: **901312** (ISO/JIS type), **21BZA005** (ANSI/AGD type)
* Quantizing error of ±1 count is excluded.

DIMENSIONS



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

Functions

Signal output (–NG/OK/+NG, NPN open collector), Remote control (hold-reset, preset-recall, zero-set), Preset, Zeroset, GO/±NG judgment, Max/Min/ Runout value holding, Counting direction switching, Power ON/OFF, inch/mm conversion (inch/mm models)
Alarm: Counting value composition error, Overflow error, Tolerance limit setting error

Optional accessories

Spindle lifting lever (ISO/JIS type): **902011***4
Spindle lifting lever (ANSI/AGD type): **902794**
Spindle lifting cable: **540774***4
Rubber boot: **02ACA376**
Contact points for Mitutoyo's dial indicators*5
Interchangeable backs for Series 2 models*6
Note: Use the waterproof types of Series 2 for plain backs.
Measuring stands
*4 Dust-water protection is not guaranteed.
*5 Refer to pages F-46 to F-49 for details.
*6 Refer to pages F-50 for details.

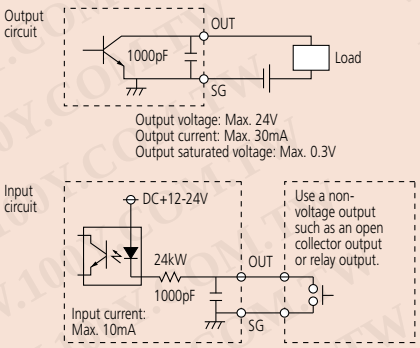
Output pattern

Wire	– NG	OK	+ NG	Composition error
Orange (– NG)	Low	High	High	High
Green (OK)	High	Low	High	High
Brown (+ NG)	High	High	Low	High
LED	Red	Green	Red	Red (blinking)
LCD	<	O	>	"x.xxE" indication

I/O Specifications

Wire	Signal	I/O	Description
Black	– V (GND)	—	Connected to minus (-) terminal
Red	+ V	I	Power supply (12 - 24VDC)
Orange	– NG	O	Tolerance judgment result output: Only the terminal corresponding to a judgment result is set to the low level.
Green	OK	O	
Brown	+ NG	O	
Yellow	PRESET_RECALL ZERO	I	External input terminal: If the relevant terminal is set to the low level, its signal becomes true.
Blue	HOLD_RESET	I	
Shield	FG	—	Connected to GND

Note: Measurement data cannot be output.



F

ABSOLUTE

(Refer to page VIII for details.)

Functions

Presetting, Power on/off, inch/mm coversion (inch/mm type only), 3set of master value and tolerance value memory, GO/±NG tolerance judgment, Min value holding, Data hold

Optional accessories

SPC Cable:
1m (**905338**)
2m (**905409**)
Refer to page A-15 for details.
Connecting Cables for **U-WAVE-T**:
160mm (**02AZD790F**)
For footswitch (**02AZE140F**)
Refer to page A-15 for details.
Digimatic Mini-Processor **DP-1VR**: **264-504**

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-41 and C-42 for details.

Example of bore gage (optional) equipped with an IDC Digimatic Indicator

ABSOLUTE Digimatic Indicator ID-C
SERIES 543 — Bore Gage Type

- Exclusively designed for Bore Gages: this ID-C series has the minimum value holding and GO/±NG judgment function.
- Employing an ABSOLUTE Linear Encoder, the Signal ID-C always displays the spindle's "Absolute Position" from the origin at power-on. Also, the reliability has been increased due to elimination of over-speed errors.
  Note: Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-20.
- An analog bar indication is integrated to provide the advantages of analog display for minimum value measurements.
- Up to three sets of reference diameter and upper/lower tolerance values can be memorized to simplify the start-up key operation in repeatable hole inspection of mixed diameter holes.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

543-264B

SPECIFICATIONS

Metric

Order No.*	Resolution	Range	Accuracy*2
543-264B	0.001mm	12.7mm	0.003mm

*Flat back

Metric/Inch

Order No.*	Resolution	Range	Accuracy*2
543-265B	0.001mm/.00005"	12.7mm	0.003mm
543-267B	0.001mm/.0001"	12.7mm	0.003mm

*Flat back
Measuring force: 1.5N or less
Battery: SR44 (2pcs.) **938882**
Battery life: 9 months under normal use*3

Inch/Metric

Order No.*	Resolution	Range	Accuracy*2
543-266B	.00005"/0.001mm	.5"	.00012"

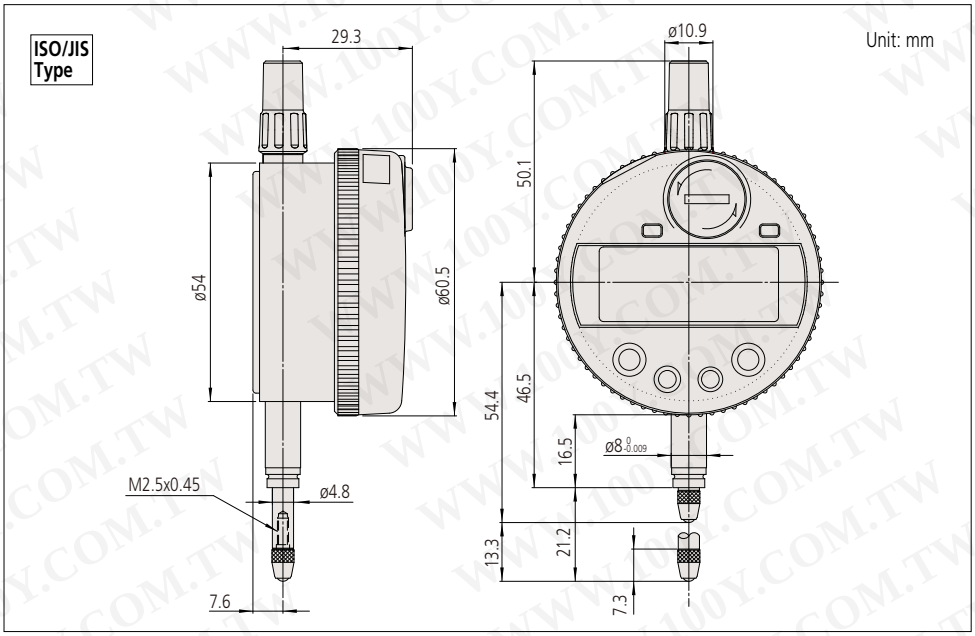
*Flat back ☐ ISO/JIS type ☐ ANSI/AGD type

*2 Quantizing error of ±1 count is excluded.
*3 Operation time per a day: 8 hours
Notes:
1) Min. holding: sample rate is 50 readings/sec; max. rate of change of reading 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.
4) Standard contact point: **901312** (ISO/JIS type)
21BZB005 (ANSI/AGD type)

DIMENSIONS

ISO/JIS Type

Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

F

Mitutoyo

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.

Green indication for GO judgment

Red indication for ±NG judgment

- With the 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-18.
- 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.

Multi-functional model

SPECIFICATIONS

Metric

Order No.*	Resolution	Range	Accuracy**
543-551	0.001mm, 0.01mm	25mm	0.003mm
543-557		50mm	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.

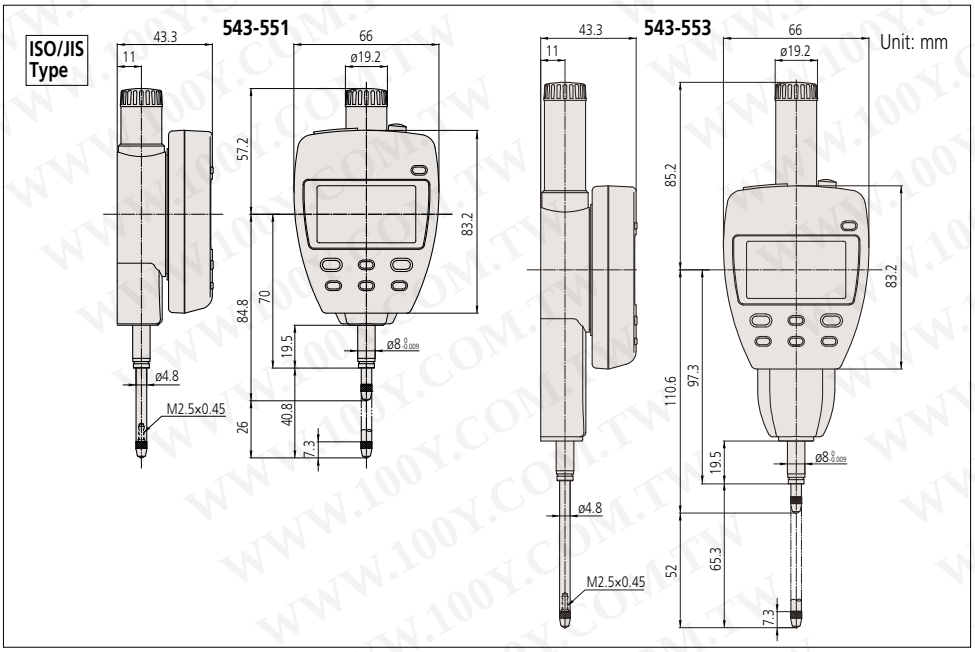
Inch/Metric

Order No.*	Resolution	Range	Accuracy**
543-552	.00002", .00005", .0001", .0005", .001", 0.001mm, 0.01mm	1"	.00012"
543-558		2"	.00012"
543-554		2"	.00024"

* 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.

ISO/JIS type ANSI/AGD type

DIMENSIONS



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

ABSOLUTE

(Refer to page VIII for details.)

Technical Data

Resolution: 0.01mm/0.001mm or .00005"/.0001"/.0005"/.001"/0.001mm/0.01mm
Display: LCD Character Height 8.5mm
Scale type: ABSOLUTE electrostatic linear encoder
Max. response speed: Unlimited
Measuring force: 1.8N/2.3N* or less (*50mm range models)
Plunger direction: Up to direction in which spindle is horizontal.
Stem dia.: 8mm (ISO/JIS type) or 3/8" (ANSI/AGD type)
Standard contact point: **901312** (ISO/JIS type)
21BZB005 (ANSI/AGD type)
Power supply: 9V DC (via AC adaptor)
Lifting lever: **137693**

Functions

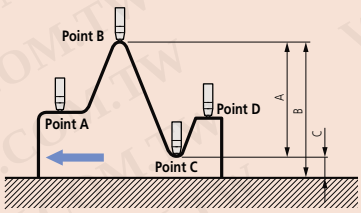
Preset, Zeroset, GO/±NG judgment, Max/Min value hold, Runout measurement, Resolution switching, Counting direction switching, Power ON/OFF, Data output, inch/mm conversion (inch/mm models)
Alarm: Counting value composition error, Overflow error, Tolerance limit setting error

Optional Accessories

Spindle lifting cable (stroke: 25.4mm): **540774**
Lifting knob: **21EZA197** (for the model with the measuring range of 25.4mm)
Lifting knob: **21EZA200** (for the model with the measuring range of 50.8mm)
Center-lug back: **101040** (ISO/JIS type)
101306 (ANSI/AGD type)
Auxiliary spindle spring for 25mm/1" models: **02ACA571**
Auxiliary spindle spring for 50mm/2" models: **02ACA773**
SPC cable: 1m (**936937**)
2m (**965014**)
Connecting Cables for **U-WAVE-T**:
160mm (**02AZD790D**)
For footswitch (**02AZE140D**)
Contact points for Mitutoyo's dial indicators *4
Interchangeable backs for Series 2 models*5
Measuring stands
*4 Refer to pages F-46 to F-49 for details.
*5 Refer to pages F-50 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.



F

ABSOLUTE

(Refer to page VIII for details.)

Technical Data

Display: LCD Character Height 8.5mm
Scale type: ABSOLUTE electrostatic linear encoder
Max. response speed: Unlimited (Measurement by scanning can not 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**
Battery life: Approx. 20,000 hours under normal use
Dust/Water protection level: IP42 (IP53: **543-694**, **543-695**, **543-696**)

Function

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

Optional Accessories

Spindle lifting lever (ISO/JIS type): **903424**
Spindle lifting lever (ANSI/AGD type): **No. 903425**
Spindle lifting cable: **540774**
Contact points for Mitutoyo's dial indicators
(Refer to pages F-46 to F-49 for details.)
Special backs:
Post-type Back: **02ACB610**
Adjustable Back: **02ACB630**
Offset-lug Back: **02ACB640**
Magnetic Back: **02ACB650**
Screw-mount Back: **02ACB670**
Adjustable-bracket Back: **02ACB680**
SPC Cable:
1m (**905338**)
2m (**905409**)
Connecting Cables for **U-WAVE-T**:
160mm (**02AZD790F**)
For footswitch (**02AZE140F**)
Digimatic Mini-Processor DP-1VR: **264-504**
Measuring Stands

ABSOLUTE Digimatic Indicator ID-S SERIES 543 — Economical Design

- Cost-effective and user-friendly type which is equipped with selected, necessary functions. Especially, **543-690** and **543-694** are a low-priced type with a resolution of 1µ.
- Dust-water protection level: IP42*1,*3 IP53 *2,*3: **543-694**, **543-695**, **543-696**)
- The ABS (ABSOLUTE) sensor restores the last origin position automatically when the indicator is turned on. It also realizes high reliability by eliminating over-speed errors. Regarding origin setting, refer to "Origin Setting of Digimatic Indicators" on page F-18.
- Battery life of 20,000 hours in continuous use has been achieved.
- Easy-to-read large LCD readout with the character height of 8.5mm.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

*1 Protected against solid foreign objects and vertical water drops
*2 Protected against dust and spraying water
*3 Both the cap (without the spindle lifting lever and the spindle lifting cable) and the output cap have to be mounted to keep this rating. Anti-corrosive treatment is necessary after use.

General purpose type

543-690

SPECIFICATIONS

Metric

ISO/JIS type ANSI/AGD type

Order No. (w/ lug, flat-back)		Resolution	Range	Accuracy*2	Measuring force	Remarks
543-690	**543-690B**	0.001mm	12.7mm	0.003mm	2.0N or less	—
543-694	**543-694B**	0.001mm	12.7mm	0.003mm	2.5N or less	Dust-proof (IP53)
543-681	**543-681B**	0.01mm	12.7mm	0.02mm	2.0N or less	—

Inch/Metric

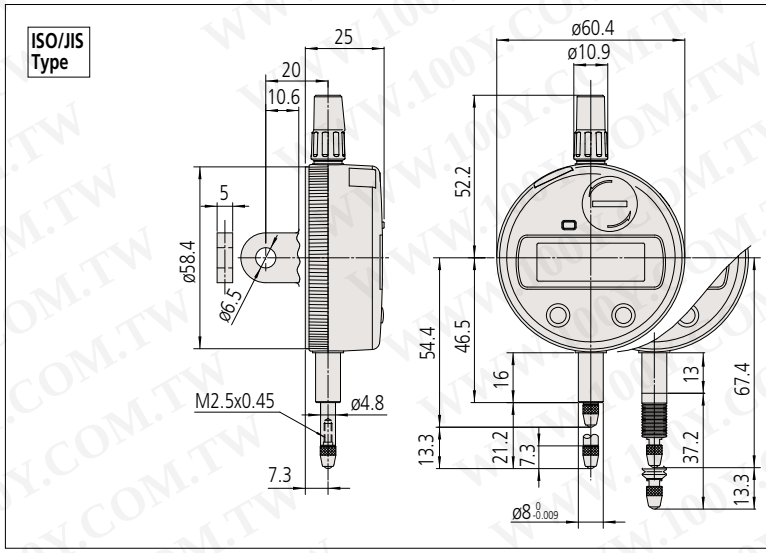
Order No. (w/ lug, flat-back)		Resolution	Range	Accuracy*2	Measuring force	Remarks
543-691	**543-691B**	.00005"/0.001mm	.5"	.00012"	2.0N or less	—
543-695	**543-695B**	.00005"/0.001mm	.5"	.00012"	2.5N or less	Dust-proof (IP53)
543-692	**543-692B**	.00005"/0.001mm	.5"	.00012"	2.0N or less	—
543-696	**543-696B**	.00005"/0.001mm	.5"	.00012"	2.5N or less	Dust-proof (IP53)
543-693	**543-693B**	.0001"/0.001mm	.5"	.00012"	2.0N or less	—
543-682	**543-682B**	.0005"/0.01mm	.5"	.0008"	2.0N or less	—
543-683	**543-683B**	.0005"/0.01mm	.5"	.0008"	2.0N or less	—

* Products with an Order No. suffixed "B" have a plain back.
*2 Quantizing error of ±1 count is excluded.

DIMENSIONS

ISO/JIS Type

Unit: mm



543-694

Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

F

Mitutoyo

Digimatic Indicators

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

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-20.
- 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

ABSOLUTE

(Refer to page VIII for details.)

Technical Data

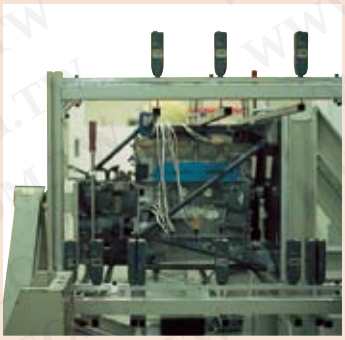
Accuracy: Refer to the list of specifications (Excluding quantizing error of ±1 count)
Resolution: 0.01mm, .0005"/0.01mm
Display: LCD Character Height 8.5mm
Scale type: ABSOLUTE electrostatic linear encoder
Max. response speed: Unlimited (Measurement by scanning can not be performed)
Measuring force: 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**
Battery life: Approx. 20,000 hours under normal use
Dust/Water protection level: IP42
Lifting lever: **137693**

Function

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

Optional Accessories

Spindle lifting cable (stroke: 10mm): **540774**
Contact points for Mitutoyo's dial indicators
(Refer to pages F-46 to F-49 for details.)
SPC Cable:
1m (**905338**)
2m (**905409**)
Refer to page A-15 for details.
Connecting Cables for **U-WAVE-T**:
160mm (**02AZD790F**)
For footswitch (**02AZE140F**)
Digimatic Mini-Processor **DP-1VR**: **264-504**
Measuring Stands



Application example

SPECIFICATIONS

Metric

ISO/JIS type ANSI/AGD type

Order No. (w/ lug, flat-back)		Resolution	Range	Accuracy*	Measuring force
—	**575-121**	0.01mm	25.4mm	0.02mm	1.8N or less

Inch/Metric

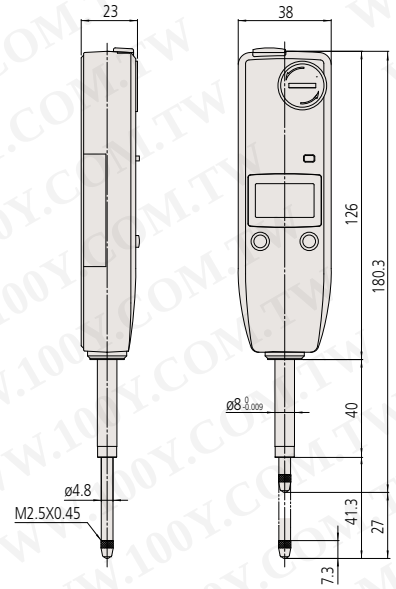
Order No. (w/ lug, flat-back)		Resolution	Range	Accuracy*	Measuring force
—	**575-122**	.0005"/0.01mm	1"	.0008"	1.8N or less
—	**575-123**	.0005"/0.01mm	1"	.0008"	1.8N or less

*Quantizing error of ±1 count is excluded

DIMENSIONS

ISO/JIS Type

Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

Supplemental information on Digimatic Indicators

Origin setting of Digimatic Indicators

The stability of measurement within 0.2mm from the start of spindle travel is not guaranteed, so this region should not be used during operation.

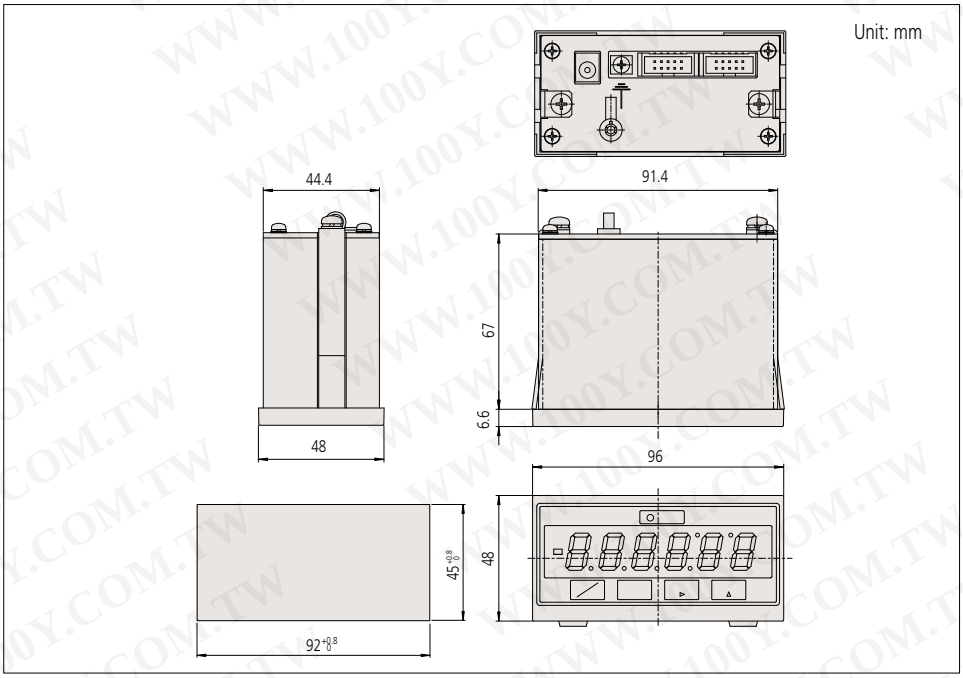
EC Counter
SERIES 542 — Low-cost, Modular Type Display Unit

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.

DIMENSIONS

Unit: mm



F

Mitutoyo

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 graduation plates, 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 resolution dial indicators employ a sector gear made of a special alloy in order to further increase the resistance to wear.
F- and 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 list below to help choose a suitable model for your application.

Parts of a dial indicator

Feature icons

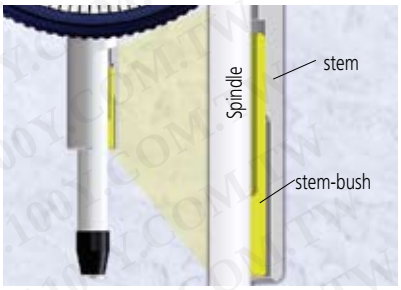
Icon	Feature description
	Reverse reading type Suitable for depth and step measurement.
	One revolution type for easy and error-free reading
	Double scale spacing type, easy-on-the-eyes
	Shockproof type
63	Waterproof type (IP63)
64	Waterproof type (IP64)
	With damper at lowest rest point
	Jeweled bearing type
STOP	Peak retaining type
	Dustproof type
	With coaxial revolution counter
90°	Back plunger type
	Adjustable hand type

*Mitutoyo produces ASME-compatible products. Contact us for details.

F

FEATURES: S Series (Series 2, 3, 4)

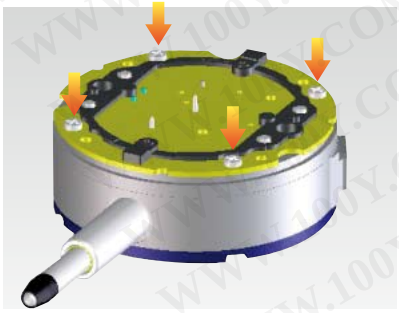
- No through screw-holes on the frame for high oil- and dust-resistance. The bezel clamp can be attached either to the right or left side.
- Improved Impact- and oil-resistant materials are employed in the outer frame. Easier reading is due to the improved shape of the crystal face.



- Revolutionary stem-bush design for trouble-free stem clamping (longer clamping range; maximum tightening torque at the clamping point with M5 screw: 150N-cm).

- 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.

- 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.

F

Mitutoyo

Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

SERIES 2
2046S

- Standard 0.01mm graduation dial indicators 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 any tools.
- Both the stem and the spindle are made of high-strength quench-hardened stainless steel.
- A carbide contact point is fitted.
- 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.

SPECIFICATIONS

Metric

ISO/JIS type

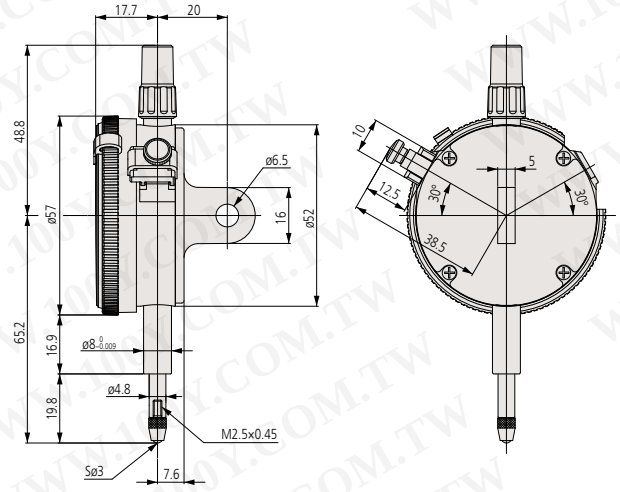
Order No.		Graduation	Range (range/rev)	Accuracy				Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			Overall	Retrace	1/10 Rev	1 Rev			
2046S	**2046SB**	0.01mm	10mm (1mm)	13µm	3µm	5µm	10µm	3µm	±0-100	1.4N or less
2046S-09	**2046SB-09**	0.01mm	10mm (1mm)	15µm	3µm	5µm	10µm	3µm	±0-100	1.4N or less
2046S-60	**2046SB-60**	0.01mm	10mm (1mm)	13µm	3µm	5µm	10µm	3µm	±0-100	2.5N or less

*Use in a vertical position only (contact point downward).

DIMENSIONS

ISO/JIS Type

Unit: mm



An inspection certificate is attached as standard.
Refer to page IX for details.

SERIES 1 — Compact Type

- Compact dial indicators with outer bezel diameters of ø31, ø36, and ø40 for restricted-space applications in gaging jigs.

1911

Resolution: 0.01mm, Measuring range: 2.5mm **1911**

Resolution: 0.002mm, Measuring range: 0.5mm **1913-10**

1003

1040S

1044S

1109S-10

Resolution: 0.01mm, Measuring range: 4mm **1003**

Resolution: 0.01mm, Measuring range: 3.5mm **1040S**

Resolution: 0.01mm, Measuring range: 3.5mm **1041S**

Resolution: 0.01mm, Measuring range: 5mm **1044S** **1044S-15** **1044S-60**

Resolution: 0.01mm, Measuring range: 5mm **1045S**

Resolution: 0.005mm, Measuring range: 3.5mm **1124S**

Resolution: 0.002mm, Measuring range: 1mm **1013S-10**

Resolution: 0.001mm, Measuring range: 1mm **1109S-10**

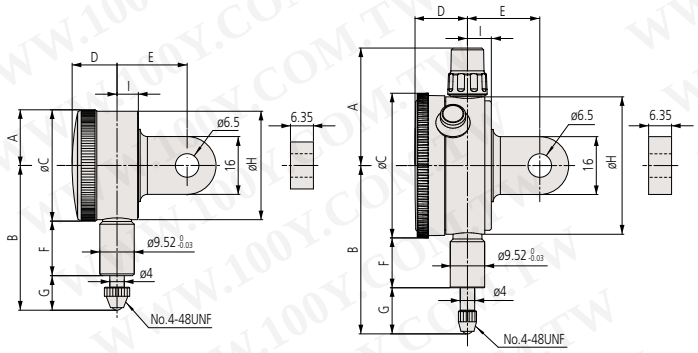
F

Dial Indicators

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

DIMENSIONS

ANSI/AGD Type



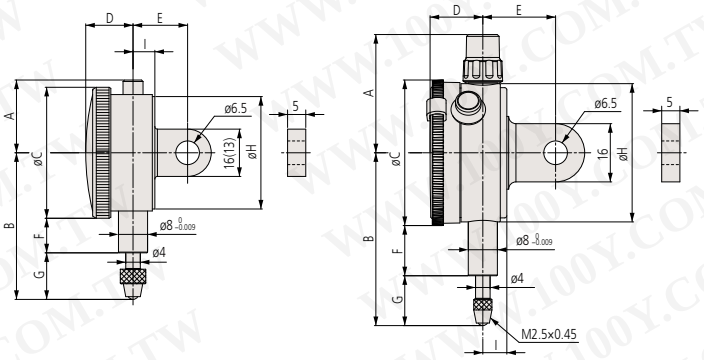
Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.

Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

Unit: mm

Order No.	A	B	C	D	E	F	G	H	I
1921	15.5	40	31	12.5	19	15	9.5	30	7
1923	15.5	38.3	31	12.5	19	15	7.8	30	7
1927-10	15.5	37.2	31	12.5	19	15	6.7	30	7
1925-10	15.5	37.5	31	12.5	19	15	7	30	7
1410S	32.5	47.6	40	14.5	19	12.8	14.8	38	6.6
1411S	32.5	47.6	40	14.5	19	12.8	14.8	38	6.6
1410S-10	32.5	47.6	40	14.5	19	12.8	14.8	38	6.6
1780S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1781S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1506S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1507S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1670S	32.5	43.4	40	14.5	19	12.8	10.6	38	6.6
1671S	32.5	43.4	40	14.5	19	12.8	10.6	38	6.6
1802S-10	32.5	41.3	40	14.5	19	12.5	8.5	38	6.6
1803S-10	32.5	41.3	40	14.5	19	12.5	8.5	38	6.6

ISO/JIS Type



Order No.	A	B	C	D	E	F	G	H	I
1911	15.5	42	31	12.5	19	15	11.5	30	7
1913-10	15.5	39.5	31	12.5	19	15	9	30	7
1003	20	40.3	36	13	15	9.5	12.8	32	6
1013S-10	32.5	49	40	14.5	20	13.8	15.2	38	6.6
1040S	32.5	46	40	14.5	20	13.8	12.2	38	6.6
1041S	32.5	46	40	14.5	20	13.8	12.2	38	6.6
1044S	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1044S-15*2	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1044S-60	32.5	57	40	14.5	20	12.2	24.8	38	6.6
1045S	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1109S-10	32.5	49	40	14.5	20	13.8	15.2	38	6.6
1124S	32.5	46	40	14.5	20	13.8	12.2	38	6.6

*2 Use in a vertical position (contact point downward) for the low measuring force model and the long stroke model.

FEATURES

Metric

Order No.				
w/ lug	Flat-back			
1911	1911B	—	—	—
1913-10	1913B-10	—	✔	—
1003	1003B	—	—	—
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	—	—	—

Inch

Order No.			
w/ lug	Flat-back		
1921	1921B	—	—
1923	1923B	—	—
1927-10	1927B-10	✔	—
1925-10	1925B-10	✔	—
1410S	1410SB	—	—
1411S	1411SB	—	—
1410S-10	1410SB-10	✔	—
1780S	1780SB	—	—
1781S	1781SB	—	—
1506S	1506SB	—	—
1507S	1507SB	—	—
1670S	1670SB	—	—
1671S	1671SB	—	—
1802S-10	1802SB-10	✔	✔
1803S-10	1803SB-10	✔	✔

F

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			
1911	**1911B**	0.01mm	2.5mm (1mm)	12µm	4µm	8µm	10µm	3µm	0-50-0	1.8N or less
1913-10	**1913B-10**	0.002mm	0.5mm (0.2mm)	6µm	2.5µm	2.5µm	5µm	1µm	0-100-0	1.8N or less
1003	**1003B**	0.01mm	4mm (1mm)	13µm	4µm	8µm	11µm	3µm	0-50-0	1.4N or less
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

*Use in a vertical position only (contact point downward).

Inch

ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
1921	**1921B**	.001″	.1″ (.04″)	±.001″ / ±.001″ / —	.0002″	±.0002″	0-20-0	1.8N or less
1923	**1923B**	.0005″	.05″ (.02″)	±.0005″ / ±.005″ / —	.0016″	±.0001″	0-10-0	1.8N or less
1927-10	**1927B-10**	.0001″	.01″ (.004″)	±.0002″ / ±.0002″ / —	.0001″	±.00003″	0-2-0	1.8N or less
1925-10	**1925B-10**	.0001″	.025″ (.01″)	±.0002″ / ±.0002″ / —	.0001″	±.00003″	0-5-0	1.8N or less
1410S	**1410SB**	.001″	.25″ (.1″)	±.001″ / ±.001″ / —	.0002″	±.0002″	0-100	1.4N or less
1411S	**1411SB**	.001″	.25″ (.1″)	±.001″ / ±.001″ / —	.0002″	±.0002″	0-50-0	1.4N or less
1410S-10	**1410SB-10**	.001″	.25″ (.1″)	±.001″ / ±.001″ / —	.0002″	±.0002″	0-100	1.4N or less
1780S	**1780SB**	.001″	.125″ (.05″)	±.001″ / ±.001″ / —	.0002″	±.0002″	0-50	1.4N or less
1781S	**1781SB**	.001″	.125″ (.05″)	±.001″ / ±.001″ / —	.0002″	±.0002″	0-25-0	1.4N or less
1506S	**1506SB**	.0005″	.125″ (.05″)	±.0005″ / ±.0005″ / —	.00016″	±.0001″	0-50	1.4N or less
1507S	**1507SB**	.0005″	.125″ (.05″)	±.0005″ / ±.0005″ / —	.00016″	±.0001″	0-25-0	1.4N or less
1670S	**1670SB**	.0005″	.1″ (.04″)	±.0005″ / ±.0005″ / —	.00016″	±.0001″	0-40	1.4N or less
1671S	**1671SB**	.0005″	.1″ (.04″)	±.0005″ / ±.0005″ / —	.00016″	±.0001″	0-20-0	1.4N or less
1802S-10	**1802SB-10**	.0001″	.025″ (.01″)	±.0001″ / ±.0001″ / —	.0001″	±.00003″	0-10	1.5N or less
1803S-10	**1803SB-10**	.0001″	.025″ (.01″)	±.0001″ / ±.0001″ / —	.0001″	±.00003″	0-5-0	1.5N or less

Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

SERIES 2 — Standard Type, 0.01mm Resolution

- 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 stem 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.

2046S

2046S-60

Resolution: 0.01mm, Measuring range: 10mm — **2046S**, **2046S-09**

Resolution: 0.01mm, Measuring range: 10mm — **2046S-60**

Resolution: 0.01mm, Measuring range: 10mm — **2047S**

Resolution: 0.01mm, Measuring range: 10mm — **2902S**

Resolution: 0.01mm, Measuring range: 10mm — **2310S-10**

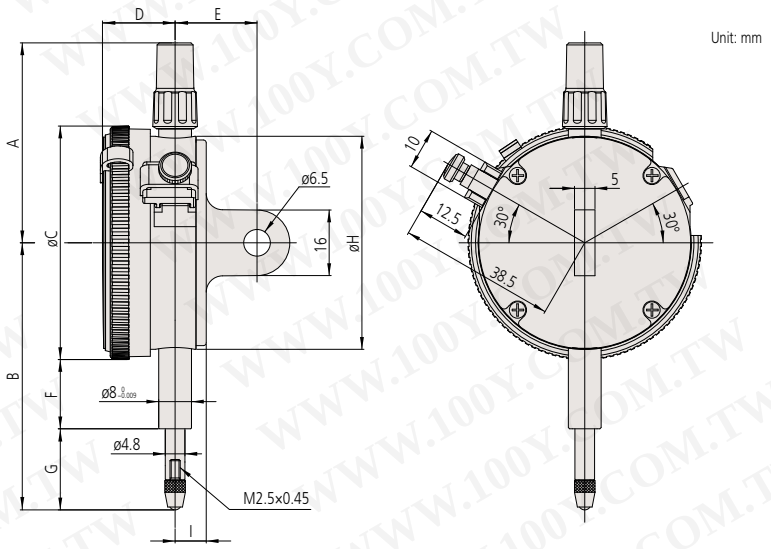
Resolution: 0.01mm, Measuring range: 5mm — **2044S**, **2044S-60**, **2044S-09**

Resolution: 0.01mm, Measuring range: 5mm — **2045S**

DIMENSIONS

ISO/JIS Type

Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

Order No.	A	B	C	D	E	F	G	H	I
2046S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2046S-60	48.8	70	57	17.7	20	12.3	29.2	52	7.6
2046S-09	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2047S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2902S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2310S-10	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2044S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2044S-60	48.8	70	57	17.7	20	12.3	29.2	52	7.6
2044S-09	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2045S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6

FEATURES

Metric

Order No.						
w/ lug	Flat-back					
2046S	2046SB	—	—	—	—	—
2046S-60	2046SB-60	—	✔	—	—	—
2046S-09	2046SB-09	✔	—	—	—	—
2047S	2047SB	—	—	—	—	—
2902S	2902SB	—	—	—	—	✔
2310S-10	2310SB-10	—	—	✔	✔	—
2044S	2044SB	—	—	—	—	—
2044S-60	2044SB-60	—	✔	—	—	—
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-60	2046SB-60	0.01mm	10mm (1mm)	13μm	3μm	5μm	10μm	3μm	±0-100	2.5N 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-60	2044SB-60	0.01mm	5mm (1mm)	12μm	3μm	5μm	10μm	3μm	±0-100	2.5N or less
2044S-09	2044SB-09	0.01mm	5mm (1mm)	13μm	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

* Use in a vertical position only (contact point downward).

F

Mitutoyo

Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

SERIES 2 — Standard Type, 0.001mm & 0.005mm Resolution

- Standard 0.001mm and 0.005mm graduation dial indicators having a bezel with an outside diameter of ø57mm. 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.

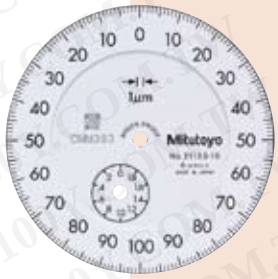
2109S-10

2110S-10

2119S-10

Resolution: 0.001mm, Measuring range: 1mm — **2109S-10**, **2109S-70**

Resolution: 0.001mm, Measuring range: 1mm — **2110S-10**, **2110S-70**



Resolution: 0.001mm, Measuring range: 2mm — **2113S-10**

Resolution: 0.001mm, Measuring range: 5mm — **2118S-10**

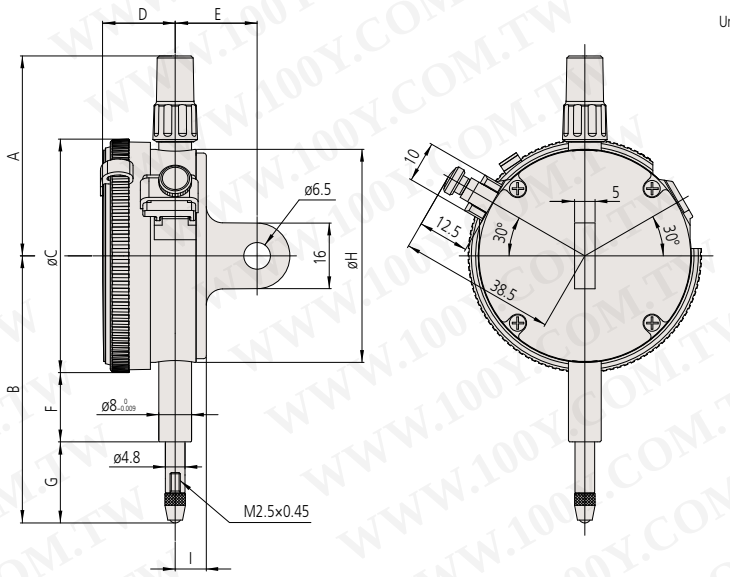
Resolution: 0.001mm, Measuring range: 5mm — **2119S-10**

Resolution: 0.005mm, Measuring range: 5mm — **2124S-10**

DIMENSIONS

ISO/JIS Type

Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

Order No.	A	B	C	D	E	F	G	H	I
2109S-10	48.8	60.5	57	17.7	20	16.9	15.1	52	7.6
2109S-70	48.8	65.3	57	17.7	20	12.3	24.5	52	7.6
2110S-10	48.8	66.5	57	17.7	20	16.9	21.1	52	7.6
2110S-70	48.8	67.5	57	17.7	20	12.3	26.7	52	7.6
2113S-10	48.8	61	57	17.7	20	16.9	15.6	52	7.6
2118S-10	48.8	60.3	57	17.7	20	16.9	14.9	52	7.6
2119S-10	48.8	60.3	57	17.7	20	16.9	14.9	52	7.6
2124S-10	48.8	60.3	57	17.7	20	16.9	14.9	52	7.6

FEATURES

Metric

Order No. w/ lug	Order No. Flat-back				
2109S-10	2109SB-10	✔	—	✔	—
2109S-70	2109SB-70	✔	✔	✔	—
2110S-10	2110SB-10	✔	—	✔	✔
2110S-70	2110SB-70	✔	✔	✔	✔
2113S-10	2113SB-10	✔	—	✔	—
2118S-10	2118SB-10	—	—	✔	—
2119S-10	2119SB-10	—	—	✔	—
2124S-10	2124SB-10	—	—	✔	—

SPECIFICATIONS

Metric

ISO/JIS type

Order No. w/ lug	Order No. Flat-back	Graduation	Range (range/rev)	Accuracy Overall	Accuracy Retrace	Accuracy 1/10 Rev	Accuracy 1 Rev	Repeat-ability	Dial reading	Measuring force
2109S-10	2109SB-10	0.001mm	1mm (0.2mm)	5µm	2µm	2µm	4µm	0.5µm	0-100-0	1.5N 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-10	2110SB-10	0.001mm	1mm (0.1mm)	5µm	2µm	2µm	4µm	0.5µm	±0-100	1.5N or less
2110S-70	2110SB-70	0.001mm	1mm (0.1mm)	5µm	2µm	2µm	4µm	0.5µm	±0-100	2.0N or less
2113S-10	2113SB-10	0.001mm	2mm (0.2mm)	7µm	2µm	2µm	5µm	0.5µm	0-100-0	1.5N or less
2118S-10	2118SB-10	0.001mm	5mm (0.2mm)	10µm	3µm	3.5µm	6µm	1µm	0-100-100	1.5N or less
2119S-10	2119SB-10	0.001mm	5mm (0.2mm)	10µm	3µm	3.5µm	6µm	1µm	0-100-0	1.5N or less
2124S-10	2124SB-10	0.005mm	5mm (0.5mm)	12µm	3µm	5µm	9µm	3µm	±0-50	1.5N or less

F

Mitutoyo

Dial Indicators

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

SERIES 2 — Standard Type, Inch Reading

SPECIFICATIONS

Inch

ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
2414S	**2414SB**	.001″	.5″ (.1″)	±.001″ / ±.001″ / ±.001″	.0002″	±.0002″	±0-100	1.8N or less
2415S	**2415SB**	.001″	.5″ (.1″)	±.001″ / ±.001″ / ±.001″	.0002″	±.0002″	0-50-0	1.8N or less
2914S	**2914SB**	.001″	.5″ (.1″)	±.001″ / ±.001″ / ±.001″	.0002″	±.0002″	100-0	1.8N or less
2506S	**2506SB**	.0005″	.125″ (.05″)	±.0005″ / ±.0005″ / —	.00016″	±.0001″	±0-50	1.8N or less
2507S	**2507SB**	.0005″	.125″ (.05″)	±.0005″ / ±.0005″ / —	.00016″	±.0001″	0-25-0	1.8N or less
2514S	**2514SB**	.0005″	.5″ (.05″)	±.0005″ / ±.0005″ / ±.0015″	.00016″	±.0001″	±0-50	1.8N or less
2922S	**2922SB**	.0005″	.125″ (.05″)	±.0005″ / ±.0005″ / —	.00016″	±.0001″	0-25-0	1.8N or less
2356S-10	**2356SB-10**	.0001″	.25″ (.01″)	±.0002″ / ±.0002″ / ±.0003″ ±.0004″ (First 20rev) / ±.0005″ (Over 20rev)	.0001″	±.00003″	0-10	2.0N or less
2358S-10	**2358SB-10**	.0001″	.5″ (.01″)	±.0002″ / ±.0002″ / ±.0003″ ±.0004″ (First 20rev) / ±.0008″ (Over 20rev)	.00015″	±.00003″	0-10	2.0N or less
2802S-10	**2802SB-10**	.0001″	.025″ (.01″)	±.0001″ / ±.0001″ / —	.0001″	±.00003″	0-10	2.0N or less
2803S-10	**2803SB-10**	.0001″	.025″ (.01″)	±.0001″ / ±.0001″ / —	.0001″	±.00003″	0-5-0	2.0N or less
2804S-10	**2804SB-10**	.0001″	.05″ (.01″)	±.0001″ / ±.0001″ / ±.0002″	.0001″	±.00003″	0-10	2.0N or less
2805S-10	**2805SB-10**	.0001″	.05″ (.01″)	±.0001″ / ±.0001″ / ±.0002″	.0001″	±.00003″	0-5-0	2.0N or less
2905S-10	**2905SB-10**	.0001″	.05″ (.01″)	±.0001″ / ±.0001″ / ±.0002″	.0001″	±.00003″	10-0	2.0N or less
2923S-10	**2923SB-10**	.0001″	.05″ (.01″)	±.0001″ / ±.0001″ / ±.0002″	.0001″	±.00003″	0-5-0	2.0N or less

FEATURES

Inch

Order No.				
w/ lug	Flat-back			
2414S	**2414SB**	—	—	—
2415S	**2415SB**	—	—	—
2914S	**2914SB**	—	✔	—
2506S	**2506SB**	—	—	—
2507S	**2507SB**	—	—	—
2514S	**2514SB**	—	—	—
2922S	**2922SB**	—	—	—
2356S-10	**2356SB-10**	—	—	✔
2358S-10	**2358SB-10**	—	—	✔
2802S-10	**2802SB-10**	✔	—	✔
2803S-10	**2803SB-10**	✔	—	✔
2804S-10	**2804SB-10**	✔	—	✔
2805S-10	**2805SB-10**	✔	—	✔
2905S-10	**2905SB-10**	✔	✔	✔
2923S-10	**2923SB-10**	✔	—	✔

PROPRIETARY INSPECTION CERTIFICATE

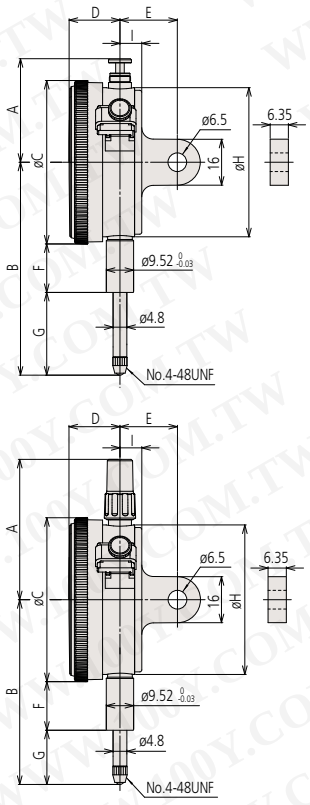
An inspection certificate is attached as standard.
Refer to page IX for details.

Optional Accessories

———: Backs (See page F-50.)
———: Contact points (See page F-46 to F-49.)

DIMENSIONS

ANSI/AGD Type



Unit: mm

Order No.	A	B	C	D	E	F	G	H	I
2414S	38.9	64.1	57	17.7	19	13.6	22	52	7.6
2415S	38.9	64.1	57	17.7	19	13.6	22	52	7.6
2914S	38.9	64.1	57	17.7	19	13.6	22	52	7.6
2506S	48.8	54.3	57	17.7	19	13.6	12.2	52	7.6
2507S	48.8	54.3	57	17.7	19	13.6	12.2	52	7.6
2514S	38.9	64.1	57	17.7	19	13.6	22	52	7.6
2922S	48.8	54.3	57	17.7	19	13.6	12.2	52	7.6
2356S-10	48.8	57.2	57	17.7	19	13.6	15.1	52	7.6
2358S-10	38.9	63.6	57	17.7	19	13.6	21.5	52	7.6
2802S-10	48.8	51.4	57	17.7	19	13.6	9.3	52	7.6
2803S-10	48.8	51.4	57	17.7	19	13.6	9.3	52	7.6
2804S-10	48.8	51.7	57	17.7	19	13.6	9.6	52	7.6
2805S-10	48.8	51.7	57	17.7	19	13.6	9.6	52	7.6
2905S-10	48.8	51.7	57	17.7	19	13.6	9.6	52	7.6
2923S-10	48.8	51.7	57	17.7	19	13.6	9.6	52	7.6

F

Mitutoyo

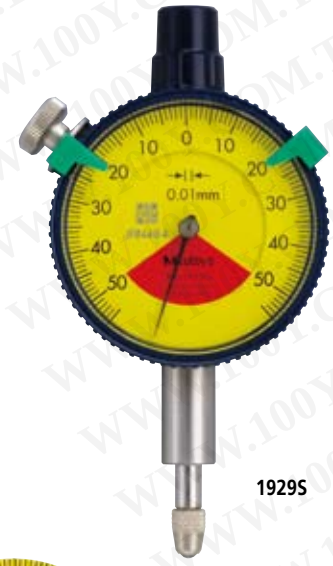
Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

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-44 to F-45 for details.)



1929S

Resolution: 0.01mm, Measuring range: 1mm

1929S
1929S-62

Resolution: 0.001mm, Measuring range: 0.1mm

1900S-10
1900S-72

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			
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

Inch

ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
1909S-62	**1909SB-62**	.0005"	.04" (.056")	±.0005" / — / —	.00016"	±.0001"	20-0-20	1.4N or less
1910S-72	**1910SB-72**	.0001"	.006" (.008")	±.0001" / — / —	.0001"	±.00003"	3-0-3	1.5N or less

FEATURES

Metric

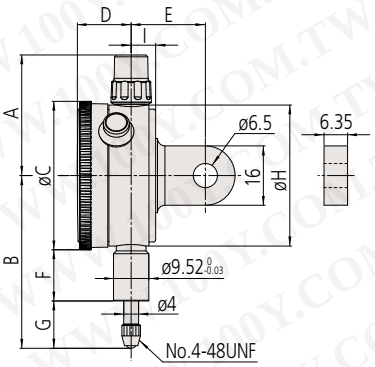
Order No.				
w/ lug	Flat-back			
1929S	**1929SB**	—	—	✔
1929S-62	**1929SB-62**	—	✔	✔
1900S-10	**1900SB-10**	✔	—	✔
1900S-72	**1900SB-72**	✔	✔	✔

Inch

Order No.				
w/ lug	Flat-back			
1909S-62	**1909SB-62**	—	✔	✔
1910S-72	**1910SB-72**	✔	✔	✔

DIMENSIONS

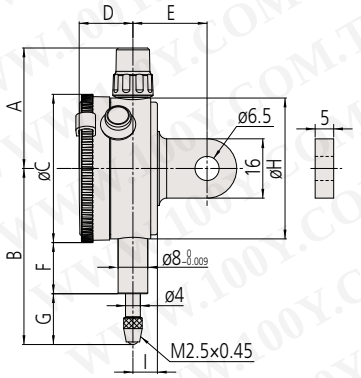
ANSI/AGD Type



Order No.	A	B	C	D	E	F	G	H	I
1909S-62	32.5	41.7	40	14.5	19	12.8	8.9	38	6.6
1910S-72	32.5	40.8	40	14.5	19	12.8	8	38	6.6

ISO/JIS Type

Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

Order No.	A	B	C	D	E	F	G	H	I
1929S	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1929S-62	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1900S-10	32.5	53.5	40	14.5	20	16.8	16.7	38	6.6
1900S-72	32.5	53.5	40	14.5	20	16.8	16.7	38	6.6

Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

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".
- One revolution type Back plunger dial gages are also available. (Refer to pages F-44 to F-45 for details.)

2970 Series

- 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 scratch- and oil-resistant.
- Lightweight type (75g).

2971

2972

2973

2929S

2900S-10

2990

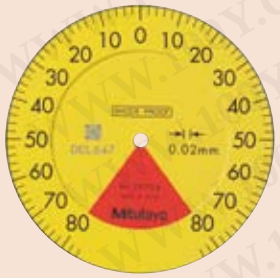
Resolution: 0.01mm, Measuring range: 0.8mm
2929S
2929S-60
2929S-62

Resolution: 0.01mm, Measuring range: 1.6mm
2959S

Resolution: 0.01mm, Measuring range: 0.08mm
2900S-10
2900S-70
2900S-72

Resolution: 0.01mm, Measuring range: 0.5mm
2971

Resolution: 0.01mm, Measuring range: 1mm
2972



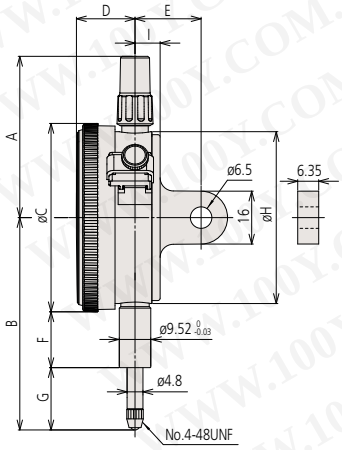
Resolution: 0.02mm, Measuring range: 1.6mm
2973

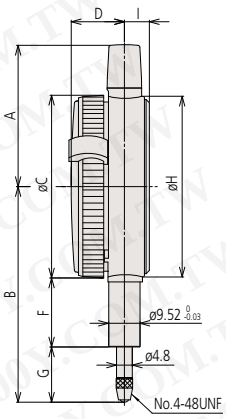
Resolution: 0.1mm, Measuring range: 4mm
2928S

Resolution: 0.001mm, Measuring range: 0.16mm
2901S-10

DIMENSIONS

ANSI/AGD Type

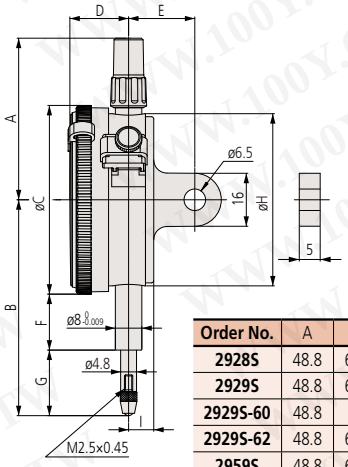




Order No.	A	B	C	D	E	F	G	H	I
2909S-62	48.8	51.9	57	17.7	19	13.6	9.8	52	7.6
2910S-10	48.8	51.2	57	17.7	19	13.6	9.1	52	7.6
2910S-72	48.8	51.2	57	17.7	19	13.6	9.1	52	7.6
2978	43.2	65.3	55.6	16.2	—	21	16.5	55	7.6
2976	43.2	64.7	55.6	16.2	—	21	15.9	55	7.6
2977	43.2	65	55.6	16.2	—	21	16.2	55	7.6

ISO/JIS Type

Unit: mm



Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

*2971, 2972, 2973, 2976, 2977, 2978: Plain back

Order No.	A	B	C	D	E	F	G	H	I
2928S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2929S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2929S-60	48.8	70	57	17.7	20	12.3	29.2	52	7.6
2929S-62	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2959S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2900S-10	48.8	66	57	17.7	20	16.9	20.6	52	7.6
2900S-70	48.8	67	57	17.7	20	12.3	26.2	52	7.6
2900S-72	48.8	66	57	17.7	20	16.9	20.6	52	7.6
2901S-10	48.8	66.1	57	17.7	20	16.9	20.7	52	7.6
2973	43.2	66.3	55.6	16.2	—	21	17.5	55	7.6
2971	43.2	65.6	55.6	16.2	—	21	16.8	55	7.6
2972	43.2	66.0	55.6	16.2	—	21	17.2	55	7.6

FEATURES

Metric

Order No. w/ lug	Order No. Flat-back					—	—
2928S	2928SB	✔	—	—	—	—	—
2929S	2929SB	✔	—	—	—	—	—
2929S-60	2929SB-60	✔	✔	—	—	—	—
2929S-62	2929SB-62	✔	—	✔	—	—	—
2959S	2959SB	✔	—	—	—	—	—
2900S-10	2900SB-10	✔	—	—	✔	—	—
2900S-70	2900SB-70	✔	✔	—	✔	—	—
2900S-72	2900SB-72	✔	—	✔	✔	—	—
2901S-10	2901SB-10	✔	—	—	✔	—	—
—	2973	✔	—	✔	—	—	—
—	2971	✔	—	✔	—	—	—
—	2972	✔	—	✔	—	—	—
2990*	—	✔	—	—	✔	—	—
—	2960F*	✔	—	—	—	—	—

Inch

Order No. w/ lug	Order No. Flat-back					—	—
2909S-62	2909SB-62	✔	—	✔	—	—	—
2910S-10	2910SB-10	✔	—	—	✔	—	—
2910S-72	2910SB-72	✔	✔	✔	✔	—	—
—	2978	✔	—	✔	—	—	—
—	2976	✔	—	✔	—	—	—
—	2977	✔	—	✔	—	—	—
—	2991*	✔	—	✔	—	—	—

SPECIFICATIONS

Metric

ISO/JIS type

Order No. w/ lug	Order No. Flat-back	Graduation	Range (range/rev)	Accuracy Overall	Retrace	1/10 Rev	1 Rev	Repeat-ability	Dial reading	Measuring force
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-60	2929SB-60	0.01mm	0.8mm (1mm)	8μm	3μm	5μm	—	3μm	40-0-40	2.0N 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	1.4N or less
2900S-70	2900SB-70	0.001mm	0.08mm (0.1mm)	3μm	2μm	2μm	—	0.5μm	40-0-40	2.0N 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	1.4N or less
2973	—	0.02mm	1.6mm (2mm)	16μm	6μm	8μm	—	5μm	80-0-80	1.4N or less
2971	—	0.01mm	0.5mm (0.7.mm)	8μm	3μm	5μm	—	3μm	25-0-25	1.4N or less
2972	—	0.01mm	1mm (1.4mm)	8μm	3μm	5μm	—	3μm	50-0-50	1.4N or less
2990*	—	0.01mm	0.1mm (0.14mm)	5μm	2μm	2.5μm	—	1μm	50-0-50	1.5N or less
2960F*	—	0.001mm	1mm (1.27mm)	14μm	4μm	8μm	—	3μm	50-0-50	1.4N or less

* Back plunger type (see page F-45.)

Inch

ANSI/AGD type

Order No. w/ lug	Order No. Flat-back	Graduation	Range (range/rev)	Accuracy First 1 Rev / 2.5 Rev / 10 Rev	Retrace	Repeat-ability	Dial reading	Measuring force
2909S-62	2909SB-62	.0005"	.04" / .05"	±.0005" / — / —	.00016"	±.0001"	20-0-20	2.5N or less
2910S-10	2910SB-10	.0001"	.008" / .01"	±.0001" / — / —	.0001"	±.00003"	4-0-4	1.8N or less
2910S-72	2910SB-72	.0001"	.008" / .01"	±.0001" / — / —	.0001"	±.00003"	4-0-4	2.5N or less
2978	—	.001"	.06" / .079"	±.001" / — / —	.0002"	±.0002"	30-0-30	1.4N or less
2976	—	.0005"	.02" / .028"	±.0005" / — / —	.00016"	±.0001"	10-0-10	1.4N or less
2977	—	.0005"	.04" / .055"	±.0005" / — / —	.00016"	±.0001"	20-0-20	1.4N or less
2991*	—	.0001"	.008" / .01"	±.0002" / — / —	.0001"	±.00005"	4-0-4	1.5N or less

* Back plunger type

F

Mitutoyo

Dial Indicators

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

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is attached as standard.
Refer to page IX for details.

SERIES 2 — Long Stroke Type

- Long stroke dial indicators with a ø57mm 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-tipped 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.

2050S

2052S

2330S-10

Resolution: 0.01mm, Measuring range: 20mm

2050S-60
2050S
2050S-19

Resolution: 0.01mm, Measuring range: 30mm

2052S
2052S-19

Resolution: 0.01mm, Measuring range: 30mm

2330S-10

Resolution: 0.01mm, Measuring range: 20mm

2320S-10

Resolution: 0.01mm, Measuring range: 30mm

2952S

FEATURES

Metric

Order No. w/ lug	Order No. 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	—	—	✔	—	—	✔

Inch

Order No. w/ lug	Order No. Flat-back						
2416S	2416SB	—	—	—	—	—	—
2416S-06	2416SB-06	—	—	—	—	—	—
2416S-10	2416SB-10	—	—	—	✔	—	—
2417S	2417SB	—	—	—	—	—	—
2424S-19	2424SB-19	✔	—	—	✔	—	✔
2776S	2776SB	—	—	—	—	—	—
2904S	2904SB	—	—	✔	—	—	—

SPECIFICATIONS

Metric

ISO/JIS type

Order No. w/ lug	Order No. Flat-back	Graduation	Range (range/rev)	Accuracy Overall	Accuracy Retrace	Accuracy 1/10 Rev	Accuracy 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

* 2050S-60 and 2050SB-60 are waterproof types that use a rubber bellows to cover the stem.
Please note that the outer diameter of the bellows (ø9.5) is larger than that of the stem (ø8).

Inch

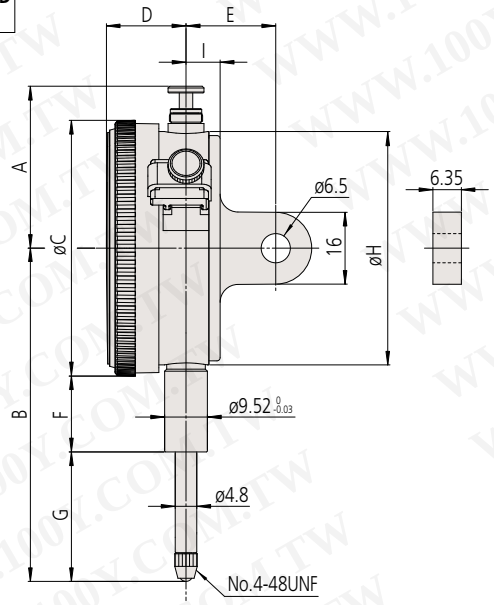
ANSI/AGD type

Order No. w/ lug	Order No. Flat-back	Graduation	Range (range/rev)	Accuracy First 1 Rev / 2.5 Rev / 10 Rev	Accuracy Retrace	Repeat-ability	Dial reading	Measuring force
2416S	2416SB	.001″	1″ (.1″)	±.001″ / ±.001″ / ±.002″	.0002″	±.0002″	±0-100	1.8N or less
2416S-06	2416SB-06	.001″	1″ (.1″)	±.001″ / ±.001″ / ±.002″	.0002″	±.0002″	±0-100	1.8N or less
2416S-10	2416SB-10	.001″	1″ (.1″)	±.001″ / ±.001″ / ±.002″	.0002″	±.0002″	±0-100	1.8N or less
2417S	2417SB	.001″	1″ (.1″)	±.001″ / ±.001″ / ±.002″	.0002″	±.0002″	0-50-0	1.8N or less
2424S-19	2424SB-19	.001″	2″ (.1″)	±.001″ / ±.001″ / ±.002″ / ±.003″ (First 20Rev)	.00033″	±.0002″	±0-100	2.5N or less
2776S	2776SB	.0005″	1″ (.05″)	±.0005″ / ±.0005″ / ±.0015″	.0002″	±.0001″	±0-50	2.5N or less
2904S	2904SB	.001″	1″ (.1″)	±.001″ / ±.001″ / ±.002″	.0002″	±.0002″	100-0	1.8N or less

DIMENSIONS

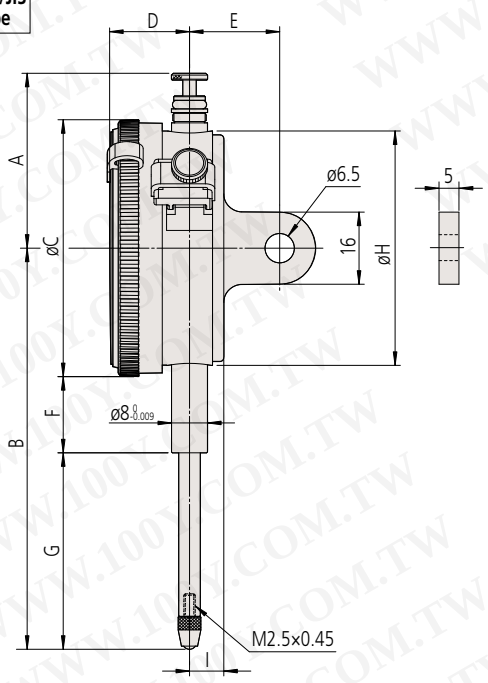
Unit: mm

ANSI/AGD Type



Order No.	A	B	C	D	E	F	G	H	I
2416S	38.9	76.8	57	17.7	19	13.6	34.7	52	7.6
2416S-06	38.9	76.8	57	17.7	19	13.6	34.7	52	7.6
2416S-10	38.9	76.8	57	17.7	19	13.6	34.7	52	7.6
2417S	38.9	76.8	57	17.7	19	13.6	34.7	52	7.6
2424S-19	118	142.5	57	17.7	20.9	54.3	59.7	52	9.5
2776S	38.9	76.8	57	17.7	19	13.6	34.7	52	7.6
2904S	38.9	76.8	57	17.7	19	13.6	34.7	52	7.6

ISO/JIS Type



Order No.	A	B	C	D	E	F	G	H	I
2050S	38.8	75.2	57	17.7	20	16.9	29.8	52	7.6
2050S-60	59.8	87.2	57	17.7	20	12.3	46.4	52	7.6
2050S-19	38.8	75.2	57	17.7	20	16.9	29.8	52	7.6
2320S-10	38.8	75.2	57	17.7	20	16.9	29.8	52	7.6
2052S	38.8	88.7	57	17.7	20	16.9	43.3	52	7.6
2052S-19	38.8	88.7	57	17.7	20	16.9	43.3	52	7.6
2330S-10	38.8	88.7	57	17.7	20	16.9	43.3	52	7.6
2952S	38.8	88.7	57	17.7	20	16.9	43.3	52	7.6

F

Mitutoyo

Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

SERIES 3, 4 — Long Stroke Type

- 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**.

4046S

Resolution: 0.01mm, Measuring range: 10mm **3046S**

3058S-19

3109S-10

Resolution: 0.01mm, Measuring range: 10mm **3047S**

Resolution: 0.01mm, Measuring range: 20mm **3050S**

Resolution: 0.01mm, Measuring range: 30mm **3052S-19**

Resolution: 0.01mm, Measuring range: 50mm **3058S-19**

Resolution: 0.01mm, Measuring range: 80mm **3060S-19**

Resolution: 0.01mm, Measuring range: 100mm **3062S-19**

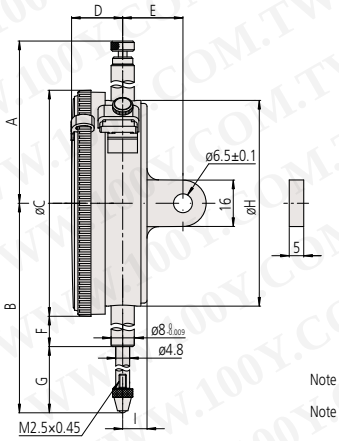
Resolution: 0.001mm, Measuring range: 1mm **3109S-10**

Resolution: 0.01mm, Measuring range: 10mm **4046S**

F

DIMENSIONS

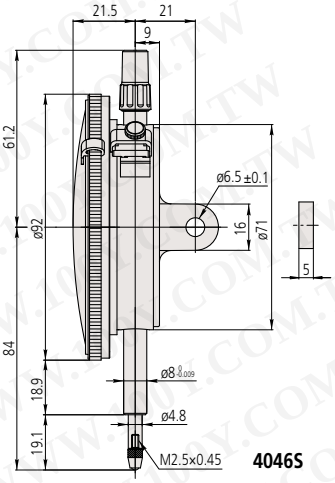
ISO/JIS Type



Unit: mm

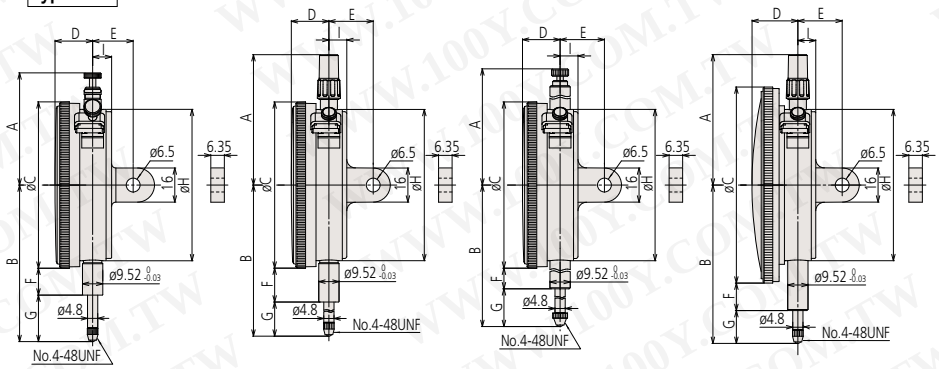
Order No.	A	B	C	D
3046S	61.2	75.5	15.9	20.6
3047S	61.2	75.5	15.9	20.6
3050S	52.6	94	25.9	29.1
3052S-19	72.9	104.3	25.9	39.4
3058S-19	81.9	142.3	43.9	59.4
3060S-19	120.9	202.3	73.9	89.4
3062S-19	141.9	243.3	94.9	109.4
3109S-10	61.2	79	25.9	14.1

Note 1: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 2: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.



4046S

ANSI/AGD Type



Unit: mm

Order No.	A	B	C	D	E	F	G	H	I
3414S	52.6	73.4	78	17.7	19	12.6	21.8	71	9
3415S	52.6	73.4	78	17.7	19	12.6	21.8	71	9
3416S	52.6	86.1	78	17.7	19	12.6	34.5	71	9
3417S	52.6	86.1	78	17.7	19	12.6	34.5	71	9
3424S-19	84	149.3	78	17.7	19	50.6	59.7	71	9
3426S-19	123	198.1	78	17.7	19	73.9	85.2	71	9
3428S-19	144	244.5	78	17.7	19	94.9	110.6	71	9
3803S-10	61.2	59.7	78	17.7	19	12.6	8.1	71	9
3802S-10	61.2	59.7	78	17.7	19	12.6	8.1	71	9
3052S-11	72.9	102.4	78	17.7	19	25.9	37.5	71	9
3058S-11	81.9	147.1	78	17.7	19	50.6	57.5	71	9
4887S-19	123	198.1	92	21.5	19	66.9	85.2	71	9

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	—	—	—	—	—	—

Inch

Order No.							
w/ lug	Flat-back				—	—	—
3414S	3414SB	—	—	—	—	—	—
3415S	3415SB	—	—	—	—	—	—
3416S	3416SB	—	—	—	—	—	—
3417S	3417SB	—	—	—	—	—	—
3424S-19	3424SB-19	✔	✔	✔	—	—	—
3426S-19	3426SB-19	✔	✔	✔	—	—	—
3428S-19	3428SB-19	✔	✔	✔	—	—	—
3802S-10	3802SB-10	✔	✔	—	—	—	—
3803S-10	3803SB-10	✔	✔	—	—	—	—
4887S-19	4887SB-19	✔	✔	✔	—	—	—

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

*Use in a vertical position only.

Inch

ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
3414S	3414SB	.001"	.5" (.1")	±.001" / ±.001" / ±.001"	.0002"	±.0002"	±0-100	1.8N or less
3415S	3415SB	.001"	.5" (.1")	±.001" / ±.001" / ±.001"	.0002"	±.0002"	0-50-0	1.8N or less
3416S	3416SB	.001"	1" (.1")	±.001" / ±.001" / ±.002"	.0002"	±.0002"	±0-100	1.8N or less
3417S	3417SB	.001"	1" (.1")	±.001" / ±.001" / ±.002"	.0002"	±.0002"	0-50-0	1.8N or less
3424S-19	3424SB-19	.001"	2" (.1")	±.001" / ±.001" / ±.002" / ±.003" (20Rev)	.00033"	±.0002"	±0-100	3.0N or less
3426S-19*	3426SB-19*	.001"	3" (.1")	±.001" / ±.001" / ±.002" / ±.003" (20Rev) / ±.005" (Over 20Rev)	.00033"	±.0002"	±0-100	3.0N or less
3428S-19*	3428SB-19*	.001"	4" (.1")	±.001" / ±.001" / ±.002" / ±.003" (20Rev) / ±.005" (Over 20Rev)	.00033"	±.0002"	±0-100	3.2N or less
3802S-10	3802SB-10	.0001"	.025" (.01")	±.0001" / ±.0001" / —	.0001"	±.00003"	0-10	2.0N or less
3803S-10	3803SB-10	.0001"	.025" (.01")	±.0001" / ±.0001" / —	.0001"	±.00003"	0-5-0	2.0N or less
4887S-19*	4887SB-19*	.001"	3" (.1")	±.001" / ±.001" / ±.002" / ±.003" (20Rev) / ±.005" (Over 20Rev)	.00033"	±.0002	±0-100	3.0N or less

*Use in a vertical position only.

F

Mitutoyo

Dial Indicators

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

ANSI/AGD Type Metric Dial Indicator with 3/8" DIA. Stem and #4-48UNF-Thread Contact Point Compatible Type

SPECIFICATIONS

Metric Series 1 — ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
1230S-01	**1230SB-01**	0.01mm	2.5mm (1mm)	±10μm / ±10μm / —	3μm	±2μm	0-100	1.4N or less
1231S-01	**1231SB-01**	0.01mm	2.5mm (1mm)	±10μm / ±10μm / —	3μm	±2μm	0-50-0	1.4N or less
1044S-01	**1044SB-01**	0.01mm	5mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	±0-100	1.4N or less
1045S-01	**1045SB-01**	0.01mm	5mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	0-50-0	1.4N or less
1010S-11	**1010SB-11**	0.002mm	0.5mm (0.2mm)	±2μm / ±2μm / —	2μm	±1μm	0-20	1.5N or less
1011S-11	**1011SB-11**	0.002mm	0.5mm (0.2mm)	±2μm / ±2μm / —	2μm	±1μm	0-10-0	1.5N or less

Metric Series 2 — ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
2230S-01	**2230SB-01**	0.01mm	2.5mm (1mm)	±10μm / ±10μm / —	3μm	±3μm	±0-100	1.4N or less
2231S-01	**2231SB-01**	0.01mm	2.5mm (1mm)	±10μm / ±10μm / —	3μm	±3μm	0-50-0	1.4N or less
2046S-01	**2046SB-01**	0.01mm	10mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	±0-100	1.4N or less
2046S-11	**2046SB-11**	0.01mm	10mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	±0-100	1.4N or less
2048S-11	**2048SB-11**	0.01mm	10mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	±0-100	1.4N or less
2047S-01	**2047SB-01**	0.01mm	10mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	0-50-0	1.4N or less
2047S-11	**2047SB-11**	0.01mm	10mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	0-50-0	1.4N or less
2902S-01	**2902SB-01**	0.01mm	10mm (1mm)	±10μm / ±10μm / ±13μm	3μm	±3μm	100-0	1.4N or less
2050S-01	**2050SB-01**	0.01mm	20mm (1mm)	±10μm / ±10μm / ±15μm / ±20μm (20Rev)	4μm	±3μm	±0-100	2.0N or less
2050S-11	**2050SB-11**	0.01mm	20mm (1mm)	±10μm / ±10μm / ±15μm / ±20μm (20Rev)	4μm	±3μm	±0-100	2.0N or less
2056S-01	**2056SB-01**	0.01mm	25mm (1mm)	±10μm / ±10μm / ±15μm/ ±20μm (20Rev)/ ±25μm (Over 20Rev)	4μm	±3μm	±0-100	2.5N or less
2900S-73*	**2900SB-73***	0.001mm	0.08mm (0.1mm)	±2μm / — / —	2μm	±0.3μm	40-0-40	2.0N or less
2109S-11	**2109SB-11**	0.001mm	1mm (0.2mm)	±3μm / ±3μm / ±4μm	2μm	±0.3μm	0-10-0	1.5N or less
2119S-11	**2119SB-11**	0.001mm	5mm (0.2mm)	±7μm / ±7μm / ±8μm / ±10μm (20Rev) / ±10μm (Over 20Rev)	2μm	±0.3μm	0-10-0	1.5N or less

*One revolution type

FEATURES

Metric

Order No.								
w/ lug	Flat-back							—
1230S-01	**1230SB-01**	—	—	—	—	—	—	—
1231S-01	**1231SB-01**	—	—	—	—	—	—	—
1044S-01	**1044SB-01**	—	—	—	—	—	—	—
1045S-01	**1045SB-01**	—	—	—	—	—	—	—
1010S-11	**1010SB-11**	—	✔	—	—	✔	—	—
1011S-11	**1011SB-11**	—	✔	—	—	✔	—	—

Metric

Order No.								
w/ lug	Flat-back							
2230S-01	**2230SB-01**	—	—	—	—	—	—	—
2231S-01	**2231SB-01**	—	—	—	—	—	—	—
2046S-01	**2046SB-01**	—	—	—	—	—	—	—
2046S-11	**2046SB-11**	—	✔	—	—	—	—	—
2048S-11	**2048SB-11**	—	✔	✔	✔	—	—	—
2047S-01	**2047SB-01**	—	—	—	—	—	—	—
2047S-11	**2047SB-11**	—	✔	—	—	—	—	—
2902S-01	**2902SB-01**	—	—	—	—	—	—	✔
2050S-01	**2050SB-01**	—	—	—	—	—	—	—
2050S-11	**2050SB-11**	—	✔	—	—	—	—	—
2056S-01	**2056SB-01**	—	—	—	—	—	—	—
2900S-73*	**2900SB-73***	—	✔	—	—	✔	✔	—
2109S-11	**2109SB-11**	—	✔	—	—	✔	—	—
2119S-11	**2119SB-11**	—	✔	—	—	—	—	

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is attached as standard.
Refer to page IX for details.

Optional Accessories

———: Backs (See page F-50.)
———: Contact points (See page F-46 to F-49.)

ANSI/AGD Type Metric Dial Indicator with 3/8" DIA. Stem and #4-48UNF-Thread Contact Point Compatible Type

FEATURES

Metric

Order No.							
w/ lug	Flat-back				—	—	—
3052S-11	**3052SB-11**	✔	✔	✔	—	—	—
3058S-11	**3058SB-11**	✔	✔	✔	—	—	—

SPECIFICATIONS

Metric Series 3

ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev / 20 Rev / Over 20 Rev	Retrace			
3052S-11	**3052SB-11**	0.01mm	30mm (1mm)	±10µm / ±10µm / ±15µm / ±20µm / ±30µm	4µm	±3µm	±0-100	2.5N or less
3058S-11	**3058SB-11**	0.01mm	50mm (1mm)	±15µm / ±15µm / ±20µm / ±25µm / ±40µm	5µm	±3µm	±0-100	3.0N or less

Mitutoyo guarantees the product quality. Mitutoyo thus writes the product quality. PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is attached as standard.
Refer to page IX for details.

Optional Accessories

———: Backs (See page F-50.)
———: Contact points (See page F-46 to F-49.)

F

Mitutoyo

Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

SERIES 2 — Special Dial Indicators

2048S-10 2046S-80

Adjustable hand dial gauge

- The hand position can be adjusted independently of the position of the spindle by rotating the top knob.

Peak hold type dial gauge

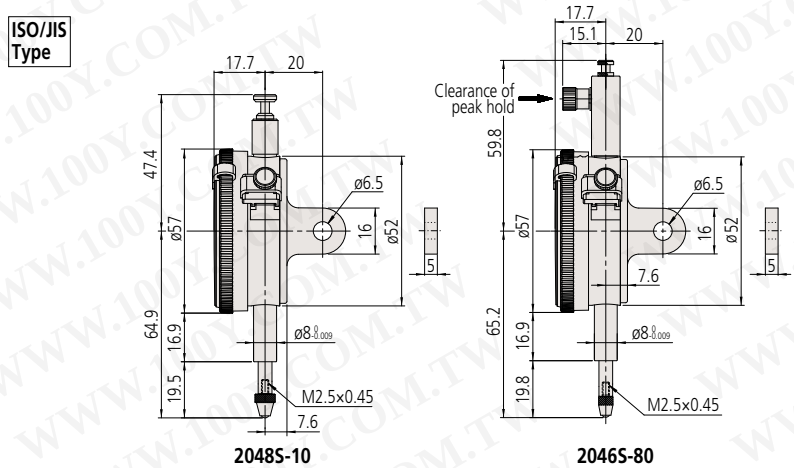
- A mechanism holds the pointer and the spindle at the position of maximum depression and hence displays the maximum value.

* Clearance of peak hold: push the nut in the direction of the arrow indicated in the dimensions of 2046S-80.

DIMENSIONS

ISO/JIS Type

Unit: mm



2048S-10 2046S-80

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			
2048S-10	**2048SB-10**	0.01mm	10mm (1mm)	15µm	3µm	5µm	10µm	3µm	0-100	1.4N or less
2046S-80	**2046SB-80**	0.01mm	10mm (1mm)	15µm	3µm	5µm	10µm	3µm	0-100	5.0N or less

Inch

ANSI/AGD type

Order No.		Graduation	Range (range/rev)	Accuracy		Repeat-ability	Dial reading	Measuring force
w/ lug	Flat-back			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
2915S-10	**2915SB-10**	.001"	.5" (.1")	±.001" / ±.001" / ±.001	.0002	±.0002	0-100	1.8N or less
2918S-10	**2918SB-10**	.001"	.5" (.1")	±.001" / ±.001" / ±.001	.0002	±.0002	0-50-0	1.8N or less

FEATURES

Metric

Order No.							
w/ lug	Flat-back					—	—
2048S-10	**2048SB-10**	✔	—	✔	—	—	
2046S-80	**2046SB-80**	—	✔	—	—	—	

Inch

Order No.							
w/ lug	Flat-back					—	—
2915S-10	**2915SB-10**	✔	—	✔	—	—	
2918S-10	**2918SB-10**	✔	—	✔	—	—	

An inspection certificate is attached as standard.
Refer to page IX for details.

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 1960, which uses Mitutoyo's proprietary shock-proofing mechanism, has excellent durability and shock resistance.

1160

1960

Holding bar (optional)

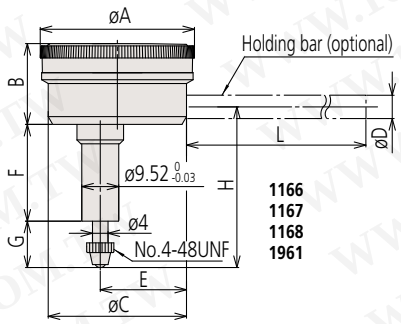
Order No.	øD	L
21AAA166	ø6mm	42mm
136567	ø6mm	81mm
124625	ø6.35mm	81mm
21AAA167	ø6.35mm	42mm
21AAA168	ø8mm	42mm
136568	ø8mm	81mm

* øD and L: equivalent to the below-mentioned dimensions.

DIMENSIONS

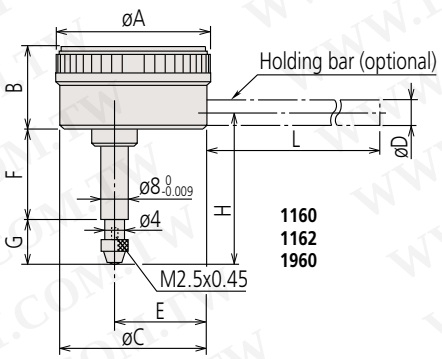
Unit: mm

ISO/JIS Type



Order No.	A	B	C	D	E	F	G	H
1166	39.6	21.5	35	—	22	25	10.9	42
1167	39.6	21.5	35	—	22	25	10.9	42
1168	39.6	21.5	35	—	22	25	10.9	42
1961	39.6	21.5	35	—	22	25	10.9	40

ANSI/AGD Type



Order No.	A	B	C	E	F	G	H
1160	39.6	21.5	35	22	25	13.8	43.3
1162	39.6	21.5	35	22	25	13.8	43.3
1960	39.6	21.5	35	22	28.7	12.8	46

Note 1: Refer to pages F-44 to F-47 for contact point details.
Note 2: Dimensions of the inch (ANSI/AGD Type) dial indicator partly differ from those of the metric (ISO/JIS Type) indicator.
Note 3: Inch (ANSI/AGD Type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

FEATURES

Metric

Order No.				—	—	—
1960	✔	✔	—	—	—	—
1160	—	—	—	—	—	—
1162	—	—	✔	—	—	—

Inch

Order No.				—	—	—
1961	✔	✔	—	—	—	—
1166	—	—	—	—	—	—
1167	—	—	—	—	—	—
1168	—	—	✔	—	—	—

SPECIFICATIONS

Metric

ISO/JIS type

Order No.	Graduation	Range (range/rev)	Accuracy				Repeatbility	Dial reading	Measuring force
			Overall	Retrace	1/10 Rev	1 Rev			
1960	0.01mm	1mm (1.27mm)	14µm	4µm	8µm	—	3µm	50-0-50	1.4N or less
1160	0.01mm	5mm (1mm)	16µm	4µm	8µm	14µm	3µm	0-100	1.4N or less
1162	0.01mm	5mm (1mm)	16µm	4µm	8µm	14µm	3µm	100-0	1.4N or less

Inch

ANSI/AGD type

Order No.	Graduation	Range (range/rev)	Accuracy		Repeatbility	Dial reading	Measuring force
			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
1961	.001"	.04" (.05")	±.001" / — / —	.0002"	±.0002"	20-0-20	1.4N or less
1166	.001"	.2" (.05")	±.001" / ±.001" / ±.001"	.00033"	±.0002"	0-50	1.4N or less
1167	.001"	.2" (.05")	±.001" / ±.001" / ±.001"	.00033"	±.0002"	0-25-0	1.4N or less
1168	.001"	.2" (.05")	±.001" / ±.001" / ±.001"	.00033"	±.0002"	50-0	1.4N or less

F

Dial Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

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 2960F and 2990, which use Mitutoyo's proprietary shock-proofing mechanism, have excellent durability and shock resistance.
- Model 2990 provides 0.001mm resolution.

2960F

2990

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: equivalent to the below-mentioned dimensions.

Metric — ISO/JIS type

Order No.	Graduation	Range (range/full stroke)	Accuracy				Repeatbility	Dial reading	Measuring force
			Overall	Retrace	1/10 Rev	1 Rev			
2960F	0.01mm	1mm (1.27mm)	14µm	4µm	8µm	—	3µm	50-0-50	1.4N or less
2990	0.001mm	0.1mm (0.14mm)	5µm	2µm	2.5µm	—	1µm	50-0-50	1.5N or less

Inch — ANSI/AGD type

Order No.	Graduation	Range (range/full stroke)	Accuracy		Repeatbility	Dial reading	Measuring force
			First 1 Rev / 2.5 Rev / 10 Rev	Retrace			
2961F	.0005"	.04" / .05"	±.0005" / — / —	.0002"	±.0001"	20-0-20	1.4N or less
2991	.0001"	.008" / .01"	±.0002" / — / —	.0001"	±.00005"	4-0-4	1.5N or less

Metric

Order No.				—	—	—
2960F	✔	✔	—	—	—	—
2990	✔	✔	✔	—	—	—

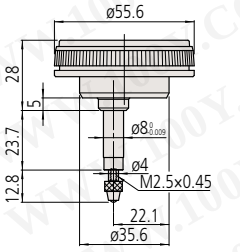
Inch

Order No.				—	—	—
2961F	✔	✔	—	—	—	—
2991	✔	✔	✔	—	—	—

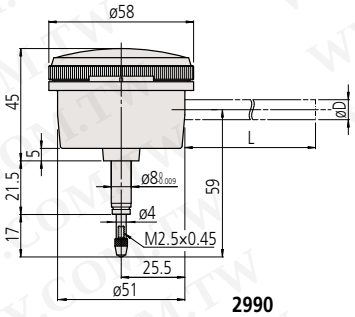
DIMENSIONS

Unit: mm

ANSI/AGD Type

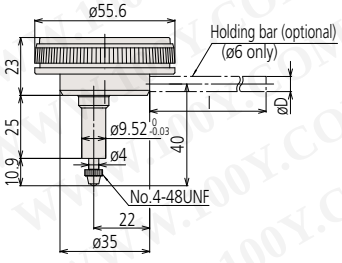


2960F
Mass net: 115 g

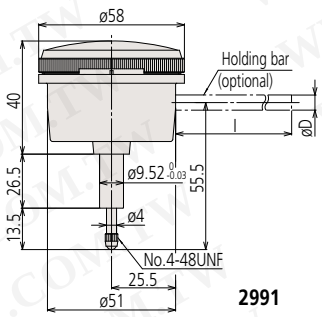


2990
Mass net: 220 g

ISO/JIS Type



2961F



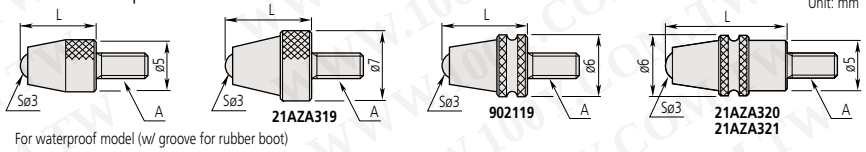
2991

F

Contact Points
Optional Accessory for Digimatic and Dial Indicators and Linear Gages

Ball point

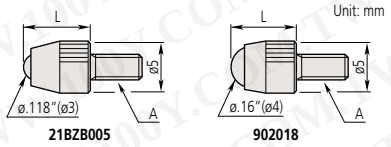
Standard contact point.



For waterproof model (w/ groove for 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**	—

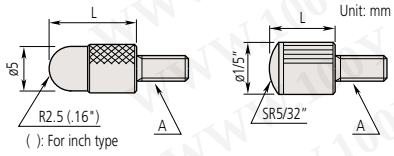


A: 4-48UNF

L \ Material	Carbide	Plastic
1/4"	**21BZB005**	**902018**

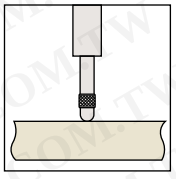
Shell Type Point

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

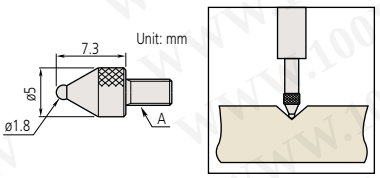


A: 4-48UNF

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"

Ball point

Optimal for workpieces with deep indentations.

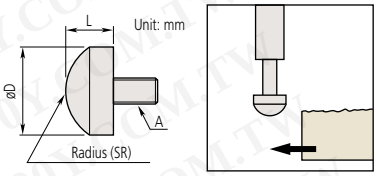


A: M2.5x0.45

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

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"

F

Mitutoyo

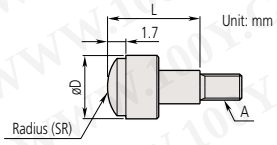
Dial Indicators

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

Contact Points
Optional Accessory for Digimatic and Dial Indicators and Linear Gages

Spherical Point (Carbide)

A large radius makes this contact point optimal for use where the workpiece needs to slide from the side.

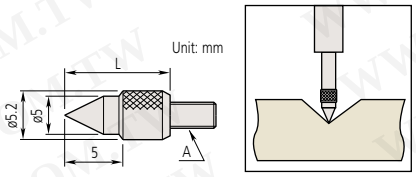


A: M2.5x0.45

Order No.	D	L	SR
120058	5.2	5	5
120059	7.5	10	7
120060	10.5	10	10

Conical Point

Used for positioning the measurement point. Since it can damage a workpiece easily, it is not suitable for use on soft materials.

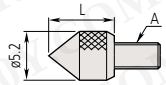


A: M2.5x0.45

Order No.	Tip angle	L
101120	60°	10

A: 4-48UNF

Order No.	L	A
101190	1/2"	.2"



A: M2.5x0.45

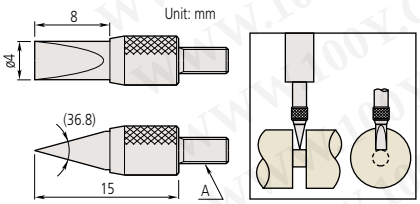
Order No.	Tip angle	L
101385	90°	5

A: 4-48UNF

Order No.	D	L
101191	.2"	1/4"

Knife Edge Point (Carbide)

Suitable for measuring narrow groove diameter, etc.

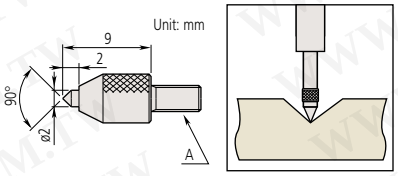


A: M2.5x0.45

Order No.
120067

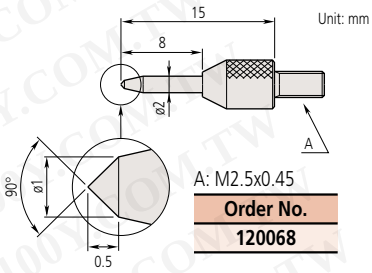
Conical Point (Carbide)

Used for positioning the measurement point. Since it can damage a workpiece easily, it is not suitable for use on soft materials.



A: M2.5x0.45

Order No.
120057

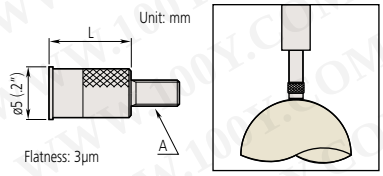


A: M2.5x0.45

Order No.
120068

Flat Point

Optimal for use on convex surfaces.

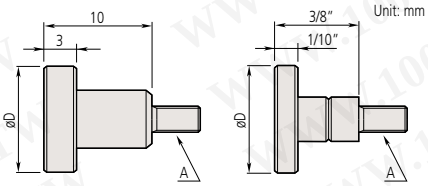


A: M2.5x0.45

Order No.	L
131365	8
21AAA340	10

A: 4-48UNF

Order No.	L
133017	5/16"
21AAA043	1/2"
21AAA044	3/4"
21AAA045	1"

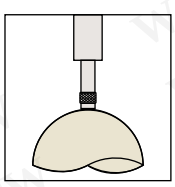


A: M2.5x0.45

Order No.	D
10117	10
21AAA341	15
21AAA342	20
21AAA343	25
21AAA344	30

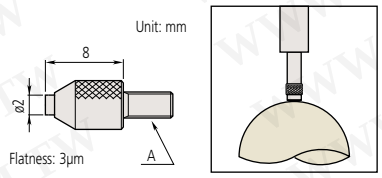
A: 4-48UNF

Order No.	D
101188	1/2"
101189	3/8"



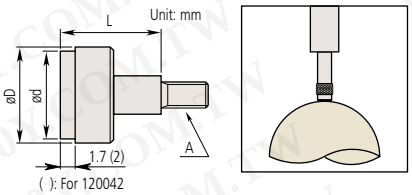
Flat Point (Carbide)

Optimal for use on convex surfaces.



A: M2.5x0.45

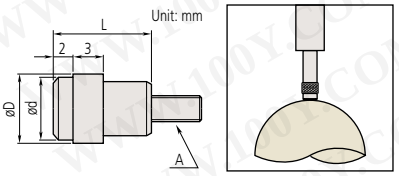
Order No.
120056



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

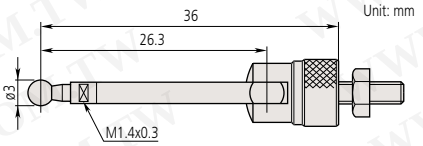


A: M2.5x0.45

Order No.	D	d	L
137255	7	6.4	10
137399	9	8	10

Lever Point

Suitable for use on perpendicular faces, such as those within mold cavities. Lever can be adjusted to the required angle.

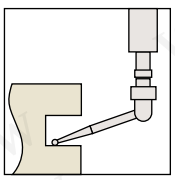


A: M2.5x0.45

Order No.
900391

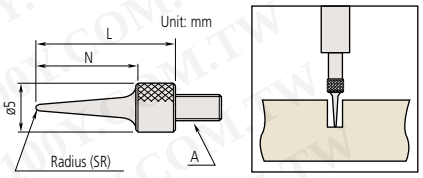
A: 4-48UNF

Order No.
900393



Needle Point

Suitable for probing the bottom of a groove or hole.



A: M2.5x0.45

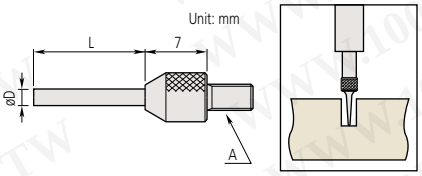
Order No.	N	L	SR
101121	11	15	0.4
137413	13	17	0.2
21AAA255	21	25	0.4
21AAA256	31	35	0.4

A: 4-48UNF

Order No.	L	SR
21AAA030	.6"	.016"
21AAA046	1"	.016"
21AAA047	11/2"	.016"
21AAA048	2"	.016"

Needle Point (Carbide)

Suitable for probing the bottom of a groove or hole.



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
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

F

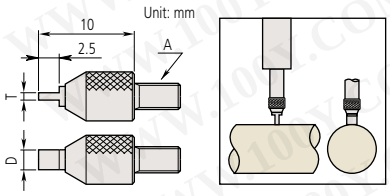
Dial Indicators

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

Contact Points
Optional Accessory for Digimatic and Dial Indicators and Linear Gages

Blade Point (Carbide)

Suitable for use on convex surfaces, especially those with shallow grooves.

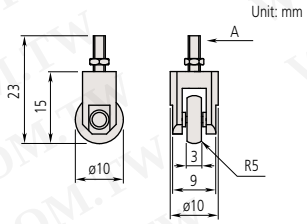


A: M2.5x0.45

Order No.	T	W
120061	0.4	2
120062	0.6	2
120063	1	4

Roller Point

Suitable for use on a moving workpiece surface, or where the workpiece needs to slide from the side.



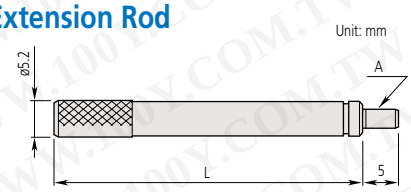
A: M2.5x0.45

Order No.
901954

A: 4-48UNF

Order No.
901991

Extension Rod



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

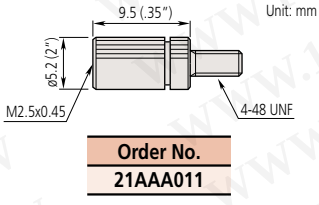
Order No.	L
139167	1/2"
301655	1"
301657	2"
301659	4"

Interchangeable Contact Point Set

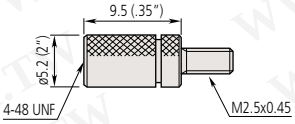
This set consists of six types of popular contact point for extending the use of an indicator to many applications.

A: M2.5x0.45

Order No.	Contact points included
7822	Flat Point (**131365**, ø5mm)
	Flat Point (**101117**, ø10mm)
	Needle Point (**101121**)
	Spherical Point (**101119**)
	Shell Type Point (**101118**)
	Shell Type Point (**101387**)



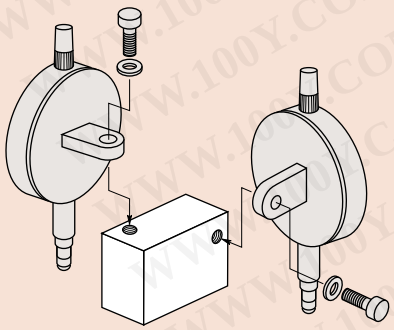
Order No.
21AAA011



Order No.
21AAA012

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.

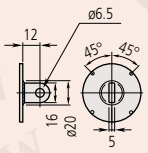
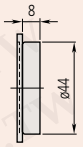
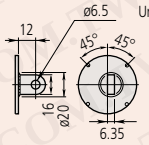
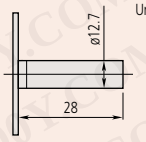
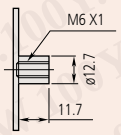
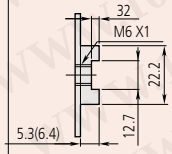
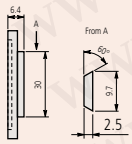
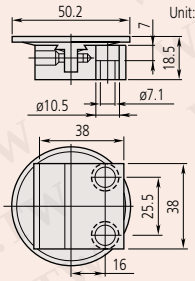
Application



F

Interchangeable Backs
Optional Accessory for Digimatic and Dial Indicators

SPECIFICATIONS

Description		Order No. Series 1 (ø41mm)	Series 2 (ø57mm)	Series 3, 4 (ø78, 91mm)
Flat Back 	Unit: mm 	**101211**: a=2.2 **136872**: for water-proof type **191559**: for 1911, 1913-10, 1921, 1923, 1925-10, 1927-10 **137906**: for 1003	**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 1911, 1913-10, 1921, 1923, 1925-10, 1927-10 **192910**: **137905**: for 1003	**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**: #1/4-20UNF	**136026**: M6x1 **101168**: #1/4-20UNF)	**136027**: M6x1 **100838**: #1/4-20UNF
Back with Dovetail	Unit: mm 	—	**900008**	**Special order**
Back with Adjustable Bracket 	Unit: mm 	—	**901963**	—

F

Dial Indicators

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

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.

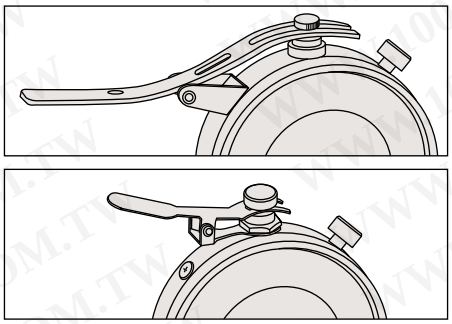
21AZB149

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 dial indicators (up to 10mm/.4" range).

903307: Lever
192686: Screw

F

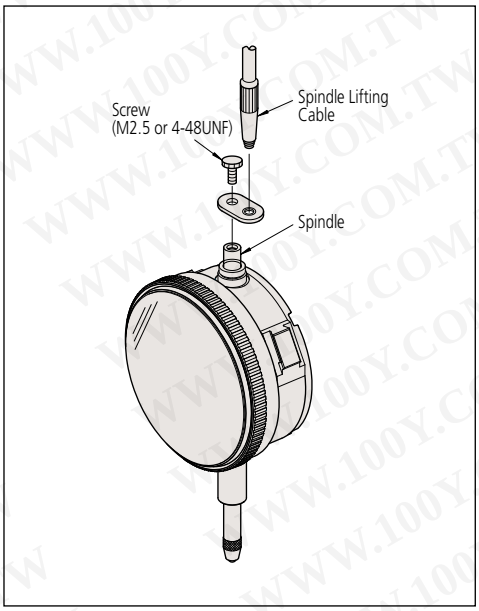
Spindle Lifting Cable

901975: with auto-stop function

Spindle Lifting Knob

137693
Suitable for 4.8mm spindle diameter.

Application



F

Mitutoyo

Dial Indicators

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

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

No.136420
(10 sheets/set)

Green

No.136421
(10 sheets/set)

Yellow

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 1003, 1911, 1913-10, and 2971 to 2973.

Note: When attaching to small dial indicators, the overall height will be 8mm taller.

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 ø1 (**129736**)
(7) Reamer ø0.6 (**193702**)
(8) Reamer for pointer (ø0.5: 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 (ø0.8) (**126630**)
(24) Pointer removing tip (ø0.5) (**126630B**)
(25) Pointer removing tip (ø1.6) (**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 ø1 (No. 6) or reamer ø0.6 (No. 7) for F-type dial indicators and dial test indicators. Use the reamer for hands (ø0.5: 1/20 taper) (No.8) on S-type dial indicators.

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**

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) ø19.5 (2) ø22.5 (3) ø25.5 (4) ø28.5
  (5) ø32.5 (6) ø35 (7) ø38 (8) ø50

- 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.

F

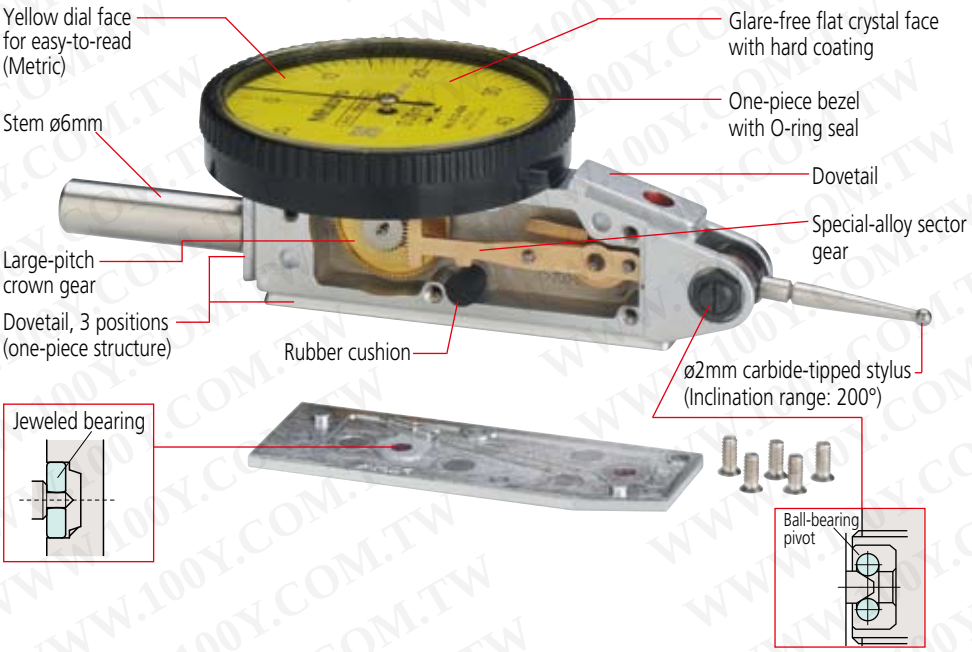
Mitutoyo

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 model 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.
  - · Parallel: The graduations can be read from the front, with the probe on the tip of the horizontal conical rod abutting the workpiece.
  - · Universal: The direction of the probe movement can be freely changed.
  - · Pocket: Compact type



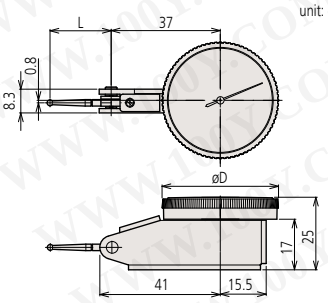
Features of dial test indicators with a ruby contact point

- Dial test indicators with a ruby contact point are available for 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.
  - · Will not pick up ferrous swarf.

Feature icons

Icon	Feature description
	With revolution counter type
	Long stylus type
	Jeweled bearing type
	Double scale spacing type, easy-on-the-eyes
	Compact type
	Dustproof type
	Anti-magnetic type

DIMENSIONS



Order No.	L	D
513-424E/513-478E	22.3	ø40
513-404E/513-474E	20.9	ø40
513-415E/513-477E	44.5	ø40
513-426E	22.3	ø40
513-405E/513-475E	14.7	ø40
513-425E	14.7	ø40
513-401E/513-471E	12.8	ø40
513-414E	36.8	ø40
513-409	14.7	ø40

Order No.	L	D
513-466E	22.3	ø28
513-464E	20.9	ø28
513-465E	14.7	ø28

Special Set: **No. 513-908 (mm)**

513-404E: Dial test indicator
7014: Mini magnetic stand

No. 513-907 (inch)

513-402: Dial test indicator
7014E: Mini magnetic stand

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.


513-474E


513-477E


513-471E


513-478E


513-475E


513-424E


513-404E

Ruby contact point models
- Higher resistance to wear
- Non-magnetic, non-conductive tip allows use in EDM processes


513-414E


513-415E

Carbide contact point models


513-426E


513-405E


513-425E


513-401E

F

Mitutoyo

Dial Test Indicators

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

Anti-magnet type | Double scale spacing type | Long stylus type | Jeweled bearing type | Compact type | With revolution counter type

513-466E

513-464E

513-465E

SPECIFICATIONS

Metric

Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force						
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.

Inch

Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force						
Basic set	Plus set	Full set											
513-402	—	**513-402T**	.0005"	.03"	±.0005"	0-15-0	0.3N or less	✔	—	✔	—	—	—
513-472	—	—	.0005"	.03"	±.0005"	0-15-0	0.3N or less	✔	—	✔	—	—	—
513-412	—	**513-412T**	.0005"	.03"	±.0005"	0-15-0	0.2N or less	✔	✔	✔	—	—	—
513-479	—	—	.0005"	.03"	±.0005"	0-15-0	0.2N or less	✔	✔	✔	—	—	—
513-462	—	—	.0005"	.03"	±.0005"	0-15-0	0.3N or less	✔	—	✔	✔	—	—
513-403	—	**513-403T**	.0001"	.008"	±.0001"	0-4-0	0.3N or less	✔	—	✔	—	—	—
513-473	—	—	.0001"	.008"	±.0001"	0-4-0	0.3N or less	✔	—	✔	—	—	—
513-463	—	—	.0001"	.008"	±.0001"	0-4-0	0.3N or less	✔	—	✔	✔	—	—

Provided with a .079"DIA ruby contact point as a substitute for .079"DIA carbide contact point.

Metric/inch

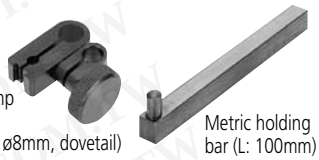
Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force						
Basic set	Plus set	Full set											
513-409	—	**513-409T**	0.002mm, .0001"	0.2mm, .0075"	3μm	0-10-0, 0-3.8-0	0.3N or less	✔	✔	—	—	—	—

Inch/Metric

Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force						
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

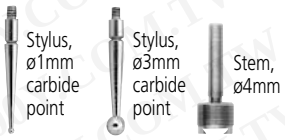
Full set



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

Stylus, ø2mm contact point (carbide)

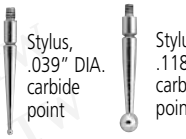
Indicator

Knurled clamp ring

Stem, ø8mm

Set Configuration: Inch and Inch/Metric

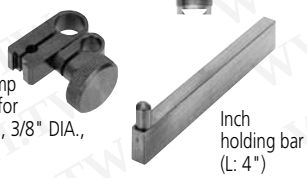
Full set



Stylus, .039" DIA. carbide point

Stylus, .118" DIA. carbide point

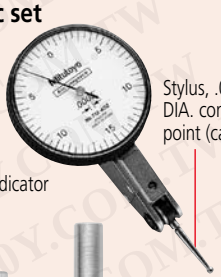
Stem, .157" DIA.



Swivel clamp (**900322**, for .157" DIA., 3/8" DIA., dovetail)

Inch holding bar (L: 4")

Basic set



Stylus, .079" DIA. contact point (carbide)

Indicator

Knurled clamp ring

Stem, 3/8" DIA.

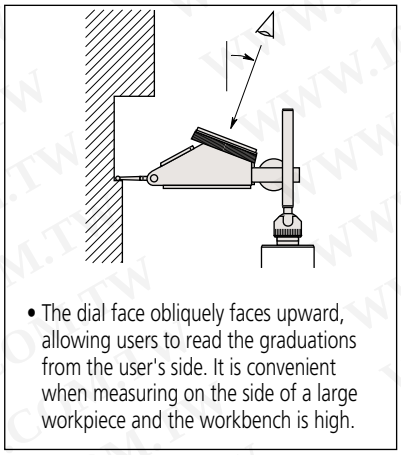
F

PROPRIETARY INSPECTION CERTIFICATE

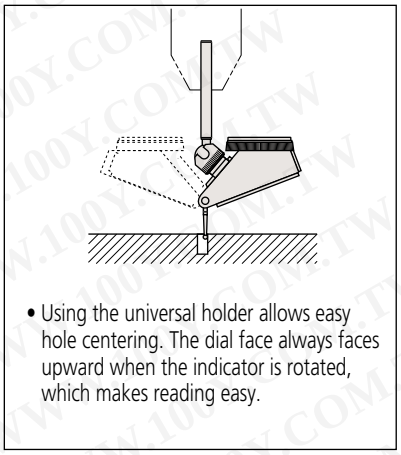
An inspection certificate is attached as standard.
Refer to page IX for details.

Dial Test Indicator
SERIES 513 — Horizontal (20° Tilted Face), Vertical, and Parallel Types

- Specially designed for easy viewing of dial.



- The dial face obliquely faces upward, allowing users to read the graduations from the user's side. It is convenient when measuring on the side of a large workpiece and the workbench is high.



- Using the universal holder allows easy hole centering. The dial face always faces upward when the indicator is rotated, which makes reading easy.

513-444E

513-445E

513-454E
513-284GE

513-455E

513-454E

513-455E

513-444E

513-445E

513-284GE

513-452

Optional Accessories

———: Swivel clamps (See page F-63.)
———: Holding bars (See page F-63.)
———: Stems (See page F-63.)
———: Styli (See page F-63.)

F

Mitutoyo

Dial Test Indicators

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

Anti-magnet type | With revolution counter type | Jeweled bearing type | Long stylus type

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	✔	✔	✔	—	—	—

Inch Horizontal (20° tilted face) type

Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force					Remarks
Basic set	Plus set	Full set										
513-442	—	**513-442T**	.0005″	.06″	±.0005″	0-15-0	0.3N or less	✔	✔	✔	—	—
513-442-06	—	**513-442T-06**	.0005″	.06″	±.0005″	0-15-0	0.3N or less	✔	✔	✔	—	Black dial
513-446	—	**513-446T**	.0005″	.06″	±.0005″	0-15-0	0.2N or less	✔	✔	✔	✔	—
513-446-06	—	**513-446T-06**	.0005″	.06″	±.0005″	0-15-0	0.2N or less	✔	✔	✔	✔	Black dial
513-443	—	**513-443T**	.0001″	.016″	±.0002″	0-4-0	0.3N or less	✔	✔	✔	—	—
513-443-06	—	**513-443T-06**	.0001″	.016″	±.0002″	0-4-0	0.3N or less	✔	✔	✔	—	Black dial

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	✔	✔	—	—	—	—

Inch Vertical type

Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force						
Basic set	Plus set	Full set											
513-452	—	**513-452T**	.0005″	.03″	±.0005″	0-15-0	0.3N or less	✔	✔	—	—	—	—
513-453	—	**513-453T**	.0001″	.008″	±.0001″	0-4-0	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	✔	—	—	—	—	—

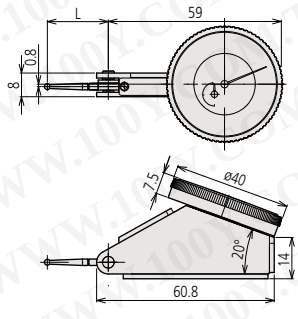
Inch Parallel type

Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force						
Basic set	Plus set	Full set											
513-282G	—	**513-282GT**	.0005″	.03″	±.0005″	0-15-0	0.3N or less	✔	—	—	—	—	—

DIMENSIONS

Horizontal (20° Tilted Face) Type

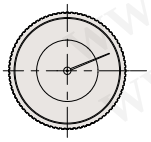
unit: mm



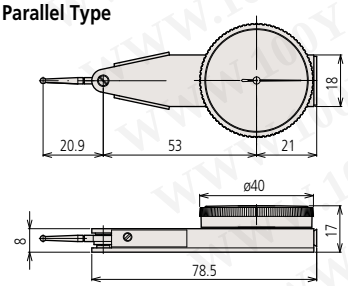
Order No.	L
513-444E	20.9
513-445E	14.7

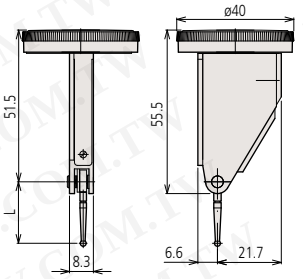
Order No.	L
513-454E	20.9
513-455E	14.7

Vertical Type



Parallel Type



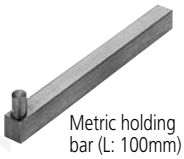


513-284GE

Set Configuration: Metric

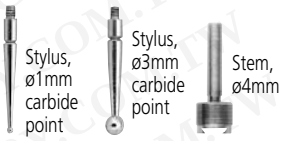
Full set

Swivel clamp (**900321**, for ø4mm, ø8mm, dovetail)

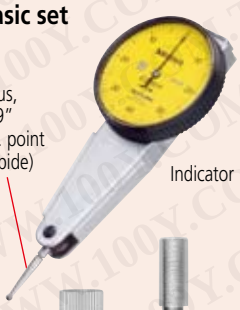


Metric holding bar (L: 100mm)

Plus set



Basic set



Set Configuration: Inch

Full set

Swivel clamp (**900322**, for .157″ DIA., 3/8″ DIA., dovetail)

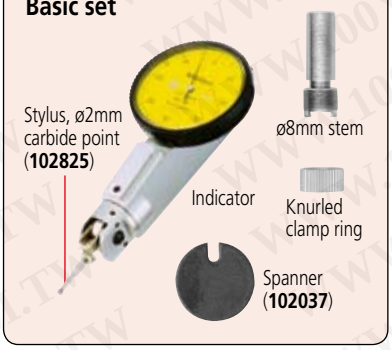
Inch holding bar (L: 4″)

Basic set

Set Configuration: Metric

Full set

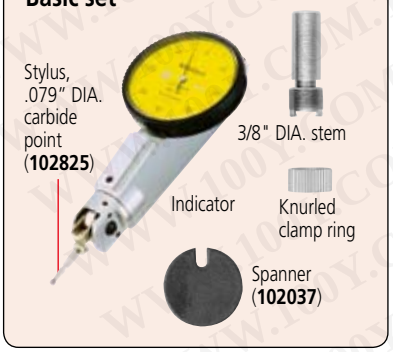
Basic set



Set Configuration: Inch

Full set

Basic set

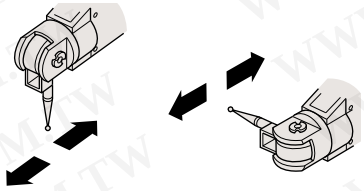


Optional Accessories

———: Swivel clamps (See page F-63.)
———: Holding bars (See page F-63.)
———: Stems (See page F-63.)
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

Jeweled bearing type

Metric

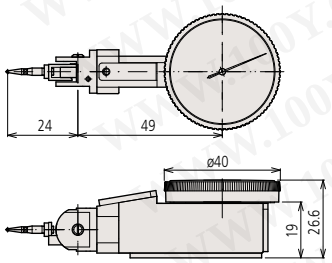
Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force		—	—	—	—	—
Basic set	Full set											
513-304GE	**513-304GT**	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✔	—	—	—	—	—

Inch

Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force		—	—	—	—	—
Basic set	Full set											
513-302G	**513-302GT**	.0005"	.03"	±.0005"	0-15-0	0.3N or less	✔	—	—	—	—	—

DIMENSIONS

Unit: mm



513-304GE

F

Dial Test Indicators

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

An inspection certificate is attached as standard.
Refer to page IX for details.

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.
- Two holding bars are supplied. (Full sets only.)
- Fully adjustable bezel/dial face.
- Stylus is adjustable within 220°.
- Bezel is sealed with on O-ring to keep out water / oil.


513-517E


513-514E


513-517WE


513-527E


513-515T


513-503E


513-501E


513-518


513-528


513-512


513-504


513-517E
513-517WE


513-515E


513-514E


513-503E


513-501E

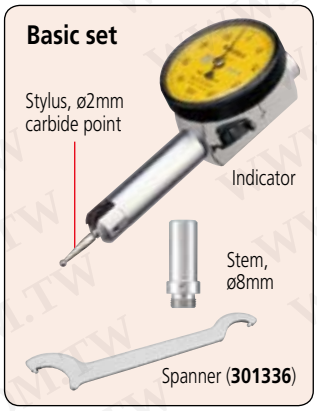
Optional Accessories

———: Swivel clamps (See page F-64.)
———: Holding bars (See page F-64.)
———: Stems (See page F-64.)
———: Styli (See page F-64.)

Set Configuration: Metric

Full set

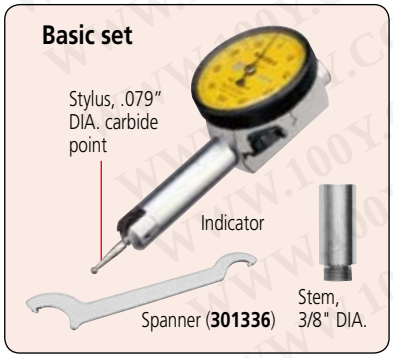
Basic set



Set Configuration: Inch

Full set

Basic set



Long stylus type | Jeweled bearing type | Dustproof type | Compact type

SPECIFICATIONS

Metric

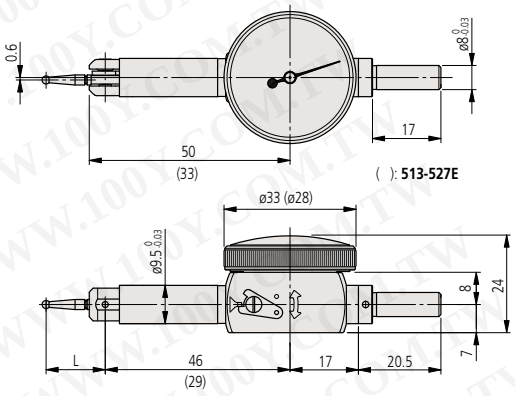
Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force						
Basic set	Full set											
513-514E	**513-514T**	0.01mm	0.5mm	10µm	0-25-0	0.3N or less	✔	✔	—	—	—	—
513-517E	**513-517T**	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	—	✔	—	—	—	—
513-517WE	**513-517WT**	0.01mm	0.8mm	8µm	0-40-0	0.3N or 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	—	✔	—	—	—	—

Inch

Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force						
Basic set	Full set											
513-518	**513-518T**	.001"	.04"	±.001"	0-20-0	0.3N or less	—	✔	—	—	—	—
513-528	**513-528T**	.001"	.04"	±.001"	0-20-0	0.3N or less	—	✔	✔	—	—	—
513-512	**513-512T**	.0005"	.02"	±.0005"	0-10-0	0.3N or less	✔	✔	—	—	—	—
513-504	**513-504T**	.0001"	.01"	±.0002"	0-5-0	0.3N or less	—	✔	—	—	—	—

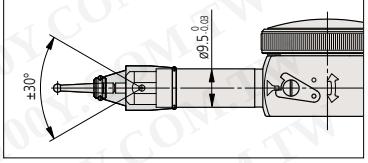
DIMENSIONS

unit: mm



Order No.	L
513-514E	36.8
513-517E	20.9
513-515T	44.5
513-503E	14.7
513-501E	12
513-517WE	20.9
513-527E	14.7

For 513-517WE, use the indicator with measuring range of ±30°



F

Dial Test Indicators

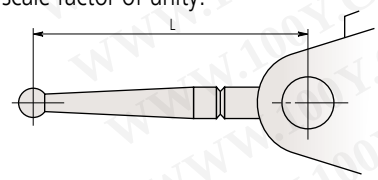
Comparison measuring instruments which ensure high quality, high accuracy and reliability.

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 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")

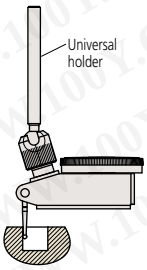
.25" x .5"

953639 (Length: 2")
900306 (Length: 4")

Universal Holder

- Allows the indicator to be set at the desired attitude to the workpiece.

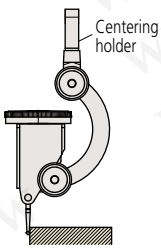
901916 (ø8mm stem)
901459 (.25" DIA. stem)
901461 (ø6mm stem)



Centering Holder

- Allows large diameter cylinders or holes to be centered on a machine tool.

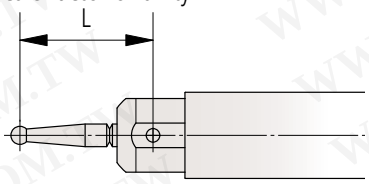
901959 (ø8mm stem)
901997 (.25" DIA. stem)



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.)

102389

ø8mm

102822

3/8" DIA.

102081

Swivel Clamps

- Can be used with Holding Bars.

For ø4mm stem and ø8mm stem, and dovetail

900321

For .157" DIA. stem and 3/8" DIA. stem, and dovetail

900322

Holding Bars

9 x 9mm

953638 (Length: 50mm)
900209 (Length: 100mm)

ø8mm (.315"DIA)

900211 (Length: 115mm)

.25" x .5"

953639 (Length: 2")
900306 (Length: 4")

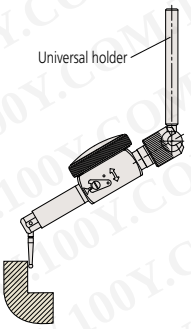
Spanner

301336

Universal Holder

- Allows the indicator to be set at the desired attitude to the workpiece.

901917 (ø8mm stem)
901546 (.25" DIA. stem)
901547 (ø6mm stem)



F

Mitutoyo

Inspection Instrument for Dial Indicator

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

i-Checker SERIES 170

The i-Checker is specially designed to calibrate dial indicators, dial test indicators, and other electronic comparison gage heads with a stroke of up to 100mm (4").

- ±(0.2+L/100)µm indication accuracy.
- Directly inspects an indicator with a stroke of up to 100mm (4"). The dial test indicator, bore gage and lever-type inductive head can be inspected with optional accessories.
- Adjustment of the measurement position is very easily accomplished because of semi-automatic measurement and fully automatic measurement functions.
- Creates and prints out a simple inspection certificate.
- Saves inspection results as a CSV file for analysis by software.

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is attached as standard.
Refer to page VIII for details.

Technical Data

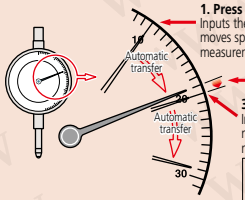
Measuring Range:	100mm/4"
Resolution:	0.02µm/0.8µin
Accuracy:	±(0.2+L/100)µm in vertical position
(at 20°C)	±(0.3+2L/100)µm in lateral position
	L = arbitrary length (mm)
Drive method:	Electric motor
Measuring Unit:	Reflective-type glass linear encoder
Thermal expansion coefficient:	(8±1)X10^{-6}/K
Measurement method:	Semi-automatic / Fully automatic*
Dimensions:	184 x 225 x 532mm (W x D x H)
Operating temperature range:	20°C±3°C
Power supply:	100VAC to 240VAC ±10%, 50/60Hz
Mass:	20kg/44.1lbs

* Automatic measurement requires the indicator's connection cable. Additionally some form of indicator, along with a connecting machine (the optional accessory for indicator as a Digimatic power-supply unit on EF counter) will be needed.

Functions

Inspect your analog indicator semi-automatically!

The pointer of the analog indicator is positioned just before the measuring point automatically via Mitutoyo's Semi-automatic Measurement function. After that, inspection begins simply by adjusting the pointer position with the jog-dial. Because of this function, measurement time is reduced and user fatigue is practically eliminated. Additionally all functions necessary for inspection are combined in the control box so that the operator need not rely on excessive eye movement to adjust the pointer.



1. Press of data button
Inputs the current position data and moves spindle just before the next measurement position automatically.

2. Positioning by Jog-dial

3. Press of data button
Inputs the current position data and moves spindle just before the next measurement position automatically.

Note: It is possible to specify the scale graduation increment so that spindle movement and data transfer are performed automatically.

Fully automatic inspection of digital indicator

The Automatic Measurement function, in tandem with a digital indicator makes the spindle move so that measurement data is acquired automatically. Therefore, manual adjustment to the measurement position is unnecessary and the efficiency of every inspection is enhanced.

Create and printout a simplified inspection certificate

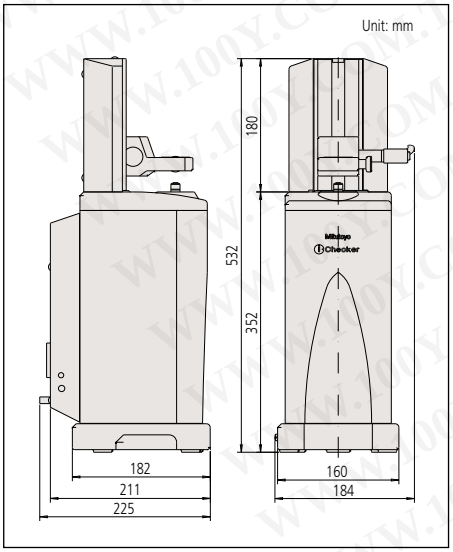
It is possible to create, edit and print out your own inspection certificate. Furthermore, that data can be saved as a CSV file.

SPECIFICATIONS

Order No.*	Remarks
170-311	with ø8mm bush
170-312	with ø3/8" bush

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **E** for BS, **K** for EK, **No suffix** is required for JIS/100V
* Calibration certificate and traceability system chart are attached as atandard.

DIMENSIONS



Applicable Indicators

- Dial indicator
- Hicator
- Digimatic indicator***
- Test indicator*
- Bore gage**
- Linear gage

* requires optional test indicator attachment set.
* Contact the nearest Mitutoyo sales office for testable indicators.
** requires optional bore gage accessory.
*** requires optional SPC cable for fully automatic measurement.

Using test indicator attachment set (**02ASK000**)

Optional Accessories

02ASK000: Test indicator attachment set (ø6mm stem)
02ASK180: Test indicator attachment set (ø8mm stem)
02ASK370: Test indicator holder (ø6mm stem)
02ASK380: Test indicator holder (ø8mm stem)
02ASL310: Accessory for Bore gages
902803: ø6mm dovetail grooved stem
902804: ø8mm dovetail grooved stem
02ASK040: Stem bush ø6mm
02ASJ856: Stem bush ø8mm
02ASK150: Stem bush ø8mm, short
02ASL150: Stem bush ø10, short
02ASK050: Bush ø9.5 (Requires **02ASK070**)
02ASK060: Stem bush ø12mm
02ASK070: Stem bush ø15mm
02ASK080: Stem bush ø20mm
02ASK710: Stem bush ø28mm
02ASK090: Stem bush 3/8"
02ASK130: Stem bush case
02ASK730: Reflector
937179T: Foot switch

An inspection certificate is attached as standard.
Refer to page VIII for details.

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-31 and C-37 for details.)

SERIES 170 — UDT-2 Dial Indicator Tester

- UDT-2 is the accuracy tester for 0.01mm resolution dial indicators, dial test indicators and bore gages.
- Stem mounting hole:ø6,ø8mm

170-102-10

SPECIFICATIONS

Metric

Order No.	Range	Graduation	Accuracy
170-102-12	0 - 25mm	0.001mm	±2μm

Inch

Order No.	Range	Graduation	Accuracy
170-101-10	0 - 1"	.0001"	±.0001"

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: ø4mm to ø10mm

521-103

SPECIFICATIONS

Metric

Order No.	Range	Graduation	Accuracy
521-103	0 - 1mm	0.0002mm	±0.2μm
521-105	0 - 5mm	0.0002mm	±0.8μm

Inch

Order No.	Range	Graduation	Accuracy
521-104	0 - .05"	.00001"	±.00001"
521-106	0 - .2"	.00001"	±.00003"

Mitutoyo

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.

Standard Type

547-301

547-321

High Accuracy Type

547-401

Standard Type

7301

Lightweight Type (integrated molding of the bezel)

7331S

7321

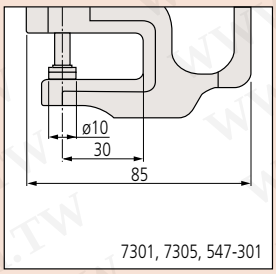
Usage examples

Measuring paper thickness

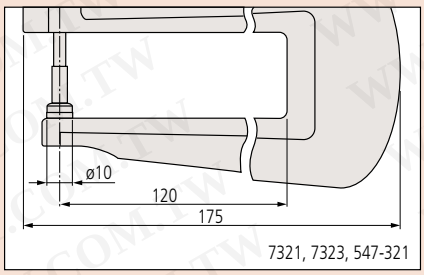
Measuring thickness of a human hair

DIMENSIONS

Unit: mm



7301, 7305, 547-301



7321, 7323, 547-321

Optional Accessories

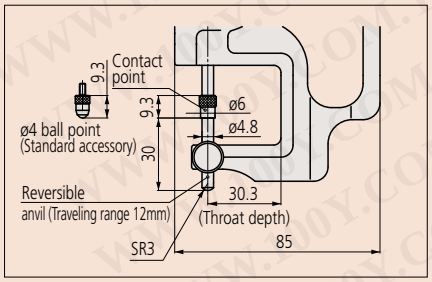
905338: SPC cable (1m) for digital models
905409: SPC cable (2m) for digital models
02AZD790F: SPC cable for U-WAVE (160mm)
Digimatic Mini-Processor DP-1VR
Refer to page A-13 for details.

Input Tool

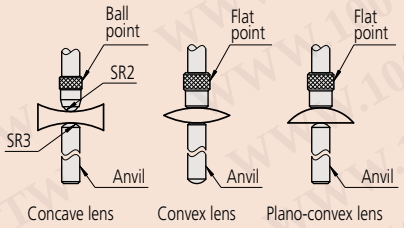
Convenient Interface Input Tools which enable the conversion of measurement data to keyboard signals and directly input them to cells in off-the-shelf spreadsheet software such as Excel.
(Refer to pages A-4 to A-8 for details.)

DIMENSIONS

Unit: mm



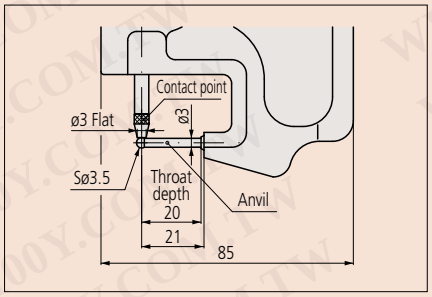
Application examples



Note: Parallelism between the flat point and anvil
547-313: 10µm
7313: 5µm

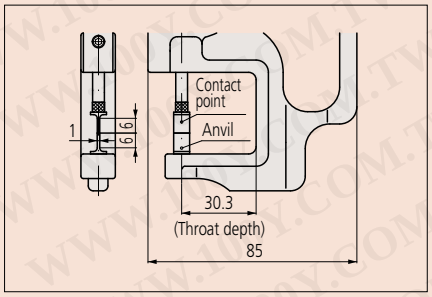
DIMENSIONS

Unit: mm



DIMENSIONS

Unit: mm



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.
- Provided with a ball point.

547-313

7313

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

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Dial Indicator Applications

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

Thickness Gages
SERIES 547, 7

SPECIFICATIONS

Metric

Order No.	Range	Resolution	Accuracy	Mesuring force	Remarks
547-401	0-12mm	0.001mm	±3μm	3.5N or less	High accuracy, carbide spindle anvil
547-301	0-10mm	0.01mm	±20μm	1.5N or less	Standard, ceramic spindle/anvil
547-321	0-10mm	0.01mm	±20μm	1.5N or less	Deep throat, ceramic spindle/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	Mesuring force	Remarks
547-400S/ -	0-.47"	.00005"/0.001mm	±.0001"/±3μm	3.5N or less	High accuracy, carbide spindle anvil
- / 547-526*	0-.47"	.0001"/0.001mm	±.0002"/±5μm	1.5N or less	Standard, ceramic spindle/anvil
547-300S / 547-500*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20μm	1.5N or less	Standard, ceramic spindle/anvil
547-320S / 547-520*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20μm	1.5N or less	Deep throat, ceramic spindle/anvil
547-312S / 547-512*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20μm	1.5N or less	Lens thickness
547-316S / 547-516*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20μm	1.5N or less	Groove depth
547-361S / 547-561*	0-.4"/0-.47"*	.0005"/0.01mm	±.001"/±20μm	1.5N or less	Tube thickness

* using ID-S Digimatic indicator.

Metric

Order No.	Range	Graduation	Accuracy	Mesuring force	Remarks
7327	0-1mm	0.001mm	±5μm	1.4N or less	Fine dial reading, ceramic spindle/anvil
7301	0-10mm	0.01mm	±15μm	1.4N or less	Standard, ceramic spindle/anvil
7305	0-20mm	0.01mm	±20μm	2.0N or less	Standard, ceramic spindle/anvil
7321	0-10mm	0.01mm	±15μm	1.4N or less	Deep throat, ceramic spindle/anvil
7323	0-20mm	0.01mm	±22μm	2.0N or less	Deep throat, ceramic spindle/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

Inch

Order No.	Range	Graduation	Accuracy	Mesuring force	Remarks
7326S	0-.05"	.0001"	±.0002"	1.4N or less	Fine dial reading, ceramic spindle/anvil
7300S	0-.5"	.001"	±.001"	1.4N or less	Standard, ceramic spindle/anvil
7304S	0-1"	.001"	±.002"	2.0N or less	Standard, ceramic spindle/anvil
7322S	0-1"	.001"	±.002"	2.0N or less	Deep throat, ceramic spindle/anvil
7312S	0-.5"	.001"	±.001"	1.4N or less	Lens thickness
7316S	0-.5"	.001"	±.001"	1.4N or less	Groove depth
7361S	0-.5"	.001"	±.001"	1.4N or less	Tube thickness

Measuring contact force on a relay

Contact Force Gage
SERIES 546

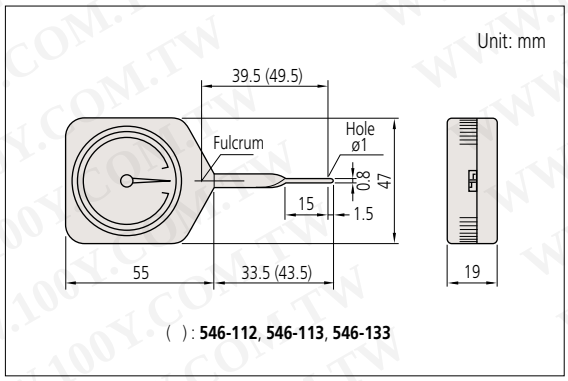
- Contact Force Gages are widely used to determine the measuring force applied by an instrument to a workpiece, as well as contact forces of electrical relays, micro-switches, valves and precision springs.
- Thanks to the miniature anti-friction bearing in the fulcrum, stable measurement is guaranteed.
- 2 types are available: Standard and peak hold.

Standard type
546-112

Standard type
546-119

Peak hold type
546-137

DIMENSIONS



( ) : **546-112**, **546-113**, **546-133**

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	

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Mitutoyo

Dial Indicator Applications

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

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

209-125

SPECIFICATIONS

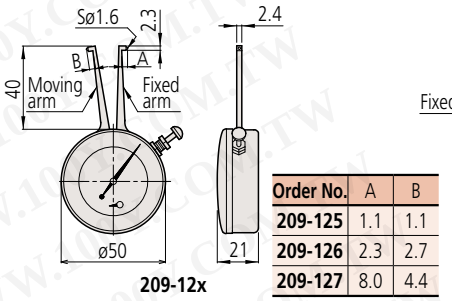
Metric

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: 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.

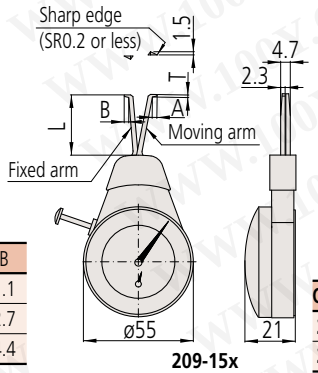
DIMENSIONS

Unit: mm



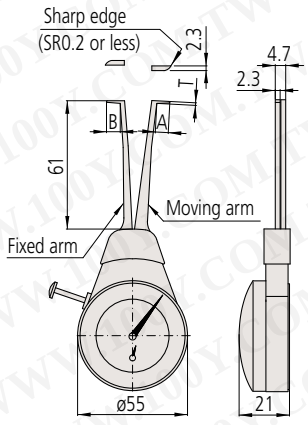
209-12x

Order No.	A	B
209-125	1.1	1.1
209-126	2.3	2.7
209-127	8.0	4.4



209-15x

Order No.	A	B	L	T
209-155	2.2	2.2	26	1.2
209-156	5.5	5.5	28	1.5



209-17x

Order No.	A	B	T
209-175	5.5	5.5	1.5
209-176	10	10	2.0

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Optional accessories

Dial indicator
Dial protection cover: **No.21DZA000**
Refer to page C-43 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 us when using dial indicators which are not recommended.

201-101

Note: The dial indicator and protection cover are optional.

SPECIFICATIONS

Metric

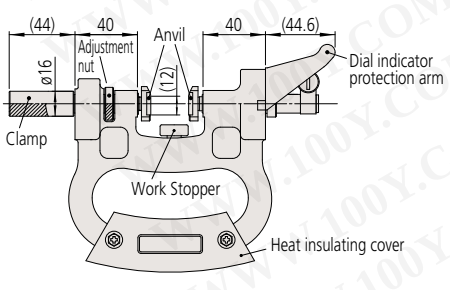
Order No.	Range	Parallelism	Measuring force	Recommended dial indicator (optional)
201-101	0 - 25mm	5µm	15N±3N	**2046SB** (0.01mm reading), **2109SB-10** (0.001mm reading)
201-102	25 - 50mm	5µm	15N±3N	**2046SB** (0.01mm reading), **2109SB-10** (0.001mm reading)
201-103	50 - 75mm	5µm	15N±3N	**2046SB** (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)

Inch

Order No.	Range	Parallelism	Measuring force	Recommended dial indicator (optional)
201-151	0 - 1"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-152	1 - 2"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-153	2 - 3"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-154	3 - 4"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-155	4 - 5"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-156	5 - 6"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-157	6 - 7"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-158	7 - 8"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-159	8 - 9"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-160	9 - 10"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-161	10 - 11"	.0002"	15N±3N	**2803SB-10** (.0001" reading)
201-162	11 - 12"	.0002"	15N±3N	**2803SB-10** (.0001" reading)

DIMENSIONS

Unit: mm



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Mitutoyo

Stands

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

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

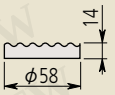
Order No.	Stem hole	Remarks
7001-10	ø8mm, ø9.53mm	With serrated anvil
7002-10	ø8mm, ø9.53mm	With flat anvil
7007-10	ø8mm, ø9.53mm	With square anvil

* Perpendicularity of the mounting hole to the anvil: less than 0.4mm/100mm
* Consult us when mounting Mitutoyo's Linear Gage on this stand. We will check the operation of the set of the stand and Linear gage before shipment (made-to-order).

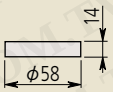
Optional Accessories

101461: Hardened steel flat anvil
101462: Hardened steel serrated anvil
101463: Hardened steel domed anvil*
*Not available for **7007-10**.

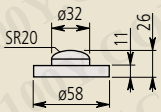
No.101462
Hardened steel



No.101461
Hardened steel



No.101463
Hardened steel



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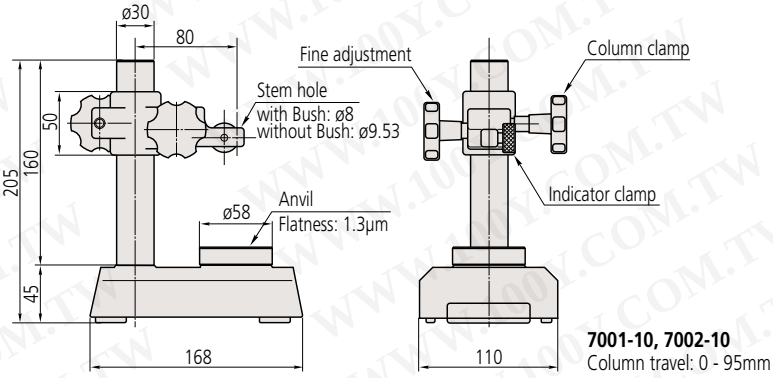
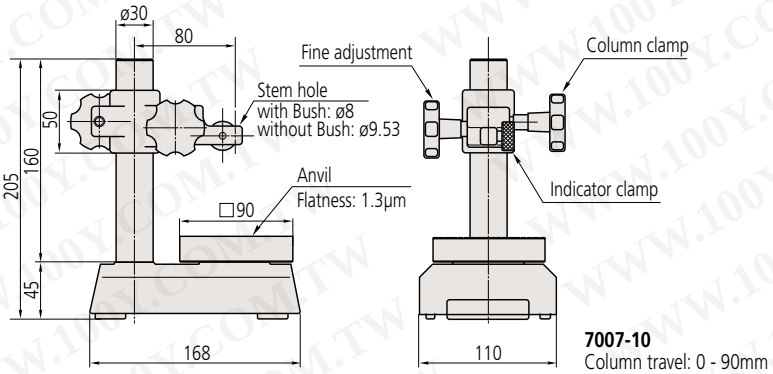
DIMENSIONS

Unit: mm



7001-10, 7002-10
Column travel: 0 - 95mm



7007-10
Column travel: 0 - 90mm

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Mitutoyo

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 ø6 or ø8) and clamp to iron or steel surfaces with a strong magnetic force.
- **7014**, **7019B**, **7027-10**, **7028-10** and **7029** have a dovetail groove.

7010-10

7011-10

7012-10

7014
(without ON/OFF switching of magnetic clamping)

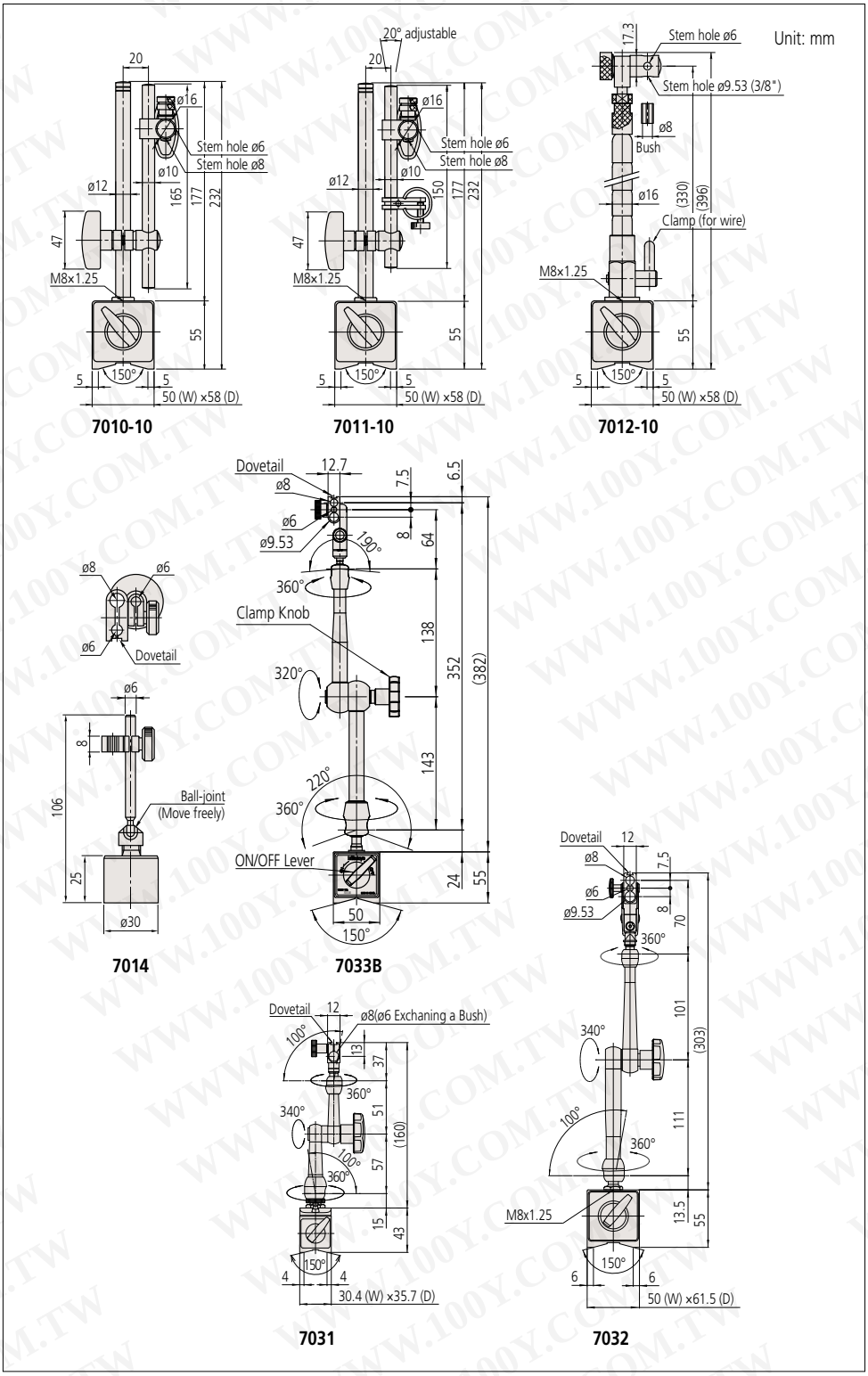
7033B

7031

7032

F

DIMENSIONS



SPECIFICATIONS

Order No.	Description	Applicable holding stem dia.	Dovetail groove	Remarks
7010S-10	Magnetic stand	ø4mm, ø8mm, ø9.53mm (3/8")	—	—
7011S-10	Magnetic stand	ø4mm, ø8mm, ø9.53mm (3/8")	—	With fine adjustment
7014	Mini magnetic stand	ø6mm, ø8mm	Provided	Without magnet ON/OFF
7014E	Mini magnetic stand	ø4mm, ø9.5mm	Provided	Without magnet ON/OFF
7033B	Universal magnetic stand	ø6, ø8mm, ø9.53mm (3/8")	Provided	With mechanical locking system
7031	Universal magnetic stand	ø6, ø8mm	Provided	With mechanical locking system
7032	Universal magnetic stand	ø6, ø8mm, ø9.53mm (3/8")	Provided	With mechanical locking system

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 pileups due to its fine-grain composition.
- Easy maintenance due to the non-rusting base.
- The rigid granite base is free from burrs and pileups due to its fine-grain composition and less viscousness compared with casting iron: the flatness is always accurate and the workpiece is free from damage.

215-151-10 **215-153-10** **215-156-10**

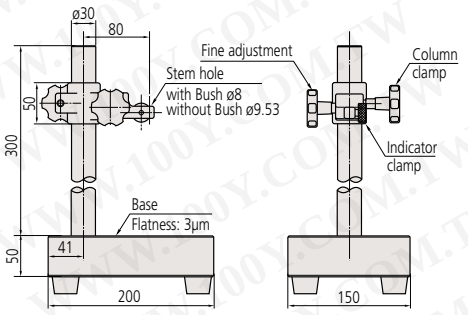
SPECIFICATIONS

Order No.	Granite base size (W x D x H)	Column travel	Stem hole	Remarks
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

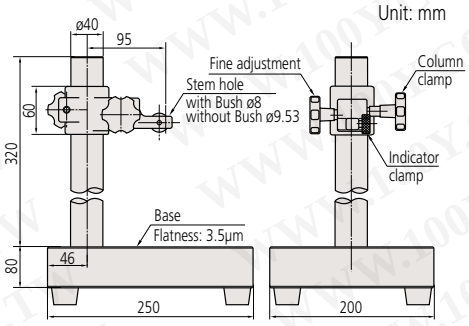
* Perpendicularity of the mounting hole to the anvil: less than 0.2/100mm
* Consult us when mounting Mitutoyo's Linear Gage on this stand. We will check the operation of the set of the stand and Linear gage before shipment (made-to-order).

DIMENSIONS

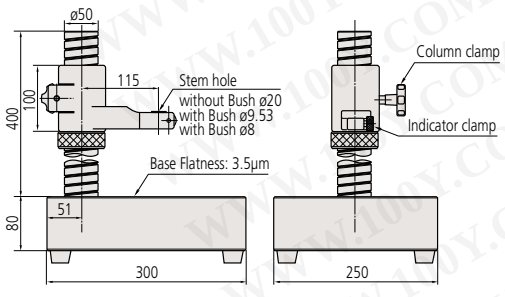
Unit: mm



215-151-10
Column travel: 0 - 250mm



215-153-10
Column travel: 0 - 260mm



215-156-10
Column travel: 0 - 275mm

Optional Accessories

21JAA329: ø8mm bush
21JAA330: ø9.53mm bush
21JAA331: ø15mm bush
only available for **215-156-10**

F

SERIES 215 — Comparator Stands

Application example using Digimatic Indicator ID-H.

- Comparator Stands have a very stable, cast-iron which 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 110×110mm are supplied with **215-405-10**, and 150×150mm with **215-505-10** models.

215-405-10

Optional Accessories

21JAA329: ø8mm bush*
21JAA330: ø9.53mm (3/8") bush*
21JAA331: ø15mm bush*
* Only available for **215-505-10**.

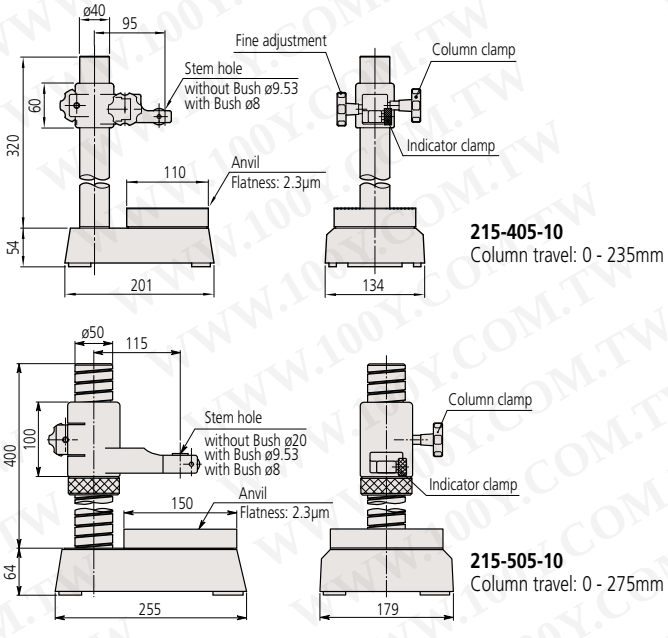
SPECIFICATIONS

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

DIMENSIONS

Unit: mm



F

Mitutoyo

Stands

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

SERIES 519 — Transfer Stand

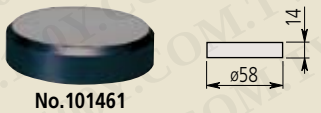
- Transfer Stands are designed for comparison measurements of size using a dial indicator or Digimatic Indicator.

519-109-10
(with a serrated anvil)

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

SPECIFICATIONS

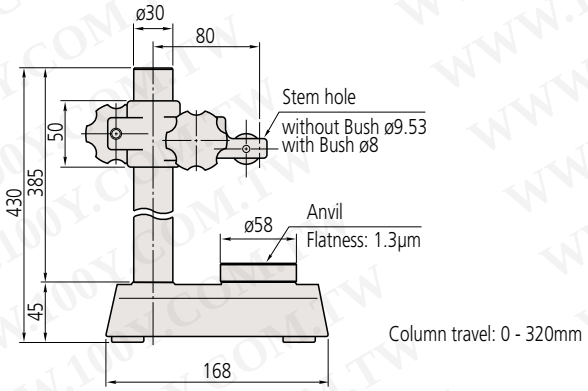
Metric

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

DIMENSIONS

Unit: mm



Column travel: 0 - 320mm

F

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

SPECIFICATIONS

Metric

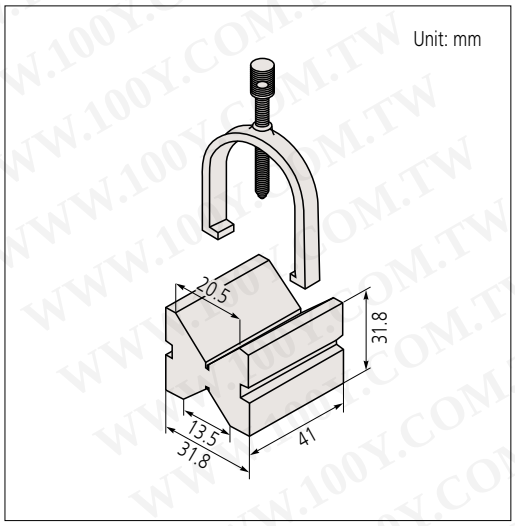
Order No.	Max. workpiece dia.	Remarks
181-902	25mm	With clamp

Inch

Order No.	Max. workpiece dia.	Remarks
181-901	1″	With clamp

DIMENSIONS

Unit: mm



Dial Gages and Digital Indicators

Nomenclature

Dial faces

0.01mm


Continuous dial (Bi-directional graduation)


Balanced dial (Multi-revolution)


Continuous dial (Reverse reading)

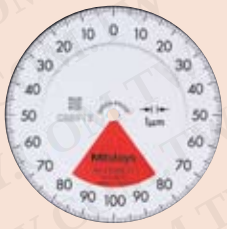

Balanced dial (One revolution)

0.001mm


Continuous dial (Standard scale spacing)


Balanced dial (Multi-revolution)


Continuous dial (Double scale spacing)

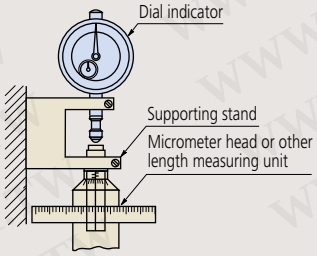
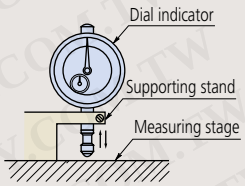
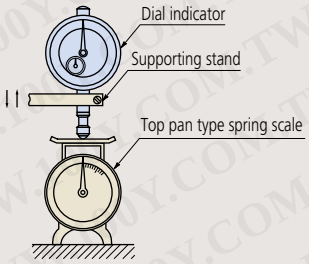

Balanced dial (One revolution)

Continuous dial: For direct reading
Balanced dial: For reading the difference from a reference surface
Reverse reading dial: For depth or bore gage measurement
One revolution dial: For error-free reading of small differences

Mitutoyo's Response to Dial Indicator Standard B7503: 2011

- We guarantee the accuracy of completed products by inspecting them in the vertical posture. Standard-attached inspection certificate includes inspection data.
- We issue paid-for inspection certificates for horizontal or opposite posture if required.
- The old JIS Standard indicates that "the uncertainty of calibration" is evaluated inclusively. On the other hand, the new JIS Standard indicates that conformity or nonconformity to specification is verified based on JIS B 0641-1 and that it is preferred that the uncertainty is evaluated based on ISO/TS 14253-2 and ISO/IEC Guide 98. Therefore, we perform shipping inspection of dial indicators inclusive of the uncertainty of calibration as usual.

Dial Indicator Standard B7503 : 2011 (Extract from JIS/Japanese Industrial Standards)

Item	Calibration method	Diagram of calibration setup in vertical posture (example)	Tools for calibration (example)
Indication error Retrace error	Hold the dial indicator with its spindle set vertically downward, retract the spindle (retraction direction) to set the dial hand at the zero point, and determine the indication error at the below-mentioned measurement points with reference to the dial graduations. - Every 1/10 revolution for the first two revolutions - Every half revolution for the next five revolutions - Every revolution for the next 25 revolutions - Every 5 revolutions for after the 25th revolution For one revolution type dial indicators and indicators whose graduations are not factors of 10, determine the indicatoin errors at the closest measurement points mentioned above. Next, retract the spindle more than three graduations over the entire measuring range, reverse the spindle displacement (extension direction), and determine the indication errors at the same points measured during spindle retraction. Then determine the indication errors and the retrace errors with reference to the bidirectional indication errors thus obrained. When automatically reading errors by automatic inspection machine, determine the gap between the dial hand and the graduation mark with reference to the displacement of the measuring instrument.		For 0.01mm graduation dial indicators: A micrometer head or other measuring unit with 0.5µm graduation or less and instrumental error of ±1µm and a supporting stand. For dial indicators other than the above: A micrometer head or other measuring unit with 1µm graduation or less and ±1µm instrumental error and a supporting stand.
Repeatability	Apply the contact point of the dial indicator perpendicularly to the upper face of a measuring stage, retract and extend the spindle quickly and slowly five times at a desired position within the measuring range and determine the maximum difference between the five indications obtained.		Measuring stage Supporting stand
Measuring Force	Holding a dial indicator, retract and extend the spindle continuously and gradually, and measure the measuring force at the zero, middle and end points in the measuring range. The largest value: maximum measurement force The smallest value: minimum measurement force The maximum difference in contact force measured when the spindle is retracting and extending at the same measuring position: difference in the measurement force		Supporting stand Top pan type spring scale (graduation: 0.02N or less) or force gage (sensitivity: 0.02N or less)

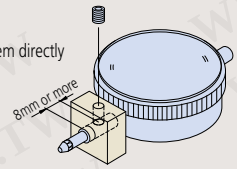
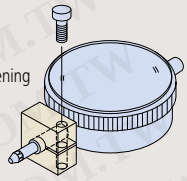
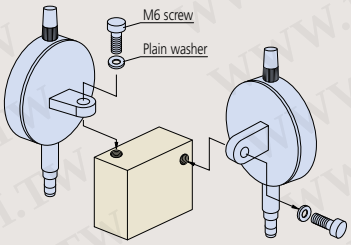
Maximum permissible error

		Maximum permissible error (MPE) by measurement characteristics -- dial indicators with the bezel dia. 50mm or more												Maximum permissible error (MPE) by measurement characteristics --dial indicators with the bezel dia. 50mm or less and back plunger type dial indicators						
Graduation (mm)		0.01								0.005	0.001			0.01				0.005	0.002	0.001
Measuring range (mm)		1 or less	Over 1 and up to 3	Over 3 and up to 5	Over 5 and up to 10	Over 10 and up to 20	Over 20 and up to 30	Over 30 and up to 50	Over 50 and up to 100	5 or less	1 or less	Over 1 and up to 2	Over 2 and up to 5	1 or less	Over 1 and up to 3	Over 3 and up to 5	Over 5 and up to 10	5 or less	1 or less	1 or less
Retrace error		3	3	3	3	5	7	8	9	3	2	2	3	4	4	4	5	3.5	2.5	2
Repeatability		3	3	3	3	4	5	5	5	3	0.5	0.5	1	3	3	3	3	3	1	1
Indication error	Arbitrary 1/10 revolution	5	5	5	5	8	10	10	12	5	2	2	3.5	8	8	8	9	6	2.5	2.5
	Arbitrary 1/2 revolution	8	8	9	9	10	12	12	17	9	3.5	4	5	11	11	12	12	9	4.5	4
	Arbitrary One revolution	8	9	10	10	15	15	15	20	10	4	5	6	12	12	14	14	10	5	4.5
	Entire measuring range	8	10	12	15	25	30	40	50	12	5	7	10	15	16	18	20	12	6	5

MPE for one revolution type dial indicators does not define the indication error of arbitrary 1/2 and 1 revolution.

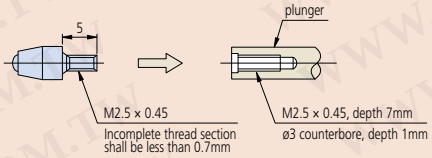
* Values in the table above apply at 20ºC, which JIS B0680 defines as the standard temperature.
* The measurement characteristics of a dial indicator have to meet both maximum permissible error (MPE) and measurement force permissible limits (MPL) at any position within the measuring range in any posture when the measurement characteristics are not specified by the manufacturer.

Mounting a Dial gage

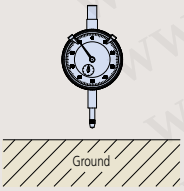
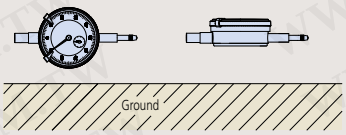
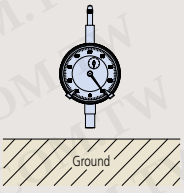
Stem mounting	Method	Clamping the stem directly with a screw 	Clamping the stem by split-clamp fastening 
	Note	• Mounting hole tolerance: ø8G7(+0.005 to 0.02) • Clamping screw: M4 to M6 • Clamping position: 8mm or more from the lower edge of the stem • Maximum clamping torque: 150N·cm when clamping with a single M5 screw • Note that excessive clamping torque may adversely affect spindle movement.	• Mounting hole tolerance: ø8G7(+0.005 to 0.02)
Lug mounting	Method		
	Note	• Lugs can be changed 90 degrees in orientation according to the application. (The lug is set horizontally when shipped.) • Lugs of some Series 1 models (No.1911,1913-10&1003), however, cannot be altered to horizontal. • To avoid cosine-effect error, ensure that any type of gage or indicator is mounted with its spindle in line with the intended measurement direction.	

Contact element

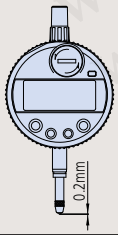
- Screw thread is standardized on M2.5x0.45 (Length: 5mm).
- Incomplete thread section at the root of the screw shall be less than 0.7mm when fabricating a contact point.



Effect of orientation on measuring force

Position	Remarks
Contact element down (normal position) 	—
Plunger horizontal (lateral position) 	If measurement is performed with the plunger horizontal or contact element up, the measuring force is less than when the contact element is down. In this case be sure to check the operation and repeatability of the indicator or digital display. For guaranteed-operation specifications according to positions of digital indicators and dial gages, refer to the product descriptions in a general catalog.
Contact element up (upside-down position) 	

Setting the origin of a digital indicator

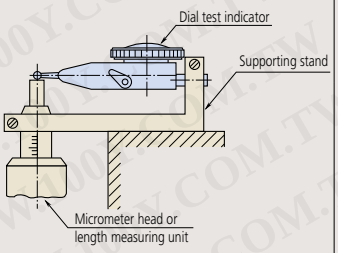
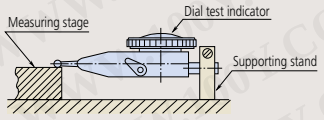
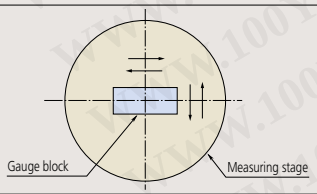
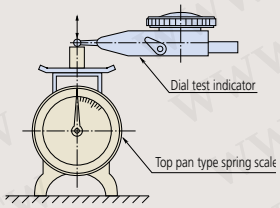


The specification in the range of 0.2 mm from the end of the stroke is not guaranteed for digital indicators. When setting the zero point or presetting a specific value, be sure to lift the spindle at least 0.2 mm from the end of the stroke.

Care of the plunger

- Do not lubricate the plunger. Doing so might cause dust to accumulate, resulting in a malfunction.
- If the plunger movement is poor, wipe the upper and lower plunger surfaces with a dry or alcohol-soaked cloth. If the movement is not improved by cleaning, contact Mitutoyo for repair.
- Before making a measurement or calibration, please confirm if the spindle moves upward and downward smoothly, and stability of zero point.

Dial Test Indicator Standard B7533-1990 (Extract from JIS/Japanese Industrial Standards)

No.	Item		Calibration method	Diagram of calibration setup	Tools for calibration
1	Wide-range accuracy		(1) For an indicator of 0.01 mm graduation: Displace the contact point so as to move the pointer clockwise in increments of 0.1 mm with reference to the graduations from the zero point to the end point of the measuring range while taking readings of the calibration tool at each point and determine this accuracy from the error curve drawn by plotting the differences of each "indicator reading - calibration tool reading". (2) For an indicator of 0.002 mm graduation: Displace the contact point so as to move the pointer clockwise in increment of 0.02 mm with reference to the graduations from the zero point to the end point of the measuring range while taking readings of the calibration tool at each point and determine this accuracy from the error curve drawn by plotting the differences of each "indicator reading - calibration tool reading". The instrumental error of the calibration tool shall be compensated prior to this measurement.		Micrometer head or measuring unit (graduation: 1µm or less, instrumental error: within ±1µm), supporting stand
2	Adjacent error				
3	Retrace error		After the completion of the wide-range accuracy measurement, reverse the contact point from the last point of measurement while taking readings at the same scale graduations as for the wide-range accuracy measurement and determine the retrace error from the error curve plotted.		
4	Repeatability	a	Holding the dial test indicator with its stylus parallel with the top face of the measuring stage, displace the contact point quickly and slowly five times at a desired position within the measuring range and determine the maximum difference in indication.		Measuring stage, Supporting stand, and Gauge block of grade 1 as stipulated by JIS B7506 (Gauge block)
		b	Holding the stylus parallel to a gauge block placed on the measuring stage, move the gauge block to and fro and left to right under the contact point within the measuring range and determine the maximum difference in indication.		
5	Measuring force		Holding an indicator by the case or stem, displace the contact point gradually and continuously in the forward and backward directions respectively and take a reading of measuring force at the zero, middle and end points of the measuring range in each direction. • Performance The maximum measuring force in the forward direction shall not exceed 0.5N. The difference between the maximum and minimum measuring forces in one direction shall not exceed 0.2N (20gf). Note that the smallest possible measuring force is desirable for indicators.		Top pan type spring scale (graduation: 2gf or less) or force gage (sensitivity: 0.02N or less)

Notes: There are no JIS standards applicable to models with a graduation of 0.001 mm. Therefore, referring to JIS B 7533-1990 for inspecting the wide-range accuracy and adjacent error, the accuracy is measured by moving the contact point 0.01 mm clockwise from the start point of the measuring range to the end point with reference to the graduations.

Accuracy of indication

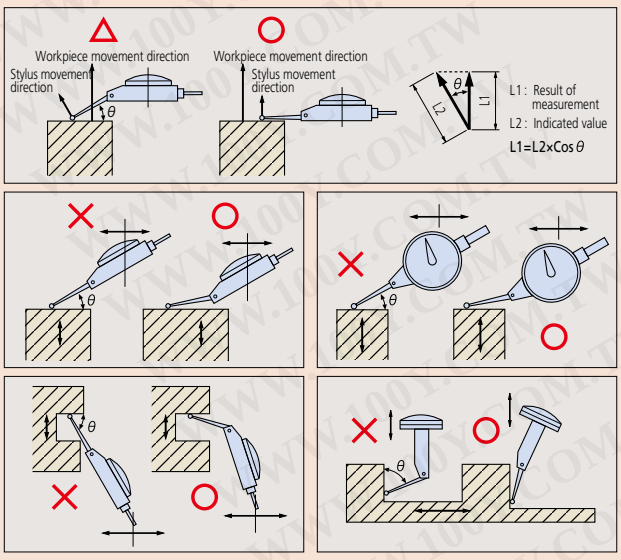
Permissible indication errors of dial test indicators are as per the table below.

Graduation (mm)	Measuring range (mm)	Wide range accuracy	Adjacent error	Repeatability	Retrace error
0.01	0.5	5	5	3	3
	0.8	8			
	1.0	10			4*1
0.002	0.2	3	2	1	2
	0.28				

*1: Applies to indicators with a stylus over 35 mm long.
Remarks: Values in the table above apply at 20°C.

Dial Test Indicators and the Cosine Effect

Always minimize the angle between movement directions during use.



The reading of any indicator will not represent an accurate measurement if its measuring direction is misaligned with the intended direction of measurement (cosine effect). Because the measuring direction of a dial test indicator is at right angles to a line drawn through the contact point and the stylus pivot, this effect can be minimized by setting the stylus to minimize angle θ (as shown in the figures). If necessary, the dial reading can be compensated for the actual θ value by using the table below to give the resulut of measurement.
Result of measurement = indicated value x compensation value

Compensating for a non-zero angle

Angle	Compensation value
10°	0.98
20°	0.94
30°	0.86
40°	0.76
50°	0.64
60°	0.50

Examples

If a 0.200mm measurement is indicated on the dial at various values of θ, the result of measurements are:
For θ = 10°, 0.200mm×.98 = 0.196mm
For θ = 20°, 0.200mm×.94 = 0.188mm
For θ = 30°, 0.200mm×.86 = 0.172mm

Note: A special contact point of involute form can be used to apply compensation automatically and allow measurement to be performed without manual compensation for any angle θ from 0 to 30°. (This type of contact point is custom-made.)