

Introduction for Measurement data recording tools for Digimatic Indicators (optional)

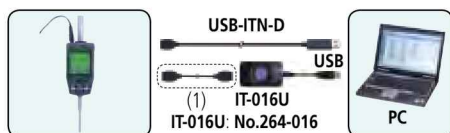
For Digimatic Indicators ID-H and ID-F (Connector type D)

■ Dedicated connecting cables (optional)

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

- PC connection (wired system) ... **USB Input Tool**
(refer to page A-5/A-6)

USB-ITN-D (2m): No.06ADV380D

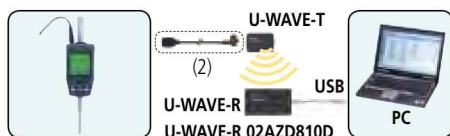


Dedicated cable for models with SPC data output

- (1) 1m: **No.936937**
- 2m: **No.965014**

- PC connection (wireless system) ... **U-WAVE**
(refer to page A-7)

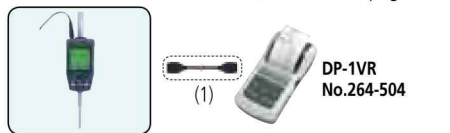
U-WAVE-T (IP67): No.02AZD730D
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790D**
- For footswitch: **No.02AZE140D**

- Dedicated printer connection (only for wired system)
... **DP-1VR** (refer to page A-13)



Dedicated cable for models with SPC data output

- (1) 1m: **No.936937**
- 2m: **No.965014**

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)
... **IT-007R** (refer to page A-6), **MUX-10F** (refer to page A-14)



Dedicated cable for models with SPC data output

- (1) 1m: **No.936937**
- 2m: **No.965014**

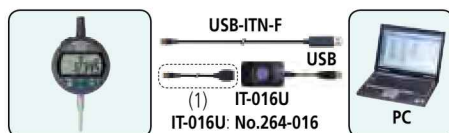
For Digimatic Indicators other than ID-H/ID-F/ID-N/ID-B (Connector type F)

■ Dedicated connecting cables (optional)

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

- PC connection (wired system) ... **USB Input Tool**
(refer to page A-5/A-6)

USB-ITN-F (2m): No.06ADV380F

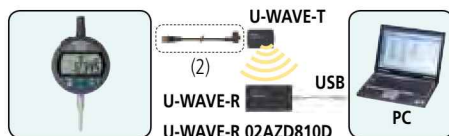


Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
- 2m: **No.905409**

- PC connection (wireless system) ... **U-WAVE**
(refer to page A-7)

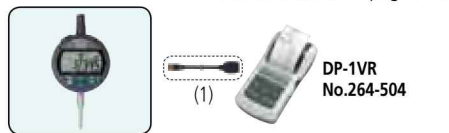
U-WAVE-T (IP67): No.02AZD730D
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790F**
- For footswitch: **No.02AZE140F**

- Dedicated printer connection (only for wired system)
... **DP-1VR** (refer to page A-13)



Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
- 2m: **No.905409**

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)
... **IT-007R** (refer to page A-6), **MUX-10F** (refer to page A-14)



Dedicated cable for models with SPC data output

- (1) 1m: **No.905338**
- 2m: **No.905409**

For Digimatic Indicators ID-N and ID-B (Connector type G)

■ Dedicated connecting cables (optional)

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

- PC connection (wired system) ... **USB Input Tool**
(refer to page A-5/A-6)

USB-ITN-G (2m): No.06ADV380G

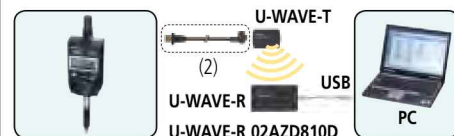


Dedicated cable for models with SPC data output

- (1) 1m: **No.21EAA194**
- 2m: **No.21EAA190**

- PC connection (wireless system) ... **U-WAVE**
(refer to page A-7)

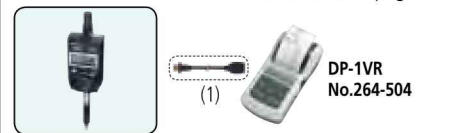
U-WAVE-T (IP67): No.02AZD730D
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790G**
- For footswitch: **No.02AZE140G**

- Dedicated printer connection (only for wired system)
... **DP-1VR** (refer to page A-13)



Dedicated cable for models with SPC data output

- (1) 1m: **No.21EAA194**
- 2m: **No.21EAA190**

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)
... **IT-007R** (refer to page A-6), **MUX-10F** (refer to page A-14)



Dedicated cable for models with SPC data output

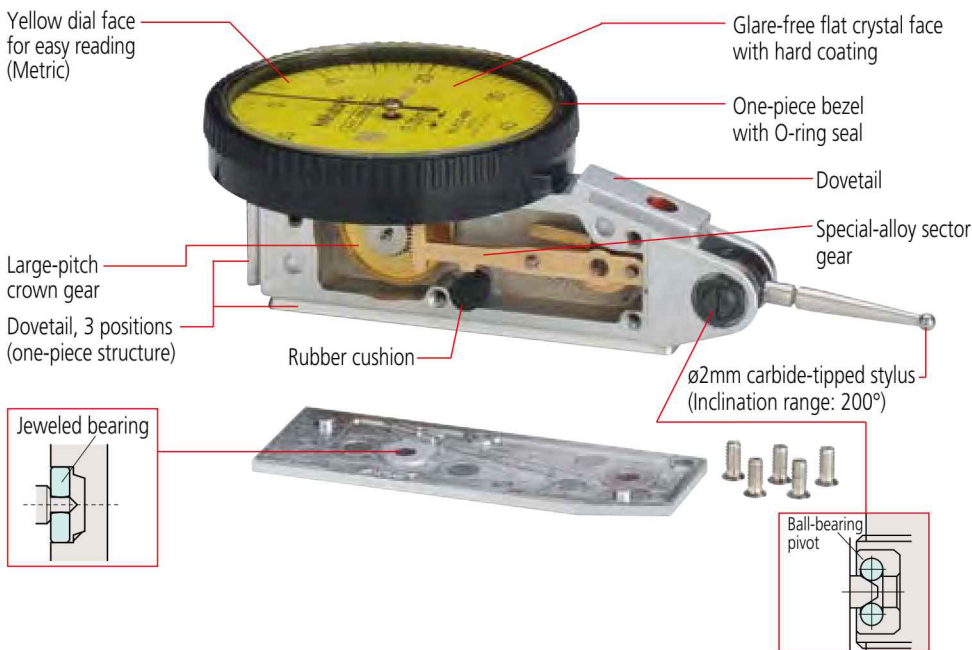
- (1) 1m: **No.21EAA194**
- 2m: **No.21EAA190**

Dial Test Indicators

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

SERIES 513 — Lever-Type Dial Indicators

- Designed to probe surfaces that cannot be reached with a normal dial gauge. Useful both for alignment and for measurement purposes.
- Mitutoyo's proprietary new design permits smooth pointer operation.
- Strong frame provides excellent rigidity and durability.
- Non-magnetic pointer and contact point permit reliable operation even in magnetic environments.
- Clear and concise wide dial face allows excellent visibility.
- The surface of the crystal is hard-coated for excellent scratch resistance.
- Flat crystal makes graduations easy to read. Moreover, the O-ring sealing method used for the bezel prevents water or oil penetration. (Note that this type is NOT waterproof.)
- Six types are available: horizontal, horizontal (20° tilted face) vertical, parallel, universal, and pocket, allowing users to select the model most suited to their needs.
 - Horizontal: Standard
 - Horizontal (20° Tilted Face): Dial face inclined 20°, compared with the vertical type, allows easy reading.
 - Vertical: Best suited for centering holes under the spindle of a machine tool.
 - Parallel: The scale can be read from the front, with the stylus pivoting in a plane parallel to that of the dial face.
 - Universal: The direction of the probe movement can be freely changed.
 - Pocket: Compact type



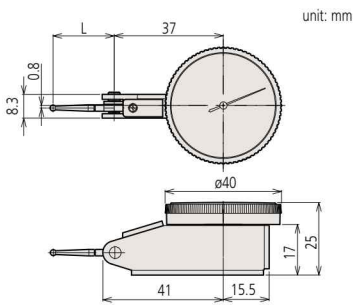
- Dial test indicators with a ruby contact point are available in the horizontal (standard) type.
- Benefits of ruby contact points:
 - Several times more resistant to wear than carbide.
 - Can be used on electrical discharge machines without special precautions.



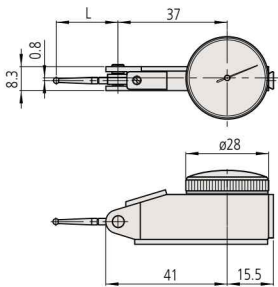
Feature icons

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

DIMENSIONS



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



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

Special Set: No. 513-908 (mm)

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

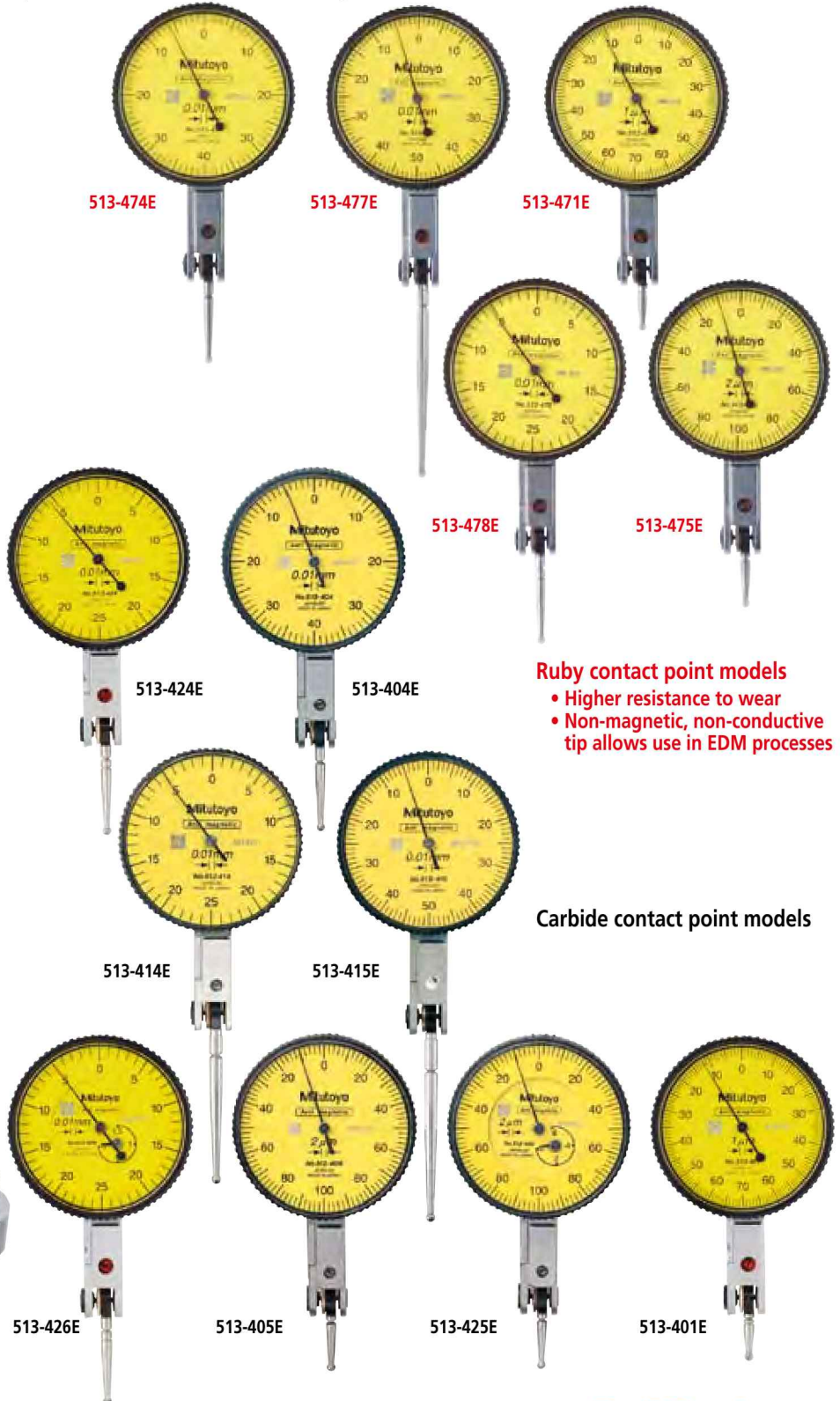
No. 513-907 (inch)

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.



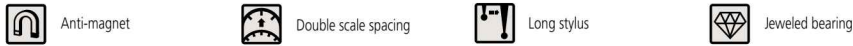
Ruby contact point models

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

Carbide contact point models

Dial Test Indicators

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



SPECIFICATIONS

Metric			Graduation	Range	Accuracy	Dial reading	Measuring force	Anti-magnet	Double scale spacing	Long stylus	Jeweled bearing	Compact	With revolution counter
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			Graduation	Range	Accuracy	Dial reading	Measuring force	Anti-magnet	Long stylus	Jeweled bearing	Compact	With revolution counter
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			Graduation	Range	Accuracy	Dial reading	Measuring force	Anti-magnet	Jeweled bearing
Basic set	Plus set	Full set							
513-409	—	513-409T	0.002mm, .0001"	0.2mm, .0075"	3µm	0-10-0, 0-3.8-0	0.3N or less	✓	✓

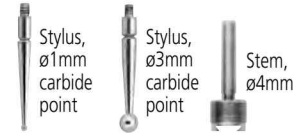
Inch/Metric			Graduation	Range	Accuracy	Dial reading	Measuring force	Anti-magnet	Jeweled bearing
Basic set	Plus set	Full set							
513-406	—	513-406T	.0005", 0.01mm	.03", 0.7mm	±.0005"	0-15-0, 0-35-0	0.3N or less	✓	✓

Set Configuration: Metric and Metric/Inch

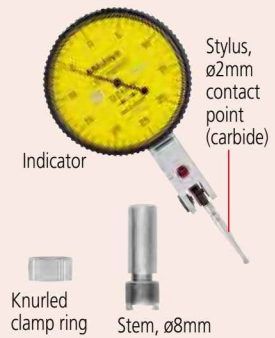
Full set



Plus set



Basic set

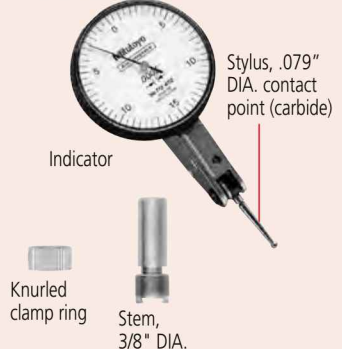


Set Configuration: Inch and Inch/Metric

Full set

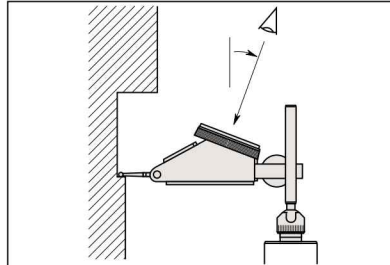


Basic set

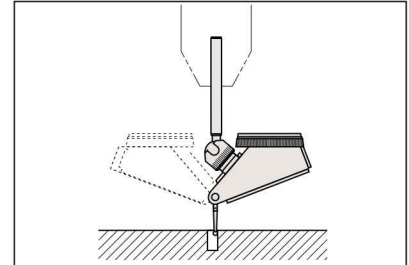


Dial Test Indicator SERIES 513 — Horizontal (20° Tilted Face), Vertical, and Parallel Types

- Specially designed for easy viewing of dial.



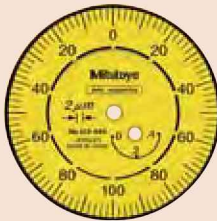
- The dial face obliquely faces upward, allowing users to read the graduations from the user's side. It is convenient when probing on the side of a large workpiece and the workbench is high.



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



513-444E



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.)

Dial Test Indicators

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



Anti-magnet



With revolution counter



Jeweled bearing



Long stylus

SPECIFICATIONS

Metric			Horizontal (20° tilted face) type									
Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force	Anti-magnet	With revolution counter	Jeweled bearing	Long stylus	Remarks
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	Anti-magnet	With revolution counter	Jeweled bearing	Long stylus	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

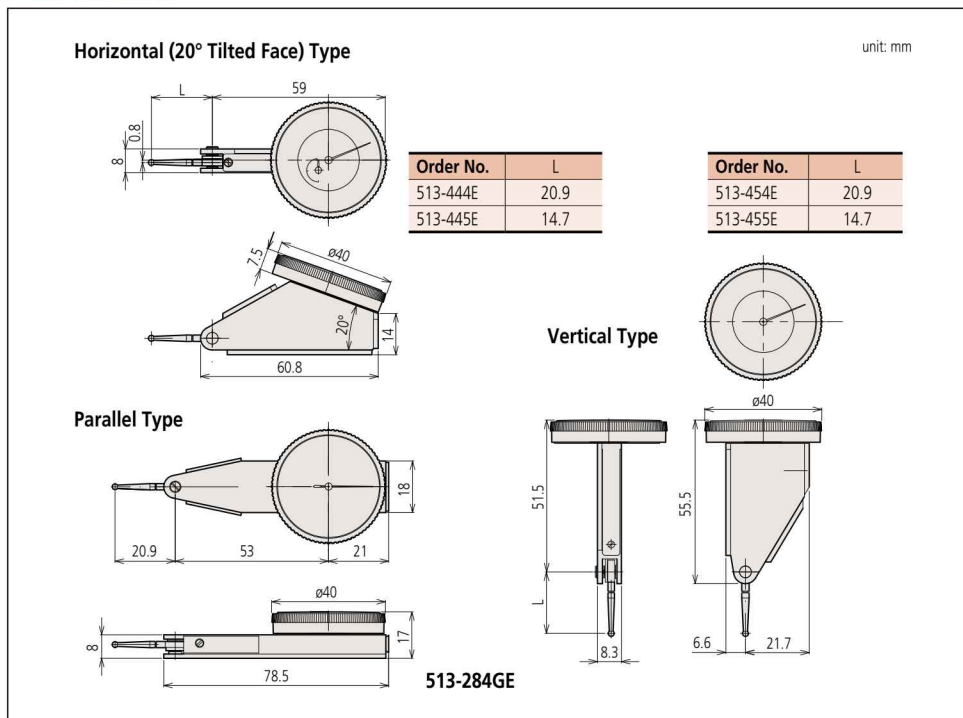
Metric			Vertical type									
Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force	Anti-magnet	Jeweled bearing	Long stylus	Remarks	
Basic set	Plus set	Full set										
513-454E	513-454A	513-454T	0.01mm	0.8mm	8µm	0-40-0	0.3N or less	✓	✓	—	—	
513-455E	513-455A	513-455T	0.002mm	0.2mm	3µm	0-100-0	0.3N or less	✓	✓	—	—	

Inch			Vertical type									
Order No.			Graduation	Range	Accuracy	Dial reading	Measuring force	Anti-magnet	Jeweled bearing	Long stylus	Remarks	
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	Anti-magnet	Jeweled bearing	Long stylus	Remarks	
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	Anti-magnet	Jeweled bearing	Long stylus	Remarks	
Basic set	Plus set	Full set										
—	513-282G	513-282GT	.0005"	.03"	±.0005"	0-15-0	0.3N or less	✓	—	—	—	

DIMENSIONS

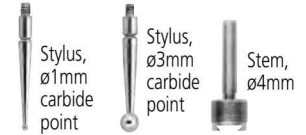


Set Configuration: Metric

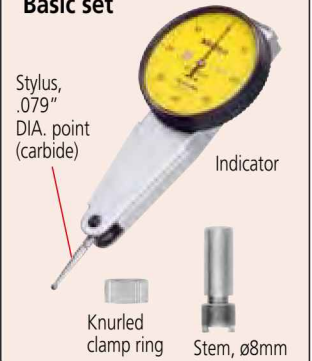
Full set



Plus set



Basic set



Set Configuration: Inch

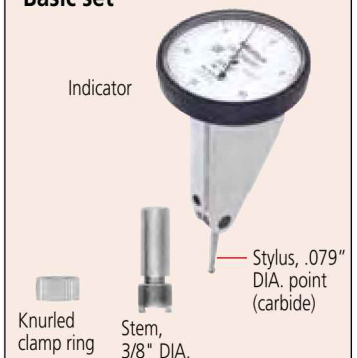
Full set



Plus set



Basic set



Set Configuration: Metric

Full set

- Swivel clamp (900321 for $\varnothing 4\text{mm}$ stem, $\varnothing 8\text{mm}$ stem, dovetail)
- Stylus, $\varnothing 1\text{mm}$ carbide point
- Stylus, $\varnothing 3\text{mm}$ carbide point
- Stem, $\varnothing 4\text{mm}$
- Metric holding bar (L: 100mm)
- Spare stylus, $\varnothing 2\text{mm}$ carbide point

Basic set

- Stylus, $\varnothing 2\text{mm}$ carbide point (102825)
- Indicator
- Knurled clamp ring
- Spanner (102037)
- $\varnothing 8\text{mm}$ stem

Set Configuration: Inch

Full set

- (900322 for .157" DIA stem, 3/8" DIA. stem, dovetail)
- Stylus, .039" DIA. carbide point
- Stylus, .118" DIA. carbide point
- Stem, .157" DIA.
- Inch holding bar (L: 4")
- Spare stylus, .079" DIA. carbide point

Basic set

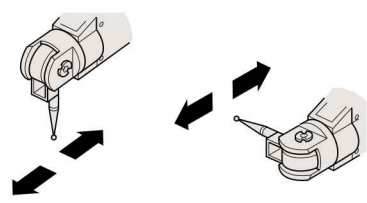
- Stylus, .079" DIA. carbide point (102825)
- Indicator
- Knurled clamp ring
- Spanner (102037)
- 3/8" DIA. stem

Optional Accessories

- : Swivel clamps (See page F-63.)
- : Holding bars (See page F-63.)
- : Stems (See page F-63.)
- 102824: Stylus, $\varnothing 1\text{mm}$ ball contact (carbide)
- 102825: Stylus, $\varnothing 2\text{mm}$ ball contact (carbide)
- 102826: Stylus, $\varnothing 3\text{mm}$ 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

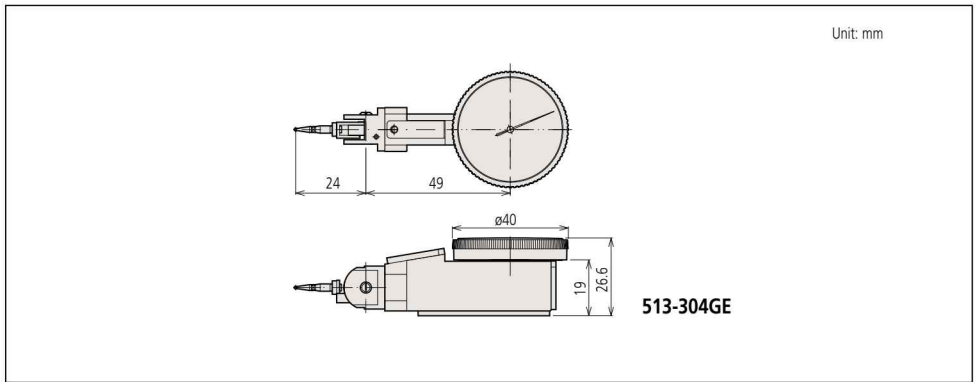
SPECIFICATIONS



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

Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force	Jeweled bearing	—	—	—	—
Basic set	Full set										
513-302G	513-302GT	.0005"	.03"	$\pm .0005$ "	0-15-0	0.3N or less	✓	—	—	—	—

DIMENSIONS



513-304GE

Dial Test Indicators

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

Pocket Type Dial Test Indicator SERIES 513

- Jeweled bearings assure higher sensitivity and accuracy. Indicator can be mounted by clamping the stem or the body (except for 513-517WE and 513-517WT).
- Reversible measuring direction (Clutch type).
- Two holding bars are supplied. (Full sets only.)
- Fully adjustable bezel/dial face.
- Stylus is adjustable within 220°.
- Bezel is sealed with an O-ring to keep out water and oil.



513-518



513-528



513-512



513-504



513-517E
513-517WE



513-515T



513-514E



513-503E



513-501E

Optional Accessories

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

Set Configuration: Metric

Full set



Basic set



Set Configuration: Inch

Full set



Basic set



Long stylus



Jeweled bearing



Dustproof



Compact

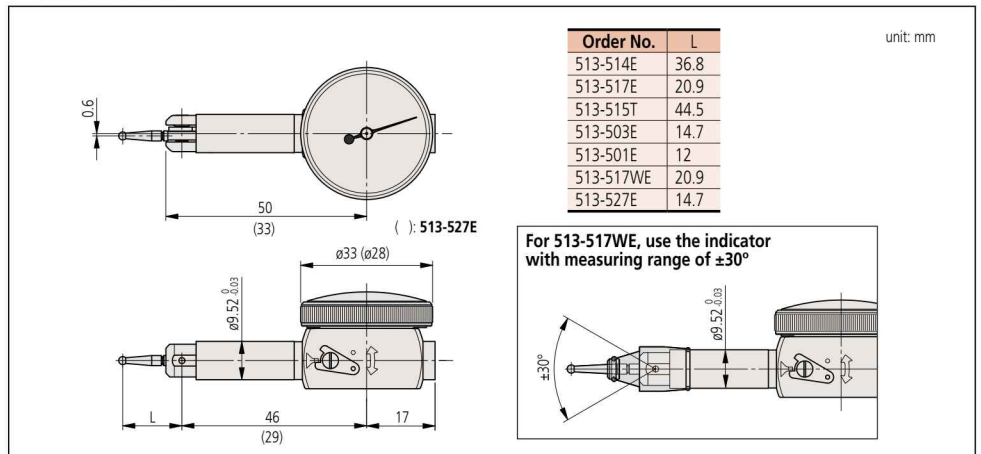
SPECIFICATIONS

Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force	Long stylus	Jeweled bearing	Dustproof	Compact	—	—
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

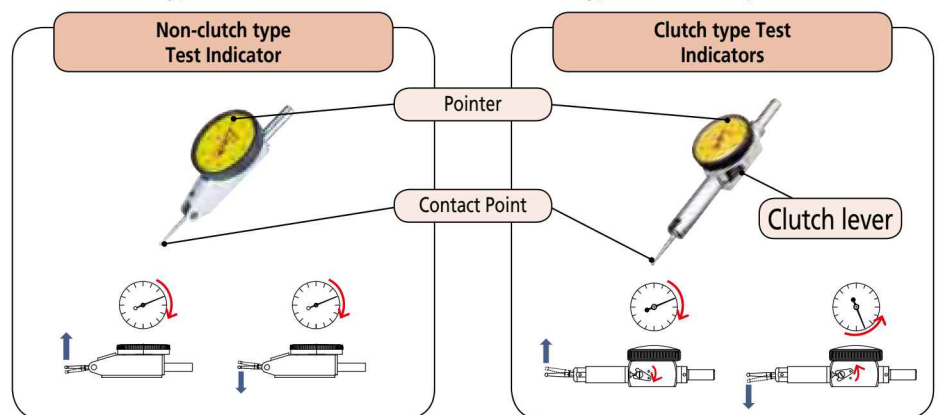
Order No.		Graduation	Range	Accuracy	Dial reading	Measuring force	Long stylus	Jeweled bearing	Dustproof	Compact	—	—
Basic set	Full set											
513-518	513-518T	.001"	.04"	±.001"	0-20-0	0.3N or less	—	✓	—	—	—	—
513-528	513-528T	.001"	.04"	±.001"	0-20-0	0.3N or less	—	✓	✓	—	—	—
513-512	513-512T	.0005"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

DIMENSIONS



There are two types of Mitutoyo Dial Test Indicator:

The non-clutch type (without a clutch lever) and the clutch type (with a two-position clutch lever)



In the non-clutch type, although the contact point may move either in the upward or downward direction, the pointer always rotates clockwise.

In the clutch type, if the clutch lever is set in one position the contact point moves in the upward direction and the pointer rotates clockwise. Conversely, if the lever is set in the other position the contact point moves in the downward direction and the pointer rotates counterclockwise.

Dial Test Indicators

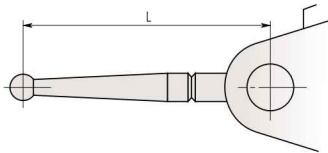
Comparison measuring instruments which ensure high quality, high accuracy and reliability.

Styli, Stems and Holders Optional Accessories for Dial Test Indicators

Styli (for Metric Models Only*)

* Except for universal type dial test indicator (513-304G).

- Stylus length affects the scale factor of an indicator. The styli provided as standard give a scale factor of unity.



ø0.5mm ball-point



190547 (L=14.7mm)
190549 (L=20.9mm)
190654 (L=22.3mm)
190656 (L=44.5mm)

ø0.7mm ball-point



190548 (L=14.7mm)
190550 (L=20.9mm)
190653 (L=22.3mm)
190655 (L=44.5mm)

ø1mm ball-point (Carbide)



21CZA044 (L=12.8mm)
103017 (L=14.7mm)
103013 (L=20.9mm)
137558 (L=22.3mm)
137746 (L=36.8mm)
136235 (L=44.5mm)

ø2mm ball-point (Carbide)



21CZA036 (L=12.8mm)
103010 (L=14.7mm)
103006 (L=20.9mm)
137557 (L=22.3mm)
129949 (L=36.8mm)
136013 (L=44.5mm)

ø2mm ball-point (Ruby)



21CZA212 (L=12.8mm)
21CZA209 (L=14.7mm)
21CZA201 (L=20.9mm)
21CZA210 (L=22.3mm)
21CZA211 (L=44.5mm)

ø3mm ball-point (Carbide)



21CZA045 (L=12.8mm)
103018 (L=14.7mm)
103014 (L=20.9mm)
137559 (L=22.3mm)
137747 (L=36.8mm)
136236 (L=44.5mm)

Spanner



Stems with Knurled Clamp Ring

ø4mm (.157" DIA.)



ø8mm



3/8" DIA.



Swivel Clamps

- Can be used with Holding Bars.

For ø6mm stem, ø8mm stem, and dovetail



For ø4mm stem, ø8mm stem, and dovetail



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



Holding Bars



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



900211 (Length: 115mm/ 4.528")



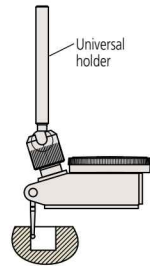
953639 (Length: 2")
900306 (Length: 4")

Universal Holder

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



21CZA233 (ø8mm stem)
21CZA231 (.25" DIA. stem)
21CZA229 (ø6mm stem)

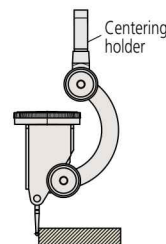


Centering Holder

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



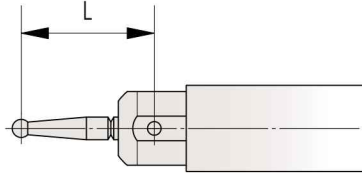
901959 (ø8mm stem)
901997 (.25" DIA. stem)



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.)



102036

ø8mm



102822

3/8" DIA.



102081

Swivel Clamps

- Can be used with Holding Bars.

For ø6mm stem, ø8mm stem, and dovetail



902053

For ø4mm stem and ø8mm stem, and dovetail



900321

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



900322

Holding Bars



9 x 9mm

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



ø8mm (.315" DIA)

900211 (Length: 115mm)



.25" x .5"

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

Spanner



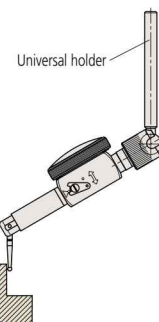
301336

Universal Holder

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



21CZA234 (ø8mm stem)
21CZA232 (.25" DIA. stem)
21CZA230 (ø6mm stem)



Inspection Instrument for Indicators

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

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").

- $\pm(0.2+L/100)\mu\text{m}$ 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.

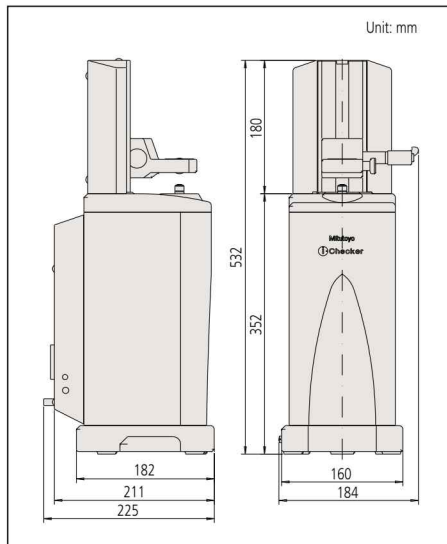


SPECIFICATIONS

Order No.*	Remarks
170-311	with $\varnothing 8\text{mm}$ bush
170-312	with $\varnothing 3/8"$ 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 standard.

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)



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

Technical Data

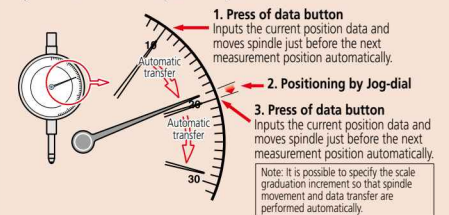
Measuring Range: 100mm/4"
Resolution: 0.02 μm /0.8 μin
Accuracy: $\pm(0.2+L/100)\mu\text{m}$ in vertical position
(at 20°C) $\pm(0.3+2L/100)\mu\text{m}$ in lateral position
L = arbitrary length (mm)
Drive method: Electric motor
Measuring Unit: Reflective-type glass linear encoder
Thermal expansion coefficient: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



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.

Optional Accessories

- 02ASK000: Test indicator attachment set ($\varnothing 6\text{mm}$ stem)
- 02ASK180: Test indicator attachment set ($\varnothing 8\text{mm}$ stem)
- 02ASK370: Test indicator holder ($\varnothing 6\text{mm}$ stem)
- 02ASK380: Test indicator holder ($\varnothing 8\text{mm}$ stem)
- 02ASL310: Accessory for Bore gages
- 902803: $\varnothing 6\text{mm}$ dovetail grooved stem
- 902804: $\varnothing 8\text{mm}$ dovetail grooved stem
- 02ASK040: Stem bush $\varnothing 6\text{mm}$
- 02ASJ856: Stem bush $\varnothing 8\text{mm}$
- 02ASK150: Stem bush $\varnothing 8\text{mm}$, short
- 02ASL150: Stem bush $\varnothing 10$, short
- 02ASK050: Bush $\varnothing 9.5$ (Requires 02ASK070)
- 02ASK060: Stem bush $\varnothing 12\text{mm}$
- 02ASK070: Stem bush $\varnothing 15\text{mm}$
- 02ASK080: Stem bush $\varnothing 20\text{mm}$
- 02ASK710: Stem bush $\varnothing 28\text{mm}$
- 02ASK090: Stem bush 3/8"
- 02ASK130: Stem bush case
- 02ASK730: Reflector
- 937179T: Foot switch



An inspection certificate is supplied as standard. Refer to page X 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-33 and C-39 for details.)



Application example of the stand

Stand for bore gage inspection (No. 12AAK824)

SERIES 170 — UDT-2 Dial Indicator Tester

- UDT-2 is the accuracy tester for 0.01mm resolution/graduation dial indicators, dial test indicators and bore gages.
- Stem mounting hole: $\varnothing 6$, $\varnothing 8$ mm (Metric) $\varnothing 1/4$ ", $\varnothing 3/8$ " (Inch)



170-102-10

SPECIFICATIONS

Metric				Inch			
Order No.	Range	Graduation	Accuracy	Order No.	Range	Graduation	Accuracy
170-102-12	0 - 25mm	0.001mm	$\pm 2\mu\text{m}$	170-101-10	0 - 1"	.0001"	$\pm .0001$ "

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: $\varnothing 4$ mm to $\varnothing 10$ mm

Calibrating a dial test indicator



521-103

SPECIFICATIONS

Metric				Inch			
Order No.	Range	Graduation	Accuracy	Order No.	Range	Graduation	Accuracy
521-103	0 - 1mm	0.0002mm	$\pm 0.2\mu\text{m}$	521-104	0 - .05"	.00001"	$\pm .00001$ "
521-105	0 - 5mm	0.0002mm	$\pm 0.8\mu\text{m}$	521-106	0 - .2"	.00001"	$\pm .00003$ "

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

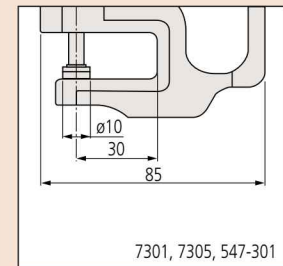


Measuring thickness of a human hair

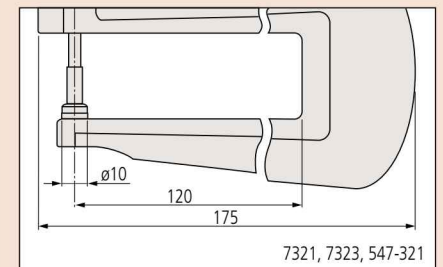


DIMENSIONS

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.

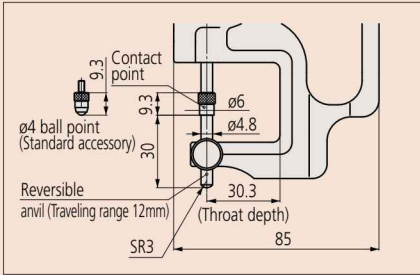
Input Tool

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.

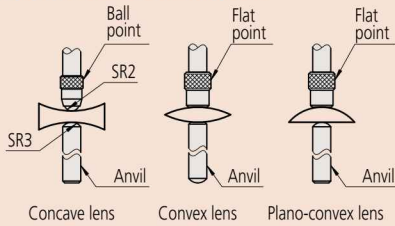
(Refer to pages A-5 to A-6 for details.)

DIMENSIONS

Unit: mm



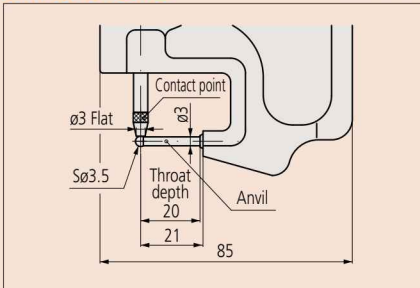
Application examples



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

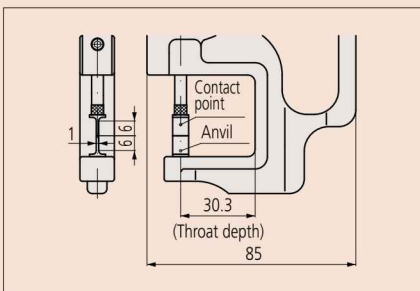
DIMENSIONS

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

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	Measuring force	Remarks
547-401	0-12mm	0.001mm	±3µm	3.5N or less	High accuracy, carbide point anvil
547-301	0-10mm	0.01mm	±20µm	1.5N or less	Standard, ceramic point/anvil
547-321	0-10mm	0.01mm	±20µm	1.5N or less	Deep throat, ceramic point/anvil
547-313	0-10mm	0.01mm	±20µm	1.5N or less	Lens thickness
547-315	0-10mm	0.01mm	±20µm	1.5N or less	Groove depth
547-360	0-10mm	0.01mm	±20µm	1.5N or less	Tube thickness

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

* using ID-SX Digimatic indicator.

Metric					
Order No.	Range	Graduation	Accuracy	Measuring force	Remarks
7327	0-1mm	0.001mm	±5µm	1.4N or less	Fine dial reading, ceramic point/anvil
7301	0-10mm	0.01mm	±15µm	1.4N or less	Standard, ceramic point/anvil
7305	0-20mm	0.01mm	±20µm	2.0N or less	Standard, ceramic point/anvil
7321	0-10mm	0.01mm	±15µm	1.4N or less	Deep throat, ceramic point/anvil
7323	0-20mm	0.01mm	±22µm	2.0N or less	Deep throat, ceramic point/anvil
7313	0-10mm	0.01mm	±15µm	1.4N or less	Lens thickness
7315	0-10mm	0.01mm	±15µm	1.4N or less	Groove depth
7360	0-10mm	0.01mm	±15µm	1.4N or less	Tube thickness
7331S (lightweight type)	0-10mm	0.01mm	±20µm	1.4N or less	Integrated molded bezel

Inch					
Order No.	Range	Graduation	Accuracy	Measuring force	Remarks
7326S	0-.05"	.0001"	±.0002"	1.4N or less	Fine dial reading, ceramic point/anvil
7300S	0-.5"	.001"	±.001"	1.4N or less	Standard, ceramic point/anvil
7304S	0-1"	.001"	±.002"	2.0N or less	Standard, ceramic point/anvil
7322S	0-1"	.001"	±.002"	2.0N or less	Deep throat, ceramic point/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



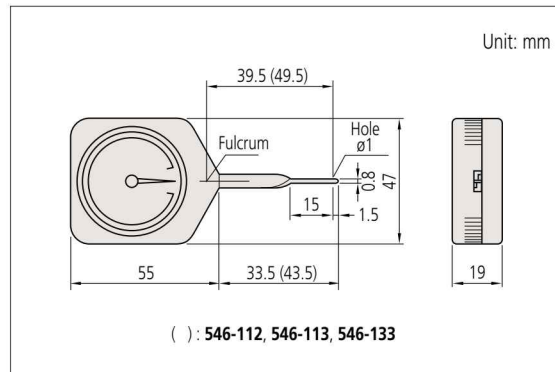
Measuring contact force on a relay



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.

DIMENSIONS



SPECIFICATIONS

Standard			
Order No.	Graduation	Range	Accuracy
546-112	2mN	6mN - 50mN	±0.5 (division)
546-113	5mN	10mN - 100mN	
546-114	10mN	30mN - 300mN	
546-115	0.02N	0.06N - 0.5N	
546-116	0.05N	0.1N - 1N	
546-117	0.05N	0.15N - 1.5N	
546-118	0.1N	0.3N - 3N	
546-119	0.2N	0.6N - 5N	

Peak hold			
Order No.	Graduation	Range	Accuracy
—	—	—	—
546-133	5mN	10mN - 100mN	±0.5 (division)
546-134	10mN	30mN - 300mN	
546-135	0.02N	0.06N - 0.5N	
546-136	0.05N	0.1N - 1N	
546-137	0.05N	0.15N - 1.5N	
546-138	0.1N	0.3N - 3N	
546-139	0.2N	0.6N - 5N	

Dial 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



SPECIFICATIONS

Metric

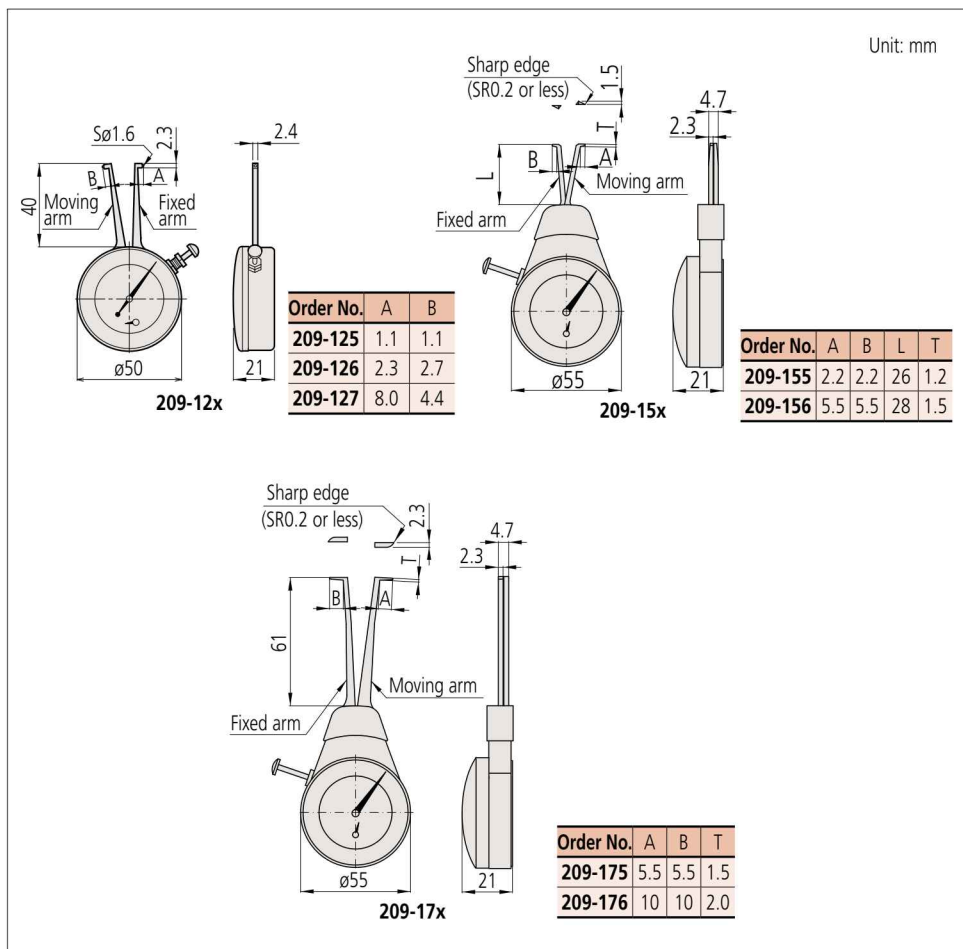
Order No.	Range	Graduation	Range of opening*1	Dial face	Accuracy	Measuring force
209-125	6 - 18mm	0.01mm	5.8 - 18.2mm	0-100-100	±40μm	2.0N or less
209-126	10 - 22mm	0.01mm	9.8 - 22.2mm	0-100-100	±40μm	2.0N or less
209-127	20 - 32mm	0.01mm	19.8 - 32.2mm	0-100-100	±40μm	2.0N or less
209-155	5 - 15mm	0.01mm	4.8 - 15.2mm	0-100	±30μm	2.0N or less
209-156	10 - 20mm	0.01mm	9.8 - 20.2mm	0-100	±30μm	2.0N or less
209-175	10 - 30mm	0.01mm	9.8 - 30.2mm	0-100-100	±40μm	2.0N or less
209-176	20 - 40mm	0.01mm	19.8 - 40.2mm	0-100-100	±40μm	2.0N or less

*1: Datum point setting is required (Reference gage available as an optional accessory).

*2: Range of opening is a value for reference. Accuracy is not guaranteed if the Dial Caliper Gage is used beyond the measuring range.

* Please note that this Dial Caliper Gage is only provided with standard models. Special size and special specification models are not supported.

DIMENSIONS



F

Optional accessories

Dial indicator
Dial protection cover: **No.21DZA000**
Refer to page C-45 for details.

Recommended dial indicators

No.2046SB: Dial indicator (Graduation: 0.01mm)
No.2109SB-10: Dial indicator (Graduation: 0.001mm)

Dial Snap Gage

- Designed for quick GO/NG judgment of diameters of cylinders and shafts in machining processes.
- Wide (13.5 x 12mm/ 1.53 x 47"), flat carbide anvils.
- Anvil retracting stroke: 2mm/.080"
- Anvil positioning range: 25mm/ 1"
- Adjustment nut: adjusts the measuring range.
- Clamp: adjustment nut
- Flatness of measuring face: 1µm
- Stability of indication: 2µm or less (stability of indicators is not included)
- The dial indicator and protection cover are optional. Also, some dial indicators and protection covers cannot be used with the dial snap gage. Consult Mitutoyo if intending to use dial indicators which are not recommended.



201-101

Note: The dial indicator and protection cover are optional.

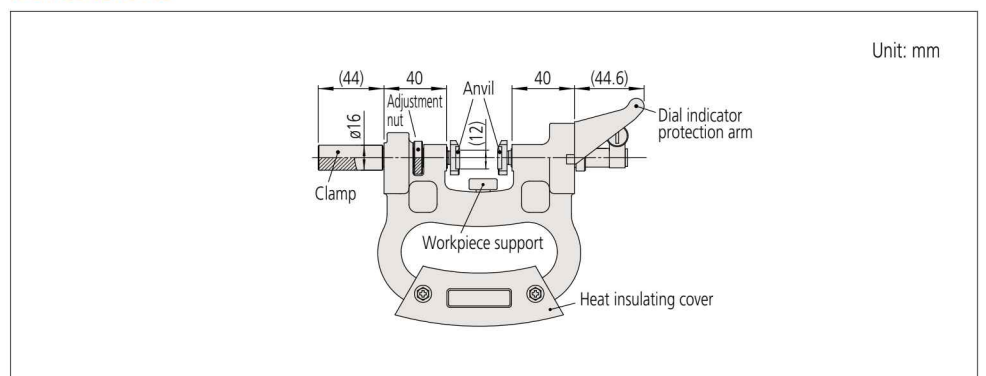
SPECIFICATIONS

Metric				
Order No.	Range	Parallelism	Measuring force	Recommended dial indicator (optional)
201-101	0 - 25mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-102	25 - 50mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-103	50 - 75mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-104	75 - 100mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-105	100 - 125mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-106	125 - 150mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-107	150 - 175mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-108	175 - 200mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-109	200 - 225mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-110	225 - 250mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-111	250 - 275mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)
201-112	275 - 300mm	5µm	15N±3N	2046SB (0.01mm reading), 2109SB-10 (0.001mm reading)

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)

*1: Measuring force is that force present before an indicator is installed and is determined at the point where the spindle is retracted 1mm from the rest position.

DIMENSIONS



Unit: mm

Stands

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

SERIES 7 — Magnetic Stands

- Mitutoyo's Magnetic Stands accept all dial indicators and dial test indicators (with stem $\varnothing 6$ or $\varnothing 8$) and clamp to iron or steel surfaces with a strong magnetic force.
- **7014-10**, **7031**, **7032** and **7033B** have a dovetail groove.



7010-10



7011-10



7012-10



7014-10

(without ON/OFF switching of magnetic clamping)



7033B

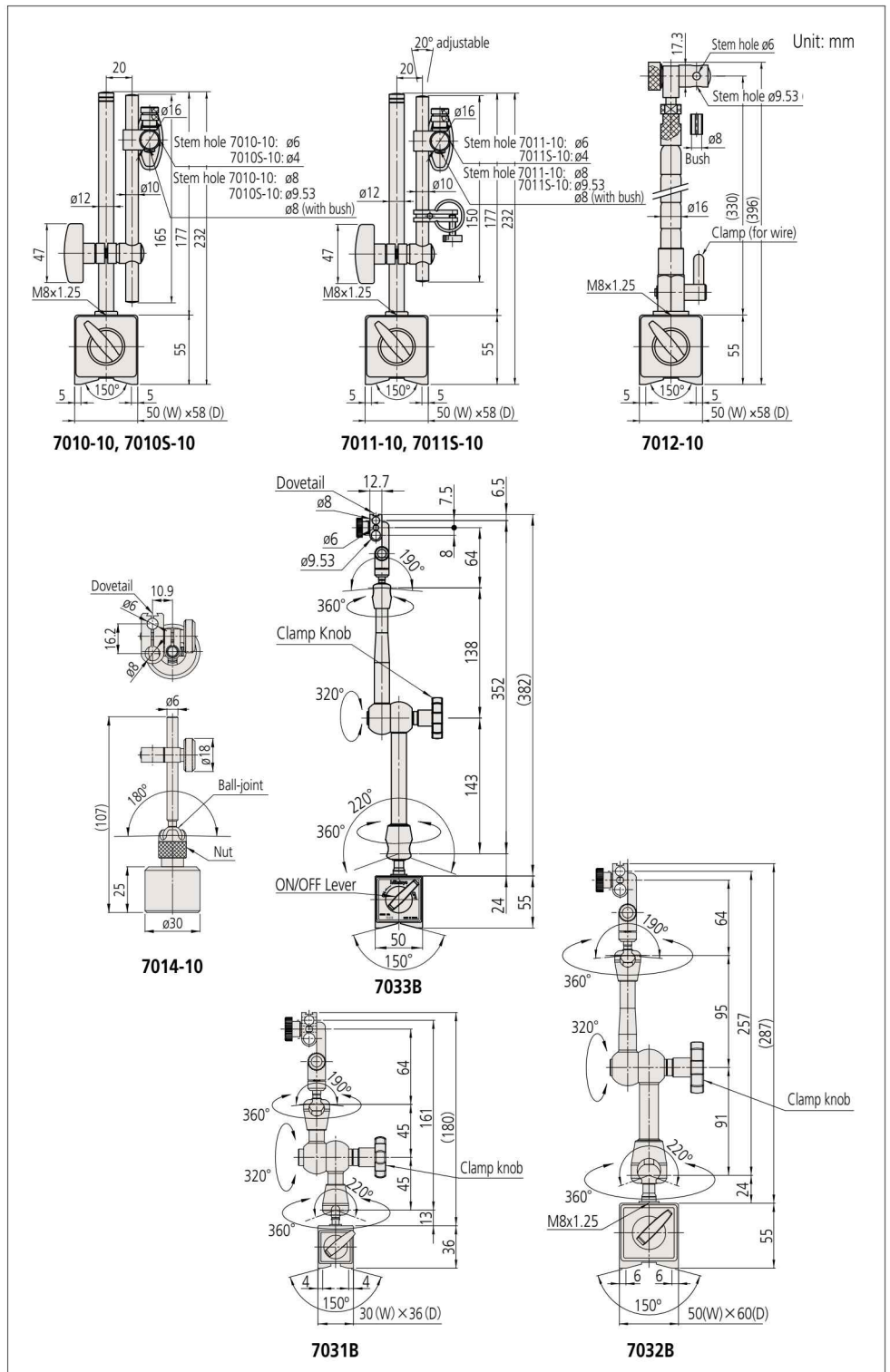


7031B



7032B

DIMENSIONS



SPECIFICATIONS

Order No.	Description	Applicable holding stem dia.	Magnetic force	Remarks
7010-10	Magnetic stand	ø6mm, ø8mm	Approx. 600N	—
7010S-10	Magnetic stand	ø4mm, ø8mm, ø9.53mm (3/8")	Approx. 600N	—
7011-10	Magnetic stand	ø6mm, ø8mm	Approx. 600N	With fine adjustment
7011S-10	Magnetic stand	ø4mm, ø8mm, ø9.53mm (3/8")	Approx. 600N	With fine adjustment
7012-10	Magnetic stand	ø6mm, ø8mm, ø9.53mm (3/8")	Approx. 600N	—
7014-10	Mini magnetic stand	ø6mm, ø8mm	Approx. 150N	Without magnet ON/OFF
7014E-10	Mini magnetic stand	ø4mm, ø9.53mm (3/8")	Approx. 150N	Without magnet ON/OFF
7033B	Universal magnetic stand	ø6, ø8mm, ø9.53mm (3/8")	Approx. 600N	With mechanical locking system
7031B	Universal magnetic stand	ø6, ø8mm, ø9.53mm (3/8")	Approx. 300N	With mechanical locking system
7032B	Universal magnetic stand	ø6, ø8mm, ø9.53mm (3/8")	Approx. 600N	With mechanical locking system

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: \varnothing 58mm
Anvil of 7007-10: 90mm square
- Vertical fine adjustment is available with one-touch control thanks to the parallel spring suspension.



7001-10
(with \varnothing 58mm serrated anvil)

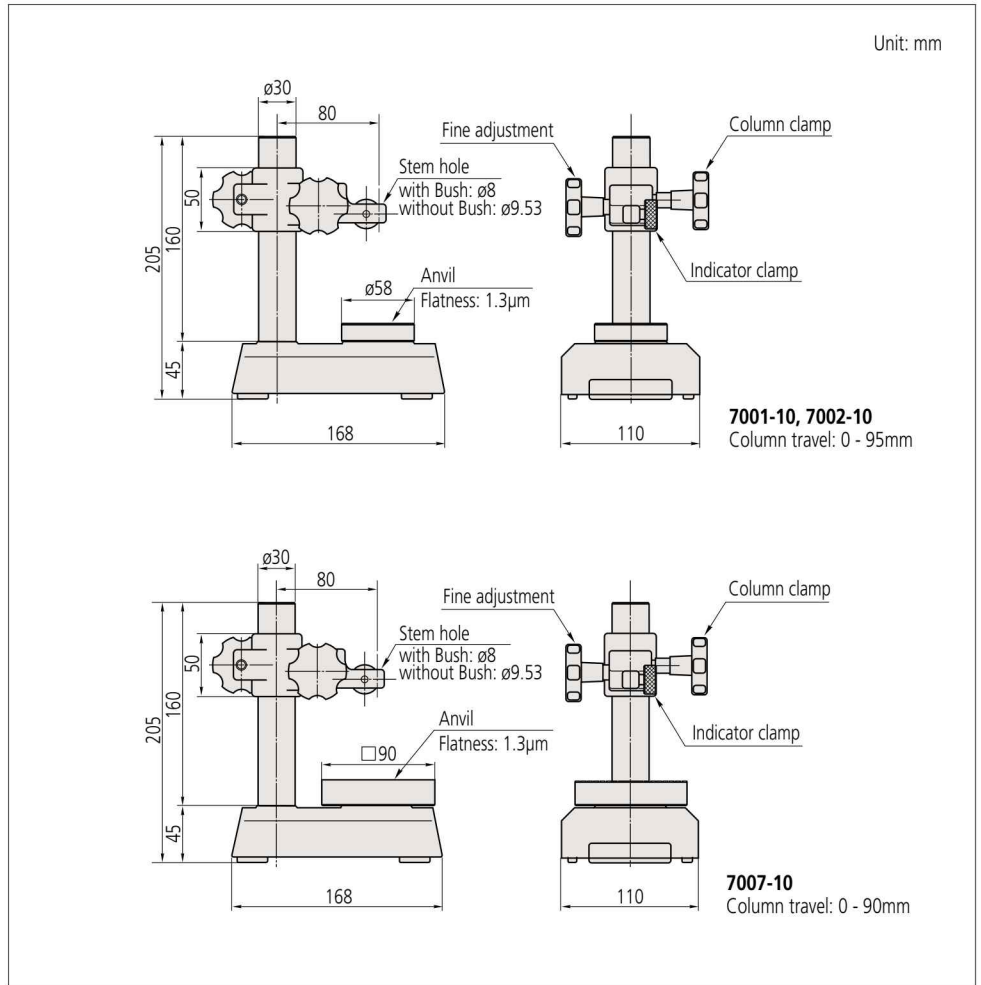


7002-10
(with \varnothing 58mm flat anvil)



7007-10
(with 90mm square anvil)

DIMENSIONS



SPECIFICATIONS

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

* Perpendicularity of the mounting hole to the anvil: less than 0.4mm/100mm

* Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1µm or less) to these stands, it may affect the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

Optional Accessories

101462: Hardened steel serrated anvil



101461: Hardened steel flat anvil



101463: Hardened steel domed anvil*
*Not available for 7007-10.

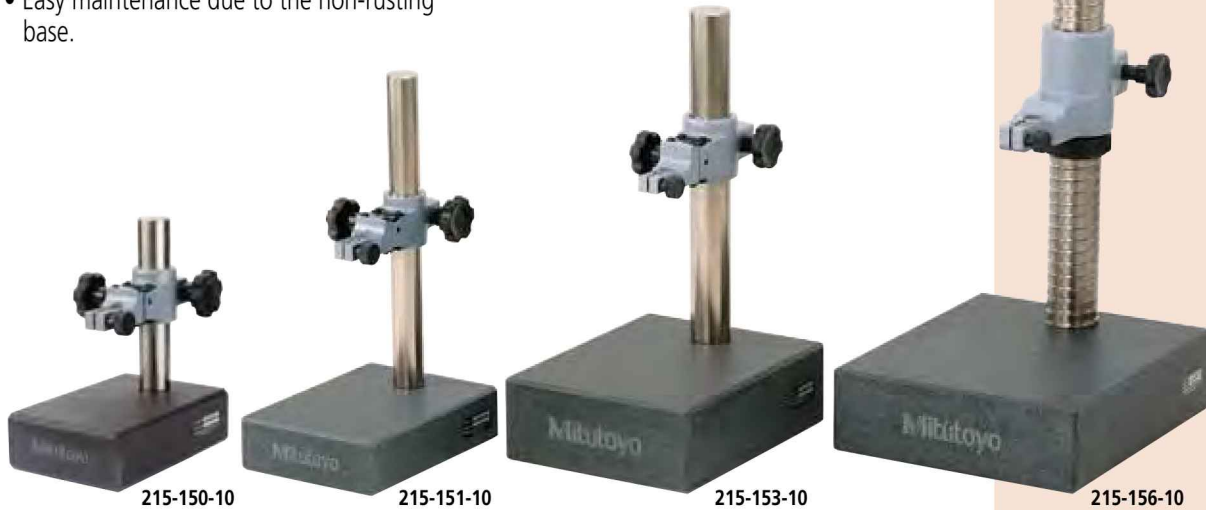


Stands

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

SERIES 215 — Granite Comparator Stands

- The base is made of black granite that stays free of burrs and build-ups due to its fine-grain composition.
- Easy maintenance due to the non-rusting base.



SPECIFICATIONS

Order No.	Granite base size (W x D x H)	Column travel	Stem hole	Remarks
215-150-10	120 x 180 x 50mm	110mm	ø8mm, ø9.53mm	With fine adjustment of 1mm range
215-151-10	150 x 200 x 50mm	250mm	ø8mm, ø9.53mm	With fine adjustment of 1mm range
215-153-10	200 x 250 x 80mm	260mm	ø8mm, ø9.53mm	With fine adjustment of 1mm range
215-156-10	300 x 250 x 80mm	275mm	ø8mm, ø9.53mm, ø20mm	With fine adjustment over the entire travel

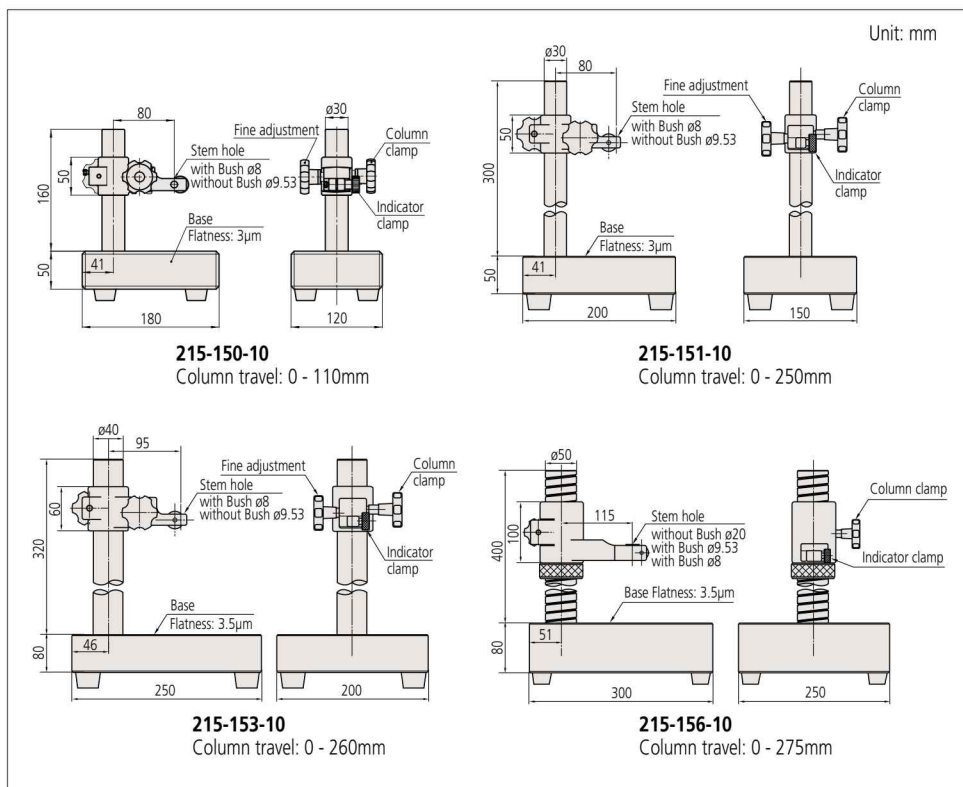
* Perpendicularity of the mounting hole to the anvil: less than 0.2mm/100mm.

* Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1µm or less) to these stands, it may affect the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

Optional Accessories

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

DIMENSIONS



SERIES 215 — Comparator Stands



Application example using Digimatic Indicator ID-H.

- Comparator Stands have a very stable cast-iron base that enables precise measurement.
- The partially serrated anvil prevents very flat workpieces from wringing to it and the 2.3 μ m flatness (or better) promotes accurate measurement.
- The **215-505-10** model has a threaded column which enables easy and precise coarse adjustment.
- Serrated anvils 110x110mm are supplied with **215-405-10**, and 150x150mm with **215-505-10** models.



215-405-10

SPECIFICATIONS

Order No.	Square anvil size (W x D)	Column travel	Stem hole	Remarks
215-405-10	110 x 110mm	235mm	\varnothing 8mm, \varnothing 9.53mm	With fine adjustment of 1mm range
215-505-10	150 x 150mm	275mm	\varnothing 8mm, \varnothing 9.53mm, \varnothing 20mm	With fine adjustment over the entire travel

* Perpendicularity of the mounting hole to the anvil: less than 0.4mm/100mm

* Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1 μ m or less) to these stands, it may affect the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

Optional Accessories

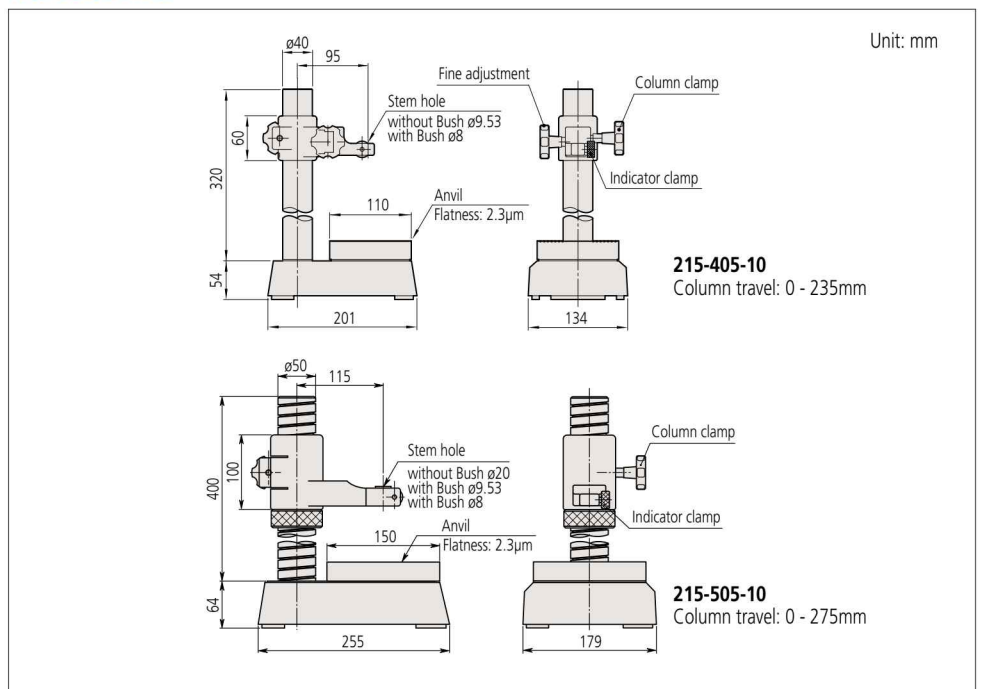
21JAA329: \varnothing 8mm bush*

21JAA330: \varnothing 9.53mm (3/8") bush*

21JAA331: \varnothing 15mm bush*

* Only available for **215-505-10**.

DIMENSIONS



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)

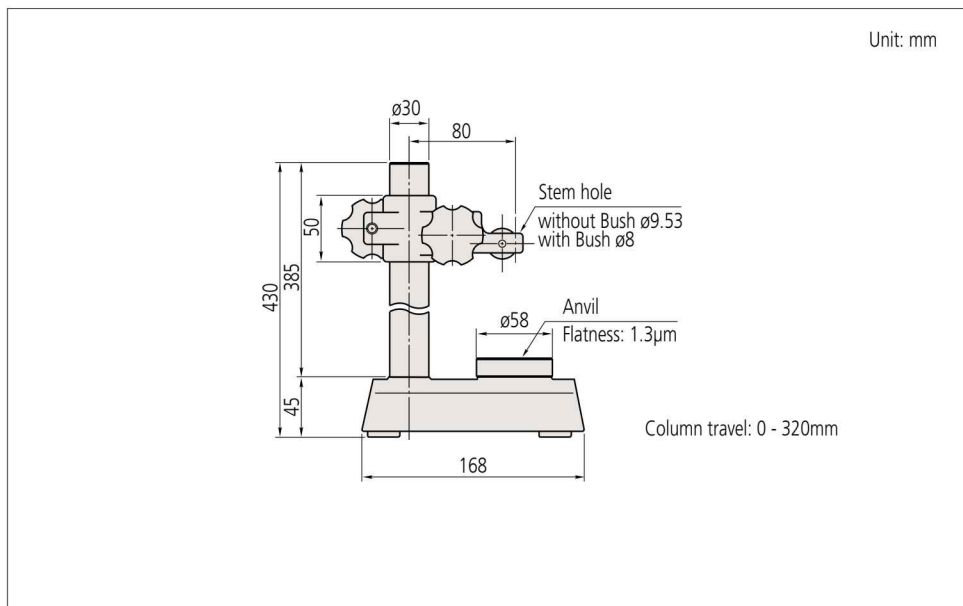
SPECIFICATIONS

Metric		
Order No.	Stem hole	Remarks
519-109-10	ø8mm, ø9.53mm	With serrated anvil

* Perpendicularity of the mounting hole to the anvil: less than 0.4mm/100mm

* Take note that when mounting the high-accuracy Linear Gages (with resolution of 0.1µm or less) to these stands, it may affect the indication value depends on the perpendicularity of the mounting hole to the top surface of the anvils.

DIMENSIONS



Optional Accessories

101462: Hardened steel Serrated anvil

101461: Hardened steel flat anvil

101463: Hardened steel domed anvil



Accuracy

	Mitutoyo	Reference JIS B 7540 Grade 1, 100mm or less
Bottom-surface flatness	2µm or less	10µm or less
V-surface flatness	2µm or less	10µm or less
Parallelism between the bottom-surface and the cylinder on the V-surface	7.5µm or less	10µm or less
Inclination of the V-anvil against the bottom-surface	10µm or less	10µm or less
Parallelism between the side surface and the cylinder on the V-surface	7.5µm or less	20µm or less
Difference in the height of a pair of V-Blocks	9µm or less	10µm or less

Optional Accessories

No.101462 Serrated anvil (standard accessory)

V-Block Set SERIES 181

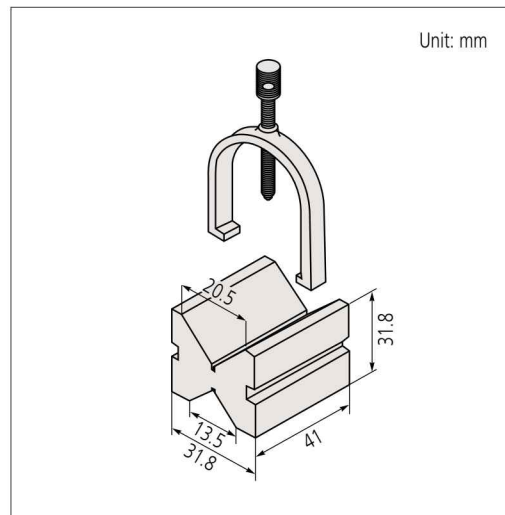


181-902-10

SPECIFICATIONS

Metric			Inch		
Order No.	Max. workpiece dia.	Remarks	Order No.	Max. workpiece dia.	Remarks
181-902-10	25mm	With clamp	181-901-10	1"	With clamp

DIMENSIONS

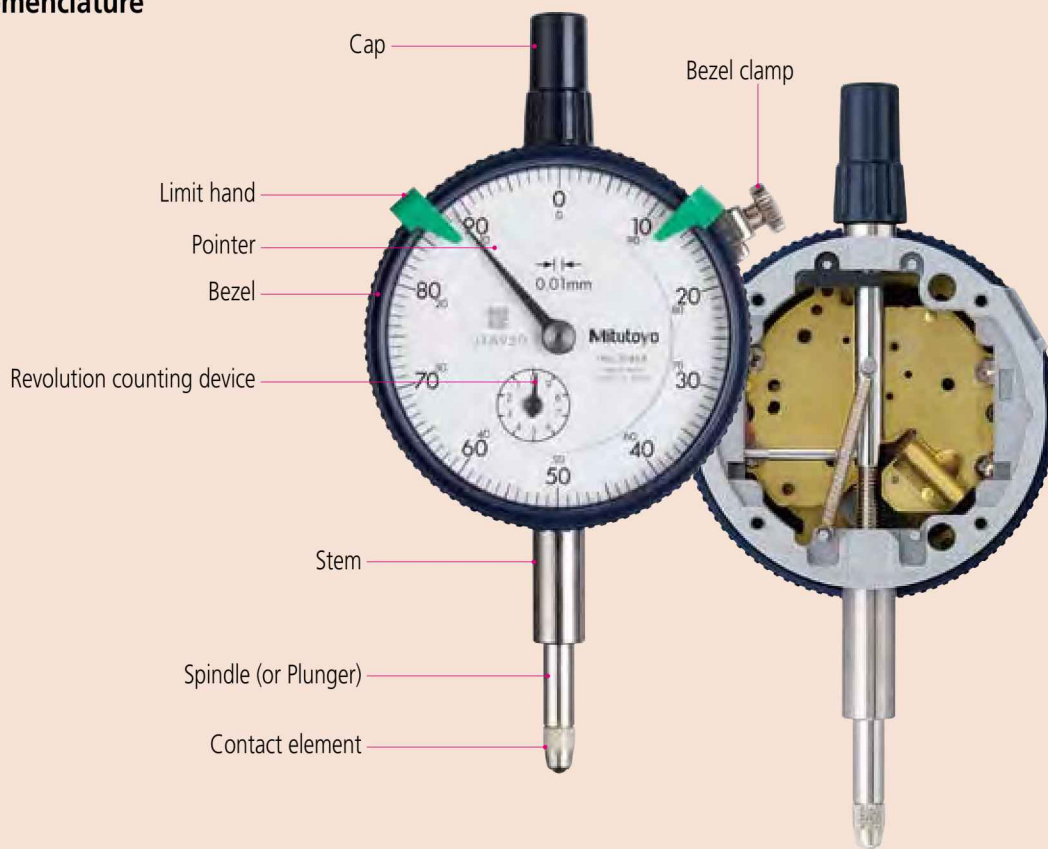


Quick Guide to Precision Measuring Instruments



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	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 indication 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 obtained. 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.
Retrace error			
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

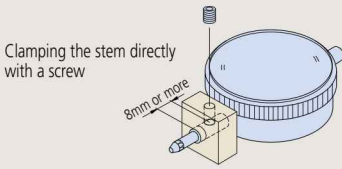
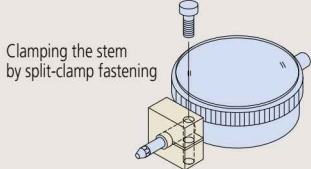
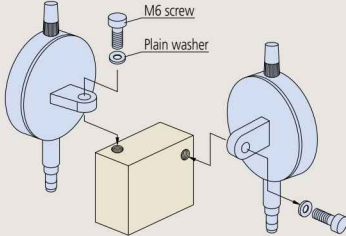
Graduation (mm)	Maximum permissible error (MPE) by measurement characteristics -- dial indicators with the bezel dia. 50mm or more												Maximum permissible error (MPE) by measurement characteristics --dial indicators with the bezel dia. 50mm or less and back plunger type dial indicators							
	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 20°C, which JIS B0680 defines as the standard temperature.

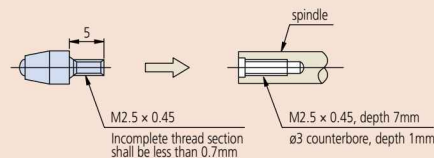
* The measurement characteristics of a dial indicator have to meet both maximum permissible error (MPE) and measurement force permissible limits (MPL) at any position within the measuring range in any posture when the measurement characteristics are not specified by the manufacturer.

■ Mounting a Dial gage

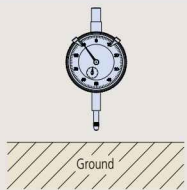
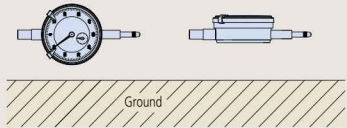

Stem mounting	Method	 <p>Clamping the stem directly with a screw</p>	 <p>Clamping the stem by split-clamp fastening</p>
	Note	<ul style="list-style-type: none"> • Mounting hole tolerance: $\varnothing 8G7(+0.005 \text{ to } 0.02)$ • Clamping screw: M4 to M6 • Clamping position: 8mm or more from the lower 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. 	<ul style="list-style-type: none"> • Mounting hole tolerance: $\varnothing 8G7(+0.005 \text{ to } 0.02)$
Lug mounting	Method		
	Note	<ul style="list-style-type: none"> • 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.1911T-10, 1913T-10&1003T), 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 point

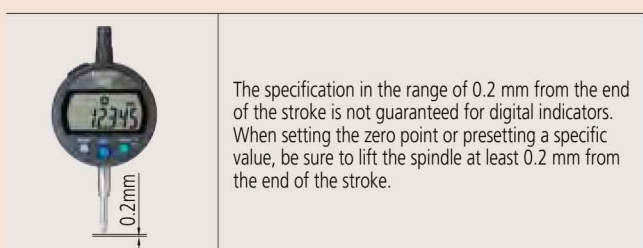
- Screw thread is standardized on M2.5x0.45 (Length: 5mm).
- Incomplete thread section at the root of the screw shall be less than 0.7mm when fabricating a contact point.



■ Measuring orientation

Position	Remarks
Vertical position (contact point downward) 	If measurement is performed with the lateral position or upside-down position, the measuring force is less than in the vertical position. 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.
Lateral position (spindle horizontal) 	
Upside-down position (contact point upward) 	

■ Setting the origin of a digital indicator



■ Care of the spindle

- Do not lubricate the spindle. Doing so might cause dust to accumulate, resulting in a malfunction.
- If the spindle movement is poor, wipe the upper and lower spindle 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 the 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		Measuring stage, Supporting stand, and Gauge block of grade 1 as stipulated by JIS B7506 (Gauge block)
		b		
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

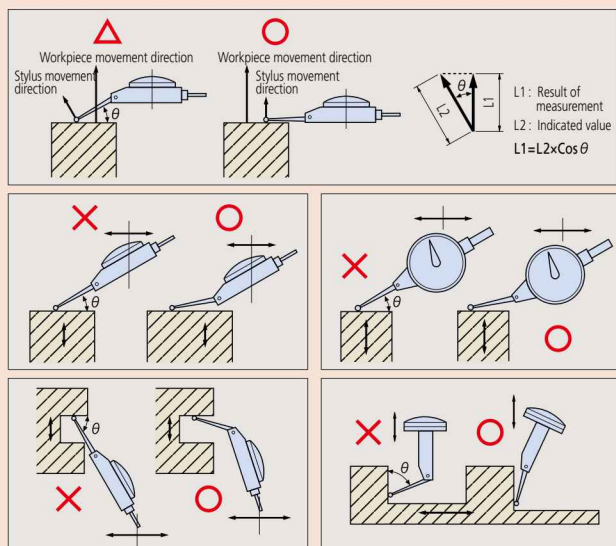
Permissible indication errors of dial test indicators are as per the table below.

Graduation (mm)	Measuring range (mm)	Wide range accuracy	Adjacent error	Repeatability	Retrace error
0.01	0.5	5	5	3	3
	0.8	8			4* ¹
	1.0	10			
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 result 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 $\theta = 10^\circ$, $0.200\text{mm} \times 0.98 = 0.196\text{mm}$
For $\theta = 20^\circ$, $0.200\text{mm} \times 0.94 = 0.188\text{mm}$
For $\theta = 30^\circ$, $0.200\text{mm} \times 0.86 = 0.172\text{mm}$

New Products



Linear Gages / Gage Heads

LGH

Refer to page G-17 for details.



Laser Scan Micrometers

LSM-500S series

Refer to pages G-42 - G-47 for details.



G

Sensor Systems

Linear Gages



Mu checker



Laser Scan Micrometers Laser Indicators Automatic Measuring Instruments

Laser Scan Micrometers






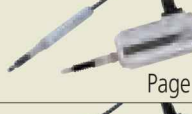











Automatic Measuring Instruments













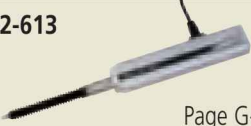
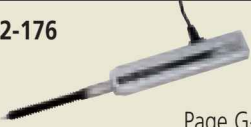



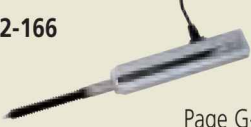









INDEX

Linear Gages	
Gage Heads	
LGK (Slim, Robust)	G-5
LGF (Economical Design) (Robust)	G-6
LGF (with origin point mark)	G-7
LGB (Slim)	G-8
LGB2 (Slim, High Res Data)	G-9
LG (long stroke)	G-11
LGM (long stroke, motorized)	G-12
LGD (economical)	G-13
LGS-1012P	G-15
LGF (0.1µm resolution)	G-16
High-precision LGH (0.01µm resolution)	G-17
Super high-precision LGH (0.01µm resolution)	G-19
Display unit (counter)	
EC Counter	G-21
EG Counter	G-22
EB Counter	G-23
EH Counter	G-24
EV-16P/D/Z	G-25
D-EV	G-27
Measurement data loading software for EH/EV/VL (SENSORPAK)	G-28
LITEMATIC	
VL-50-B/50S-B	G-29
Quick Guide to Precision Measuring Instruments	G-31
Mu-Checker	
Probe	G-33
Amplifier	G-36
EV-16A	G-38
Quick Guide to Precision Measuring Instruments	G-40
Laser Scan Micrometers	
LSM902/6900 (high accuracy)	G-41
LSM-500S	G-42
LSM-501S	G-43
LSM-503S	G-44
LSM-506S	G-45
LSM-512S	G-46
LSM-516S	G-47
LSM-9506 (integrated display)	G-48
LSM-6200 (multifunction display)	G-49
LSM-5200 (panel mount display)	G-50
LSMPAK	G-51
Optional Accessories	G-52
Quick Guide to Precision Measuring Instruments	G-56

Gage Heads / Display Units

		Gage Heads			
		Measuring range			
Resolution		5mm / .2"	10mm / .4"	25mm / .1"	
0.0001mm (0.01µm)	Laser Hologage Page G-19		542-925, 542-926 542-927, 542-928 (Low measuring force)  Page G-19 and G-20		
	LGH series Page G-17		542-715 542-716 Page G-17 and G-18		
0.0001mm (0.1µm)	LGB series (nut clamp) Page G-9	542-246 Refer to page G-9	542-158 542-181  Page G-5 and G-16	542-182  Page G-16	
	LGK series Page G-5				
	LGF series Page G-16				
	Long Stroke series (Motor-drive type) Page G-11 and G-12				
0.0005mm (0.5µm)	LGK series Page G-5		542-171 542-157  Page G-5 and G-6	542-172  Page G-6	
	LGF series Page G-6				
0.001mm (1µm)	LGK series Page G-5		542-156 542-161  Page G-5 and G-6	542-162  Page G-6	
	LGF series • 0.5µm high-resolution type Page G-6				
	LGB series (ø8mm Straight) Page G-8	542-204 Refer to page G-8	542-222, 542-222H (High-precision) 542-223 (air drive) 542-224 (Low measuring force) 542-230 (air drive) Page G-8		
	Long Stroke series (Motor-drive type) Refer to page G-11 and G-12				
	LGB series (nut clamp) Page G-9	542-244 Refer to page G-9	542-262 542-262H (High accuracy) 542-264 (Low measuring force) 542-270 (Air drive) Page G-9		
0.005mm (5µm)	LGF series Page G-6			542-612  Page G-6	
0.0005mm (0.5µm)	LGF series Series with reference point mark Page G-7		542-174  Page G-7	542-175  Page G-7	
0.001mm (1µm)	LGF series Series with reference point mark Page G-7		542-164  Page G-7	542-165  Page G-7	
0.01mm (10µm)	LGD series Page G-13		575-326  Page G-13	575-327  Page G-13	
	LGS series Page G-15		575-303  Page G-15		

Gage Heads		Display unit		
Measuring range		Point measurement	Calculation measurement (addition and subtraction)	Multi-point measurement
50mm / 2"	100mm / 4"			
		Exclusive counter (sold in sets with Gage Head) 		
	542-312 542-316  Page G-11	EG Counter 542-015  Page G-22		
	542-313 542-315 (Motor-drive type)  Page G-12			
542-173  Page G-6		EB Counter (LGH excluded) 542-092-2  Page G-23	EH Counter 542-071  Page G-24	EV Counter (LGH excluded) 542-063  Page G-25 and G-26
542-163  Page G-6				
	542-332 542-336  Page G-11			
	542-333 (Motor-drive type)  Page G-12	EH Counter 542-075  Page G-24		
542-613  Page G-6				
542-176  Page G-7		EG Counter 542-017  Page G-22	EH Counter 542-073  Page G-24	EV Counter 542-067  Page G-25 and G-26
542-166  Page G-7		EB Counter 542-094-2  Page G-23		
575-328  Page G-13		EC Counter 542-007  Page G-21		
		EG Counter 542-016  Page G-22	EH Counter 542-072  Page G-24	EV Counter 542-064  Page G-25 and G-26
		EB Counter 542-093-2  Page G-23		

Linear Gage

Ideal for integration into harsh environments such as automation applications

Linear Gage SERIES 542 — Slim type LGK

- Compact model offers the vibration/shock resistance of the proven LGF series. Cross-sectional area is approx 1/5 compared to LGF-110L-B.
- Resolution of each model can be selected from 0.1µm, 0.5µm, or 1µm.
- Excellent Sliding durability improved to remain serviceable for at least 15 million Cycles (in-house testing).
- Excellent shock resistance, 100g/1ms (IEC 60068-2-27)



SPECIFICATIONS

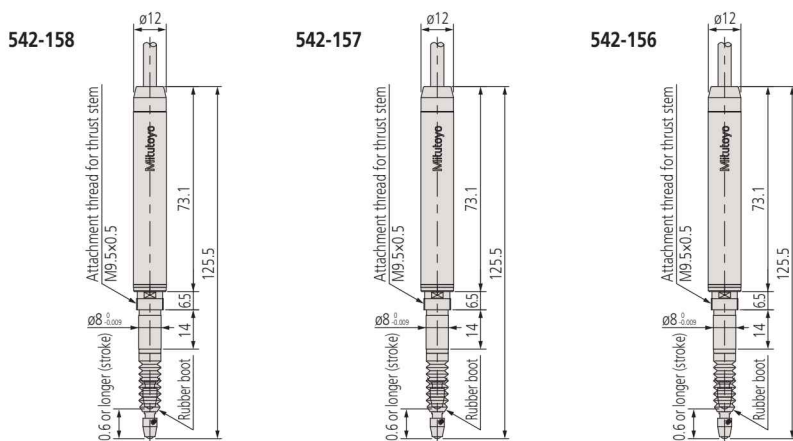
Order No.	542-158	542-157	542-156
Measuring range		10mm (.4")	
Resolution	0.1µm	0.5µm	1µm
Measuring accuracy (20°C)	(0.8+L/50) µm (L=mm)		(1.5+L/50) µm (L=mm)
Quantizing error	±1 count		
Measuring force	Contact point downwards	0.8N or less	
	Contact point horizontal	0.75N or less	
	Contact point upwards	0.7N or less	
Position detection method	Photoelectric linear encode		
Response speed*1	400mm/s	1500mm/s	
Output signal	90° phase difference, differential square wave (RS-422A equivalent), minimum edge intervals: 200ns for 0.1µm model, 200ns for 0.5µm model, 400ns for 1µm model		
Output signal pitch	0.4µm	2µm	4µm
Mass	Approx. 175g		
Dust/water resistance*2	Equivalent to IP66 (only gage head)		
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312		
Stem dia.	ø8mm		
Bearing type	Linear ball bearing		
Output cable length	2m (directly from casing)		
Connector	Plug: RM12BPE-6PH (HIROSE), Compatible receptacle: RM12BRD-6S (HIROSE)		
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)		
Storage temperature (humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)		
Standard Accessories	Wrench for contact point: 538610		
Remarks	Gold banded	Blue banded	Green banded

*1: When the spindle speed exceeds 1500mm/s (400mm/s for 0.1µm model), an alarm signal will be output. Also, if using Mitutoyo counter, an error message will be displayed. If using counters made by other companies, please inquire separately for the alarm signals. For the models of 0.1µm resolution, note that over-speed error may occur depending on the impact amount when releasing the contact point freely.

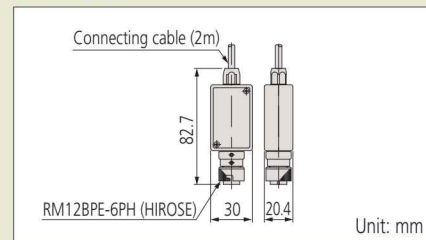
*2: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

DIMENSIONS

Unit: mm



Connector



Optional Accessories

- Air lifter 10: **02ADE230**
- * Required air pressure: 0.2 to 0.4MPa
- * Spindle extends when air is supplied.

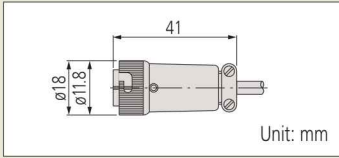


- Rubber boot: **238772** (spare)
- Thrust stem set: **02ADB680**
- Thrust stem: **02ADB681**
- Clamp nut: **02ADB682**
- Special spanner: **02ADB683**
- * A thrust stem set is a combination of thrust stem and a clamp nut. A special spanner is required for tightening. If using multiple gages, a thrust stem set for each gage and one special spanner are required.
- Extension cable (5m): **902434**
- Extension cable (10m): **902433**
- Extension cable (20m): **902432**



Refer to the Linear Gage (Catalog No.E13007) for more details.

Connector



Optional Accessories

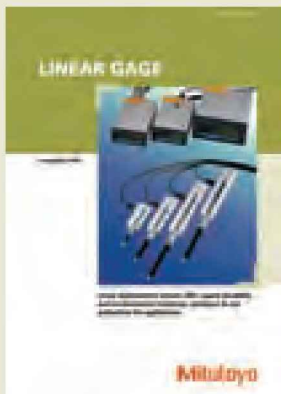
- Air drive unit
For 10mm range models: **02ADE230**
For 25mm range models: **02ADE250**
For 50mm range models: **02ADE270**
- * Required air pressure: 0.2 to 0.4MPa
- * Spindle extends when air is supplied.



- Rubber boot (spare)
For 10mm range models: **238772**
For 25mm range models: **962504**
For 50mm range models: **962505**
- Thrust stem set
For 10mm range models: **02ADB680**
Thrust stem: **02ADB681**
Clamp nut: **02ADB682**
For 25/50mm range models: **02ADN370**
Thrust stem: **02ADN371**
Clamp nut: **02ADB692**

- * External dimensions are described in the dimensional drawing of the product.
- * A thrust stem set is a combination of thrust stem and a clamp nut.
- A special spanner is required for tightening. If using multiple gages, a thrust stem set for each gage and one special spanner are required.

- Special spanner
For 10mm range models: **02ADB683**
For 25/50mm range models: **02ADB693**
- Extension cable (5m) : **902434**
- Extension cable (10m): **902433**
- Extension cable (20m): **902432**



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage SERIES 542 — Slim type LGF

- Excellent vibration/shock resistance due to the design of the spindle guide section.
- Sliding durability improved to remain serviceable for at least 15 million Cycles (in-house testing).
- Shock resistance, 100g/11ms (IEC 60068-2-27)
- LGF-Z series, which is equipped with reference point mark on the linear encoder (refer to page G-7), and 0.1μm resolution type (refer to page G-16) are also available.

542-171, -161



542-172, -162



542-173, -163



542-612, -613



SPECIFICATIONS

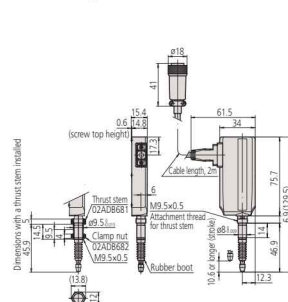
Order No.	542-171	542-161	542-172	542-162	542-612	542-173	542-163	542-613
Measuring range	10mm (.4")			25mm (1")		50mm (2")		
Resolution	0.5μm	1μm	0.5μm	1μm	5μm	0.5μm	1μm	5μm
Measuring accuracy (20°C) L=arbitrary measuring length (mm)	(1.5+L/50) μm				(7.5+L/50) μm	(1.5+L/50) μm		(7.5+L/50) μm
Quantizing error	±1 count							
Measuring force	Contact point downwards	1.2N or less		4.6N or less		5.7N or less		
	Contact point horizontal	1.1N or less		4.3N or less		5.3N or less		
	Contact point upwards	1.0N or less		4.0N or less		4.9N or less		
Position detection method	Photoelectric linear encoder							
Response speed*1	1500mm/s							
Output	90° phase difference, differential square wave (RS-422A equivalent), minimum edge intervals: 1000ns for 5μm model, 500ns for 1μm model, 250ns for 0.5μm model							
Output square wave pitch	2μm	4μm	2μm	4μm	20μm	2μm	4μm	20μm
Mass	Approx. 260g		Approx. 300g		Approx. 400g			Approx. 400g
Dust/water resistance	Equivalent to IP66 (only gage head)							
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312							
Stem dia.	ø8mm		ø15mm			ø15mm		
Bearing type	Linear ball bearing							
Output cable length	2m (directly from casing)							
Connector	Plug: RM12BPE-6PH (HIROSE), Compatible receptacle: RM12BRD-6S (HIROSE)							
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)							
Storage temperature (humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)							
Standard Accessories	Wrench for contact point: 538610			Wrench for contact point: 210187				

*1: When the spindle speed exceeds 1500mm/s, an alarm signal will be output. Also, if using a Mitutoyo counter, an error message will be displayed. If using counters made by other companies, please inquire separately for the alarm signals. For the models using 50mm stroke gage, note over-speed speed error may occur depending on the impact amount when releasing the contact point freely.

*2: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

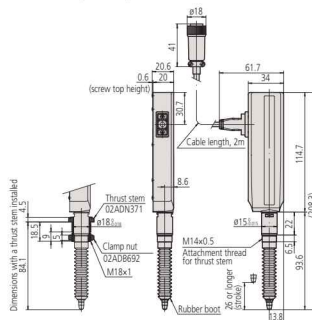
DIMENSIONS

542-171, -161



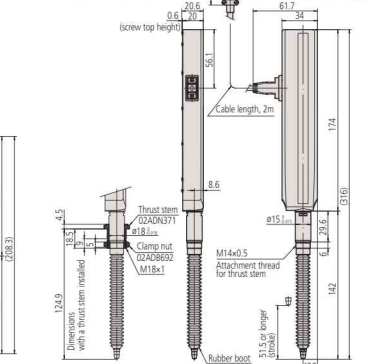
*With thrust stem set (optional accessory)

542-172, -162, -612



*With thrust stem set (optional accessory)

542-173, -163, -613



*With thrust stem set (optional accessory)

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 — Linear Gage Head with Origin Point Mark LGF-Z

- LGF series with reference point signal output function.
The master setting to use it, incorporated in the unit, is easy to operate. The origin point can be easily detected even when a fault, such as over-speed error, etc. occurs.
- Sliding durability improved to remain serviceable for at least 15 million Cycles (in-house testing).
- Shock resistance, 100g/11ms (IEC 60068-2-27)
- Resolutions are available in 0.5µm or 1µm.

542-174, -164

IP66



542-175, -165

IP66



542-176, -166

IP66



SPECIFICATIONS

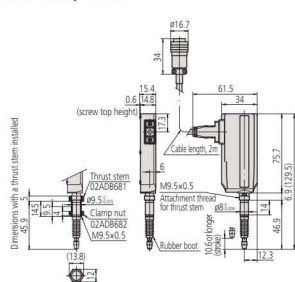
Order No.	542-174	542-164	542-175	542-165	542-176	542-166
Measuring range	10mm (.4")		25mm (1")		50mm (2")	
Resolution	0.5µm	1µm	0.5µm	1µm	0.5µm	1µm
Measuring accuracy (20°C)	(1.5+L/50)µm (L=arbitrary measuring length (mm))					
Quantizing error	±1 count					
Measuring force	Contact point downwards	1.2N or less		4.6N or less		5.7N or less
	Contact point horizontal	1.1N or less		4.3N or less		5.3N or less
	Contact point upwards	1.0N or less		4.0N or less		4.9N or less
Position detection method	Photoelectric linear encoder					
Reference mark position	3mm from contact point tip (lowest rest point)			5mm from contact point tip (lowest rest point)		
Reference mark repeatability (20°C): σ	σ≤0.5µm (at a constant reference point passing speed less than 300mm/s in the same direction)					
Response speed*1	1500mm/s					
Output signal	90° phase difference, differential square wave (RS-422A equivalent), minimum edge intervals: 250ns for 0.5µm model, 500ns for 1µm model					
Output square wave pitch	2µm	4µm	2µm	4µm	2µm	4µm
Mass	Approx. 260g		Approx. 300g		Approx. 400g	
Dust/water resistance*2	Equivalent to IP66 (only gage head)					
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312					
Stem dia.	ø8mm				ø15mm	
Bearing type	Linear ball bearing					
Output cable length	2m (directly extended from the main unit)					
Connector	Plug: PRC05-P8M (TAJIMI), Compatible receptacle: PRC05-R8F (TAJIMI)					
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)					
Storage temperature (humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)					
Standard Accessories	Wrench for contact point: 538610			Wrench for contact point: 210187		
Remarks	w/ origin point mark					

*1: When the spindle speed exceeds 1500mm/s, an alarm signal will be output. For use of alarm signals, please inquire separately. For models with 50mm stroke, note that over-speed error may occur depending on the impact amount when releasing the contact point freely.

*2: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

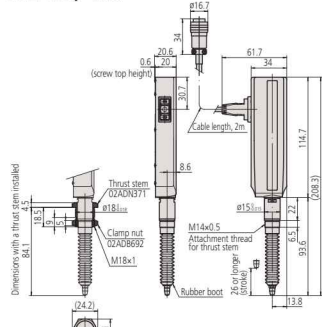
DIMENSIONS

542-174, -164



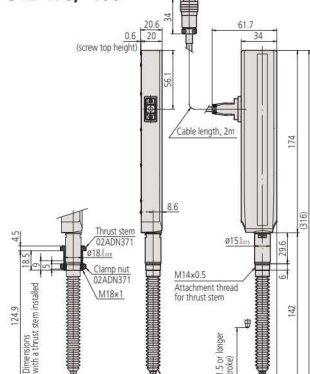
*With thrust stem set (optional accessory)

542-175, -165



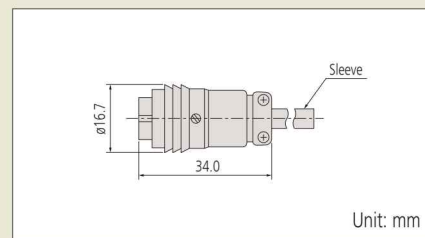
*With thrust stem set (optional accessory)

542-176, -166



*With thrust stem set (optional accessory)

Connector

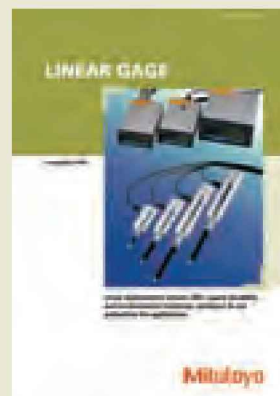


Optional Accessories

- Air drive unit
For 10mm range models: **02ADE230**
For 25mm range models: **02ADE250**
For 50mm range models: **02ADE270**
- * Required air pressure: 0.2 to 0.4MPa
- * Spindle extends when air is supplied.



- Rubber boot (spare)
For 10mm range models: **238772**
For 25mm range models: **962504**
For 50mm range models: **962505**
- Thrust stem set
For 10mm range models: **02ADB680**
Thrust stem: **02ADB681**
Clamp nut: **02ADB682**
For 25/50mm range models: **02ADN370**
Thrust stem: **02ADN371**
Clamp nut: **02ADB692**
- * External dimensions are described in the dimensional drawing of the product.
- * Thrust stem set is a combination of thrust stem and a clamp nut. A special spanner is required for tightening. If using multiple gages, a thrust stem set for each gage and one special spanner are required.
- Special spanner
For 10mm range models: **02ADB683**
For 25/50mm range models: **02ADB693**
- Extension cable (5m) : **02ADF260**
- Extension cable (10m): **02ADF280**
- Extension cable (20m): **02ADF300**



Refer to the Linear Gage (Catalog No.E13007) for more details.

Optional Accessories

- Rubber boot (spare)
For 5mm range models: **238773**
For 10mm range models: **238772**
 - Extension cable (5m): **902434***6
 - Extension cable (10m): **902433***6
 - Extension cable (20m): **902432***6
- *6: Not available for sine-wave output type.

SERIES 542 — Slim Type Gage Head LGB

- Compact form (ø8mm straight stem) is an optimal choice as a built-in type sensor.
- The spindle guide uses high precision linear ball bearings for extremely smooth

- movement and exceptional durability.
- Nut clamp type is also available (LGB2: refer to page G-9).



SPECIFICATIONS

Type	L-shaped	Straight		Low measuring force	Air-driven contact point *1		Sine-wave output type
Order No.	542-204	542-222	542-222H	542-224	542-230*2	542-223*3	542-401
Measuring range	5mm (.2")				10mm (.4")		
Resolution				1μm			*4
Measuring accuracy (20°C)	2μm	1μm			2μm		
Quantizing error				±1 count			
Response speed	900mm/s						
Measuring force	Contact point downwards	0.65N or less	0.8N or less	0.6N or less	0.8N or less		
	Contact point horizontal	0.6N or less	0.75N or less	0.55N or less	0.75N or less		
	Contact point upwards	0.55N or less	0.7N or less	0.5N or less	0.7N or less		
Protection Level*5	Equivalent to IP54 (only gage head)						
Mass	145g	140g		165g		160g	

- *1: Required air pressure: 0.3 to 0.4MPa
- *2: Spindle extends when air is supplied.
- *3: Spindle retracts when air is supplied.
- *4: Depends on the settings of the connected counter.
- *5: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

Example of slim head low measuring force (made to order)

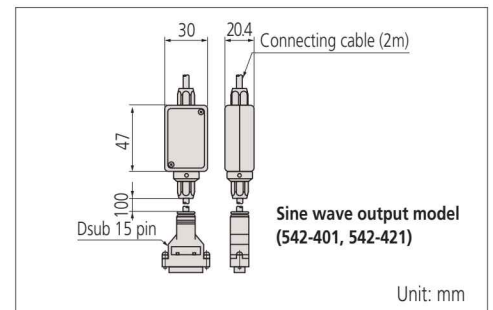
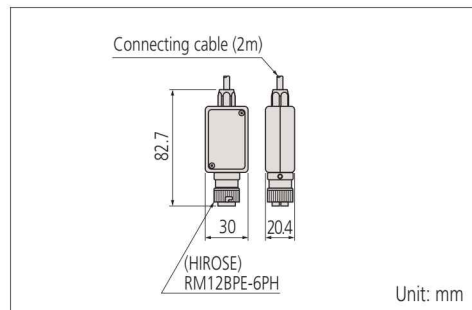
- Low measuring force, suitable for measurement of soft-material workpieces (Consult us for other measuring forces).

Model	L-shaped model	Air-driven contact point model
Measuring range	5μm	10μm
Resolution	1μm	1μm
Measuring force*	Contact point downwards	0.5N or less
	Contact point horizontal	0.45N or less
	Contact point upwards	0.4N or less

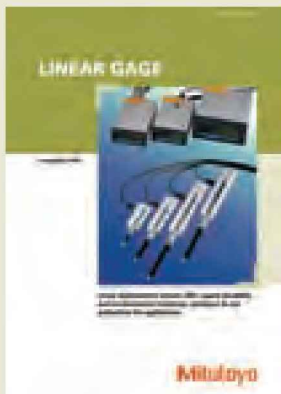
* Measuring force at the retraction of the spindle

Depending on the operating method, the spindle forward speed of low measuring force model may become slow compared to the standard model. Please check if this restriction is compatible with the application. Please contact Mitutoyo to verify the application.

Connector



External dimensions: refer to page G-10.



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 — Slim Type LGB2

- Slim design, nut clamp type (Stem dia. is $\varnothing 9.5\text{mm}$)
- The spindle guide uses high precision linear ball bearings for extremely smooth movement and exceptional durability.



SPECIFICATIONS

Type	L-shaped	Straight		Low measuring force	Air-driven contact point*1	Sine-wave output type	Slim type
Order No.	542-244	542-262	542-262H	542-264	542-270 *2	542-421	542-246
Measuring range	5mm (.2")	10mm (.4")					5mm (.2")
Resolution		1 μm				*3	0.1 μm
Measuring accuracy (20°C)	2 μm		1 μm	2 μm			0.8 μm
Maximum response speed	900mm/s						380mm/s
Measuring force	Contact point downwards	0.65N or less	0.8N or less	0.6N or less	0.8N or less		0.65 or less
	Contact point horizontal	0.6N or less	0.75N or less	0.55N or less	0.75N or less		0.6 or less
	Contact point upwards	0.55N or less	0.7N or less	0.5N or less	0.7N or less		0.55 or less
Protection Level*4	Equivalent to IP54 (only gage head)						
Mass	160g	170g		170g	180g		160g

*1: Required air pressure: 0.3 to 0.4MPa

*2: Spindle extends when air is supplied.

*3: Depends on the settings of the connected counter.

*4: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

Example of slim head low measuring force (made to order)

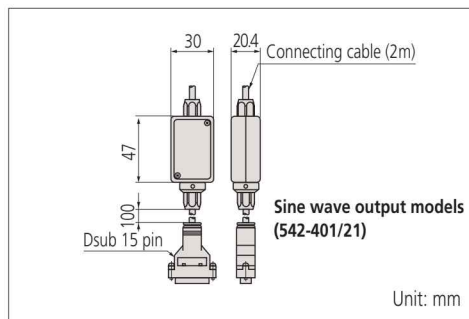
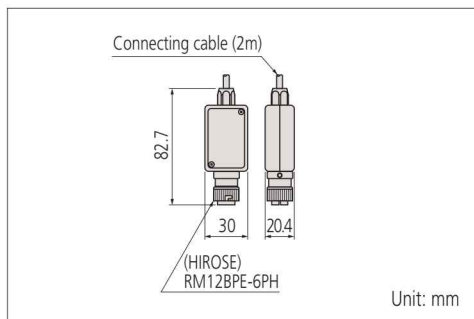
- Low measuring force, suitable for measurement of soft-material workpieces (Consult us for other measuring forces).

Model	L-shaped model	Air-driven contact point model
Measuring range	5 μm	10 μm
Resolution	1 μm	1 μm
Measuring force*	Contact point downwards	0.5N or less
	Contact point horizontal	0.45N or less
	Contact point upwards	0.4N or less

* Measuring force at the retraction of the spindle

Depending on the operating method, the spindle forward speed of low measuring force model may become slow compared to the standard model. Please check if this restriction is compatible with the application. Please contact Mitutoyo to verify the application.

Connector

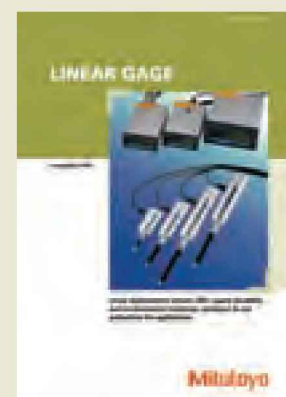


External dimensions: refer to page G-10.

Optional Accessories

- Rubber boot (spare)
For 5mm range models: **238773**
For 10mm range models: **238772**
- Extension cable (5m): **902434***5
- Extension cable (10m): **902433***5
- Extension cable (20m): **902432***5

*5: Not available for sine-wave output type.



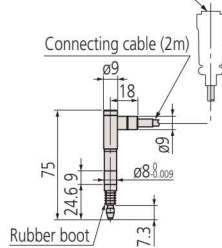
Refer to the Linear Gage (Catalog No.E13007) for more details.

DIMENSIONS

Unit: mm

542-204

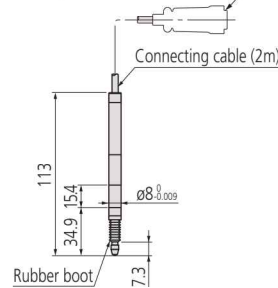
Refer to the connector section.



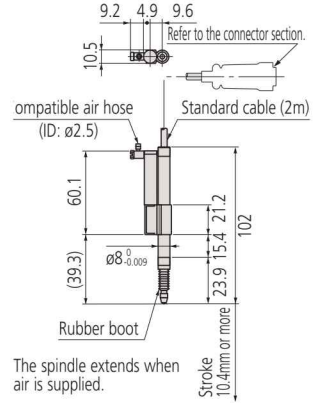
542-222/542-222H

542-224

Refer to the connector section.



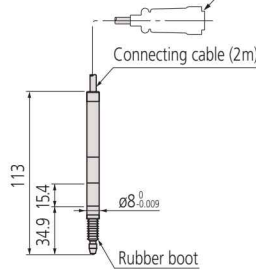
542-230



The spindle extends when air is supplied.

542-401

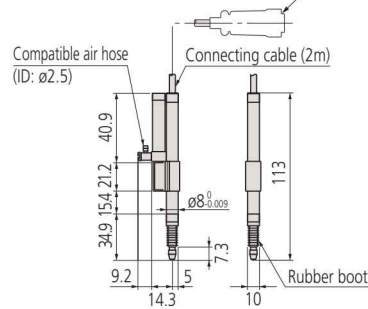
Refer to the connector section.



Connectable to Mitutoyo linear scale counter.

542-223

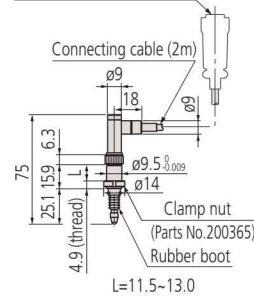
Refer to the connector section.



The spindle retracts when air is supplied.

542-244

Refer to the connector section.

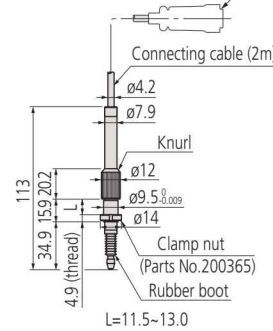


L=11.5~13.0

542-262/542-262H

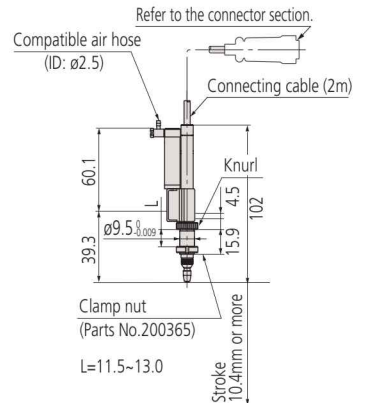
542-264

Refer to the connector section.



L=11.5~13.0

542-270

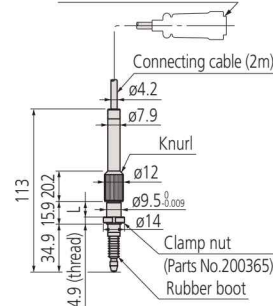


L=11.5~13.0

The spindle extends when air is supplied.

542-421

Refer to the connector section.

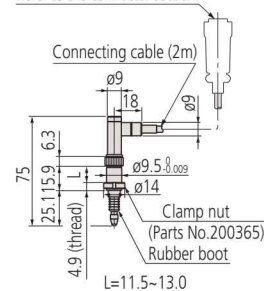


L=11.5~13.0

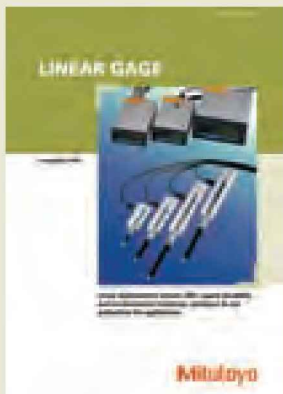
Connectable to Mitutoyo linear scale counter.

542-246

Refer to the connector section.



L=11.5~13.0



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 — Long Stroke Type LG

- A series to cover maximum measuring range, 100mm.
- Three versions are available; standard model, low measuring force model, and rubber boot type (made to order).
- The resolution of each model can be selected from 0.1µm and 1µm.



IP54
542-312

Lifting lever attachment



SPECIFICATIONS

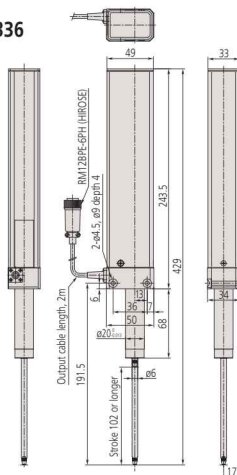
Type	Standard spar type	Low measuring force	Rubber boot type	Standard spar type	Low measuring force	Rubber boot type
Order No.	542-312	542-316	542-314	542-332	542-336	542-334
Measuring range	100mm (4")					
Resolution	0.1µm			1µm		
Measuring accuracy (20°C)	(2+L/100)µm ≤ 2.5µm L=arbitrary measuring length (mm)			(2+L/100)µm ≤ 2.5µm L=arbitrary measuring length (mm)		
Quantizing error	±1 count					
Measuring force	Contact point downwards	8.0N or less	3.0N or less	8.0N or less	3.0N or less	8.0N or less
	Contact point horizontal	6.5N or less	Not applicable	6.5N or less	6.5N or less	6.5N or less
	Contact point upwards	5.0N or less	Not applicable	5.0N or less	5.0N or less	5.0N or less
Position detection method	Photoelectric linear encoder					
Response speed*1 (max. electrical response speed)	Approx. 400mm/s			Approx. 800mm/s		
Output signal	90° phase difference, differential squarewave (RS-422A equivalent)					
Spindle drive	Helical extension spring					
Spindle guide	Bearing guide					
Stem diameter	ø20					
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312					
Shock resistance	60g (in-house testing)					
Cable length	Approx. 2m (directly extended from the gage unit)					
Spindle sealing method	Scraper type		Rubber boot type	Scraper type		Rubber boot type
Dust/water resistance*2	Equivalent to IP54		Equivalent to IP66	Equivalent to IP54		Equivalent to IP66
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)					
Storage temperature (humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)					
Input/output connector	For calculation: RM12BPE-6PH (HIROSE) Compatible receptacle: RM12BRD-6S (HIROSE)					
Mass (including cables)	Approx. 750g		Approx. 780g	Approx. 750g		Approx. 780g
Standard Accessories	Wrench for contact point: 210187 Hexagon socket head cap screw, M4×0.7×35, 2 pcs. (for gage fixing) Round flat washer, nominal 4, 2 pcs. (for gage fixing) Lifting lever: 137693 Fixing holder: 02ADG181 (for fixing lifting lever)					
Remarks	Standard	Low Measuring force	w/ rubber boot	Standard	Low Measuring force	w/ rubber boot

*1: Note that over-speed error may occur depending on the indentation amount when releasing the contact point freely after indentation.

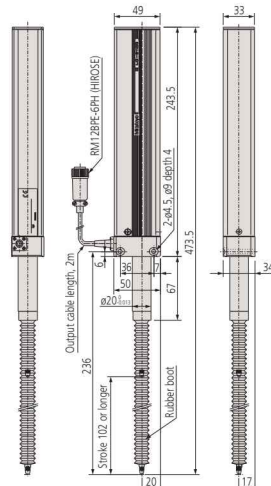
*2: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid. (Only gage head)

DIMENSIONS

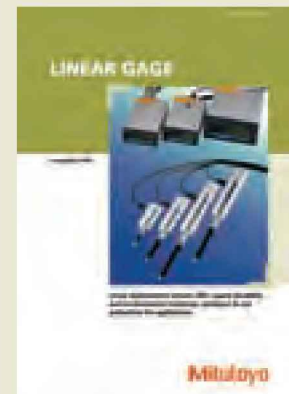
542-312, -316, -332, -336



542-314, -334



Unit: mm



Refer to the Linear Gage (Catalog No.E13007) for more details.

**Motor drive unit
02ADG400**

(standard accessory for LGM series main unit)



- A unit to move the spindle of the LGM series forward and backward.

Measuring force

Can be set with the rotary switch of the main unit (to one of the combinations of H/L and a number between 0 and 9) depending on the mounting position.

External dimensions

90 (W)×175 (D)×74 (H)mm (rubber boot excluded)

External input signal

Spindle retract
Spindle extend

External output signal

Spindle stop signal at upper limit

Mass

Approx. 700g

Power supply

100 - 240V AC

Optional Accessories

- Rubber boot: **02ADA004** (for rubber boot type)
- Extension cable (5m) : **902434**
- Extension cable (10m): **902433**
- Extension cable (20m): **902432**

**SERIES 542 — Long Stroke / Motor-driven Type
LGM**

- Long stroke (100mm), motor-driven spindle.
- Rubber boot type (made-to-order) is also available.
- Resolutions are available in 0.1µm and 1µm.



IP54
542-313

SPECIFICATIONS

Type	Standard spar type	Rubber boot type	Standard spar type	Rubber boot type
Order No.	542-313*	542-315*	542-333*	542-335*
Measuring range	100mm (.4")			
Resolution	0.1µm		1µm	
Measuring accuracy (20°C)	(2+L/100) µm ≤ 2.5µm L=arbitrary measuring length (mm)		(2.5+L/100) µm ≤ 3µm L=arbitrary measuring length (mm)	
Quantizing error	±1 count			
Measuring force	Contact point downwards	L3 (3.0N)	L4 (4.5N)	L3 (3.0N)
	Contact point horizontal	L7 (6.5N)	Not applicable	L7 (6.5N)
	Contact point upwards	H4 (9.5N)	L9 (6.0N)	H4 (9.5N)
Position detection method	Reflection type photoelectric linear encoder			
Response speed*1 (max. electrical response speed)	Approx. 400mm/s		Approx. 800mm/s	
Output signal	90° phase difference, differential squarewave (RS-422A equivalent)			
Spindle drive	Motor drive			
Spindle guide	Bearing guide			
Stem diameter	ø20			
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312			
Shock resistance	60g (in-house testing)			
Cable length	Approx. 2m (directly extended from the gage unit)			
Spindle sealing method	Scraper type	Rubber boot type	Scraper type	Rubber boot type
Dust/water resistance*2	Equivalent to IP54	Equivalent to IP66	Equivalent to IP54	Equivalent to IP66
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)			
Storage temperature (humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)			
Input/output connector	Gage (counter output)	Connector for counter: RM12BPE-6PH (HIROSE) Compatible receptacle: RM12BRD-6S (HIROSE)		
	Gage (I/O for driving)	Gage side plug: HR10A-7P-6P (HIROSE) Receptacle on motor drive unit: HR10A-7R-6S (HIROSE)		
	Motor drive unit (for external control)	Receptacle on motor drive unit: HR10A-10R-10S (HIROSE) Motor drive unit plug: HR10A-10P-10P (HIROSE)		
Mass (including cables)	Approx. 940g	Approx. 970g	Approx. 940g	Approx. 970g
Standard Accessories	Wrench for contact point: 210187 Hexagon socket head cap screw, M4×0.7×35, 2 pcs. (for gage fixing) Round flat washer, nominal 4, 2 pcs. (for gage fixing) Motor drive unit: 02ADG400			
Remarks	Motor-driven Type			

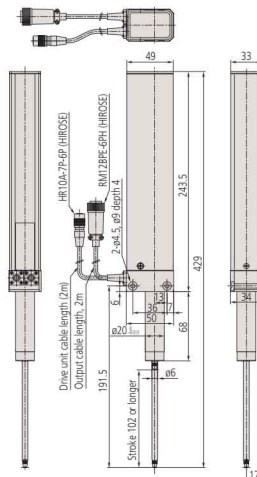
*1: The speed and measuring force are adjustable on the motor drive unit. Note that the rubber boot type cannot be used in the horizontal position.

*2: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid (only gage head).

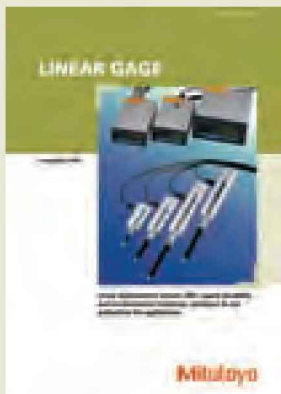
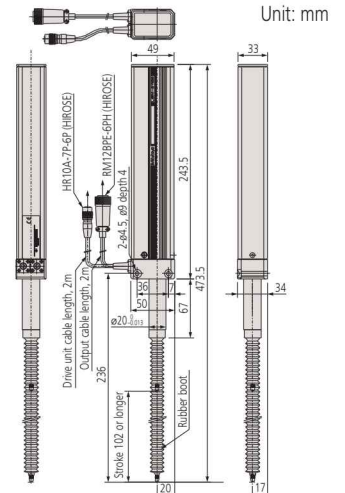
* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, E for BS, C and No suffix are required for PSE.

DIMENSIONS

542-313, -333



542-315, -335



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 575 — ABSOLUTE / Standard Type LGD

- Absolute position detection makes it possible to maintain the reference point even when the power is switched off.
- Excellent protection against dust and splashing water (IP66) in the factory floor.
- The spindle guide uses high precision linear ball bearings for extremely smooth movement and exceptional durability.
- Sliding durability improved to remain serviceable for at least 15 million cycles (in-house testing).
- Shock resistance, 100g/11ms (IEC 60068-2-27)

575-326,
575-326-3/5/7

IP66



575-327,
575-327-3/5/7

IP66



575-328,
575-328-3/5/7

IP66



SPECIFICATIONS

Metric					
Order No.*1		575-326, 575-326-3/5/7	575-327, 575-327-3/5/7	575-328, 575-328-3/5/7	
Measuring range		10mm	25mm	50mm	
Resolution		10µm			
Measuring accuracy (20°C)		20µm			30µm
Quantizing error		±1 count			
Measuring force	Contact point downwards	1.2N or less	4.6N or less	5.7N or less	
	Contact point horizontal	1.1N or less	4.3N or less	5.3N or less	
	Contact point upwards	1.0N or less	4.0N or less	4.9N or less	
Position detection method		ABSOLUTE electrostatic capacitance type linear encoder			
Response speed		Unlimited (not applicable to scanning measurement)			
Output		Digimatic output			
External input		Reference-setting signal (Absolute reference position*2 can be changed externally.)			
Mass*3		Approx. 260g	Approx. 300g	Approx. 400g	
Contact point		ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312			
Stem dia.		ø8	ø15		
Bearing type		Linear ball bearing			
Dust/water resistance*4		Equivalent to IP66 (only gage head)			
Output cable length (directly extended from the main unit)		2m, 3m, 5m, 7m			
Operating temperature (humidity) range		0 to 40°C (RH 20 to 80%, no condensation)			
Storage temperature (humidity) range		-10 to 60°C (RH 20 to 80%, no condensation)			
Standard Accessories		Wrench for contact point: 538610	Wrench for contact point: 210187		

*1: The last number of the Code No. represents special cable length. (meters)

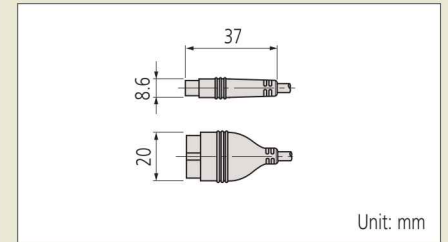
*2: The absolute reference point is near the lowest rest point at shipment.

*3: Mass including 2m cable.

*4: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

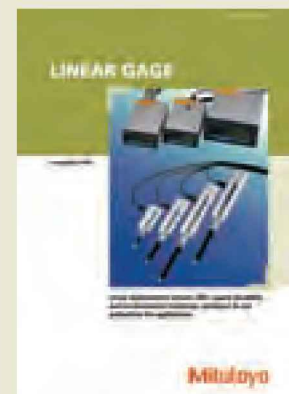
ABSOLUTE™ (Refer to page X for details.)

Connector



Optional Accessories

- Air drive unit
 - For 10mm range models: **02ADE230**
 - For 25mm range models: **02ADE250**
 - For 50mm range models: **02ADE270**
- * Required air pressure: 0.2 to 0.4MPa
- * Spindle extends when air is supplied.
- Rubber boot (spare)
 - For 10mm range models: **238772**
 - For 25mm range models: **962504**
 - For 50mm range models: **962505**
- Thrust stem set
 - For 10mm range models: **02ADB680**
 - Thrust stem: **02ADB681**
 - Clamp nut: **02ADB682**
 - For 25/50mm range models: **02ADN370**
 - Thrust stem: **02ADN371**
 - Clamp nut: **02ADB692**
- * External dimensions are described in the dimensional drawing of the product.
- * Thrust stem set is a combination of thrust stem and a clamp nut. A special spanner is required for tightening. If using multiple gages, a thrust stem set for each gage and one special spanner are required.
- Special spanner
 - For 10mm range models: **02ADB683**
 - For 25/50mm range models: **02ADB693**
 - Digimatic Power Supply Unit: **965275***
- * To denote your AC line voltage add the following suffixes to the order No. (e.g.: **965275A**): A for UL/CSA, D for CEE, E for BS, F for SAA, DC for China, K for KC, No suffix is required for JIS/100V



Refer to the Linear Gage (Catalog No.E13007) for more details.

Inch			
Order No.*1	575-336, 575-336-3/5/7	575-337, 575-337-3/5/7	575-338, 575-338-3/5/7
Measuring range	.4"	1"	2"
Resolution		.0005"	
Measuring accuracy (20°C)		.001"	.0012"
Quantizing error		±1 count	
Measuring force	Contact point downwards	1.2N or less	4.6N or less
	Contact point horizontal	1.1N or less	4.3N or less
	Contact point upwards	1.0N or less	4.0N or less
Position detection method	ABSOLUTE electrostatic capacitance type linear encoder		
Response speed	Unlimited (not applicable to scanning measurement)		
Output	Digimatic output		
External input	Reference-setting signal (Absolute reference position*2 can be changed externally.)		
Mass*3	Approx. 260g	Approx. 300g	Approx. 400g
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312		
Stem dia.	ø8		ø15
Bearing type	Linear ball bearing		
Dust/water resistance*4	Equivalent to IP66 (only gage head)		
Output cable length (directly extended from the main unit)	2m, 3m, 5m, 7m		
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)		
Storage temperature(humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)		
Standard Accessories	Wrench for contact point: 538610		Wrench for contact point: 210187

*1: The last number of the Code No. represents special cable length. (meters)

*2: The absolute reference point is near the lowest rest point at shipment.

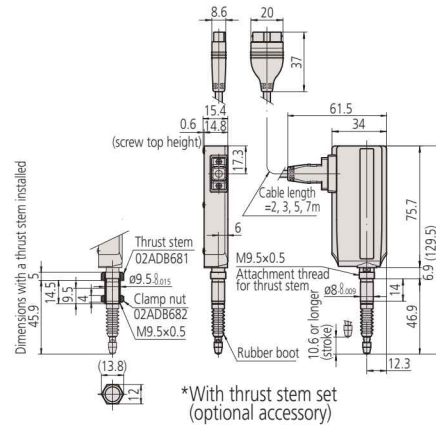
*3: Mass including 2m cable.

*4: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

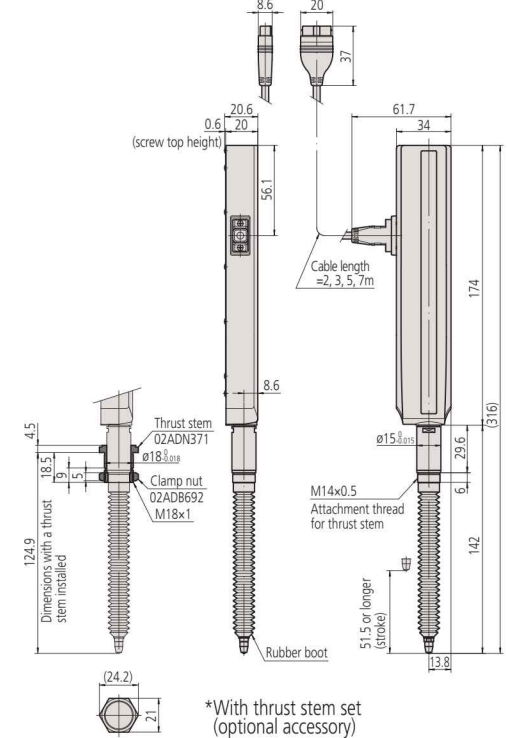
DIMENSIONS

Unit: mm

575-326, 575-326-3/5/7

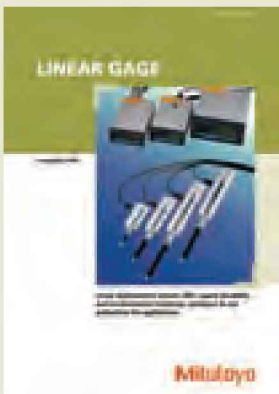
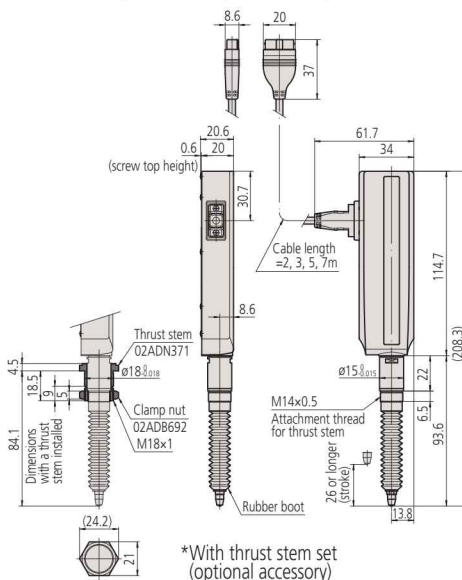


575-328, 575-328-3/5/7



575-327, 575-327-3/5/7

LGD®-1025L-B, -1025L/3-B, -1025L/5-B, -1025L/7-B



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 — 0.0001mm Resolution Type LGS-1012P

- ABSOLUTE electrostatic capacitance type encoder makes it possible to maintain the reference point even when the power is switched off.
- Excellent protection against dust and splashing water (IP66) on the factory floor.

575-303

IP66



SPECIFICATIONS

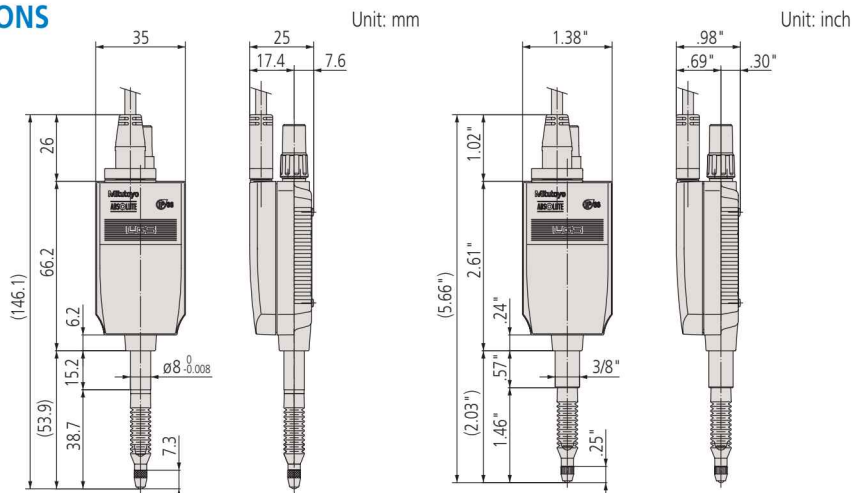
Metric		575-303
Order No.		575-303
Measuring range		12.7mm
Resolution		10µm
Measuring accuracy (20°C)		15µm
Quantizing error		±1 count
Measuring force	Contact point downwards	2N or less
	Contact point horizontal	1.8N or less
	Contact point upwards	1.6N or less
Position detection method	ABSOLUTE electrostatic capacitance type linear encoder	
Response speed	Unlimited (not applicable to scanning measurement)	
Output	Digimatic output	
Mass	Approx. 190g	
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312	
Stem dia.	ø8mm	
Bearing type	Slide bearing	
Dust/water resistance	Equivalent to IP66 (only gage head)	
Output cable length	2m (directly extended from the main unit)	
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)	
Storage temperature(humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)	

* IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

Inch		575-313
Order No.		575-313
Measuring range		.5"
Resolution		.0005"
Measuring accuracy (20°C)		.0008"
Quantizing error		±1 count
Measuring force	Contact point downwards	2N or less
	Contact point horizontal	1.8N or less
	Contact point upwards	1.6N or less
Position detection method	ABSOLUTE electrostatic capacitance type linear encoder	
Response speed	Unlimited (not applicable to scanning measurement)	
Output	Digimatic output	
Mass	Approx. 190g	
Contact point	ø3mm carbide-tipped (fixing screw: 4-48 UNF), standard contact point: 21BZB005	
Stem dia.	ø9.52=3/8" DIA	
Bearing type	Slide bearing	
Dust/water resistance	Equivalent to IP66 (only gage head)	
Output cable length	2m (directly extended from the main unit)	
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)	
Storage temperature(humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)	

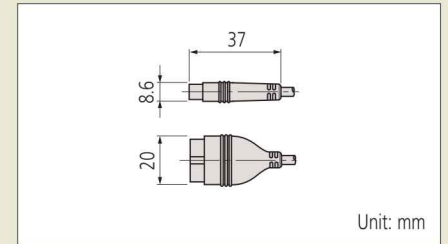
* IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

DIMENSIONS



ABSOLUTE™ (Refer to page X for details.)

Connector



Optional Accessories

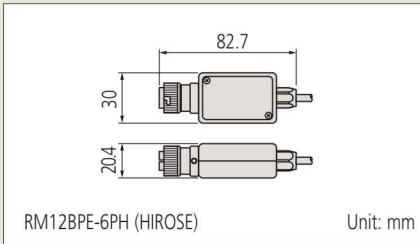
- Rubber boot: **238774** (spare)
- Air drive unit (metric): **903594**
- Air drive unit (inch): **903598**
- SPC cable extension adapter: **02ADF640**
- Extension cable (0.5m): **02ADD950**
- Extension cable (1m): **936937**
- Extension cable (2m): **965014**

* When connecting an extension cable, an SPC cable extension adapter is required.



Refer to the Linear Gage (Catalog No.E13007) for more details.

Connector



Optional Accessories

- Rubber boot (spare)
For 10mm range models: **238772**
For 25mm range models: **962504**
For 50mm range models: **962505**
- Thrust stem set
For 10mm range models: **02ADB680**
Thrust stem: **02ADB681**
Clamp nut: **02ADB682**
For 25mm range models: **02ADN370**
Thrust stem: **02ADN371**
Clamp nut: **02ADB692**
- * External dimensions are described in the dimensional drawing of the product.
- * Thrust stem set is a combination of thrust stem and a clamp nut. A special spanner is required for tightening. If using multiple gages, a thrust stem set for each gage and one special spanner are required.
- Special spanner
For 10mm range models: **02ADB683**
For 25mm range models: **02ADB693**
- Extension cable (5m): **902434**
- Extension cable (10m): **902433**
- Extension cable (20m): **902432**

Linear Gage SERIES 542 — Economical Design LGF (0.1µm resolution)

- 0.1µm resolution type of reliable LGF series gage.
- Excellent protection against dust and splashing water (IP66) on the factory floor.

542-181
IP66



542-182
IP66



SPECIFICATIONS

Order No.	542-181	542-182
Measuring range	10mm (.4")	25mm (1")
Resolution	0.1µm	
Measuring accuracy (20°C)	(0.8+L/50) µm (L=arbitrary measuring length (mm))	
Quantizing error	±1 count	
Measuring force	Contact point downwards	1.2N or less
	Contact point horizontal	1.1N or less
	Contact point upwards	1.0N or less
Position detection method	Photoelectric linear encoder	
Response speed*1	400mm/s	
Output signal	90° phase difference, differential squarewave (RS-422A equivalent) Minimum edge-to-edge interval, 200ns	
Output signal pitch	0.4µm	
Mass	Approx. 310g	Approx. 350g
Dust/water resistance*2	Equivalent to IP66 (only gage head)	
Contact point	ø3mm carbide-tipped (fixing screw: M2.5 (P=0.45)×5), standard contact point: 901312	
Stem dia.	ø8	ø15
Bearing type	Linear ball bearing	
Output cable length	2m (directly extended from the main unit)	
Connector	Plug: RM12BPE-6PH (HIROSE), Compatible receptacle: RM12BRD-6S (HIROSE)	
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)	
Storage temperature(humidity) range	-10 to 60°C (RH 20 to 80%, no condensation)	
Standard Accessories	Wrench for contact point: 538610	Wrench for contact point: 210187

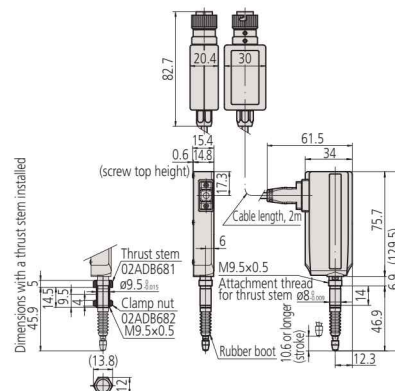
*1: When the spindle speed exceeds 400mm/s, an alarm signal will be output. Also, if using a Mitutoyo counter, an error message will be displayed. If using counters made by other companies, please consult your local Mitutoyo office. Note that over-speed error may occur depending on the impact amount when releasing the contact point freely.

*2: IP Code is a standard which classifies and rates the degree of protection provided against the intrusion of solid objects and water. This may not be applicable depending on the kind of liquid.

DIMENSIONS

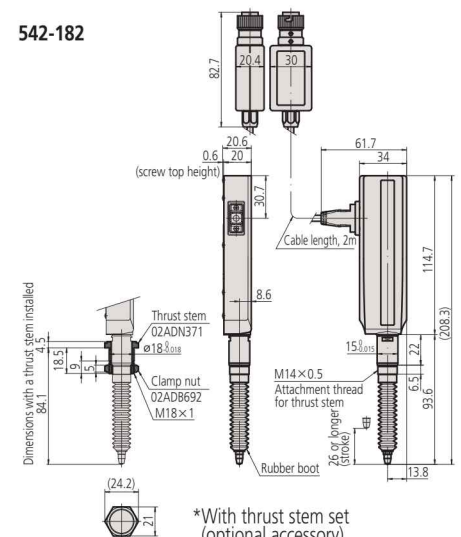
Unit: mm

542-181

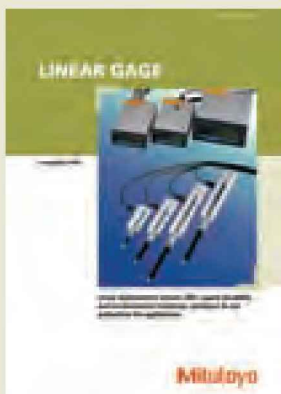


*With thrust stem set (optional accessory)

542-182



*With thrust stem set (optional accessory)



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 High-precision Linear Gage LGH (0.01 μ m resolution)

- A gage head featuring a very accurate, ultra-high-resolution photoelectric linear encoder that approaches laser interferometer performance over its measuring range of 10mm. This head is suitable for measuring high-precision components and inclusion in high-accuracy positioning applications.
- Relatively long range, very high accuracy and extreme resolution enable the head to act as a master gage for measuring-instrument calibration in many instances.
- The compact design contributes to reducing measuring system costs and permits downsizing entire system configurations.
- Linear encoder is highly resistant to being affected by unfavorable environmental conditions, such as drafts and rapid atmospheric pressure, temperature and humidity changes.
- A low measuring force model is available (**542-716**). As low as 0.12N can be selected, which enables measurement of easily-deformed workpieces or thickness of delicate films.
- Responsivity has been improved by 2.8 times (250mm/s => 700mm/s) compared to the previous model.
- Every **LGH** series gage is bundled with a dedicated counter.



Gage Head

542-715



Exclusive Counter

SPECIFICATIONS

Linear gauge		Standard	Low measuring force
Order No.		542-715	542-716
Measuring range		10mm	
Resolution		0.01 μ m (0.05 μ m, 0.1 μ m, 0.5 μ m, 1 μ m can be selected from the counter)	
Measuring accuracy (20°C)*		0.2 μ m	
Repeatability (20°C)*		0.1 μ m (2 σ)	
Retrace error (20°C)*		0.1 μ m	
Measuring force	Contact point downwards	0.65N or less	Approx. 0.12N
	Contact point horizontal	0.55N or less	Not applicable
	Contact point upwards	0.45N or less	Not applicable
Position detection method		Photoelectric reflection type linear encoder	
Detectable operation speed		In normal measurement: 700mm/sec; for peak detection: 120mm/sec	
Mass of gage head		220g (excluding cable of approx. 150g)	
Contact point		ϕ 3mm carbide-tipped (fixing screw: M2.5 (P=0.45)x5)	
Stem		ϕ 15mm	
Bearing		Linear ball type	
Output cable length		Approx. 2m	
Operating temperature/humidity		0 to 40°C/RH 20 to 80% (no condensation)	
Storage temperature		-10 to 60°C/RH 20 to 80% (no condensation)	

Counter

Quantizing error	\pm 1 count
Display range	\pm 999.99999mm
Functions	Presetting, tolerance judgment, peak measurement, analog output
Interface	RS-232C/Digimatic/USB (only for SENSORPAK)
Power supply	Supplied AC Adapter, or +12 to 24 V DC, max. 700mA
Current Consumption	8.4W (MAX 700mA) (Ensure at least 1A power supply per unit.)
External dimensions	144(W)x157(D)x75(H)
Mass	Approx. 900g (AC Adapter excluded)
Standard accessories	Wrench for contact point, rubber boot, stand, washer (for counter), AC Adapter, AC cord, DC plug, user's manual, inspection certificate

*Indication accuracy applies when used with counters.



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

Optional Accessories

- LGH stand: **971750**
- Stem fixture for fixing to top surface: **971751**
- Stem fixture for fixing to bottom surface: **971752**
- Spindle lifting cable: **971753**
- Rubber boot: **238752** (spare for **542-715**)
- I/O output connector (with cover): **02ADB440**

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 Super high-precision Linear Gage (Laser Hologage) LGH (0.01 μ m resolution)

- The Mitutoyo Laser Hologage is a high-end digital gaging system that employs laser beam interference to make highly accurate and repeatable measurements.
- The compact gage head reduces the costs required for assembling the laser scale unit for each device. The head can also contribute to downsizing the entire system. The master gage is the best tool available for measuring tools or for a length measurement sensor of the control unit, as well as for measuring high-precision components.
- High resolution and high accuracy
Highly accurate measurement due to an ultra-high resolution of 0.00001mm (0.01 μ m), which is close to the performance of laser interferometers.
- Excellent measuring stability
The design is also highly resistant to unfavorable environmental conditions such as air movement and atmospheric pressure changes.
- Low measuring force models are also available.
Low measuring force models are available for easily deformed precision workpieces.
- High-reliability and excellent durability
High precision linear ball bearings are used in the spindle guide for extremely smooth movement and exceptional durability.



Gage Head

Exclusive Counter

542-925

SPECIFICATIONS

Code No.	542-925*	542-927*	542-926*	542-928*
Configuration	Set of 1-axis Gage Head and Display Unit	Set of 2-axis Gage Head and Display Unit	Set of 1-axis Gage Head and Display Unit	Set of 2-axis Gage Head and Display Unit
Measuring range	10mm			
Measuring accuracy (20°C)	0.1 μ m*1			
Repeatability (2 σ)	0.02 μ m			
Retrace error	0.05 μ m			
Measuring force	Contact point downwards Contact point horizontal Contact point upwards	0.55N or less 0.45N or less 0.35N or less		0.1N Not applicable Not applicable
Contact point	\varnothing 3mm carbide-tipped (fixing screw: M2.5 (P=0.45) \times 5), standard contact point: 120058			
Output cable length	2m			
Display range	\pm 999.99999mm			
Minimum reading	0.01 μ m			
Operating temperature (humidity) range	10 to 30°C (RH 30 to 70%, no condensation)			
Storage temperature (humidity) range	-10 to 50°C (RH 30 to 70%, no condensation) The temperature and humidity range for storage after unpacking is the same as that for operation.			
Standard Accessories	Wrench for contact point: 538610 AC adapter: 02ADN460 AC cable (Japan): 02ZAA000* AC cable (USA): 02ZAA010* AC cable (EU): 02ZAA020* AC cable (Britain): 02ZAA030* AC cable (China): 02ZAA040* AC cable (Korea): 02ZAA050*			
Mass (Gage Head + Display Unit)	1400g			

*1: Indication accuracy applies when used with counters.

* 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, C and No suffix are required for PSE.



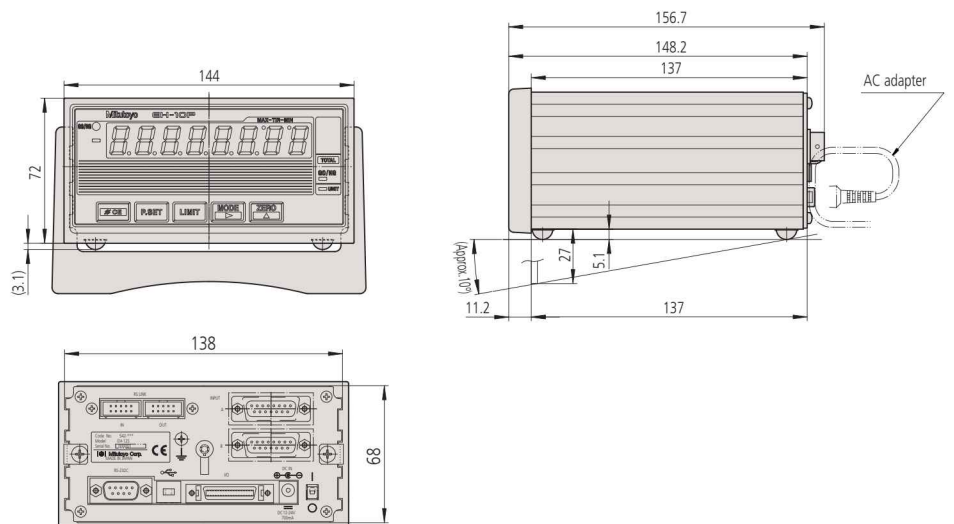
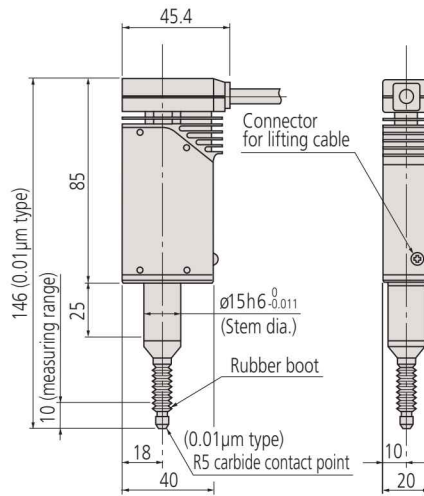
An inspection certificate is supplied as standard. Refer to page X for details.

Optional Accessories

- LGH stand: **971750**
- Stem fixture for fixing to top surface: **971751**
- Stem fixture for fixing to bottom surface: **971752**
- Spindle lifting cable: **971753**
- Rubber boot: **238752** (spare for **542-925** and **542-927**)
- I/O output connector (with cover): **02ADB440**

DIMENSIONS

Unit: mm



Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 Linear Gage Counter (Panel mount, Single-function Type) EC Counter

- Produces 3-step/5-step, 3 kinds of tolerance output and BCD output.
- A smoothing function reduces display digit fluctuations.
- (EG-101P, EG-101Z)
- Employs DIN size (96×48mm) and mount-on-panel configuration to facilitate system integration.



542-007



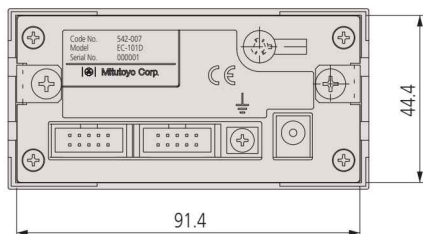
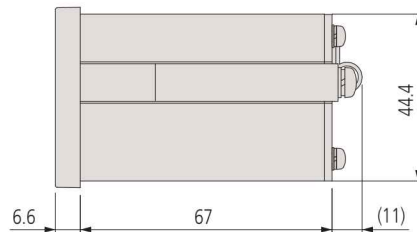
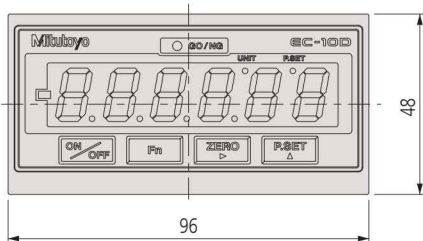
SPECIFICATIONS

Order No.	542-007*	
Quantizing error	±1 count	
Resolution () indicates maximum display range	0.01mm (±9999.99) / .0005" (±99.9995") / .001" (±999.999") 0.001mm (±9999.999) / .00005" (±9.99995") / .0001" (±99.999") [automatic setting by gage]	
Display	Sign plus 6 digits (Green LED)	
Tolerance judgment display	LED display (3 steps: Amber, Green, Red)	
External output (switching type)	Tolerance judgment output	-NG, OK, +NG (open-collector)
	Data output	Digimatic output
Control input	External PRESET, external HOLD	
Rating	Power supply voltage	Supplied AC adapter, or 9 - 12V DC
	Power consumption	4.8W (max. 400mA) Ensure at least 1A is available per unit.
Operation temperature range	0 - 40°C (RH 20 to 80%, no condensation)	
Storage temperature range	-10 to 50°C (RH 20 to 80%, no condensation)	
External dimensions	96 (W) × 48 (H) × 84.6 (D) mm	
AC adapter / AC cable	AC adapter: (Japan/North America)06AEG302JA / (EU)06AEG302D / (Britain)06AEG302E / (Korea)06AEG302K / (China)06AEG302DC	
Applicable head	LGD, LGS, ID, SD	
Applicable input	Digimatic code (SPC)	
Number of gage inputs	1	
Mass	220g	

* 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, C and No suffix are required for PSE.

DIMENSIONS

Unit: mm



Refer to the Linear Gage (Catalog No.E13007) for more details.

Function

- Preset
- Direction switch
- Tolerance judgment (3/5-step, 3 kinds)
- Peak (max., min., runout) measurement
- Constant number
- Smoothing
- Error display/output
- Key protection

Optional Accessories

- I/O output connector (with cover): **02ADB440**
 - AC adapter: **02ADN460**
 - AC cable (Japan): **02ZAA000***
 - AC cable (USA): **02ZAA010***
 - AC cable (EU): **02ZAA020***
 - AC cable (Britain): **02ZAA030***
 - AC cable (China): **02ZAA040***
 - AC cable (Korea): **02ZAA050***
 - Terminal connecting cable: **02ADD930***
- * Required when using AC adapter.

SERIES 542 Linear Gage Counter (Panel mount, Single-function Type) EG Counter

- Produces 3-step/5-step, 7 kinds of tolerance output and limit value output independently for each of 7 channels.
- Comes with serial BCD output capability, for connection to a programmable controller or personal computer, etc.
- Dynamic measurement possible with simplified analog output.
- Employs DIN size (96×48mm) and mount-on-panel configuration to facilitate system integration.



542-015



542-017



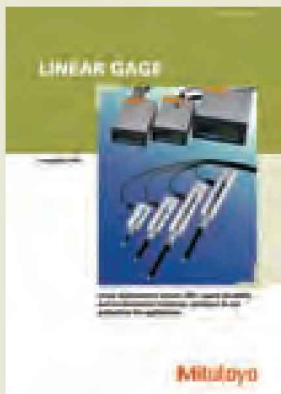
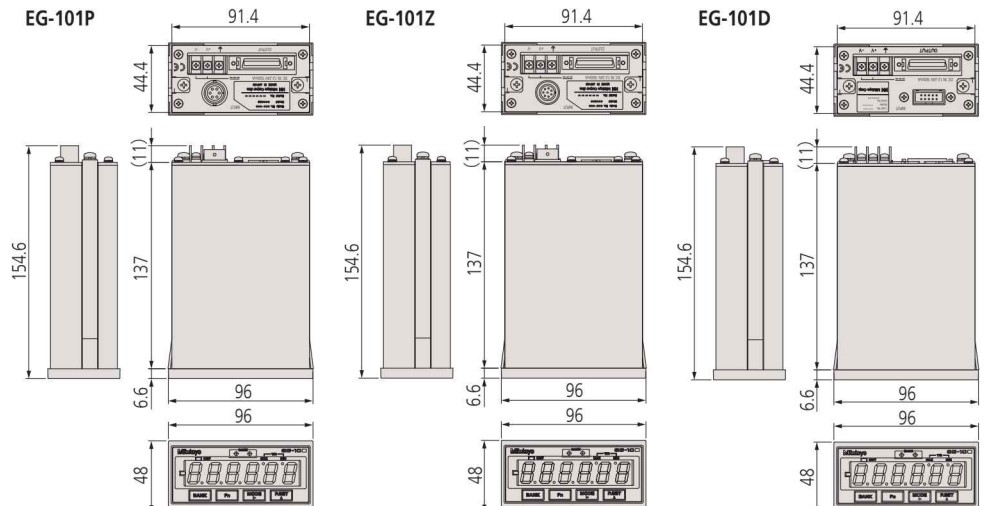
542-016

SPECIFICATIONS

Order No.	542-015	542-017	542-016
Quantizing error	±1 count		
Maximum input frequency	1.25MHz, response speed depends on gage specification.		
Resolution () indicates maximum display range	0.01mm (±9999.99mm) / .0005" (±99.9995") / .001" (±999.999") 0.005mm (±9999.995mm) / .00005" (±9.99995") / .0001" (±99.999") 0.001mm (±999.999mm) / .00005" (±9.99995") / .0001" (±99.999") 0.0005mm (±99.9995mm) / .000005" (±.999995") / .00001" (±9.99999") 0.0001mm (±99.9999mm) / .000005" (±.999995") / .00001" (±9.99999")	0.01mm (±9999.99mm) / .0005" (±99.9995") / .001" (±999.999") 0.005mm (±9999.995mm) / .00005" (±9.99995") / .0001" (±99.999") 0.001mm (±999.999mm) / .00005" (±9.99995") / .0001" (±99.999") 0.0005mm (±99.9995mm) / .000005" (±.999995") / .00001" (±9.99999") 0.0001mm (±99.9999mm) / .000005" (±.999995") / .00001" (±9.99999")	0.01mm (±9999.99mm) / .0005" (±99.9995") / .001" (±999.999") 0.005mm (±9999.995mm) / .00005" (±9.99995") / .0001" (±99.999") 0.001mm (±999.999mm) / .00005" (±9.99995") / .0001" (±99.999") 0.0005mm (±99.9995mm) / .000005" (±.999995") / .00001" (±9.99999") 0.0001mm (±99.9999mm) / .000005" (±.999995") / .00001" (±9.99999") [Automatic setting by gage]
Display	Sign plus 6 digits (Green LED)		
Tolerance judgment display	LED display (3 steps: Amber, Green, Red / 5 steps: Amber, Amber flashing, Green, Red flashing, Red)		
Tolerance judgment output	L1 to L5 (Open-collector / Switchover between L1 to L5 and BCD output with parameter)		
Control output	Normal operation signal (NOM): open-collector		
BCD output	Open-collector / Switchover between 6-digit (positive/negative-true logic) and tolerance judgment output with parameter		
Control input	Presetting, display hold, peak value clear, tolerance judgment BANK switch		
Rating	Power supply voltage	12 - 24V DC	
	Power consumption	6W or less (500mA max.) Ensure at least 1A is available per unit.	
Operating temperature range	0 to 40°C (RH 20 to 80%, no condensation)		
Storage temperature range	-10 to 50°C (RH 20 to 80%, no condensation)		
External dimensions	96 (W) × 48 (H) × 156 (D) mm		
Applicable gage head	LGE, LGF, LGK, LGB, LGM, LG, LGH (LGH110 excluded) Models with reference point mark, sine wave output type are excluded.	LGF with reference point mark	LGD, LGS, ID, SD
Applicable input	Differential square-wave	Differential square-wave with origin point mark	Digimatic code (SPC)
Number of gage inputs	1		
Mass	Approx. 400g		

DIMENSIONS

Unit: mm



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 542 Linear Gage Counter (Panel-mount, Multi-function Type) EB Counter

- Produces 3-step/5-step, 7 kinds of tolerance output and limit value output independently for each of 7 channels.
- Comes with serial BCD output capability, for connection to a programmable controller or personal computer, etc.
- Dynamic measurement possible with simplified analog output.
- Employs DIN size (96x48mm) and mount-on-panel configuration to facilitate system integration.



542-092-2



542-094-2

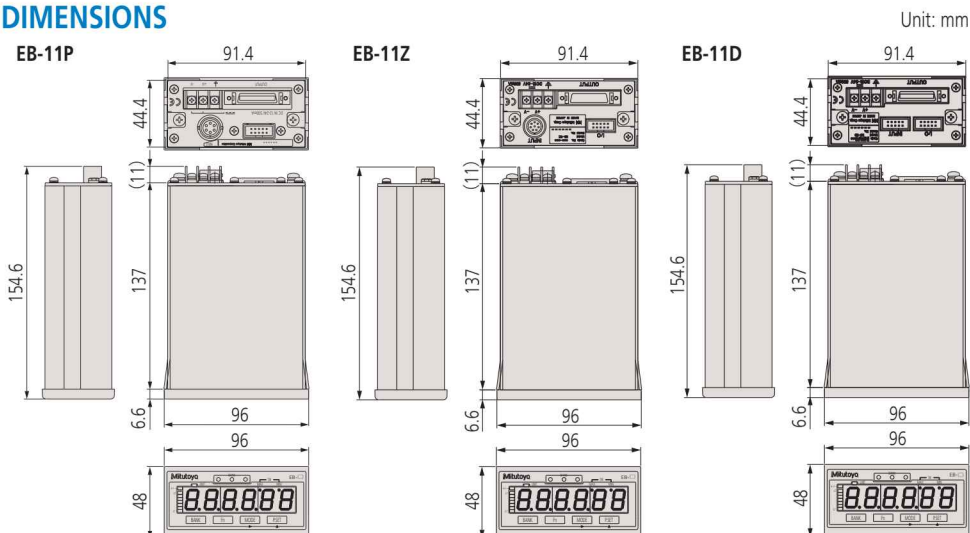


542-093-2

SPECIFICATIONS

Order No.	542-092-2	542-094-2	542-093-2
Quantizing error	±1 count		
Maximum input frequency	1.25MHz (2-phase square wave), response speed depends on gage specification.		
Resolution () indicates maximum display range	0.01mm (±9999.99mm) / .0005" (±99.9995") 0.005mm (±9999.995mm) / .00005" (±9.99995") 0.001mm (±999.999mm) / .00005" (±9.99995") 0.0005mm (±99.9995mm) / .000005" (±.999995") 0.0001mm (±99.9999mm) / .000005" (±.999995")		0.01mm (±9999.99mm) / .0005" (±99.9995") 0.005mm (±9999.995mm) / .00005" (±9.99995") 0.001mm (±999.999mm) / .00005" (±9.99995") 0.0005mm (±99.9995mm) / .000005" (±.999995") 0.0001mm (±99.9999mm) / .000005" (±.999995")
Display	Sign plus 6 digits (Green LED)		
Tolerance judgment display	LED display (3 steps: Amber, Green, Red / 5 steps: Amber, Amber flashing, Green, Red flashing, Red)		
Input/output	Tolerance judgment output	L1 to L5, open-collector	
	Control output	Normal operation signal (NOM), open-collector	
	Control input	Presetting, display hold, peak value clear, tolerance judgment BANK switch, open-collector or no-voltage contact signal (with/without contact point)	
Interface	Serial BCD	Bit serial format, open-collector	
	Analog output	2.5V+Counting valuelx Voltage resolution (25mV/2.5mV): Full-scale 0 to 5V	
Rating	Digimatic input/output	<ul style="list-style-type: none"> • Connecting to the external switch box (02ADF180) makes it easy to enter tolerance limits and preset values. Note) This function is not available when the gage is connected to DP-1VR, Digimatic Mini-Processor. • It can only be connected to DP-1VR Digimatic Mini-Processor (264-504). • Number of tolerance steps can be expanded by assembling EB-D counters. 	
	Power supply voltage	12 - 24V DC	
	Power consumption	6W or less (50mA max.) Ensure at least 1A is available per unit.	
Operating temperature range	0 to 40°C (RH 20 to 80%, no condensation) / -10 to 50°C (RH 20 to 80%, no condensation)		
External dimensions	96(W)×48(H)×156(D)mm		
Applicable gage head	LGF, LGK, LGE, LGB Models with reference point mark, sine wave output type are excluded.	LGF with reference point mark	LGS, LGD, LGD-M
Applicable input	Differential square-wave	Differential square-wave with origin point mark	Digimatic code (SPC)
Number of gage inputs	1		
Mass	Approx. 400g	Approx. 400g	Approx. 400g

DIMENSIONS

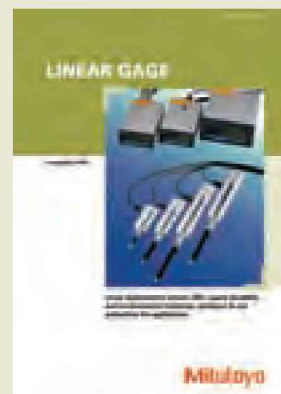


Function

- Preset
- Tolerance judgment output (3/5-step, 7 kinds)
- Limit value output (2 kinds independently for each of the 7 channels)
- Peak (max., min., runout) measurement
- Diverse data output (Serial BCD, Simplified analog, Digimatic)

Optional Accessories

- I/O output connector (with cover): **02ADB440**
 - AC adapter: **02ADN460**
 - AC cable (Japan): **02ZAA000***
 - AC cable (USA): **02ZAA010***
 - AC cable (EU): **02ZAA020***
 - AC cable (Britain): **02ZAA030***
 - AC cable (China): **02ZAA040***
 - AC cable (Korea): **02ZAA050***
 - Terminal connecting cable: **02ADD930***
- * Required when using AC adapter.
- External switch box
- The tolerance values or preset values can be easily input. **02ADF180** (with 2m cable)



Refer to the Linear Gage (Catalog No.E13007) for more details.

Optional Accessories

- I/O output connector (with cover): **02ADB440**

SERIES 542 Linear Gage Counter EH Counter (Panel-mount, Multi-function Type)

- Two types are available for this model: a 1-axis display and a 2-axis display, which enables addition or subtraction calculations between two gages.
- Multifunctional counter equipped with zero-setting, presetting, tolerance judgment.
- RS-232C and USB are equipped as standard. Data transfer to a PC is possible. (*USB is supported only by Mitutoyo SENSORPAK.)
- A multi-point (max. 20 points) measuring system can easily be configured with the built-in RS Link networking function. Refer to "Quick Guide to Precision Measuring Instruments" on page G-32 for details of the RS link.
- Employs DIN size (144x72mm) and mount-on-panel configuration to facilitate system integration.

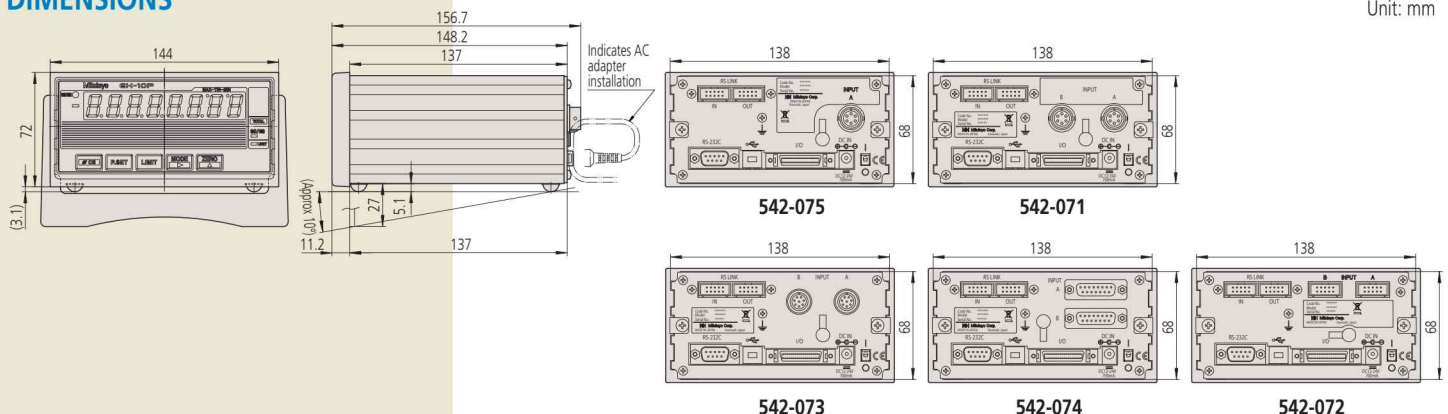


SPECIFICATIONS

Order No.	542-075*	542-071*	542-073*	542-074*	542-072*
Number of axes to be displayed	1 axis	2 axes			
Quantizing error	±1 count				
Maximum input frequency	2.5MHz (2-phase square wave)			1MHz (2-phase sine wave)	—
Resolution () indicates maximum display range	0.01mm (±9999.99mm) / .0005" (±99.9995") 0.001mm (±999.999mm) / .00005" (±9.99995") 0.0001mm (±99.9999mm) / .000005" (±.999995") [Parameter set]				Automatic setting by gage
Display	Sign plus 8 digits (Green LED)				
Tolerance judgment display	LED display (3 steps: Amber, Green, Red/ 5 steps: Amber, Amber flashing, Green, Red flashing, Red)				
Interface	RS-232C/USB/parameter selection via digimatic (only DP-1VR, digimatic mini-processor can be connected) (USB used only with SENSORPAK.) Selection by parameter from 3-step, 5-step, or digit BCD Total tolerance judgment output (when tolerance function is enabled) Analog output (1V-4V)				
Input/output	Control output	Normal operation signal (NOM): open-collector			
	Control input	Display BANK switching, peak mode, presetting, display hold, hold per axis: open-collector or no-voltage contact signal (with/without contact point)			
Rating	Power supply voltage	Supplied AC adapter, or 12 - 24V DC			
	Power consumption	8.4W (max. 700mA) Ensure at least 1A is available per unit.			
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)				
Storage temperature(humidity) range	-10 to 50°C (RH 20 to 80%, no condensation)				
External dimensions	144 (W) x72 (H) x156.7 (D) mm				
AC adpter / AC cable	AC adapter: 02ADN460 / AC cable: 02ZAA000 , AC cable (Japan): 02ZAA000* , AC cable (USA): 02ZAA010* , AC cable (EU): 02ZAA020* , AC cable (Britain): 02ZAA030* , AC cable (China): 02ZAA040* , AC cable (Korea): 02ZAA050*				
Applicable gage head	LGE, LGF, LGK, LGB, LGM, LG, LGH (LGH-110 excluded) Models with reference point mark, sine wave output type are excluded.	LGF with reference point mark	LGB sine wave output / Linear scale sine wave output		LGD, LGS, ID, SD
Applicable input	Differential square-wave				Differential sine-wave
Number of gage inputs	1	2		2	
Mass	Approx. 760g	Approx. 800g	Approx. 800g	Approx. 900g	Approx. 800g

* 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, C and No suffix are required for PSE. For those models of the Order No. with Suffix "1", AC adapter is not attached as a standard accessory.

DIMENSIONS



Unit: mm

Linear Gage

Ideal for integration into harsh environments such as automation applications

542 series 6channel input counter EV-16P/Z/D

- Up to six gages can be connected to one unit, extendable up to 10 units (60 gages at maximum) using the RS Link function* to facilitate the configuration of a multi-point measurement system.
- A range of output modes to choose from: I/O output for tolerance judgment and segment output, BCD data output and RS-232C output are available.
- Other than normal measurement, peak measurement or differential measurement between gages are available.

* Refer to "Quick Guide to Precision Measuring Instruments" on page G-32 for details of the RS link.



542-063



542-067



542-064

SPECIFICATIONS

Order No.	542-063	542-067	542-064
Number of input channels	6		
Maximum input frequency	1.25MHz (2-phase square wave), response speed depends on gage specification. Max. counting speed: 5MHz	1.25MHz (2-phase square wave), response speed depends on gage specification. Max. counting speed: 5MHz	Response speed depends on gage specification.
Quantizing error	±1 count		
Resolution () indicates maximum display range	10μm (±999999.99mm) / .0005* (±9999.9995*) 5μm (±999999.995mm) / .00005* (±999.99995*) 0.5μm (±9999.9995mm) / .000005* (±99.999995*)*1 [Parameter set]	10μm (±999999.99mm) / .0005* (±9999.9995*) 5μm (±999999.995mm) / .00005* (±999.99995*) 1μm (±99999.999mm) / .00005* (±999.99995*) 0.5μm (±9999.9995mm) / .000005* (±99.999995*) [Parameter set]	Depends on gage specification.
LED display	8 digits for parameter display (displays settings), 1 for error display		
Error message	Overspeed, gage error etc.		
External display	Dedicated external display unit D-EV (optional) can be connected.		
Number of input switches	4		
Function of input switches	Measurement mode switching, parameter setting		
Input/output	Tolerance judgment output	1 to 6 channels (L1, L2, L3), open-collector	
	BCD output	Parallel BCD output (positive/negative-true logic), open-collector	
	Segment output	Function to set on only the terminals corresponding to the counting values, open-collector	
	Control output	Normal operation signal (NOM), open-collector	
Control input	Output channel designation (segment, in the BCD mode), presetting, peak value clear, range changeover (at segment output), holding counting value open-collector or no-voltage contact signal (with/without contact point)		
Interface	RS-232C	Measurement data output and control input EIA RS-232C-compatible Use cross cables for home position, DTE (terminal definition). Max. connecting unit: 10 (6 when using EF counter)	
	RS link	Connecting cable length: Max. 10m (sum of link cable length) Data transfer time: 1sec./60ch (when transmission rate is 19200bps)	
Rating	Power supply voltage	12 - 24V DC, terminal block (M3 screw)	
	Power consumption	8.4W or less (700mA max.) Ensure at least 1A is available per unit.	
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)		
Storage temperature (humidity) range	-10 to 50°C (RH 20 to 80%, no condensation)		
External dimensions	144 (W) × 72 (H) × 139 (D) mm		
Mass	Approx. 910g	Approx. 910g	Approx. 830g
Standard Accessories	Fixing foot (4), connecting bracket (4), fixing screw M4×12 (8)		
Applicable input	Differential square-wave		Digimatic code (SPC)
Applicable gage head	LGE, LGF, LGK, LGB, LGM, LG Models with reference point mark, sine wave output type are excluded.	LGF with reference point mark	LGD, LGS

*1: Available when using D-EV.

Function

- External Control (Zero-set, Preset etc.)
- Direction switch
- Error display
- Tolerance judgment output
- Diverse data output (RS-232C, BCD, Segment)
- Peak measurement
Maximum value, minimum value, runout, and differential measurement between two gages
Addition, averaging, maximum value, minimum value, and maximum width

Optional Accessories

- ID-EV External display unit: **02ADD400**
- SPC cable (0.5m): **02ADD950**
- SPC cable (1m): **936937**
- SPC cable (2m): **965014**
- AC adapter: **02ADN460**
- AC cable (Japan): **02ZAA000***
- AC cable (USA): **02ZAA010***
- AC cable (EU): **02ZAA020***
- AC cable (Britain): **02ZAA030***
- AC cable (China): **02ZAA040***
- AC cable (Korea): **02ZAA050***
- Terminal connecting cable: **02ADD930***

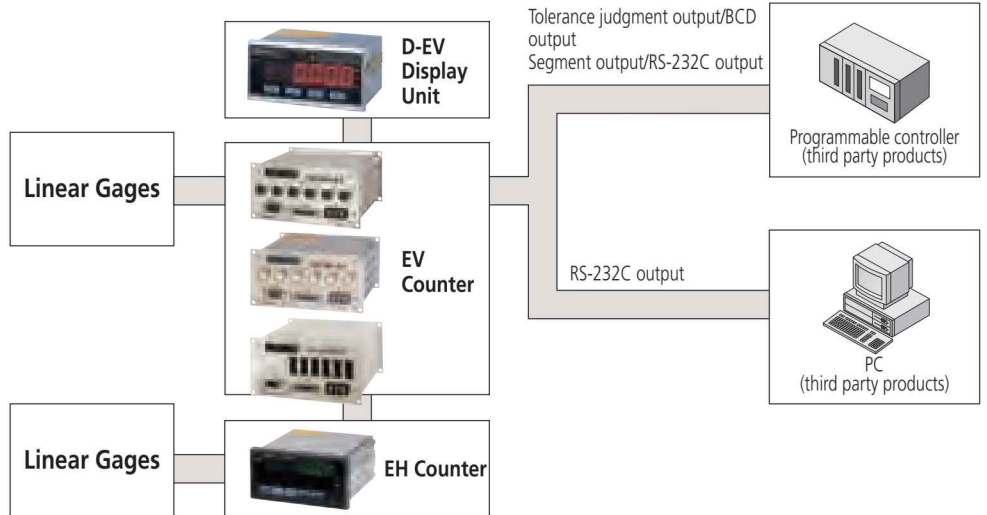
* Required when using AC adapter.



Refer to the Linear Gage (Catalog No.E13007) for more details.

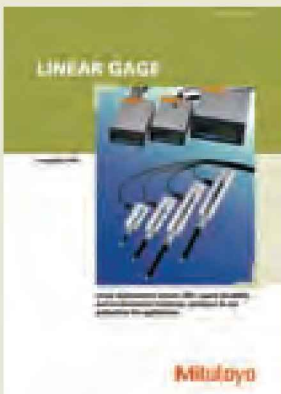
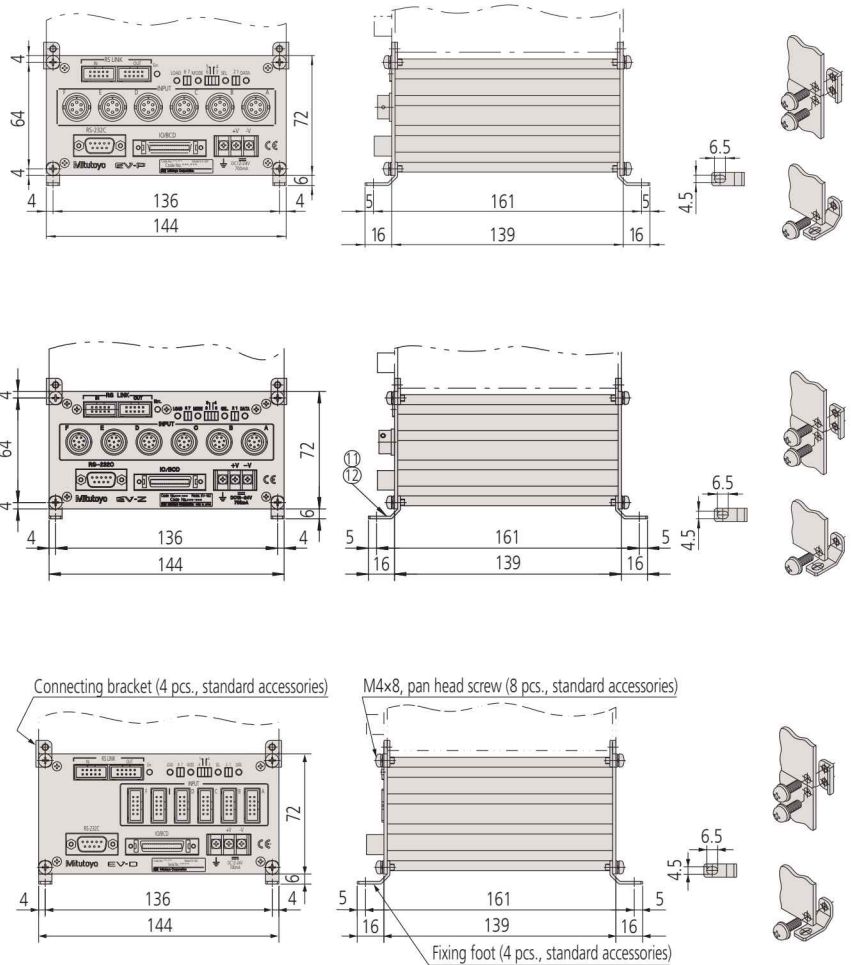
System Configuration

A counter system performs output and display for connected Mitutoyo linear gages.



DIMENSIONS

Unit: mm



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

Display unit for the EV counter D-EV Display Unit

- Display unit for the EV counter.
- Allows set-up of EV counter without a personal computer or other equipment.
- Able to display each gage measurement value and GO/NG judgment result, total GO/NG judgment result for all gages, setting details, and errors.



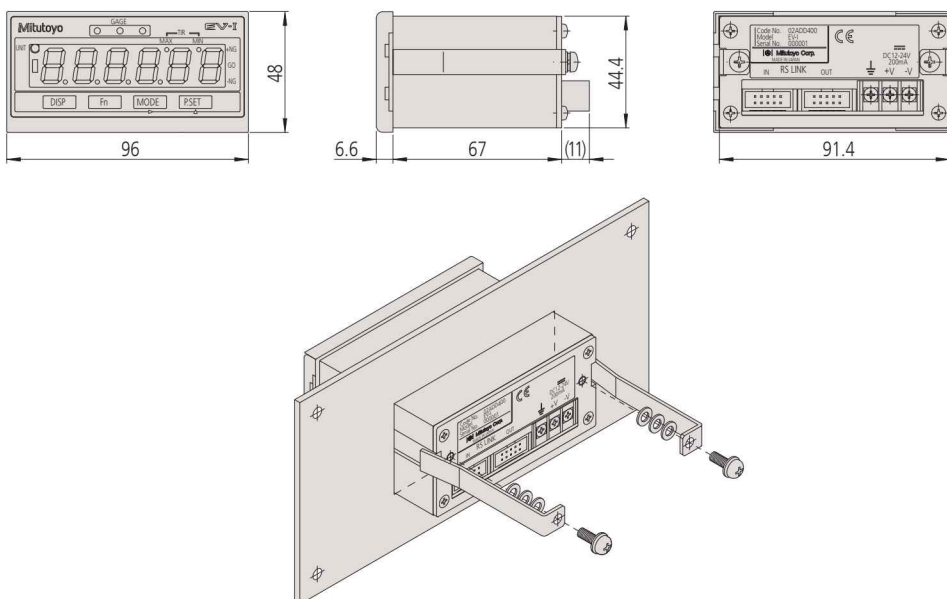
02ADD400

SPECIFICATIONS

Order No.	02ADD400
Number of connections	1 EV counter per unit
Number of digits	Sign plus 6 digits (8 digits internal to EV counter)
LED display	Channel display (also for judgment result display): 3 (3-color LED) Measurement mode display (current data, maximum value, minimum value, runout): 2 Status display: 1 (2 colors)
Operation switches	4
Function of operation switch	Channel switching, measurement mode switching (current data, maximum value, minimum value, runout), parameter setting, presetting, tolerance setting
Input/output	RS Link connectors: 1 each for IN, OUT
Error message	Overspeed, gage error etc.
Power supply	Terminal block (M3 screw), 12 - 24V DC, 200mA
Operating temperature (humidity) range	0 to 40°C (RH 20 to 80%, no condensation)
Storage temperature(humidity) range	-10 to 50°C (RH 20 to 80%, no condensation)
External dimensions	96(W)x48(H)x84.6(D)mm
Mass	150g

DIMENSIONS

Unit: mm



Function

- External Control (Zero-set, Preset etc.)
 - Direction switch
 - Error display
 - Tolerance judgment output
 - Data output (RS-232C, BCD, Segment)
 - Peak measurement
- Maximum value, minimum value, runout, and differential measurement between two gages
Addition, averaging, maximum value, minimum value, and maximum width

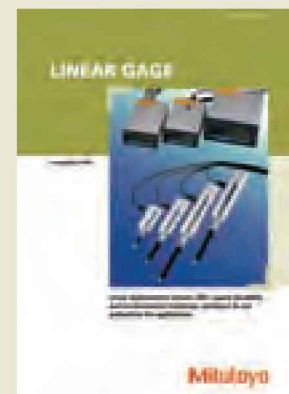
Optional Accessories

- SPC cable (0.5m): **02ADD950***1
- SPC cable (1mm): **936937***1
- SPC cable (2m): **965014***1
- AC adapter: **02ADN460**
- AC cable (Japan): **02ZAA000***2
- AC cable (USA): **02ZAA010***2
- AC cable (EU): **02ZAA020***2
- AC cable (Britain): **02ZAA030***2
- AC cable (China): **02ZAA040***2
- AC cable (Korea): **02ZAA050***2

- Terminal connecting cable: **02ADD930***2

*1: Required when connecting with EV-16P/D/Z.

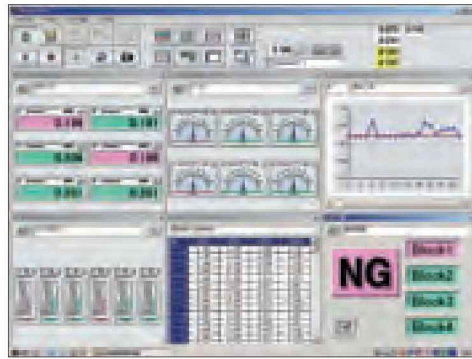
*2: Required when using AC adapter.



Refer to the Linear Gage (Catalog No.E13007) for more details.

Measurement data loading software for EH, EV, VL SENSORPAK

- This software facilitates loading measurement data onto a personal computer from a linear gage counter with RS-232C output (EH, EV), with USB output (EH), or from a Litematic display (VL).
- 60 channels (max.) of measurement data can be processed.
- Arithmetical calculations and maximum width calculations can be performed using the measurement data.
- Exporting measurement data into MS-Excel format is supported.
- Real time graphical display by means of bar-graph or meter is provided.



Measurement screen



Meter screen

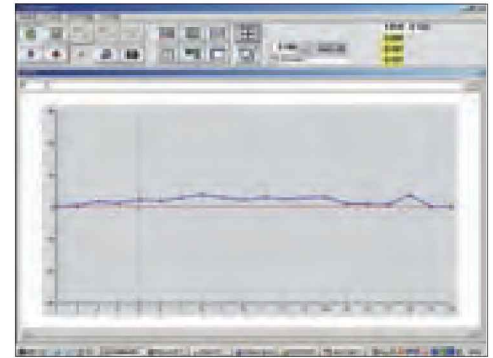
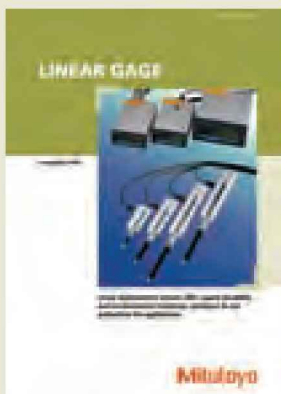


Chart screen

SPECIFICATIONS

Order No.	02NGB072 (Software only)	02NGB073 (Software plus I/O cable)
Display function	Display type: Counter, bar graph, meter, chart (capable of simultaneous display) Tolerance judgment result: Color display (green/red) Connectable gages: max. 60 gages	
Calculation functions	Calculation items: Sum, difference, total, average, maximum, minimum, range (maximum–minimum), calculation with a constant Connectable gages: Max. 30 calculation functions (between two gages)	
Total tolerance judgment	GO/NG judgment (by specifying gages to be used for total tolerance judgment) GO/NG signal output with optional I/O cable	
Input function	Trigger function: by means of key, timer or external TRG (with optional I/O cable) Data input frequency: Max. 9999 times (with 60 gages connected) to 60000 times (with 6 gages connected)	
Output function	Direct output to EXCEL spreadsheet, CSV file output (compatible with MeasurLink)	
Connectable items	Various Mitutoyo counters (those compatible with RS Link)	
System Environments	Recommendation: PC/AT compatible machine, CPU: Pentium4 2GHz or higher, Memory: 2GB or more Disk: 2GB or more OS: Windows 7/8.1 (32bit/64bit)	

Currently supported languages: English, German, French, Spanish
User's manual: English



Refer to the Linear Gage (Catalog No.E13007) for more details.

Linear Gage

Ideal for integration into harsh environments such as automation applications

SERIES 318 Litematic VL-50-B/50S-B

- The Litematic is designed for measuring easily-deformed workpieces and high-precision parts, with extra-low measuring force of 0.01N.
- 0.15N and 1N types are capable of measuring at a certain measuring force by using a Litematic feature, while the 0.01N type is suitable for measuring delicate workpieces.
- *1: 0.15N, 1N types are factory-installed option.
- The motor-driven spindle moves up/down and stops when the contact point touches the workpiece. Then the maximum, minimum values, and runout value are measured under a constant force.
- High resolution of 0.01 μ m, and wide measuring range of 50mm.
- Measuring system VL-50-B, integrated display type, and VL-50S-B, a separate display type, are available.
- The measuring table supplied with VL-50-B is ceramic, corrosion-free for easier maintenance and storage.
- The spindle is made of low thermal expansion material.
- Motor life is approximately 100,000 operations, after which replacement is advisable. This machine is not suitable for continuous use, such as on a production line.



318-221



318-226

SPECIFICATIONS

Order No.	318-221*	318-222*	318-223*	318-226*	318-227*	318-228*
Measuring range	0 to 50mm (0-2")					
Resolution	0.01/0.1/1.0 μ m (.000005"/.000005"/.00005")					
Display unit	8 digits/14mm (.6") character height (without signs)					
Scale type	Reflection type linear encoder					
Stroke	51.5mm (.2") (when using a standard contact point)					
Indication accuracy (20°C)*1	(0.5+L/100) μ m L=arbitrary measuring length (mm)					
Accuracy guaranteed temperature*2	20 \pm 1°C					
Repeatability*1	σ =0.05 μ m					
Measuring force*1	0.01N	0.15N*3	1N*3	0.01N	0.15N*3	1N*3
Feed	Approx. 2mm/s (.08"/s) or 4mm/s (.16"/s) (changeable by parameter)					
Measurement speed	Fast feed					
	Approx. 8mm/s (.3"/s)					
Contact point	ϕ 3mm carbide-tipped (fixing screw: M2.5 (P=0.45) \times 5), standard contact point: 901312					
Measuring table	ϕ 100 (ceramic, grooved, removable)					
Input	Foot switch input (when optional foot switch is used) External Control					
Output	Digimatic output/RS-232C output (changeable by parameter)					
Rating	Power supply	85 - 264V AC (depends on AC adapter)				
	Power consumption	Max. 12 W (12V, 1A)				
Standard Accessories	AC adapter: 357651 , Power cable/grounding wire: 02ZAA000 , AC cable (Japan): 02ZAA000* AC cable (USA): 02ZAA010* AC cable (EU): 02ZAA020* AC cable (Britain): 02ZAA030* AC cable (China): 02ZAA040* AC cable (Korea): 02ZAA050* Hex wrench (2 pcs, for fixing contact point and for removing fixing bracket)					

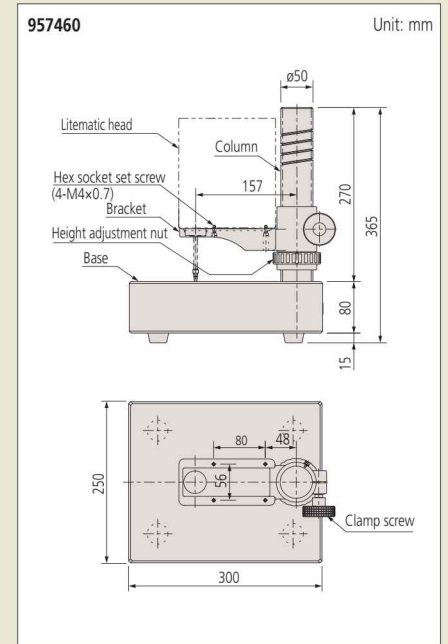
*1: Normal measurement using standard contact point.

*2: Under less temperature change, and hot or cold direct air flow should be avoided.

*3: 0.15N, 1N types are factory-installed option.

Note: To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE.

Optional Stand for VL-50S-B



Optional Accessories

- Foot switch: **937179T**
- Dedicated stand: **957460***4
- SPC cable (1mm): **936937***5
- SPC cable (2m): **965014***5
- VL weight part: **02AZE375***6
- Recommended spare contact point:
 - Shell type
 - Carbide-tipped spherical contact point, ϕ 7.5
 - Carbide-tipped spherical contact point, ϕ 10.5
 - Carbide-tipped needle contact point, ϕ 0.45

*4: Only **VL-50S** is available.

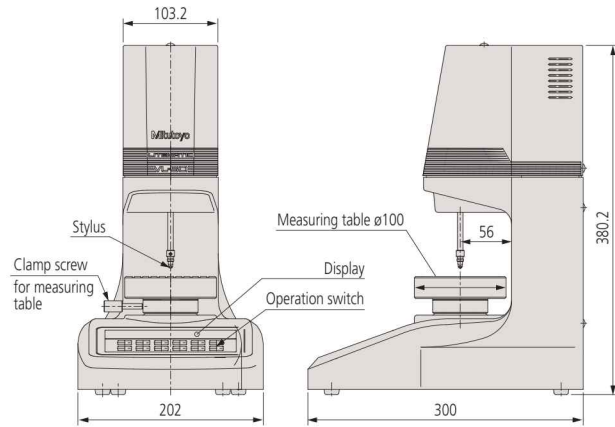
*5: Refer to page G-32 for details of the RS link.

*6: Not applicable to **VL-50-100-B**, **VL-50S-100-B**.

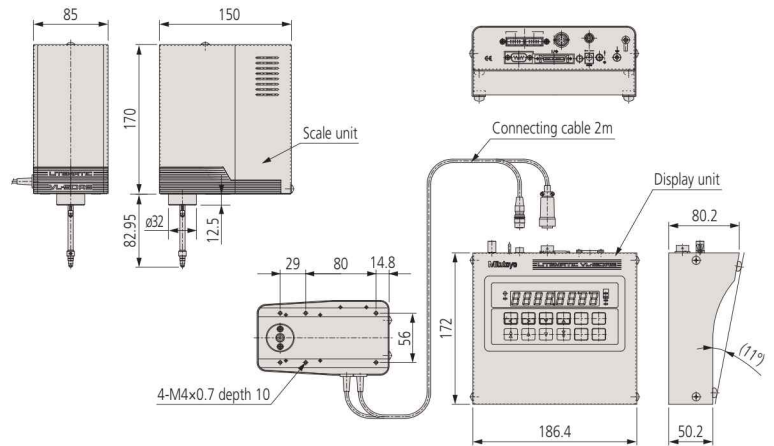
DIMENSIONS

Unit: mm

VL-50-B



VL-50S-B



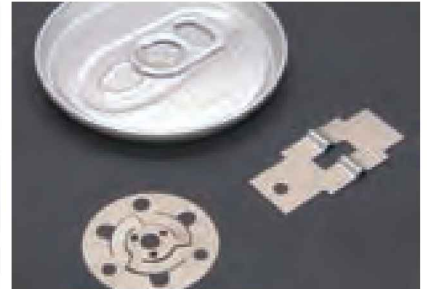
Measurement Examples



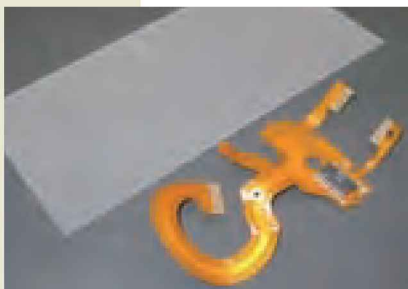
Glass dimensional measurement



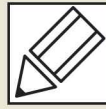
Thin sheet metal thickness



Thickness measurement of non-metallic sheet



Quick Guide to Precision Measuring Instruments

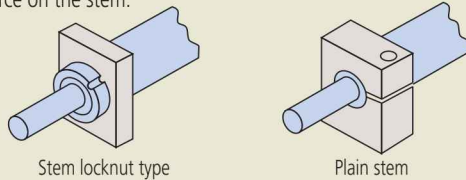


Linear Gages

Head

Plain Stem and Stem with Clamp Nut

The stem used to mount a linear gage head is classified as a "plain type" or "clamp nut type" as illustrated below. The clamp nut stem allows fast and secure clamping of the linear gage head. The plain stem has the advantage of wider application and slight positional adjustment in the axial direction on final installation, although it does require a split-fixture clamping arrangement or adhesive fixing. However, take care so as not to exert excessive force on the stem.



Measuring Force

This is the force exerted on a workpiece during measurement by the contact point of a linear gage head, at its stroke end, expressed in newtons.

Comparative Measurement

A measurement method where a workpiece dimension is found by measuring the difference in size between the workpiece and a master gage representing the nominal workpiece dimension.

Ingress Protection Code

IP54 protection code

Type	Level	Description
Protects the human body and protects against foreign objects	5: Dust protected	Protection against harmful dust
Protects against exposure to water	4: Splash-proof type	Water splashing against the enclosure from any direction shall have no harmful effect.

IP66 protection code

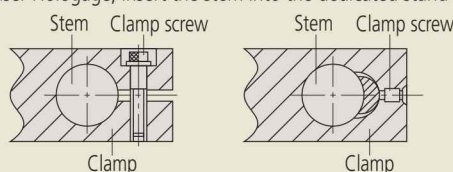
Type	Level	Description
Protection against contact with the human body and foreign objects	6: Dust tight	Protection from dust ingress Complete protection against contact
Protects against exposure to water	6: Water-resistant type	Water jets directed against the enclosure from any direction shall have no harmful effects.

Precautions in Mounting a Gage Head

- Insert the stem of the gage into the mounting clamp of a measuring unit or a stand and tighten the clamp screw.
- Notice that excessively tightening the stem can cause problems with spindle operation.
- Never use a mounting method in which the stem is clamped by direct contact with a screw.
- Never mount a linear gage by any part other than the stem.
- Mount the gage head so that it is in line with the intended direction of measurement. Mounting the head at an angle to this direction will cause an error in measurement.
- Exercise care so as not to exert a force on the gage through the cable.

Precautions in Mounting a Laser Hologage

To fix the Laser Hologage, insert the stem into the dedicated stand or fixture.



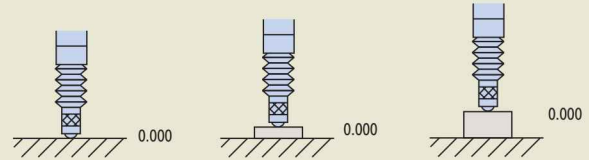
Recommended hole diameter on the fixing side: 15mm +0.034/-0.014

- Machine the clamping hole so that its axis is parallel with the measuring direction. Mounting the gage at an angle will cause a measuring error.
- When fixing the Laser Hologage, do not clamp the stem too tightly. Over-tightening the stem may impair the sliding ability of the spindle.
- If measurement is performed while moving the Laser Hologage, mount it so that the cable will not be strained and no undue force will be exerted on the gage head.

Display Unit

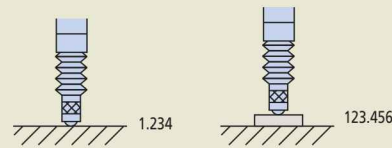
Zero-setting

A display value can be set to 0 (zero) at any position of the spindle.



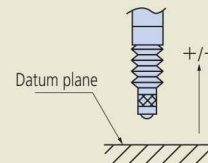
Presetting

Any numeric value can be set on the display unit for starting the count from this value.



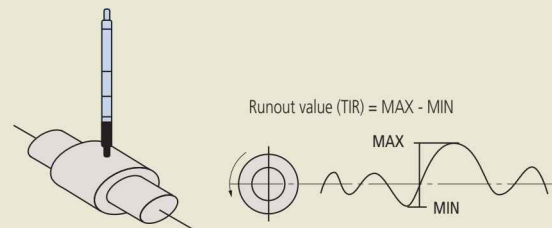
Direction changeover

The measuring direction of the gage spindle can be set to either plus (+) or minus (-) of count.



MAX, MIN, TIR Settings

The display unit can hold the maximum (MAX) and minimum (MIN) values, and the run out value (TIR) during measurement.



Tolerance Setting

Tolerance limits can be set in various display units for automatically indicating if a measurement falls within those limits.

Open Collector Output

An external load, such as a relay or a logic circuit, can be driven from the collector output of an internal transistor which is itself controlled by a Tolerance Judgement result, etc.

Relay output

Contact signal that outputs the open/closed status.

Digimatic Code

A communication protocol for connecting the output of measuring tools with various Mitutoyo data processing units. This allows output connection to a Digimatic Mini Processor DP-1VR for performing various statistical calculations and creating histograms, etc.

BCD Output

A system for outputting data in binary-coded decimal notation.

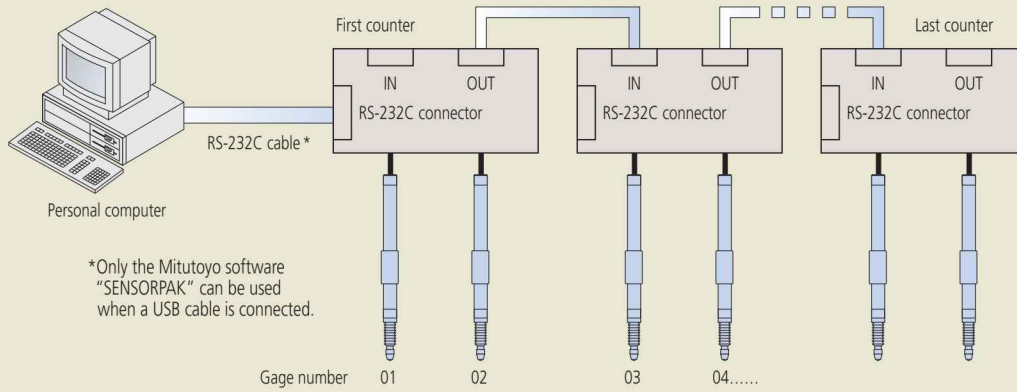
RS-232C Output

A serial communication interface in which data can be transmitted bi-directionally under the EIA Standards. For the transmission procedure, refer to the specifications of each measuring instrument.

RS Link Function Multi-point measurement can be performed by connecting multiple EH or EV counters with RS Link cables.

RS Link for EH Counter

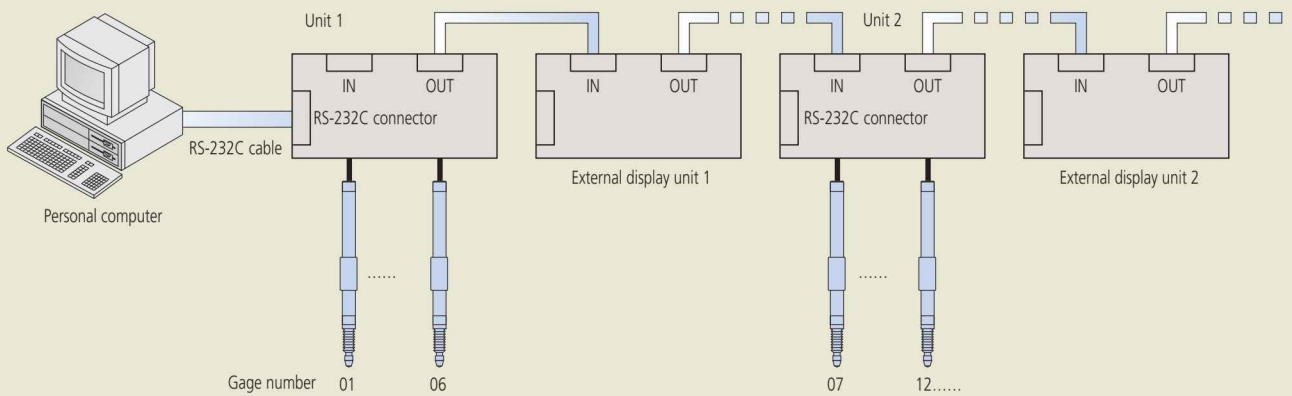
It is possible to connect a maximum of 10 counter units and handle up to 20 channels of multi-point measurement at a time. For this connection use a dedicated RS Link cable **02ADD950** (0.5m), **936937** (1m) or **965014** (2m). (The total length of RS Link cables permitted for the entire system is up to 10m.)



RS Link for EV Counter

It is possible to connect a maximum of 10* counter units and handle up to 60 channels of multi-point measurement at a time. For this connection use a dedicated RS Link cable **02ADD950** (0.5m), **936937** (1m) or **965014** (2m). (The total length of RS Link cables permitted for the entire system is up to 10m.)

* The maximum number of counter units that can be connected is limited to 6 (six) if an EH counter is included in the chain.



Mu-checker

To support building the system with automatic measuring unit or dedicated gages

SERIES 519 Mu-checker (Electronic micrometer) Probes (Lever head / Cartridge head)

SPECIFICATIONS

Lever heads

Order No.	519-521	519-522	519-326*	519-327
Measuring range (mm)	±0.5			
Stroke (mm)	±0.6			±0.65
Measuring force (N)	Approx. 0.2	Approx. 0.02	Approx. 0.15	
Linearity (%)	±0.3			±0.5
Stylus support	Pivot bearing	Pivot bearing	Parallel-leaf spring	Pivot bearing

Note: A $\varnothing 2$ mm ball-ended stylus is supplied as standard with all probes.

* This model is not subject to cosine effect.

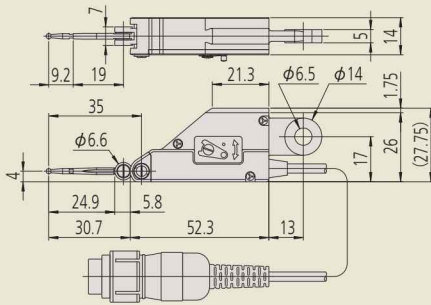
Common specifications

- Connection: Half-bridge
- Cable length: 2m
- Connector type: **MAS-5100** (DIN5P) or equivalent

519-521



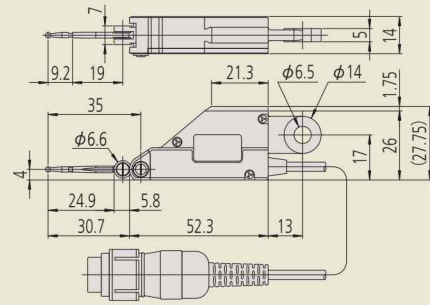
- Interchangeable styli:
 - ø1: **520940** (Standard accessory)
 - ø2: **520939** (Standard equipment)
 - ø3: **520938** (Standard accessory)



519-522



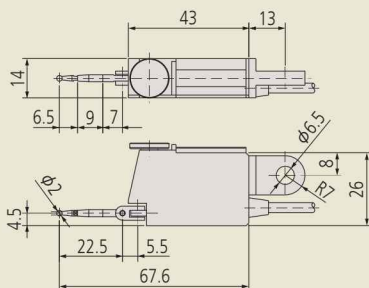
- Interchangeable styli:
 - ø1: **520940** (Standard accessory)
 - ø2: **520939** (Standard equipment)
 - ø3: **520938** (Standard accessory)



519-326



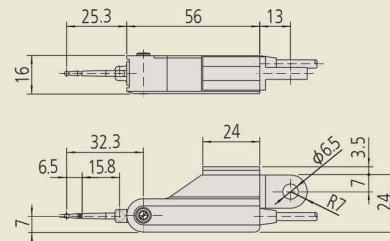
- Interchangeable styli:
 - ø1: **102824** (Option)
 - ø2: **102825** (Standard equipment)
 - ø3: **102826** (Option)



519-327



- Interchangeable styli:
 - ø1: **102824** (Option)
 - ø2: **102825** (Standard equipment)
 - ø3: **102826** (Option)





Refer to Catalog No. E13003 (Mu-checker) for more details.

SPECIFICATIONS

Cartridge heads (special order only)

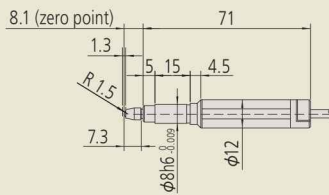
Order No.	519-331	519-332	519-346	519-347	519-385	519-341	519-348
Measuring range (mm)	±0.5	±0.5	±0.25	±0.5	±1.5	±2.5	±1.0
Stroke (mm)	±0.65	±0.65	+0.34 -0.26	+0.85 -0.65	+2.35 -1.65	+3.2 -2.8	+1.35 -1.15
Measuring force (N)	Approx. 0.25	Approx. 0.25	Approx. 0.7	Approx. 0.7	Approx. 0.7	Approx. 0.9	Approx. 0.7
Stem Dia. (mm)	ø8	ø9.52	ø8	ø8	ø8	ø8	ø8
Linearity (%)	±0.5	±0.5	±0.3	±0.3	±0.3	±0.5	±0.3
Plunger support	Plain bearing			Linear ball-bearing			

519-331



- M2.5x5 interchangeable contact points for dial indicators can be used.

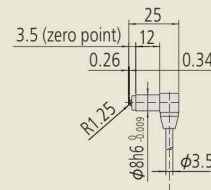
Unit: mm



519-346



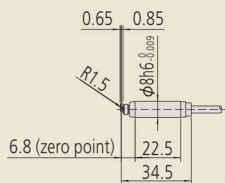
Unit: mm



519-347



Unit: mm

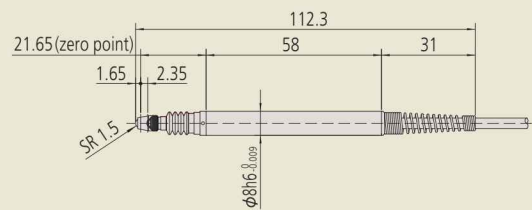


519-385



- M2.5x5 interchangeable contact points for dial indicators can be used.

Unit: mm

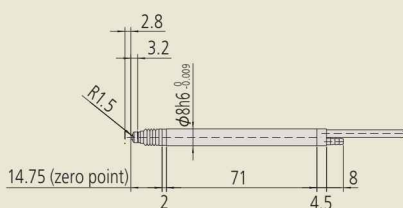


519-341



- M2.5x5 interchangeable contact points for dial indicators can be used.

Unit: mm

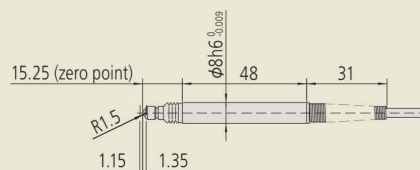


519-348



- M2.5x5 interchangeable contact points for dial indicators can be used.

Unit: mm



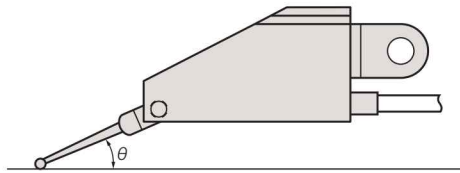
Mu-checker

To support building the system with automatic measuring unit or dedicated gages

Note on stylus angle

If the stylus of a pivot bearing type probe makes an angle with a workpiece surface, as in the figure, calibration should be performed for accurate measurement. Alternatively, the displayed value may be corrected by multiplying it by the appropriate correction factor as given in the table. Model **519-326** does not need correction.

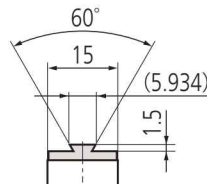
Angle (θ)	Correction factor
0°	1.00
10°	0.98
20°	0.94
30°	0.87
40°	0.77
50°	0.64
60°	0.50



Display value x Correction factor = Corrected value

Dimensions of dovetail plate on probe body

Enables mounting on a lever head mounting bracket or stem.

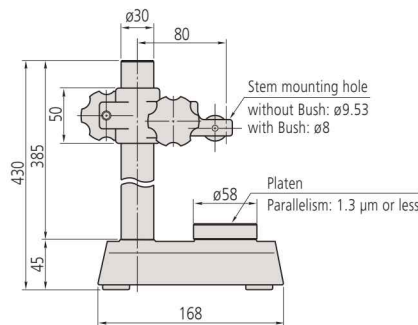


Unit: mm

Transfer Stand



519-109-10
(with a serrated plate)



Main Specifications

Order No.	Effective transfer range [mm]	Fine adjustment range [mm]	Mounting hole [mm]
519-109-10	0 - 320	1	Without Bush: $\phi 9.53$ With Bush: $\phi 8$

Lever-head mounting brackets (optional)

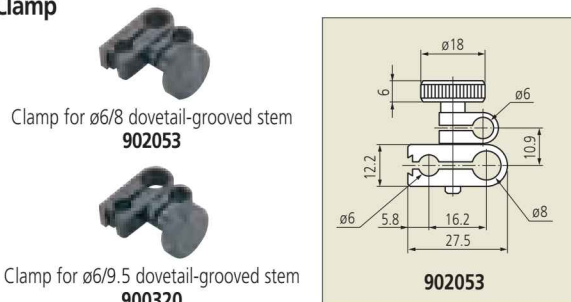
Optional accessories for Mitutoyo test indicators can be used.

Unit: mm

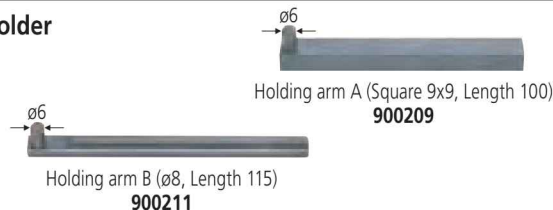
Stems



Clamp



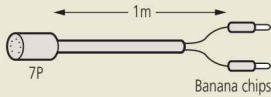
Holder



Refer to Catalog No. E13003 (Mu-checker) for more details.

Optional Accessories

- Vertical stand (271214)
Attached to the bottom surface of the Mu-checker, it can be vertically mounted on the base.
- SPC Cable for connecting digital Mu-checker (936937)
Used for connecting to the digimatic mini-processor.
- Output cable A (934795)
Used for connecting to external devices, such as data recorders, etc.



- Analog, limit out (7P) connector (529035)
Used for output to external data recorders, sequencers, etc.

SERIES 519 Mu-checker (Analog/Digital electronic micrometer)

- Single touch zero-set function is standard.
- Switchable measurement ranges make the Mu-checker suitable for a range of applications.
- Two types of analog instrument and one display are available.

Analog Mu-checker



Standard type
519-551



Differential type
519-553

SPECIFICATIONS

Metric		
Order No.	519-551*	519-553*
Type	Standard type (one probe required)	Differential type (one/two probes required)
Display range	$\pm 5\mu\text{m}/\pm 15\mu\text{m}/\pm 50\mu\text{m}/\pm 150\mu\text{m}/\pm 500\mu\text{m}/\pm 1500\mu\text{m}$	
Resolution	0.1 $\mu\text{m}/0.5\mu\text{m}/1\mu\text{m}/5\mu\text{m}/10\mu\text{m}/50\mu\text{m}$	
Differential mode	$\pm A$	$\pm A, \pm B, \pm A\pm B$
Display accuracy (linearity)	$\pm 1\%$ / \pm full scale	
Analog output	$\pm 1\text{V}$ \pm full scale	
Analog output accuracy	$\pm 0.1\%$ Within \pm full scale (excluding probe)	
Zero-setting adjustment range	Manual	Instant zero setting: 1/3 of full scale for each range
External dimensions	134(W) \times 183(D) \times 208(H) mm	
Mass	2.4kg	
Power input	AC adapter 100, 120, 220, 240VAC 50/60Hz	
Probe	Various probes (refer to page G-33 and G-34)	

* 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, C and No suffix are required for PSE.

Inch		
Order No.	519-552*	519-554*
Type	Standard type (one probe required)	Differential type (one/two probes required)
Display range	$\pm 5\mu\text{m}/\pm 15\mu\text{m}/\pm 50\mu\text{m}/\pm 150\mu\text{m}/\pm 500\mu\text{m}/\pm 1500\mu\text{m}$ $\pm .00015"/\pm .0005"/\pm .0015"/\pm .005"/\pm .015"/\pm .05"$	
Resolution	0.1 $\mu\text{m}/0.5\mu\text{m}/1\mu\text{m}/5\mu\text{m}/10\mu\text{m}/50\mu\text{m}$.000005"/.00001"/.00005"/.0001"/.0005"/.001"	
Differential mode	$\pm A$	$\pm A, \pm B, \pm A\pm B$
Display accuracy (linearity)	$\pm 1\%$ / \pm full scale	
Analog output	$\pm 1\text{V}$ \pm full scale	
Analog output accuracy	$\pm 0.1\%$ Within \pm full scale (excluding probe)	
Zero-setting adjustment range	Manual	Instant zero setting: 1/3 of full scale for each range
External dimensions	134(W) \times 183(D) \times 208(H) mm	
Mass	2.4kg	
Power input	AC adapter 100, 120, 220, 240VAC 50/60Hz	
Probe	Various probes (refer to page G-33 and G-34)	

* 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, C and No suffix are required for PSE.



Refer to Catalog No. E13003 (Mu-checker) for more details.

Mu-checker

To support building the system with automatic measuring unit or dedicated gages

Digital Mu-checker



Digital Mu-checker
519-561

SPECIFICATIONS

Metric

Order No.	519-561*
Type	Differential type digital Mu-Checker (2 connecting heads)
Display range	$\pm 2.000\text{mm}/\pm 0.2000\text{mm}$
Resolution	0.001mm/0.0001mm
Differential mode	$\pm A$, $\pm B$, $\pm A\pm B$
Measurement mode	ABS/CMP
Analog output	$\pm 1\text{V}$ \pm Full scale
Digital output	Digimatic code out
External dimension	134(W) \times 183(D) \times 208(H) mm
Mass	Approx. 2.6kg
Power input	AC adapter 100, 120, 220, 240VAC 50/60Hz
Probe	Various probes (refer to page G-33 and G-34)

* 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, C and No suffix are required for PSE.

Inch

Order No.	519-562*
Type	Differential type digital Mu-Checker (2 connecting heads)
Display range	$\pm 2.000\text{mm}/\pm 0.2000\text{mm}/\pm .08"/\pm .008"$
Resolution	0.001mm/0.0001mm/.00001"/.000001"
Differential mode	$\pm A$, $\pm B$, $\pm A\pm B$
Measurement mode	ABS/CMP
Analog output	$\pm 1\text{V}$ \pm Full scale
Digital output	Digimatic code out
External dimension	134(W) \times 183(D) \times 208(H) mm
Mass	Approx. 2.6kg
Power input	AC adapter 100, 120, 220, 240VAC 50/60Hz
Probe	Various probes (refer to page G-33 and G-34)

* 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, C and No suffix are required for PSE.



Refer to Catalog No. E13003 (Mu-checker) for more details.

Main features

- External control (Zero-set, Preset etc.)
- Direction switching
- Error messaging
- Tolerance judgment output
- Each data output (RS-232C, BCD, segment)
- Peak measurement (maximum value, minimum value, runout) and arithmetic operation (addition, average, maximum value, minimum value, maximum width) between axes

SERIES 519 6CH Mu-checker Counter EV-16A

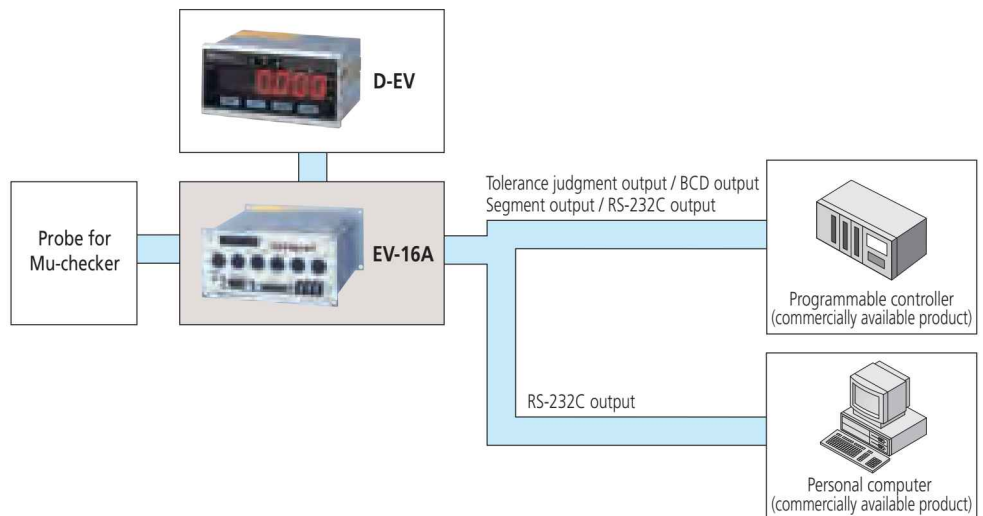


519-355

- The EV-16A counter unit provides multi-channel electronic micrometer functionality but without a display of the measurement results, which must be purchased separately. (See below.)
- Up to six probes can be connected to one unit. Up to ten counters can be connected to one personal computer using the RS Link function to enable the configuration of a multi-point measurement system comprising a maximum of 60 gages.
- I/O outputs for RS-232C, BCD, tolerance judgment and segment output are available.
- Maximum, minimum and runout measurement between channels (in the same unit) is possible in addition to normal measurement on individual channels.

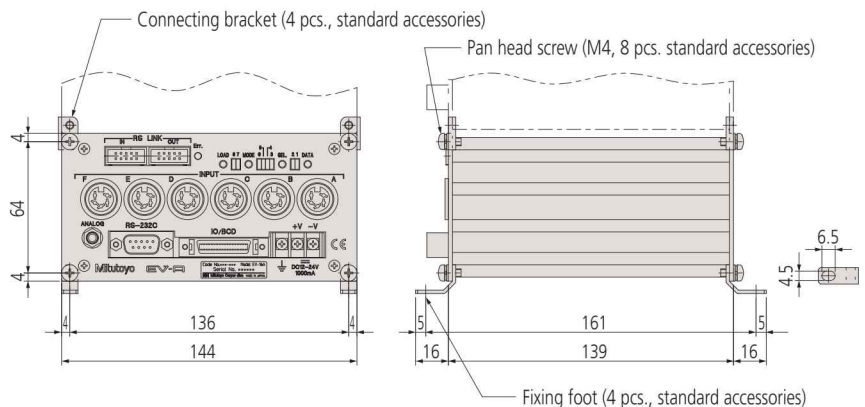
SYSTEM CONFIGURATION

Mitutoyo probes, EV-16A counters and D-EV display units combined with commercial controllers and personal computers enable construction of a powerful, multi-channel system that can be built to meet the needs of almost any measurement application.



DIMENSIONS

Unit: mm



Refer to Catalog No. E13003 (Mu-checker) for more details.

SPECIFICATIONS

Order No.	519-335	
Number of gage inputs	Six	
Quantizing error	±1 LSD	
Display range (mm)	±2.000, ±0.200	
Resolution (mm)	0.001, 0.0001	
Display processing	8 digits for parameters (display setting), 1 for error display	
Error messaging	Power supply voltage error, Gage error, etc.	
External display	Dedicated external display unit D-EV (optional) can be connected	
Number of input switches	4	
Input switch function	Measurement mode switching, Parameter settings	
I/O	Tolerance judgment output	1 to 6 gages (L1, L2, L3), open-collector
	BCD output	Parallel BCD output (positive/negative-true logic), open-collector
	Segment output	A function to enable only output from the terminal corresponding to the counting values, open-collector
	Control output	Normal operation signal (NOM), open-collector
	Control input	Output channel designation (segment, in BCD mode), presetting, peak value clear, range changeover (at segment output), holding counting value, open-collector or no-voltage contact signal (with/without contact point)
Interface	RS-232C	Measurement data output and control input, EIA RS-232C-compatible Use cross cables for home position DTE (terminal definition)
	RS link	Max. connected units: 10 (6 when using EF counter) Connecting cable length: Max. 10m (sum of link cable length) Data transfer time: 1.1 sec./60ch (when transmission rate is 19200 bps)
Rating	Power supply voltage	Terminal (M3 screw), 12-24VDC
	Current consumption	1A
Operating temperature (humidity) range	0 to 40 °C (RH 20 to 80%, no condensation)	
Storage temperature (humidity) range	-10 to 50 °C (RH 20 to 80%, no condensation)	
External dimensions	144(W) × 72(H) × 139(D) mm	
Mass	Approx. 1000 g	
Standard accessories	Fixing foot (4), connecting bracket (4), fixing screw M4 × 8 (8)	
Applicable probes	For probes, refer to G-33, 34.	

Optional Accessories

- I/O output connector: **02ADB440**
- D-EV external unit: **02ADD400**
- SPC cable, 0.5m: **02ADD950**
- SPC cable, 1m: **936937**
- SPC cable, 2m: **965014**

Note 1: To perform calibration a **D-EV** display unit is required.

At least one **D-EV** unit is required when using multiple **EV-16A**.

Note 2: As a power supply is not supplied as standard. An appropriate power supply with a current capacity of 1A or more must be provided for each **EV-16A**.



Refer to Catalog No. E13003 (Mu-checker) for more details.

Quick Guide to Precision Measuring Instruments



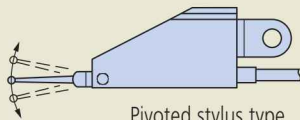
Electronic Micrometer

■ Probe

A sensor that converts movement of a contact point, on a stylus or plunger, into an electrical signal.

■ Lever probes

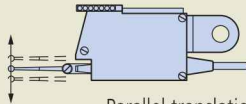
Lever probes are available in two types. The most common type uses a pivoted stylus so the contact point moves in a circular arc; this type is subject to cosine effect and, therefore, measurements may require linearity correction if the direction of measurement is much different to the direction of movement of the contact point. The less common type uses a parallel translation leaf-spring mechanism so contact point movement is linear; this type requires no correction.



Pivoted stylus type

MLH-521 (measuring direction can be switched with the up/down lever)

MLH-522 (measuring direction is not switchable)

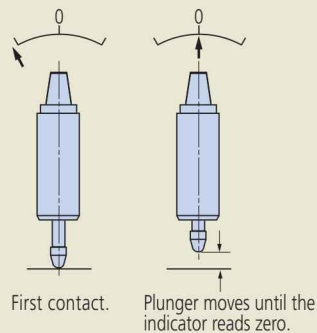


Parallel translation type

MLH-326 (measuring direction can be switched with the upper dial)

■ Pre-travel

The distance from first contact with a workpiece until the measurement indicator reads zero.



■ Measuring force

The force applied to the workpiece by the probe when the indicator registers zero. It is indicated in newtons (N).

■ Digimatic code

A data format specific to Mitutoyo measuring instruments.

■ Open collector output

A direct connection to the collector of a driving transistor.

■ Relay output

Contact signal that outputs the open/closed status.

■ Comparative measurement

A measurement method where a workpiece dimension is found by measuring the difference in size between the workpiece and a master gage that represents the nominal dimension of the workpiece.

This method is usually applied when the measurement to be made is greater than the measuring range of the instrument.

■ Linearity

The ratio of proportionality between probe output and measured distance. If this is not constant within acceptable limits then correction is required.

■ 0 (zero) point

A reference point on the master gage in a comparative measurement.

■ Measurement range

The measurement range chosen determines the resolution available. A small range increases the resolution, and visa versa. Analog Mu-checkers provide multiple ranges because of the limited length of the scale, whereas digital versions only need to provide two.

■ Tolerance setting

Tolerance limits can be set on the electronic micrometer to provide an automatic judgment as to whether a measured value falls within the tolerance.

Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer LSM-902/6900

- Non-contact laser-based measuring system, mainly for outside diameter measurement. Suitable for delicate or moving workpieces.
- Accuracy of $\pm 0.5\mu\text{m}$ in the $\varnothing 0.1 - \varnothing 25\text{mm}$ range can be achieved. It is highly suitable for pin gage measurement.
- Narrow range accuracy of $\pm(0.3+0.1\Delta\text{D})\mu\text{m}$ for high precision measurement.
- Ultra-high repeatability of $\pm 0.05\mu\text{m}$.
- The system consists of a measuring unit (LSM-902) and a display unit (LSM-6900).



SPECIFICATIONS

Set Order No.	544-494	544-495*	544-496*
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Measuring unit		mm	mm	inch/mm
Type				
Applicable standards		JIS	IEC, FDA	
Measuring range		0.1 to 25mm (.004 - 1.0")		
Resolution		0.01 to 10 μm (selectable) (.000001 - .0005")		
Repeatability*1		$\pm 0.05\mu\text{m}$ (± 0.000002 ")		
Accuracy*2 (20°C)	Whole range	$\pm 0.5\mu\text{m}$ (± 0.000020 ")		
	Small range	$\pm(0.3+0.1\Delta\text{D})\mu\text{m}$ [D:mm]*5 $\pm(.000012+.001\Delta\text{D})$ [D:inch]		
Positional error*3		$\pm 0.5\mu\text{m}$ (± 0.000020 ")		
Measuring range*4		$\pm 1.5 \times 25\text{mm}$ ($\pm 0.6 \times 1.0$ ")		
Scanning rate		800 scans/s		
Laser wavelength		650nm (Visible)		
Laser scanning speed		56m/s (2240"/sec)		
Operating environment	Temperature	0 to 40°C		
	Humidity	RH 35 to 85% (no condensation)		

*1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\varnothing 25\text{mm}$ at the interval of 1.28 sec. (average 1024 times).

*2: At the center of the measuring range.

*3: An error due to variation in workpiece position either in the optical axis direction or in the scanning direction.

*4: The area given by [optical axis direction] x [scanning direction]

*5: ΔD = Difference in diameter between the master gage and workpiece (Unit: mm)

Note: To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE.

Display unit

Display	16-digit plus 11-digit fluorescent display, and guide message LED
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges
Averaging times	Arithmetic average: per 1 to 2048/ Moving average: per 32 to 2048
Judgment	Selection from "target value + tolerance", "lower tolerance + upper tolerance", or "7 classes multi-limit tolerance zone".
Measurement mode	Standby, Single measurement, Continuous measurement
Statistical analysis	Maximum, Minimum, Average, Dispersion, σ (S.D)
External dimensions	335 (W) x 134 (H) x 250 (D) mm
Power supply	100 - 240 V AC $\pm 10\%$, 50W, 50/60Hz
Standard I/F	RS-232C, Analog I/O
Optional I/F	Digimatic code output unit (2-ch), 2nd I/O analog I/F, BCD I/F
Operating environment	0 to 40°C, RH 35 to 85% (no condensation)
Others	Nominal setting, sample setting, selection of unnecessary digits, transparent object measurement, automatic measurement in edge mode, output timer, abnormal data elimination, SHL change, group judgment, simultaneous measurement, statistical processing, mastering, buzzer function, automatic workpiece detection (dimension/position), zero-set/offset * Measuring unit dual connection, extra-fine line measurement, and some of the communication commands are not available.

Optional Accessories

(Refer to page G-44 for details.)

- Standard calibration gage set ($\varnothing 1.0, \varnothing 25.0$) : 02AGD180
- Workstage : 02AGD270
- Adjustable workstage : 02AGD280
- Digimatic code output unit (2-ch) : 02AGC840
- 2nd I/O analog interface unit : 02AGC880
- BCD interface unit : 02AGC910
- Printer & cable set (100V AC C-type plug) : 02AGD600A
- Printer & cable set (120V AC C-type plug) : 02AGD600B
- Printer & cable set (230V AC C-type plug) : 02AGD600C
- Printing paper TP411-28CL / 1Pack = 10pcs : 223663
- Digimatic code output cable : 936937
- Foot switch : 937179T

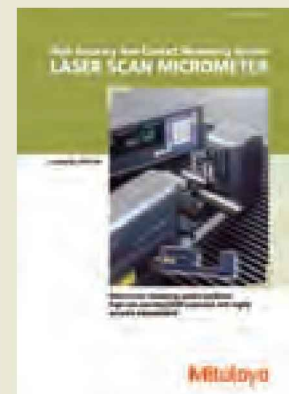
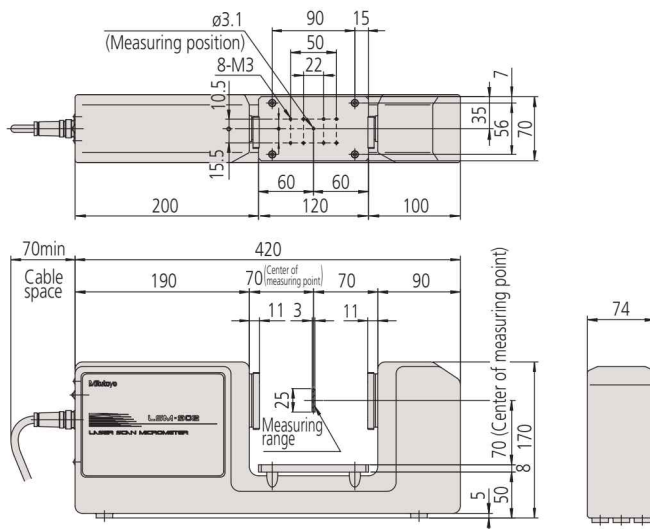
Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Measuring Unit External Dimensions

Unit: mm



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/inch	

* 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, F for SAA, K for KC, C and No suffix are required for PSE."

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set (ø0.1, ø2.0)

: **02AGD110**

- Guide pulley

: **02AGD200**

- Air blower

: **02AGD220**

Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

SERIES 544 Laser Scan Micrometer (Measuring Unit) LSM-500S

- Capable of measuring down to 5µm outside diameter*1.
- Provides ultra-high accuracy of ±0.3µm over the entire measuring range (5µm to 2mm).
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.



SPECIFICATIONS

Order No.	544-531	544-532
Applicable laser standards	JIS	IEC, FDA
User's Manual	Japanese version	English version
Measuring range	0.005 to 2mm*1	
Resolution	0.01 to 10µm (selectable)	
Repeatability*2	±0.03µm	
Accuracy (20°C)*3	±0.3µm	
Positional error*4	±0.4µm	
Measuring range*5	1x2mm (0.005 to 2mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	76m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

*1: The measuring range for the transparent object will be 0.05mm to 2mm. Please consult your local Mitutoyo office for objects smaller than 0.05mm.

The measuring range will be 0.1mm to 2mm in the 1 to 255 edge measurement mode or when activating the automatic workpiece detection.

If using the optional dual connection unit for LSM-6200, the measuring range will be 0.05mm to 2mm.

*2: Determined by the value of ±2σ (σ: standard deviation) when measuring ø2mm at the interval of 0.32 sec. (average 1024 times).

*3: Center of the measuring range for cylindrical workpieces outside diameter.

*4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.

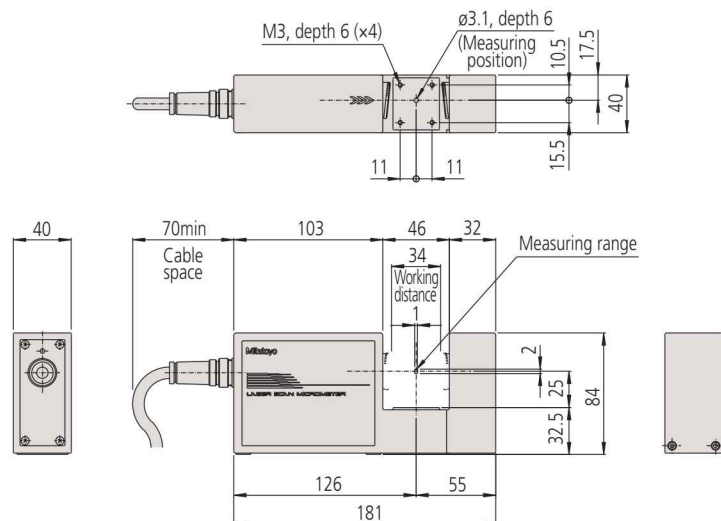
*5: The area given by [optical axis direction]x[scanning direction].

*6: If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

Note: When using extra-fine line measurement function (FINE), guide messages for setting the following will not be displayed: dual-measurement, segment designation, automatic workpiece detection, and group judgment.

DIMENSIONS

Unit: mm



Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer (Measuring Unit) LSM-501S

- Provides ultra-high accuracy of $\pm 0.5\mu\text{m}$ over the entire measuring range (0.05 to 10mm).
- Narrow range accuracy of $\pm(0.3+0.1\Delta D)\mu\text{m}$ for high precision measurement.
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.

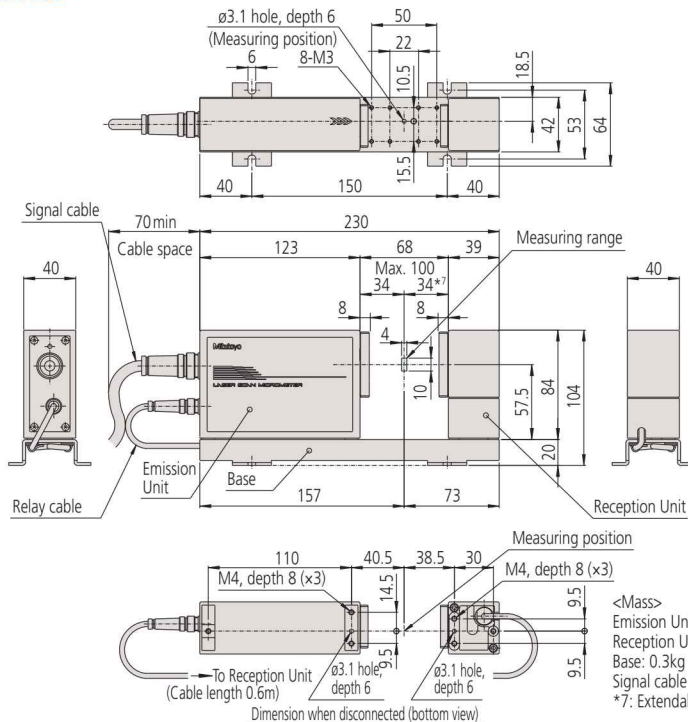


SPECIFICATIONS

Order No.	544-533	544-534
Applicable laser standards	JIS	IEC, FDA
User's Manual	Japanese version	English version
Measuring range	0.05 to 10mm	
Resolution	0.01 to 10 μm (selectable)	
Repeatability*1	$\pm 0.04\mu\text{m}$	
Accuracy*2 (20°C)	Whole range	$\pm 0.5\mu\text{m}$
	Small range	$\pm(0.3+0.1\Delta D)\mu\text{m}^{*3}$
Positional error*4	$\pm 0.5\mu\text{m}$	
Measuring range*5	2x10mm ($\phi 0.05$ to $\phi 0.1\text{mm}$) 4x10mm ($\phi 0.1$ to $\phi 10\text{mm}$)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	113m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\phi 10\text{mm}$ at the interval of 0.32 sec. (average 1024 times).
 *2: Center of the measuring range for cylindrical workpieces outside diameter.
 *3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)
 *4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.
 *5: The area given by [optical axis direction]x[scanning direction].
 *6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/inch	

* 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, F for SAA, K for KC, C and No suffix are required for PSE."

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set ($\phi 0.1$, $\phi 10.0$)

- : **02AGD120**
- Wire guiding pulley : **02AGD210**
- Adjustable workstage : **02AGD400**
- Air blower : **02AGD230**
- Workstage : **02AGD270**
- Extension signal cable

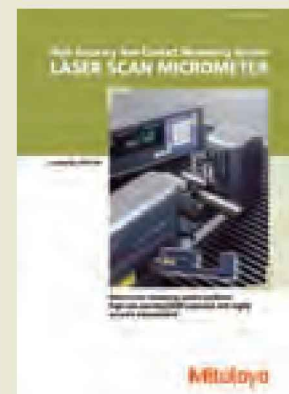
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m

- Extension relay cable

Order No.	Cable length
02AGC150A	1m

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/inch	

* 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, F for SAA, K for KC, C and No suffix are required for PSE."

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set (ø0.1, ø30.0)

	: 02AGD130
• Adjustable workstage	: 02AGD490
• Air blower	: 02AGD240
• Workstage	: 02AGD270
• Extension signal cable	

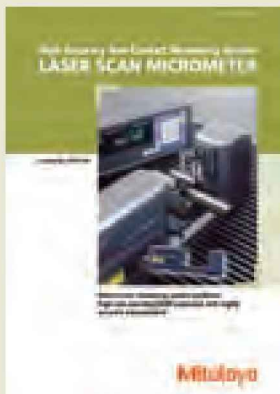
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

- Extension relay cable

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

SERIES 544 Laser Scan Micrometer (Measuring Unit) LSM-503S

- Ensures $\pm 1.0\mu\text{m}$ accuracy over the entire measuring range (0.3 to 30mm).
- Narrow range accuracy of $\pm(0.6+0.1\Delta D)\mu\text{m}$ for high precision measurement.

- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.



SPECIFICATIONS

Order No.	544-535	544-536
Applicable laser standards	JIS	IEC, FDA
User's Manual	Japanese version	English version
Measuring range	0.3 to 30mm	
Resolution	0.02 to 100 μm (selectable)	
Repeatability* ¹	$\pm 0.11\mu\text{m}$	
Accuracy* ² (20°C)	Whole range	$\pm 1.0\mu\text{m}$
	Small range	$\pm(0.6+0.1\Delta D)\mu\text{m}$ * ³
Positional error* ⁴	$\pm 1.5\mu\text{m}$	
Measuring range* ⁵	10x30mm (0.3 to 30mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	226m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64* ⁶	

*1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring ø30mm at the interval of 0.32 sec. (average 1024 times).

*2: Center of the measuring range for cylindrical workpieces outside diameter.

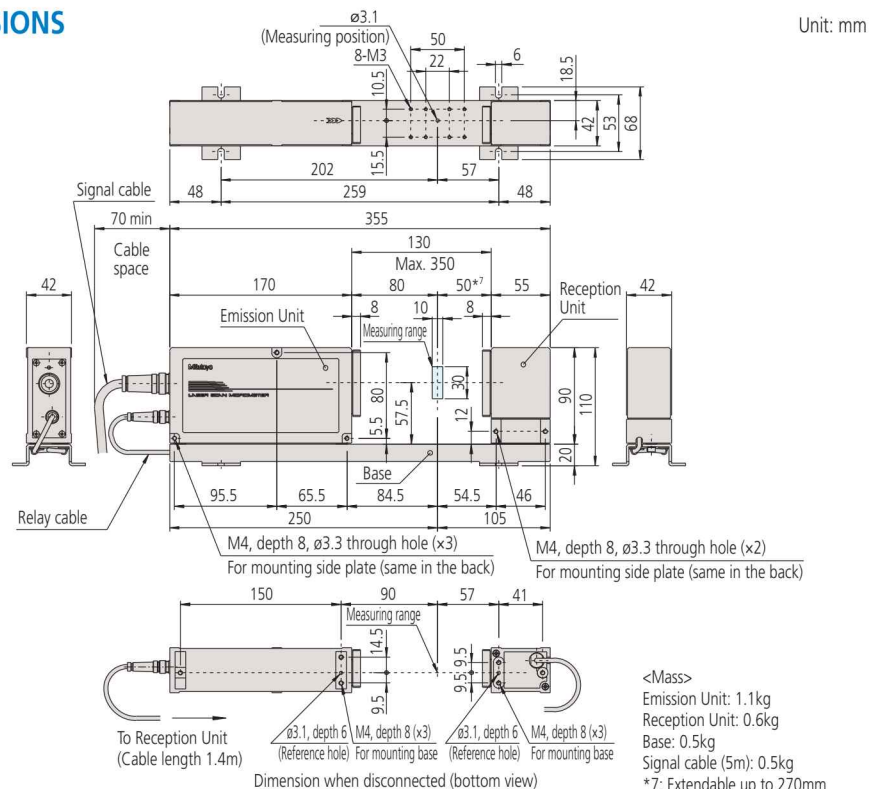
*3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)

*4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.

*5: The area given by [optical axis direction]x[scanning direction].

*6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer (Measuring Unit) LSM-506S

- Ensures $\pm 3\mu\text{m}$ accuracy over the entire measuring range (1 to 60mm).
- Narrow range accuracy of $\pm(1.5+0.5\Delta D)\mu\text{m}$ in for high precision measurement.
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.

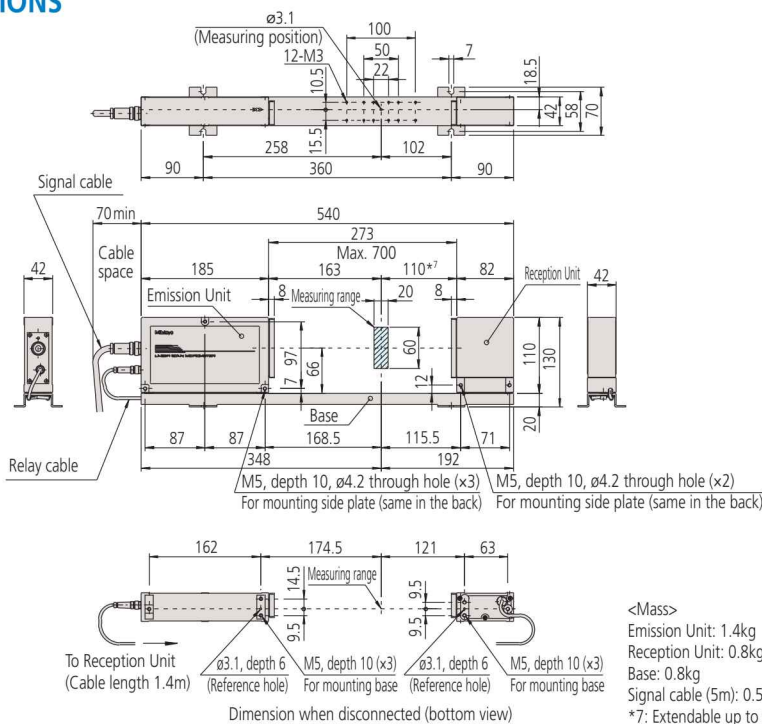


SPECIFICATIONS

Order No.	544-537	544-538
Applicable laser standards	JIS	IEC, FDA
User's Manual	Japanese version	English version
Measuring range	1 to 60mm	
Resolution	0.05 to 100 μm (selectable)	
Repeatability*1	$\pm 0.36\mu\text{m}$	
Accuracy*2	Whole range	$\pm 3\mu\text{m}$
	Small range	$\pm(1.5+0.5\Delta D)\mu\text{m}$ *3
Positional error*4	$\pm 4\mu\text{m}$	
Measuring range*5	20x60mm (1 to 60mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	452m/s	
Operating environment	0 to 40°C	
Humidity	RH 35 to 85% (no condensation)	
Protection Level	IP64*6	

- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\phi 60\text{mm}$ at the interval of 0.32 sec. (average 1024 times).
 *2: Center of the measuring range for cylindrical workpieces outside diameter.
 *3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)
 *4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.
 *5: The area given by [optical axis direction]x[scanning direction].
 *6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/inch	

* 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, F for SAA, K for KC, C and No suffix are required for PSE."

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set ($\phi 1.0, \phi 60.0$)

- Adjustable workstage : **02AGD140**
- Air blower : **02AGD520**
- Extension signal cable : **02AGD250**

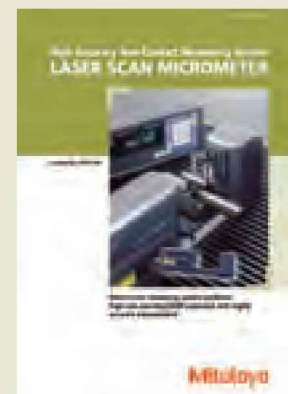
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

- Extension relay cable

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/inch	

* 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, F for SAA, K for KC, C and No suffix are required for PSE."

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set (ø20.0, ø120.0)

: **02AGD150**
: **02AGD260**

- Air blower
- Extension signal cable

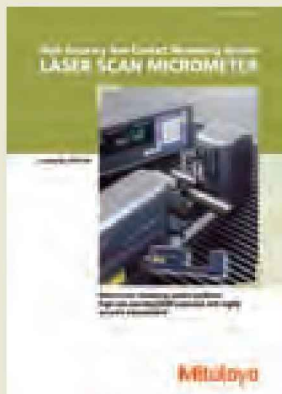
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

- Extension relay cable

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

SERIES 544 Laser Scan Micrometer (Measuring Unit) LSM-512S

- Ensures $\pm 6\mu\text{m}$ accuracy over the entire measuring range (1 to 120mm).

- Narrow range accuracy of $\pm(4.0+0.5\Delta D)\mu\text{m}$ in for high precision measurement.
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.

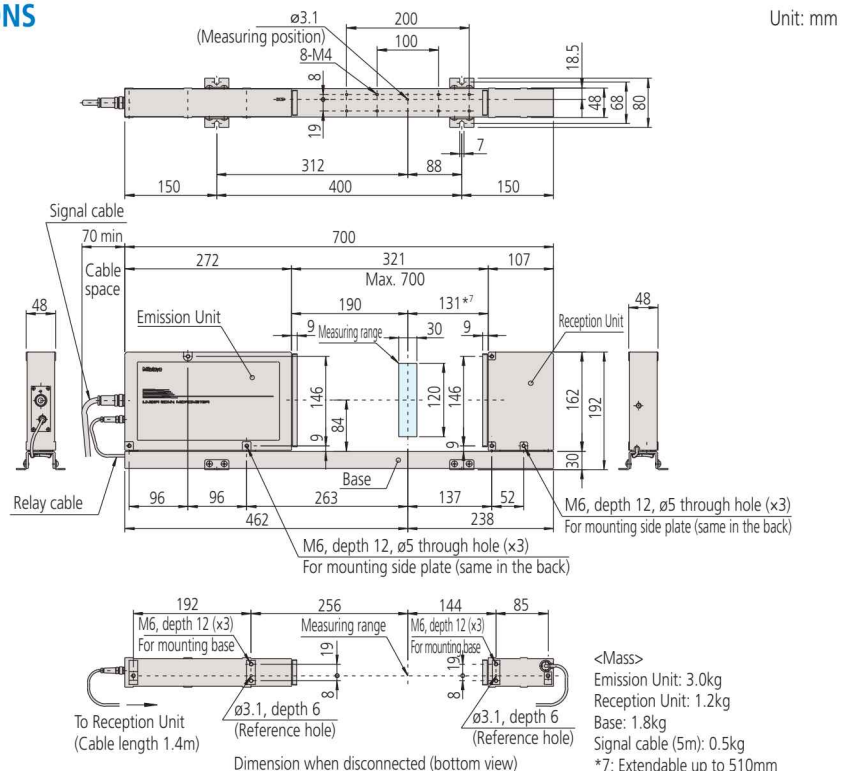


SPECIFICATIONS

Order No.	544-539	544-540
Applicable laser standards	JIS	IEC, FDA
User's Manual	Japanese version	English version
Measuring range	1 to 120mm	
Resolution	0.1 to 100 μm (selectable)	
Repeatability*1	$\pm 0.85\mu\text{m}$	
Accuracy*2 (20°C)	Whole range	$\pm 6\mu\text{m}$
	Small range	$\pm(4.0+0.5\Delta D)\mu\text{m}^*3$
Positional error*4	$\pm 8\mu\text{m}$	
Measuring range*5	30x120mm (1 to 120mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	904m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring ø120mm at the interval of 0.32 sec. (average 1024 times).
- *2: Center of the measuring range for cylindrical workpieces outside diameter.
- *3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)
- *4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.
- *5: The area given by [optical axis direction]x[scanning direction].
- *6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer (Measuring Unit) LSM-516S

- Ensures $\pm 7\mu\text{m}$ accuracy over the entire measuring range (1 to 160mm).
- Narrow range accuracy of $\pm(4.0+2.0\Delta D)\mu\text{m}$ for high precision measurement.
- Ultra-high speed measurement of 3200 scan/sec. Suitable for high speed lines or in applications subject to vibration.

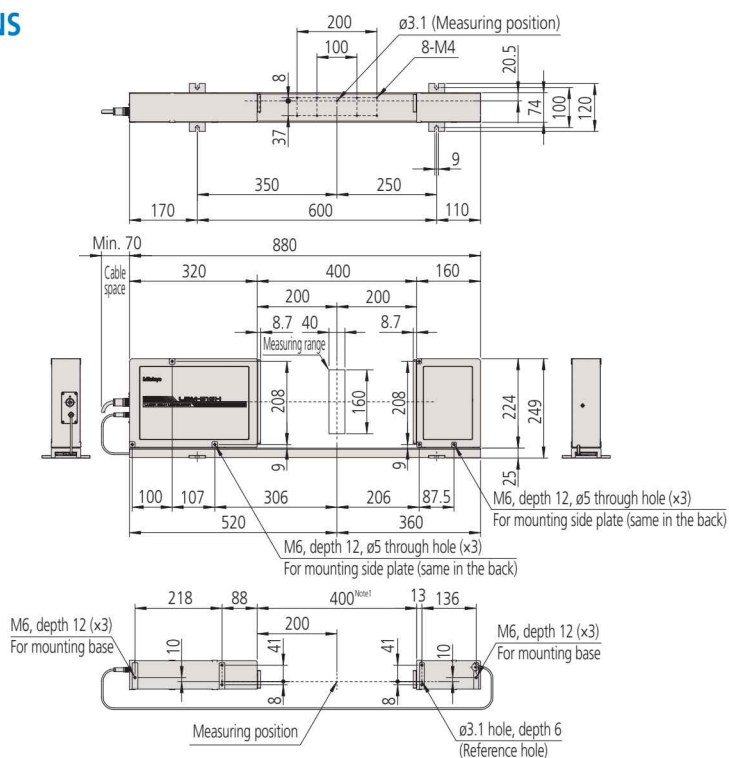


SPECIFICATIONS

Order No.	544-541	544-542
Applicable laser standards	JIS	IEC, FDA
User's Manual	Japanese version	English version
Measuring range	1 to 160mm	
Resolution	0.1 to 100 μm (selectable)	
Repeatability*1	$\pm 1.4\mu\text{m}$	
Accuracy*2 (20°C)	Whole range	$\pm 7\mu\text{m}$
	Small range	$\pm(4.0+2.0\Delta D)\mu\text{m}^*3$
Positional error*4	$\pm 8\mu\text{m}$	
Measuring range*5	40x160mm (1 to 160mm)	
Scanning rate	3200 scans/s	
Laser wavelength	650nm (Visible)	
Laser scanning speed	1206m/s	
Operating environment	Temperature	0 to 40°C
	Humidity	RH 35 to 85% (no condensation)
Protection Level	IP64*6	

- *1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\phi 160\text{mm}$ at the interval of 0.32 sec. (average 1024 times).
 *2: Center of the measuring range for cylindrical workpieces outside diameter.
 *3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)
 *4: An error of the outside diameter due to variation in cylinder position either in the optical axis direction or in the scanning direction.
 *5: The area given by [optical axis direction]x[scanning direction].
 *6: The protection level provided for the interior. If the workpiece or glass of the measuring unit window is soiled by water or dust, the unit may malfunction.

DIMENSIONS



Optional Accessories

- Multifunctional display unit, **LSM-6200**:

Order No.	Display type	Remarks
544-071	Japanese mm/E	Japanese user's manual
544-071*	English mm/E	English user's manual
544-072*	English mm/inch	

* 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, F for SAA, K for KC, C and No suffix are required for PSE."

- Easy-to-operate display unit, **LSM-5200**:

Order No.	Remarks
544-046	Japanese user's manual
544-047	English user's manual

- Standard calibration gage set ($\phi 20, \phi 160$)

: **02AGM300**

- Extension signal cable

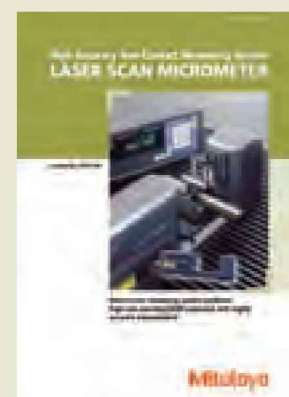
Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

- Extension relay cable

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

Optional Accessories

- Standard calibration gage set (ø1, ø60)

: 02AGD170

SERIES 544 Laser Scan Micrometer (Display Unit Integrated Model) LSM-9506

- High accuracy of $\pm 2.5\mu\text{m}$, integrated display unit with many functions equivalent to the multi-function display unit.



SPECIFICATIONS

Order No.	544-115*	544-116**
Type	mm	inch/mm
Measuring range	0.5 to 60mm	.02" - 2.36"/0.5 - 60mm
Resolution	0.05 to 100 μm (selectable)	.000002" - .005/0.00005 - 0.1mm
Repeatability* ¹		$\pm 0.6\mu\text{m}$ ($\pm 0.00003"$)
Accuracy* ² (20°C)		$\pm 2.5\mu\text{m}$ ($\pm 0.0001"$)
Positional error* ³ (optical axis/scanning direction)		$\pm 2.5\mu\text{m}$ ($\pm 0.0001"$) L: Displacement between workpiece center and optical axis center
Measuring range* ⁴		$\pm 5 \times 60\text{mm}$ ($\pm 2 \times 2.36"$)
Scanning rate		1600 scans/s
Laser wavelength		650nm (Visible)* ⁵
Laser scanning speed		226m/s (8900" / s)
Display unit		16-digit dot matrix (upper column) + 7 segment 11-digit (lower column) , guidance LEDs
Standard interface		RS-232C, Digimatic code output unit (1ch)
Optional interface		No
Power supply		AC100V-240V $\pm 10\%$, 40VA, 50/60Hz
Operating environment		0 to 40°C, RH 35 to 85% (no condensation)

*1: Determined by the value of $\pm 2\sigma$ (σ : standard deviation) when measuring $\phi 10\text{mm}$ at the interval of 0.32 sec. (average 512 times).

*2: Center of the measuring range for cylindrical workpieces outside diameter.

*3: ΔD =Difference in diameter between the master gage and workpiece (Unit: mm)

*4: An error of the outside diameter due to variation in workpiece position either in the optical axis direction or in the scanning direction.

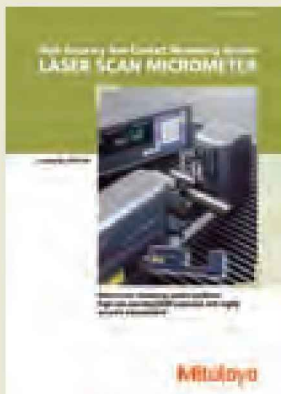
*5: FDA Class II (544-116-1A)/IEC Class 2 (All models except 544-116-1A) semiconductor laser for scanning (Maximum power: 1.0mW)

* To denote your AC power cable add the following suffixes to the order No.: D for CEE, DC for CCC, E for BS, F for SAA, K for KC, C and No suffix are required for PSE.

** 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, C and No suffix are required for PSE.

Laser safety

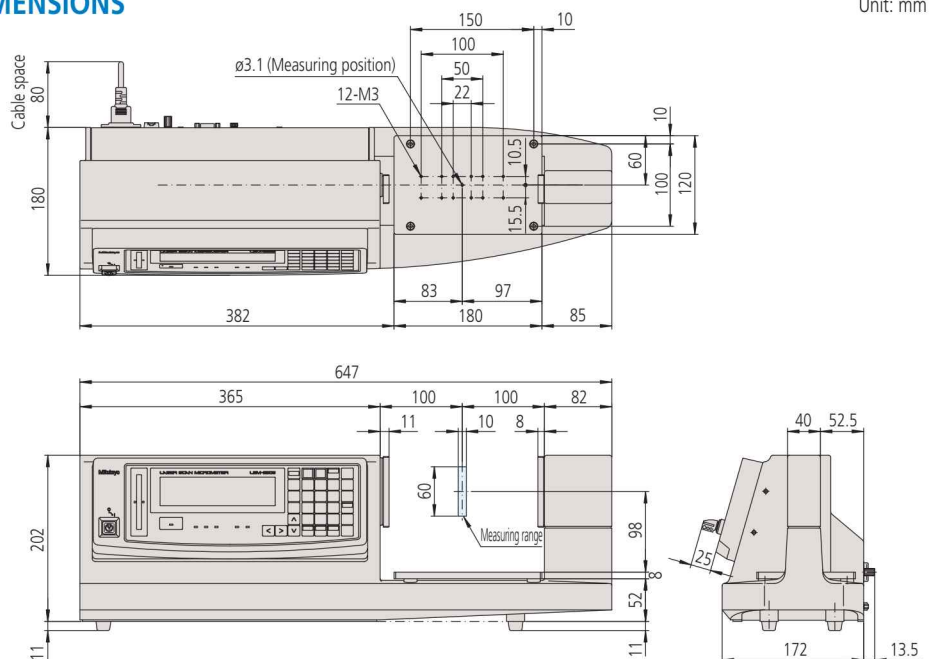
Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

DIMENSIONS

Unit: mm



Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer (Multifunctional Display Unit) LSM-6200

- 2-axis display unit enables s2 items be displayed simultaneously.
- Capable of statistical analysis such as: average, maximum value, minimum value, range (max. - min.).
- Segment measurement (7 points) or edge measurement (1 to 255 edge) can be selected.
- A function to eliminate abnormal values is standard.
- 100 tolerance values, preset values, or settings can be stored.



SPECIFICATIONS

Order No.	544-071*	544-072*
Type	mm	inch/mm
Display	16-digit plus 11-digit fluorescent display, and guide message LED	
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges* ¹	
Averaging times	Arithmetic average: per 2 to 2048/ Moving average: per 32 to 2048 (Arithmetic average is per 16 to 2048 when using 544-531, 544-532)	
Judgment	Selection from "target value + tolerance", "lower tolerance + upper tolerance", or "7 classes multi-limit tolerance zone".	
Measurement mode	Standby, Single measurement, Continuous measurement	
Statistical analysis	Maximum, Minimum, Average, Dispersion, σ (S.D)	
Size	335 (W) \times 134 (H) \times 250 (D)mm	
Power supply	100 - 240 V AC \pm 10%, 40VA, 50/60Hz	
Standard I/F	RS-232C, Analog I/O	
Optional I/F	Digimatic code output unit (2-ch), 2nd I/O analog I/F, BCD I/F	
Operating environment	0 to +40°C, RH 35 to 85% (no condensation)	
Others	Nominal setting, sample setting, selection of unnecessary digits, transparent object measurement* ² , measurement of odd fluted parts, automatic measurement in edge mode, output timer, abnormal data elimination, SHL change, group judgment, simultaneous measurement, statistical processing, mastering, buzzer function, automatic workpiece detection (dimension/position)* ¹ , zero-set/offset, dual measurement (optional)	

*1: The measuring range will be 0.1mm to 2mm in the 1 to 255 edge measurement mode or when activating the automatic workpiece detection with **544-531, 544-532**.
Each function has its combination limit.

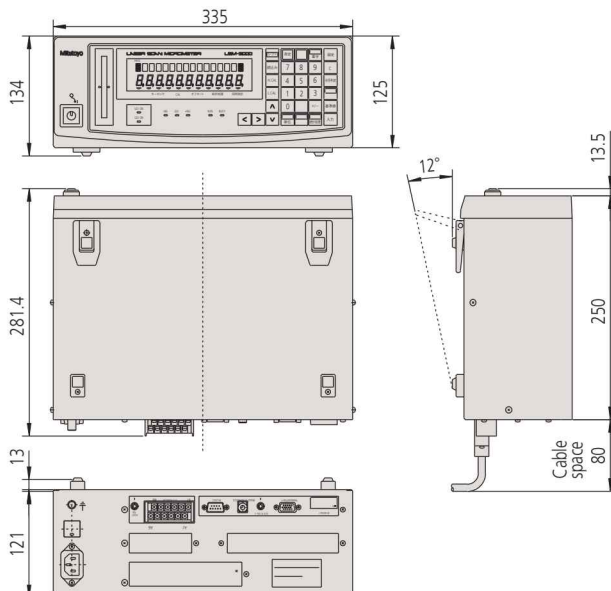
*2: The measuring range is 50 μ m to 2mm when using **544-531, 544-532**. For smaller range, contact your local Mitutoyo sales office.

* 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, F for SAA, K for KC, C and No suffix are required for PSE.

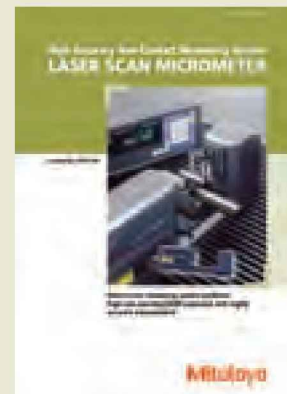
** Cannot be connected to **544-495, 544-496**.

** Previous models such as **544-451** cannot be connected.

DIMENSIONS



Unit: mm



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

SERIES 544 Laser Scan Micrometer (Panel-mount Type Display Unit) LSM-5200

- A compact controller which could be used for multi-unit system configurations.
- Capable of simple connection to a PC via USB.



- A Panel-mount type display unit designed for the LSM-S series.
- Analog I/O and RS-232C is standard.
- Measurement of odd fluted parts, and simultaneous measurement / 2-program function are equipped.

SPECIFICATIONS

Order No.	544-047
Display	9 digits plus 8 digits LED, guide message LED
Segment	1 to 7 (1 to 3, transparent) or 1 to 255 edges*1
Averaging method	Arithmetic average: from 4 to 2048; Moving average: from 32 to 2048 (Arithmetic average is from 16 to 2048 when using LSM-500S.)
Judgment	Selecting from "target value ± tolerance value" or "lower limit/upper limit".
Measurement mode	Standby, Single measurement, Continuous measurement
Statistical analysis	Calculation result is output via USB or RS-232C.
External dimensions	144 (W)×72 (H)×197.1 (D)mm
Power supply*3	24V DC±10%, 1.3A or more
Standard I/F	USB2.0, RS-232C, I/O analog
Operating environment	0 to 40°C, RH 35 to 85% (no condensation)
Preservation environments	-20 to 70°C, RH 35 to 85% (no condensation)
Others	Measurement of odd fluted parts, simultaneous measurement, nominal setting, sample setting, selection of unnecessary digits, transparent object measurement*2 Automatic workpiece detection (dimension/position detected)*1, abnormal data elimination, mastering, statistical processing (when using USB, RS-232C), output timer, automatic measurement in edge mode, presetting Note that every function is limited in its combination possibilities. See the user manual for details.
Mass	1.4 kg

*1: The measuring range will be 0.1mm to 2mm in the 1 to 255 edge measurement mode or when activating the automatic workpiece detection with **544-531, 544-532**.
Each function has its combination limit.

*2: The measuring range is 50µm to 2mm when using **544-531, 544-532**. For smaller ranges, contact your local Mitutoyo sales office.

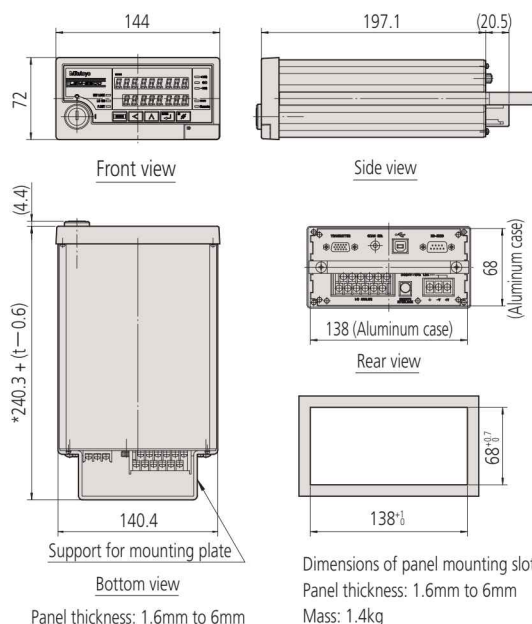
*3: DC24V external power supply (commercial item) is required separately.

Note 1: Cannot be connected to **544-495, 544-496**.

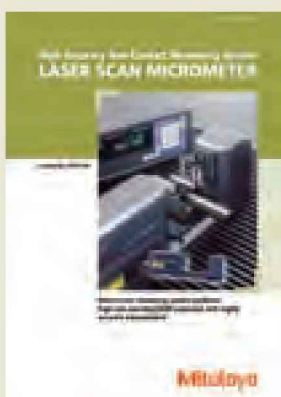
Note 2: Previous models such as **544-451** cannot be connected.

Note 3: For USB communication with a PC, a dedicated device driver is required. For details, contact your local Mitutoyo sales office.

DIMENSIONS



Unit: mm



Refer to the Laser Scan Micrometer (Catalog No. E13004) for more details.

Laser Scan Micrometer

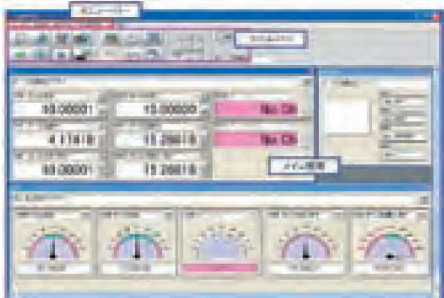
Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer (Display Unit) Optional Accessories

LSMPAK

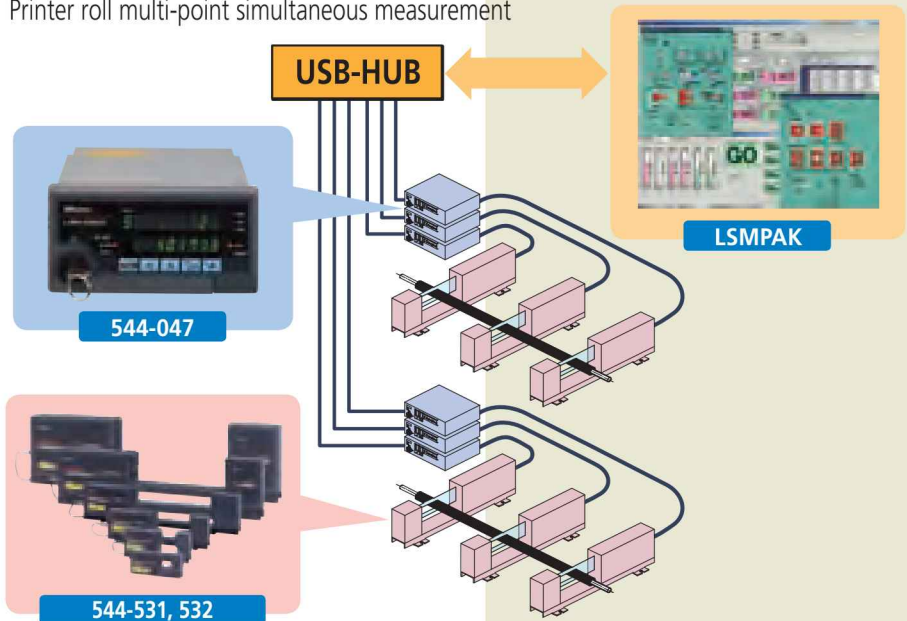
- Software can import measurement data from multiple LSM-5200 display units to a PC allowing a variety of measuring systems to be constructed.
 - Capable of processing a maximum of 10 channels of measurement data (USB-HUB connection).
 - Capable of Calculation between channels, statistical analysis, file output of calculation results.
 - Various display functions such as counter display, graph display, and calculation result are equipped.
- * Refer to page G-50 for specifications of **LSM-5200**.

Sample Screen



Measurement Examples

Printer roll multi-point simultaneous measurement



Commercially available products, such as USB hubs and cables, are available for connecting to the display unit.

SPECIFICATIONS

Order No.	02NGA002 (English)	02NGA003 (Korean)	02NGA004 (German)
Applicable models	Display unit: 544-047 (Ver.1.004A or later) Measuring unit: 544-531, 532 series		
Display function	Max. 12 windows (counter, meter, chart, overall judgment)		
Setup function	Presetting, data output, sample measurement, resolution select, judgment setting, measurement of odd number fluted parts, simultaneous measurement *Each function has its combination limit.		
Measurement function	Single, continuous measurement, single automatic repetition		
Calculation function	Arithmetic operation, maximum, minimum, range, average, total (any combination available)		
GO/NG judgment	3-step (-NG, GO, +NG)		
Interface	USB2.0 (Hi-Speed communication recommended)		
Maximum connection	10 units		
Operating environment (PC)	OS	Windows XP, 7 (32-bit)	
	CPU	Pentium 4, 2GHz or better recommended	
	Memory	1GB or more	
	HDD free space	500MB or more	
Display	1024x768 dot, True Color (32-bit) or more recommended		



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

SERIES 544 Laser Scan Micrometer (Measuring Unit) Optional Accessories

Standard calibration gage set



- Standard cylinder gage set suitable for calibration of Laser Scan Micrometers.
- Nominal gage diameters (1 to 160mm) are as given in Specifications.

SPECIFICATIONS

For calibrating models		544-495, 544-496	544-531, 544-532	544-533, 544-534	544-535, 545-536	544-537, 544-538	544-539, 544-540	544-541, 544-542	544-115, 544-116
Set No.		02AGD180	02AGD110	02AGD120	02AGD130	02AGD140	02AGD150	02AGM300	02AGD170
Configuration (Order No.)	Stand	02AGD181	02AGD111	02AGD121	02AGD131	02AGD141	02AGD151	02AGM320	02AGD171
	Gages	ø1: 02AGD920 ø25: 02AGD963	ø0.1: 958200 ø2: 958202	ø0.1: 958200 ø10: 229317	ø1: 02AGD920 ø30: 02AGD961	ø1: 02AGD920 ø60: 02AGD962	ø20: 229730 ø120: 234072	ø20: 229730 ø160: 02AGM303	ø1: 02AGD920 ø60: 02AGD962
	Carrying case	02AGD190	958203	958203	02AGD980	02AGD980	02AGD990	02AGM310	02AGD970

Workstage



Installation example (LSM-902)



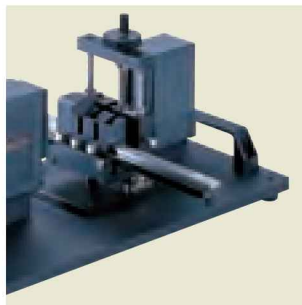
- Easy set-up and height adjustment enables high-precision measurement.

SPECIFICATIONS

Model	544-533, 544-534 544-535, 544-536 544-495, 544-496
Order No.	02AGD270

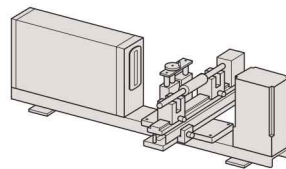
Adjustable workstage

- Vertical/horizontal slide mechanism enables easy measurement of various workpiece diameters.
- Best suited for quality assurance of high precision pin gages.

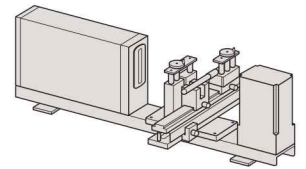


Measurement Examples

- Roller of copying machine



- Pin gage or plug gage



Basic configuration

Basic set	Order No.	Model	Standard Accessories	Measuring range (mm)	Horizontal stroke (mm)	Vertical stroke (mm)
(1) Main unit (2) V-block (3) Stop	02AGD280	544-495, 544-496	V-block (02AGD420), 2 pcs Stopper (02AGD430), 1 pc	0.1 - 25	130	47
	02AGD400	544-533, 544-534		0.05 - 10	130	32
	02AGD490	544-535, 544-536		0.3 - 30	200	35
	02AGD520	544-537, 544-538	V-block A (02AGD550), 2 pcs V-block B (02AGD560), 1 pc V-block C (02AGD570), 1 pc	1 - 60	300	45
	02AGD370	544-115, 544-116		0.5 - 60	200	45
	02AGD680			0.5 - 60	300	45

* The stop is not included in the basic set for 544-537, 544-538, 544-115, 544-116.

- Optional part for the adjustable workstage, such as center support, adjustable V-block (up/down) etc., are available.

Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer (Measuring Unit) Optional Accessories

Guide pulley

- Used for supporting measurement of outside diameter of fine wirelike materials such as magnetic wire or fiber.



SPECIFICATIONS

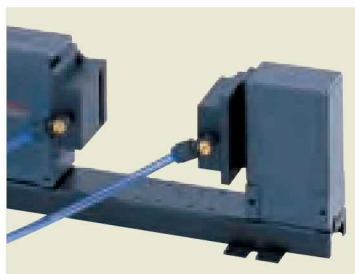
Model	544-531, 544-532	544-533, 544-534
Order No.	02AGD200	02AGD210

Each measurement range is as follows:
544-531, 544-532: $\phi 5\mu\text{m}$ to $\phi 1.6\text{mm}$
544-533, 544-534: $\phi 50\mu\text{m}$ to $\phi 2\text{mm}$

For calibration, the calibration gage set for **544-531, 544-532 (02AGD110)** is required.

Air shield

- Air blows from the air outlet installed on the laser section to clear dust adhering to the laser window.



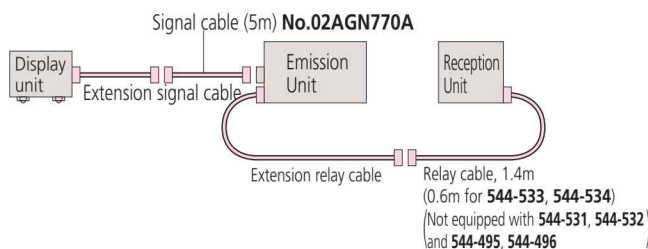
SPECIFICATIONS

Air supply unit	Air shield	Applicable models
957608	02AGD220	544-531, 544-532
	02AGD230	544-533, 544-534
	02AGD240	544-535, 544-536
	02AGD250	544-537, 544-538
	02AGD260	544-539, 544-540

*Air shield is supplied with 5m air tube (Outside Diameter: 6mm).

Extension signal cable / Extension relay cable

- Extension signal cables are necessary when the measuring unit and display unit are separated in operation; Extension relay cables are necessary when the optical section is separated in operation.



SPECIFICATIONS

Extension signal cable

Order No.	Cable length
02AGN780A	5m
02AGN780B	10m
02AGN780C	15m
02AGN780D	20m

Extension relay cable

Order No.	Cable length
02AGC150A	1m
02AGC150B	3m
02AGC150C	5m

* For **544-531, 544-532** and **544-533, 544-534** the allowable maximum length for signal cable is 20m; relay cable is 2m.

* For **544-535, 544-536, 544-537, 544-538, 544-539, 544-540** and **544-541, 544-542** the allowable maximum length for signal cable is 30m; relay cable is 5m.

* The maximum extension length of the signal cable and relay cable is 32m in total.

* Cannot be used with **544-495, 544-496**.

SERIES 544 Laser Scan Micrometer (Display Unit) Optional Accessories

Thermal printer DPU-414



- Measurement data can be printed.

SPECIFICATIONS

Order No.	02AGD600A 02AGD600B 02AGD600C 02AGD600D
Printing method	Thermal dot matrix
Printing capacity	40 Columns (Normal)
Character configuration	9x8 dot matrix
Printing direction	Bidirectional
Interface	RS-232C
Power supply	AC 100-240V 50/60Hz (AC adapter)
Standard Accessories	Printer cable 2m (02AGD620A), Printer paper 1 roll, AC adapter
Printer paper (optional)	Order No. 223663 (10-roll set)

Foot switch



- **937179T**
- For LSM Order **544-071, 544-072, 544-495, 544-496, 544-115, 544-116**

Interface for LSM6200, 6900 Optional Accessories

BCD Interface



- Outputs measurement data in BCD output (7-digit) or HEX output.
- Data logic can be switched.
- Isolated I/O circuitry
- Available for **544-071, 544-072, 544-495, 544-496**.

SPECIFICATIONS

Order No.	02AGC910
Standard Accessories	Connector (DDK) 57-30360 (214188)

Laser Scan Micrometer

Non-contact, high-speed, high-precision measurement

SERIES 544 Laser Scan Micrometer (Display Unit) Optional Accessories

Digimatic code output unit

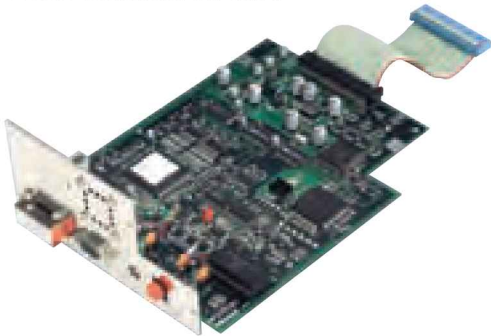


- 2-channel Digimatic code output
- In simultaneous measurement, measurement data are output as follows:
Program No.0 to No.4 in OUTPUT-1
Program No.5 to No.9 in OUTPUT-2 (10 programs operated)
- 10 pin MIL type connector.
- Output cable is not supplied.
Connecting cable (optional) 1m (936937)
- Available for **544-071, 544-072, 544-495, 544-496.**

SPECIFICATIONS

Order No.	02AGC840
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Dual connection unit

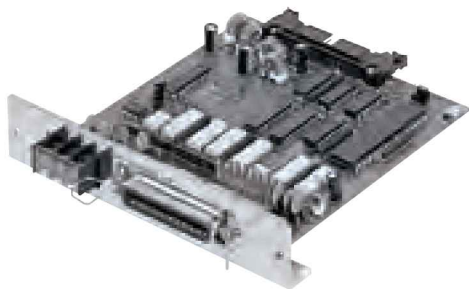


- Enables second unit connection to the **544-071, 544-072.** (both units must be the same model)
- * Cannot be used for **544-495, 544-496.**
- Depending on the layout of the two measuring units, large-diameter measurement, XY measurement, and parallel measurement are possible.
- Both of the measuring units and display units can be simultaneously operated.

SPECIFICATIONS

Order No.	02AGP150
-----------	----------

2nd I/O analog I/F



- I/O, analog output.
- Simultaneous measurement is supported by two pairs of GO/NG judgment outputs.
- Available for **544-071, 544-072, 544-495, 544-496.**

SPECIFICATIONS

Order No.	02AGC880
Standard Accessories	Connector (DDK) 57-30360 (214188)

Cable for BCD and 2nd I/O simultaneous mount

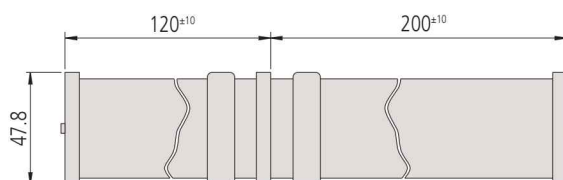
- Both BCD (**02AGC910**) and 2nd I/O analog I/F (**02AGC880**) can be mounted on **544-071, 544-072, 544-495, 544-496** using this cable.

* If using this cable, the dual connection unit (**02AGP150**) cannot be used.

SPECIFICATIONS

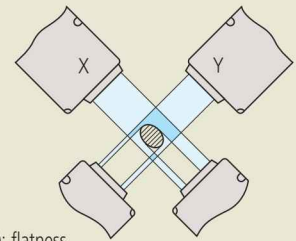
Order No.	02AGE060
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DIMENSIONS



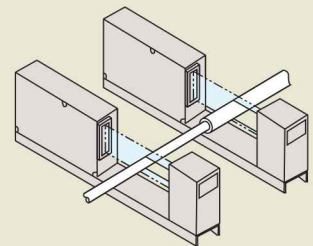
Unit: mm

XY Measurement



(X-Y): flatness
(X+Y)/2: average
* XY requires 10mm-interval.

Parallel Measurement



Quick Guide to Precision Measuring Instruments



Laser Scan Micrometers

Compatibility

Your Laser Scan Micrometer has been adjusted together with the ID Unit, which is supplied with the measuring unit. The ID Unit, which has the same code number and the same serial number as the measuring unit, must be installed in the display unit. This means that if the ID Unit is replaced the measuring unit can be connected to another corresponding display unit.

The workpiece and measuring conditions

Depending on whether the laser is visible or invisible, the workpiece shape, and the surface roughness, measurement errors may result. If this is the case, perform calibration with a master workpiece which has dimensions, shape, and surface roughness similar to the actual workpiece to be measured. If measurement values show a large degree of dispersion due to the measuring conditions, increase the number of scans for averaging to improve the measurement accuracy.

Electrical interference

To avoid operational errors, do not route the signal cable and relay cable of the Laser Scan Micrometer alongside a high voltage line or other cables capable of inducing noise current in nearby conductors. Ground all appropriate units and cable shields.

Connection to a computer

If the Laser Scan Micrometer is to be connected to an external personal computer via the RS-232C interface, ensure that the cable connections conform to the specification.

Laser safety

Mitutoyo Laser Scan Micrometers use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 (2007) device. Warning and explanation labels, as shown right, are attached to the Laser Scan Micrometers as is appropriate.

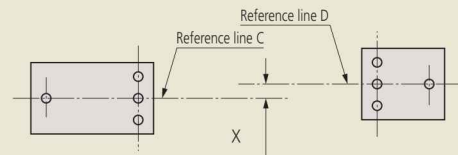


Re assembly after removal from the base

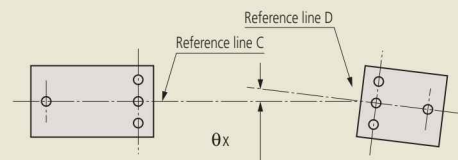
Observe the following limits when re assembling the emission unit and reception unit to minimize measurement errors due to misalignment of the laser's optical axis with the reception unit.

Alignment within the horizontal plane

- a. Parallel deviation between reference lines C and D: X (in the transverse direction)

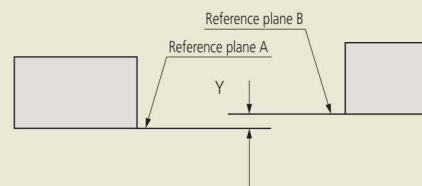


- b. Angle between reference lines C and D: θ_x (angle)

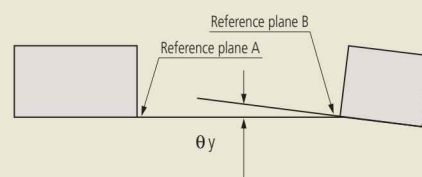


Alignment within the vertical plane

- c. Parallel deviation between reference planes A and B: Y (in height)



- d. Angle between reference planes A and B: θ_y (angle)

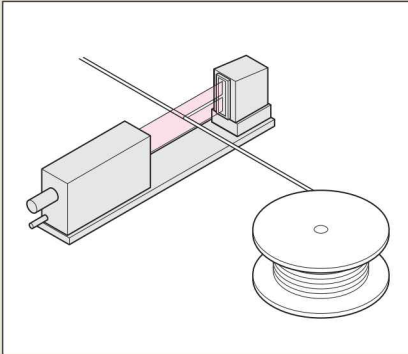


Allowable limits of optical axis misalignment

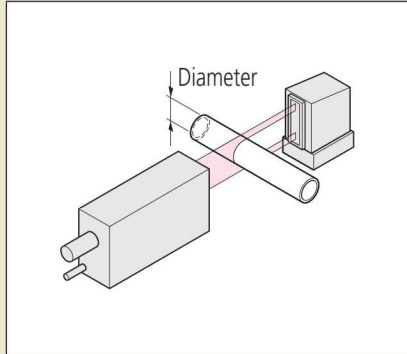
Model	Distance between Emission Unit and Reception Unit	X and Y	θ_x and θ_y
544-533, 544-534	68mm (2.68") or less	within 0.5mm (.02")	within 0.4' (7mrad)
	100mm (3.94") or less	within 0.5mm (.02")	within 0.3' (5.2mrad)
544-535, 544-536	130mm (5.12") or less	within 1mm (.04")	within 0.4' (7mrad)
	350mm (13.78") or less	within 1mm (.04")	within 0.16' (2.8mrad)
544-537, 544-538	273mm (10.75") or less	within 1mm (.04")	within 0.2' (3.5mrad)
	700mm (27.56") or less	within 1mm (.04")	within 0.08' (1.4mrad)
544-539, 544-540	321mm (12.64") or less	within 1mm (.04")	within 0.18' (3.6mrad)
	700mm (27.56") or less	within 1mm (.04")	within 0.08' (1.4mrad)
544-541, 544-542	800mm (31.50") or less	within 1mm (.04")	within 0.05' (1.6mrad)

Measurement Examples

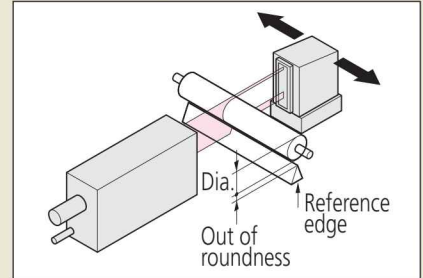
In-line measurement of glass fiber or fine wire diameter



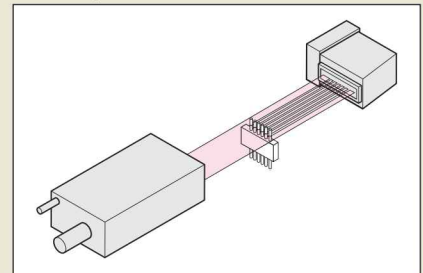
Measurement of outer diameter of cylinder



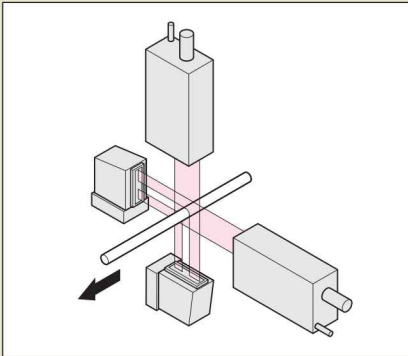
Measurement of outer diameter and roundness of cylinder



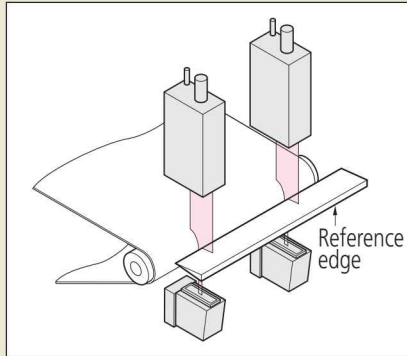
Measurement of spacing of IC chip leads



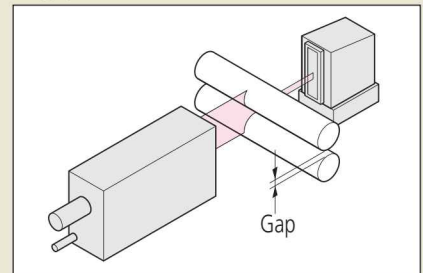
X- and Y-axis measurement of electric cables and fibers



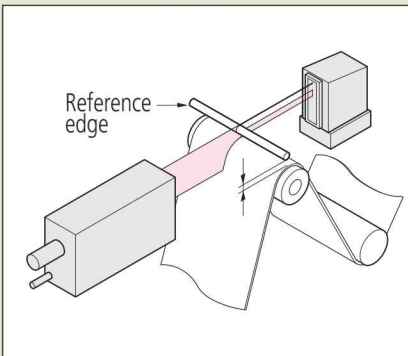
Measurement of thickness of film and sheet



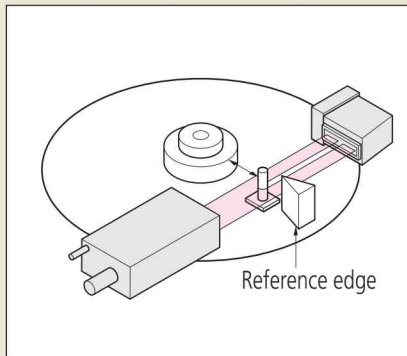
Measurement of gap between rollers



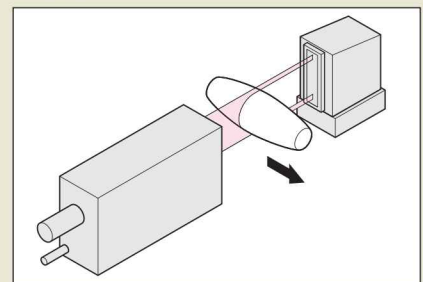
Measurement of film sheet thickness



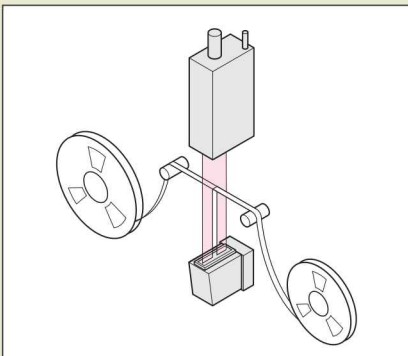
Measurement of laser disk and magnetic disk head movement



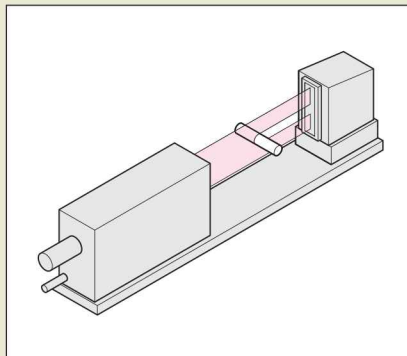
Measurement of form



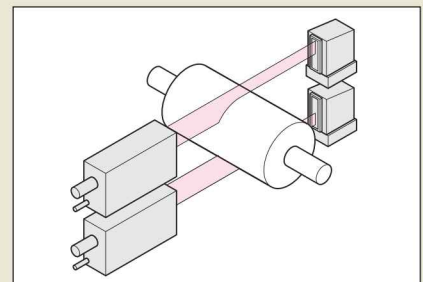
Measurement of tape width



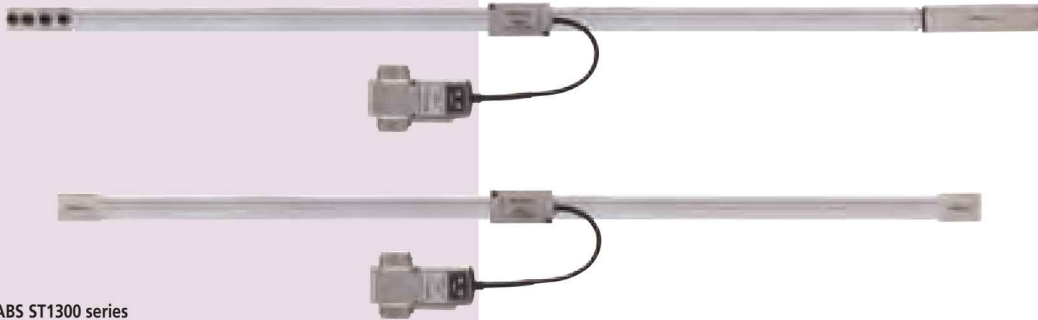
Measurement of outer diameter of optical connector and ferrule



Dual system for measuring a large outside diameter



New Products



ABS ST1300 series

Separate Type Scale Unit for Absolute Systems

ABS ST1300 series

Refer to page H-27 for details.

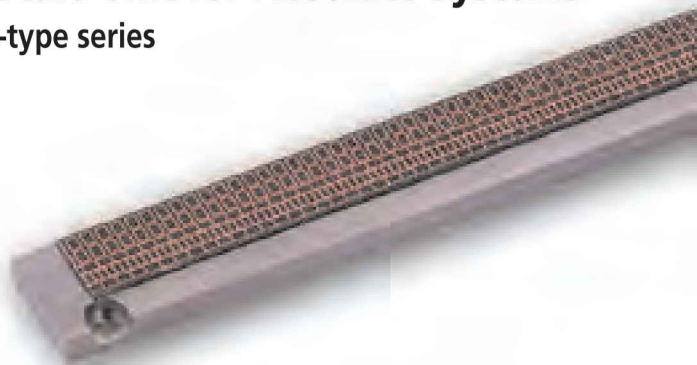


ABS ST700 Compact-type series

Separate Type Scale Unit for Absolute Systems

ABS ST700 Compact-type series

Refer to page H-26 for details.



Digimatic Scale Units/Linear Scales

ABSOLUTE Digimatic Scale Units



Linear Scales

Linear Scales



INDEX

ABSOLUTE Digimatic Scale Units

SD	H-3
----	-----

Linear scales

Linear Scale System Diagram	H-7
AT103	H-8
AT116	H-9
AT113	H-10
AT112-F	H-11
AT402E	H-12
AT203	H-13
AT216-T	H-14
AT217-TL, AT217-TL-B	H-15
AT211-A, AT211-B	H-16
ABS AT300	H-17
ABS AT500	H-18
ABS AT715	H-19
Counter (KA-200, KLD-200)	H-20
ST36	H-22
ST24	H-23
ST422	H-24
ST46-EZA	H-25
ABS ST700 Compact-type series	H-26
ABS ST1300	H-27
PSU-200	H-28

2D Image Correlation Encoder

MICSYS-SA1	H-29
Quick Guide to Precision Measuring Instruments	H-30

2D Image Correlation Encoder

2D Image Correlation Encoder



ABSOLUTE Digimatic Scale Units

Designed to capture positional coordinates from slides on machine tools and precision instruments including semiconductor production equipment

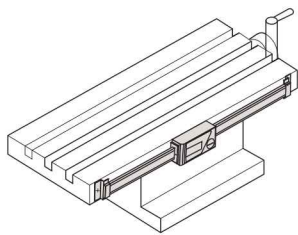
ABSOLUTE™ (Refer to page X for details.)

SD ABSOLUTE Digimatic Scale Units SERIES 572

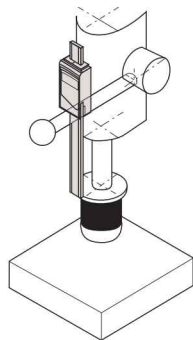


Applications

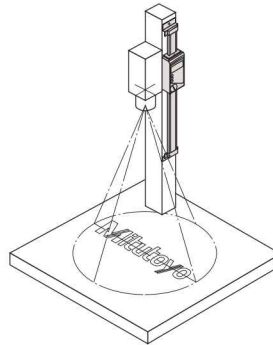
Machine table position



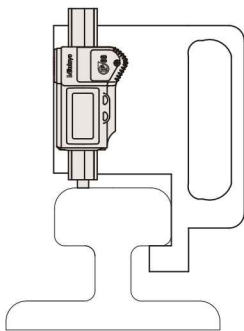
Drilling machine stroke position



Focus setting on optical instruments



Special applications



As a measurement jig for outdoor use (SD-G)



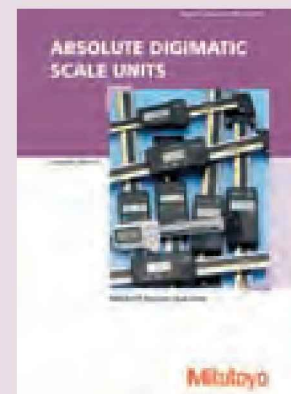
Detector head mechanism

Please contact Mitutoyo for other special orders.

- SD series facilitates mounting on jigs, tools, and small machine tools to enable accurate positioning.
- Built-in absolute scale including the ABS point requires no zero-set every time the power is turned on. In addition, reliability has improved thanks to elimination of overspeed errors.
- Horizontal or vertical display according to the scale mounting direction.
- The dust resistance and the environmental resistance of the display has improved. The SD-G series offers dust/water protection level IP66.
- Long battery life for easier maintenance.
- EC counters are available as external display units.
- Equipped with an output port to transfer measurement data. This allows implementation in control systems and gaging systems.

Functions

- ABS (Absolute) measurement function
 - INC (Incremental) measurement function
 - Zero-setting function
 - Presetting function (2 preset values can be set. Not available for SD-G, SD-D, SDV-D)
 - Double reading function (Available only for SD-F or SDV-F)
 - Direction switch function
Not available for SD-G, SD-D, SDV-D, SD-F, SDV-F)
 - Hold function*
 - Measurement value composition error alarm
 - Low battery alarm
 - Output function
- * To activate the hold function when using SD-D or SDV-D, an optional hold unit is required. Simultaneous activation with the output function is not available. SD-G are also available to special order.
- * These units use 1.5V silver oxide cells for the power supply. Therefore, when the units are directly fixed to the frame of a machine tool that requires a high voltage, malfunction such as display digit fluctuations and errors may occur. The countermeasure examples are described in the user manuals provided.



Refer to the ABSOLUTE DIGIMATIC SCALE UNITS (Catalog No.E4316) for more details.

System Diagram

[Scale units]

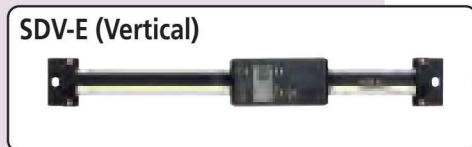
Single-function type with high dust/water resistance



Single-function type



Multi-function type



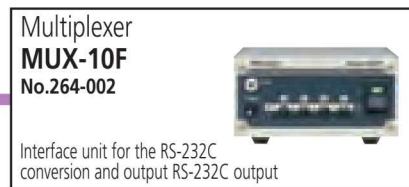
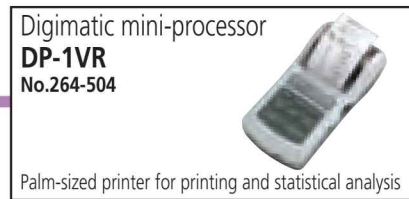
Multi-function type



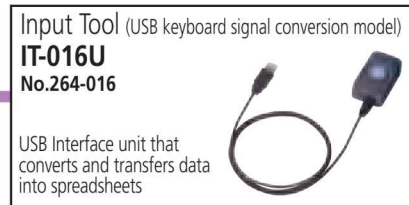
[Display units]



Tolerance judgment output*¹



RS-232C output



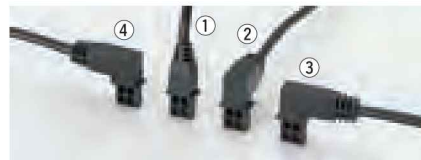
USB keyboard signal conversion

* Connection to an RS-232C conversion type (IT-007R) or a PS/2 keyboard signal conversion type (IT-005D) input tool is also available.

Connecting cable with the water-proof type output switch*² 1m : No.05CZA624
2m : No.05CZA625

Connecting cable with the output switch 1m : No.959149
2m : No.959150

Connecting cable with the output switch



① 1m : No.905338
2m : No.905409

② 1m : No.905689
2m : No.905690

③ 1m : No.905691
2m : No.905692

④ 1m : No.905693
2m : No.905694

Connecting cable 1m : No.936937
2m : No.965014

- * 1: Select the tolerance judgment output or digimatic output when setting the parameters.
- * 2: Connecting cable with the water-proof type output switch can be used only for SD-G or Water-proof Digital Caliper CD-15/20/30PM equipped with external output function.
- * 3: Connecting of SD series and DP-1VR/MUX-10F/IT-016U is also available without passing through the EC counter.
In this case, connect these units and SD series with the cables used for the connection with the EC counter.

ABSOLUTE Digimatic Scale Units

Designed to capture positional coordinates from slides on machine tools and precision instruments including semiconductor production equipment

ABSOLUTE Digimatic Scale Units SERIES 572

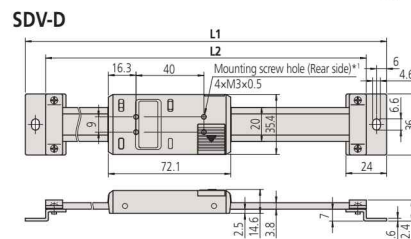
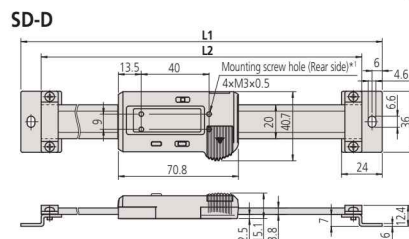
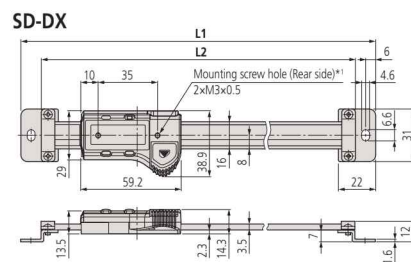
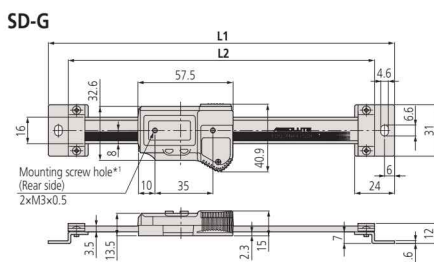
SPECIFICATIONS

Type	Unit spec.	Order No.	Model	Range	Resolution	Accuracy	Repeatability	Battery life
Horizontal single-function type (Water-proof type)	Metric	572-600	SD-10G	0-100mm	0.01mm	0.03mm	0.01mm	Approx. 13000 hours
		572-601	SD-15G	0-150mm				
		572-602	SD-20G	0-200mm				
	Metric/Inch	572-613	SD-4"/10G	0-100mm/0-4"	0.0005"/0.01mm	0.03mm/.001"		
		572-614	SD-6"/15G	0-150mm/0-6"				
Horizontal single-function type	Metric	572-200-20	SD-10DX	0-100mm	0.01mm	0.03mm	0.01mm	Approx. 20000 hours
		572-201-20	SD-15DX	0-150mm				
		572-202-20	SD-20DX	0-200mm				
	Metric/Inch	572-203-10	SD-30D	0-300mm	0.0005"/0.01mm	0.03mm/.001"		
		572-210-20	SD-4"DX	0-100mm/0-4"				
		572-211-20	SD-6"DX	0-150mm/0-6"				
		572-212-20	SD-8"DX	0-200mm/0-8"				
Horizontal multi-function type	Metric	572-213-10	SD-12"D	0-300mm/0-12"	0.01mm	0.03mm	0.01mm	Approx. 5000 hours
		572-460	SD-10E	0-100mm				
		572-461	SD-15E	0-150mm				
		572-462	SD-20E	0-200mm				
		572-463	SD-30E	0-300mm				
		572-464	SD-45E	0-450mm				
		572-465	SD-60E	0-600mm				
	Metric/Inch	572-466	SD-80E	0-800mm	0.0005"/0.01mm	0.04mm/.002"		
		572-467	SD-100E	0-1000mm				
		572-470	SD-4"E	0-100mm/0-4"				
		572-471	SD-6"E	0-150mm/0-6"				
		572-472	SD-8"E	0-200mm/0-8"				
		572-473	SD-12"E	0-300mm/0-12"				
		572-474	SD-18"E	0-450mm/0-18"				
		572-475	SD-24"E	0-600mm/0-24"				
		572-476	SD-32"E	0-800mm/0-32"				
		572-477	SD-40"E	0-1000mm/0-40"				
Horizontal multi-function type (equipped with double reading function)	Metric	572-480-10*	SD-10F	0-100mm	0.01mm	0.03mm	0.01mm	Approx. 5000 hours
		572-481-10*	SD-15F	0-150mm				
		572-482-10*	SD-20F	0-200mm				
		572-483-10*	SD-30F	0-300mm				
		572-484-10*	SD-45F	0-450mm				
		572-485-10*	SD-60F	0-600mm				
		572-486-10*	SD-80F	0-800mm				
	Metric/Inch	572-487-10*	SD-100F	0-1000mm	0.0005"/0.01mm	0.03mm/.001"		
		572-490-10*	SD-4"F	0-100mm/0-4"				
		572-491-10*	SD-6"F	0-150mm/0-6"				
		572-492-10*	SD-8"F	0-200mm/0-8"				
		572-493-10*	SD-12"F	0-300mm/0-12"				
		572-494-10*	SD-18"F	0-450mm/0-18"				
		572-495-10*	SD-24"F	0-600mm/0-24"				
		572-496-10*	SD-32"F	0-800mm/0-32"				
		572-497-10*	SD-40"F	0-1000mm/0-40"				
		Vertical single-function type	Metric	572-300-10				
572-301-10	SDV-15D			0-150mm				
572-302-10	SDV-20D			0-200mm				
Metric/Inch	572-303-10		SDV-30D	0-300mm	0.0005"/0.01mm	0.03mm/.001"		
	572-310-10		SD-4"D	0-100mm/0-4"				
	572-311-10		SD-6"D	0-150mm/0-6"				
	572-312-10		SD-8"D	0-200mm/0-8"				
Vertical multi-function type	Metric	572-313-10	SD-12"D	0-300mm/0-12"	0.01mm	0.04mm/.002"	0.01mm	Approx. 5000 hours
		572-560	SDV-10E	0-100mm				
		572-561	SDV-15E	0-150mm				
		572-562	SDV-20E	0-200mm				
		572-563	SDV-30E	0-300mm				
		572-564	SDV-45E	0-450mm				
		572-565	SDV-60E	0-600mm				
	Metric/Inch	572-566	SDV-80E	0-800mm	0.0005"/0.01mm	0.04mm/.002"		
		572-567	SDV-100E	0-1000mm				
		572-570	SDV-4"E	0-100mm/0-4"				
		572-571	SDV-6"E	0-150mm/0-6"				
		572-572	SDV-8"E	0-200mm/0-8"				
		572-573	SDV-12"E	0-300mm/0-12"				
		572-574	SDV-18"E	0-450mm/0-18"				
		572-575	SDV-24"E	0-600mm/0-24"				
		572-576	SDV-32"E	0-800mm/0-32"				
		572-577	SDV-40"E	0-1000mm/0-40"				
Vertical multi-function type (equipped with double reading function)	Metric	572-580-10*	SDV-10F	0-100mm	0.01mm	0.03mm	0.01mm	Approx. 5000 hours
		572-581-10*	SDV-15F	0-150mm				
		572-582-10*	SDV-20F	0-200mm				
		572-583-10*	SDV-30F	0-300mm				
		572-584-10*	SDV-45F	0-450mm				
		572-585-10*	SDV-60F	0-600mm				
		572-586-10*	SDV-80F	0-800mm				
	Metric/Inch	572-587-10*	SDV-100F	0-1000mm	0.0005"/0.01mm	0.03mm/.001"		
		572-590-10*	SDV-4"F	0-100mm/0-4"				
		572-591-10*	SDV-6"F	0-150mm/0-6"				
		572-592-10*	SDV-8"F	0-200mm/0-8"				
		572-593-10*	SDV-12"F	0-300mm/0-12"				
		572-594-10*	SDV-18"F	0-450mm/0-18"				
		572-595-10*	SDV-24"F	0-600mm/0-24"				
		572-596-10*	SDV-32"F	0-800mm/0-32"				
		572-597-10*	SDV-40"F	0-1000mm/0-40"				

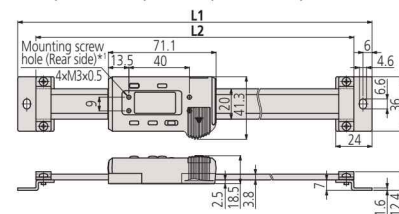
* Available to special order
Note: Response speed is unlimited

DIMENSIONS

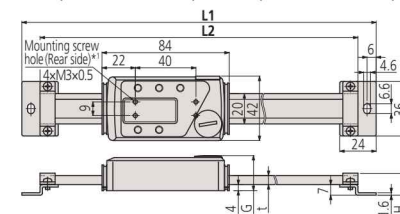
Unit: mm



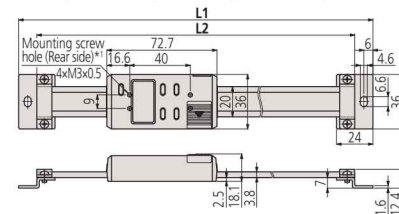
SD-E (to 300mm) / SD-F (to 300mm)



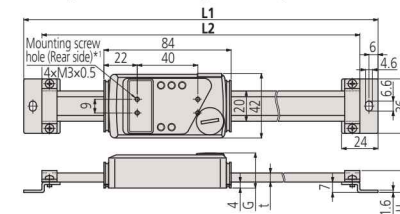
SD-E (450 to 1000mm) / SD-F (450 to 1000mm)



SDV-E (to 300mm) / SDV-F (to 300mm)



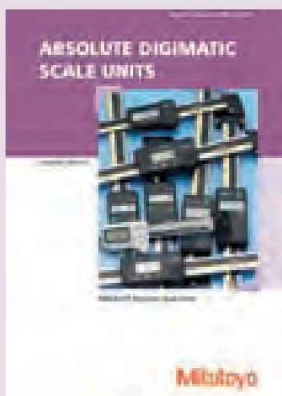
SDV-E (450 to 1000mm) / SDV-F (450 to 1000mm)



*1: Refer to the dimension table for details of the depth including the screw on the rear of the display.

SPECIFICATIONS

Model	Range (mm)	Dimensions(mm)					Depth including the screw on the rear of the display	Mass (g)	
		L1	L2	t	G	H			
SD-G	100	209	185	—	—	—	Less than 2mm	390	
	150	259	235	—	—	—		410	
	200	311	287	—	—	—		430	
SD-DX	100	209	185	—	—	—	Less than 2mm	230	
	150	259	235	—	—	—		250	
	200	311	287	—	—	—		270	
SD-30D	300	444	420	—	—	—	Less than 2mm	370	
SD-E SD-F	100	244	220	—	—	—		Less than 3mm	250
	150	294	270	—	—	—			280
	200	344	320	—	—	—	310		
	300	444	420	—	—	—	370		
	450	594	570	6	23.2	14.6	760		
SDV-E SDV-F	600	774	750	6	23.2	14.6	Less than 3mm	900	
	800	974	950	10	27.2	18.6		1710	
	1000	1174	1150	10	27.2	18.6		2040	
	100	244	220	—	—	—		Less than 2mm	250
	150	294	270	—	—	—			280
200	344	320	—	—	—	310			
300	444	420	—	—	—	370			
100	244	220	—	—	—	Less than 2mm	250		
SDV-E SDV-F	150	294	270	—	—		—	280	
	200	344	320	—	—		—	310	
	300	444	420	—	—		—	370	
	450	594	570	6	23.2		14.6	Less than 3mm	760
	600	774	750	6	23.2	14.6	900		
800	974	950	10	27.2	18.6	1710			
1000	1174	1150	10	27.2	18.6	2040			

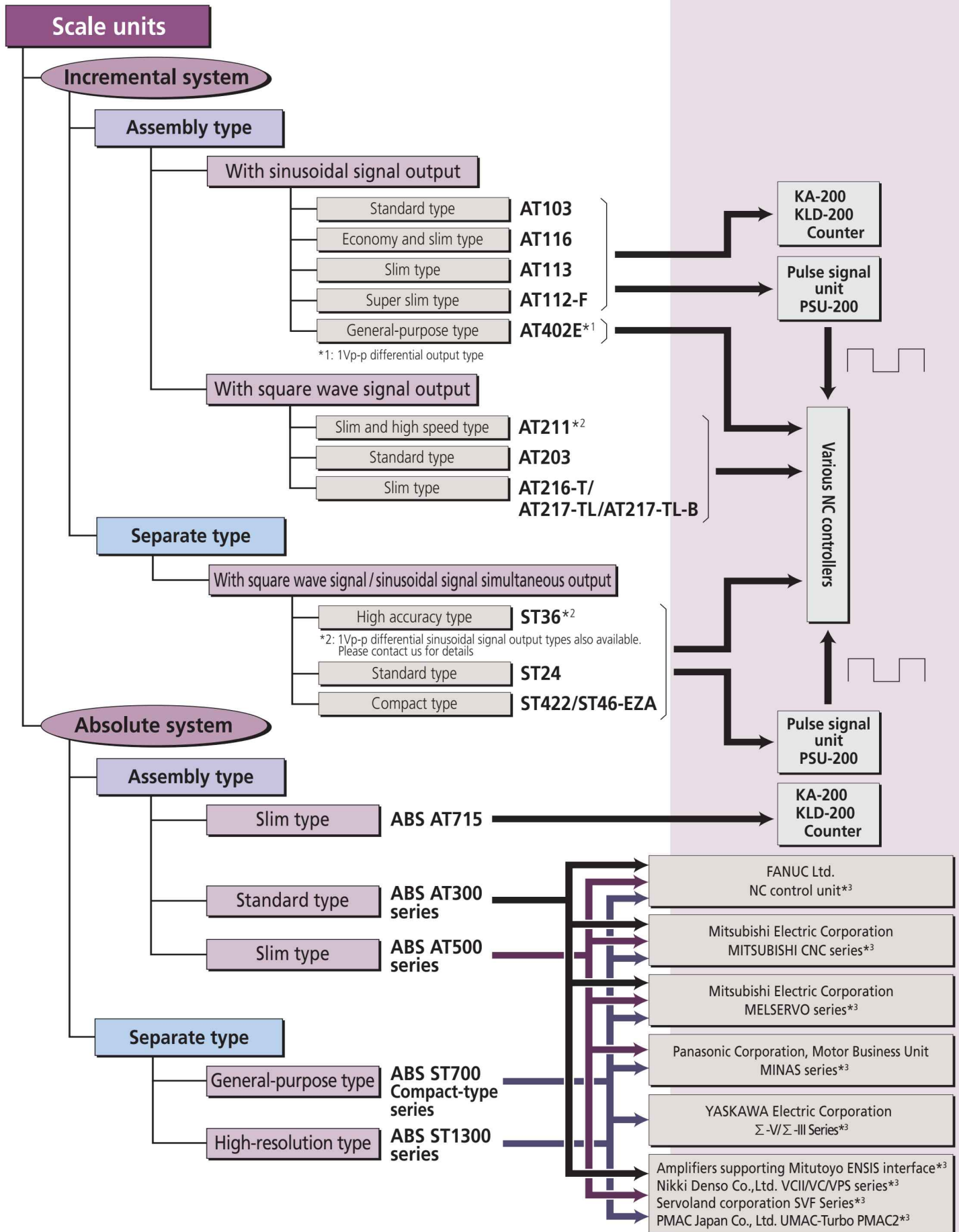


Refer to the ABSOLUTE DIGIMATIC SCALE UNITS (Catalog No.E4316) for more details.

Linear Scales

Designed to capture positional coordinates from slides on machine tools and precision instruments including semiconductor production equipment

Linear Scale System Diagram



*3: Please contact each manufacturer for details.



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

- A wide variety of measuring ranges are available in this standard type scale unit.
- Connectable to the **KA-200** counter, **KLD-200** counter, or **PSU-200**.

Linear Scales AT103 SERIES 539 — Standard Type



SPECIFICATIONS

Model	AT103
Effective range	100 to 6000mm (42 models)
Accuracy (20°C)	Effective range 100 to 3000: (5+5L ₀ /1000)μm Effective range 3250 to 6000: (5+8L ₀ /1000)μm
Output signal	Two 90° phase-shifted sinusoidal signals
Maximum response speed	120m/min (50m/min when the effective measuring length is 3250 to 6000mm)
Signal output pitch	20μm
Scale reference point	Output in 50mm pitch
Protection Level	IP53
Operating temperature	0 to 45°C

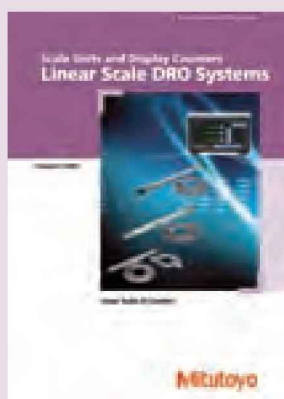
* High precision model **AT103F** (JIS Class 0, (3+3L₀/1000)μm) is also available to special order for the effective range of 100 to 2000mm.

* Ultrahigh precision model **AT103S** (2+2L₀/1000)μm is also available to special order for the effective range of 100 to 500mm.

* The indication accuracy does not include quantizing error. L₀: Effective range (mm)

AT103		Effective range L ₀ (mm)	Signal cable length (m)	
Order No.	Model			
539-111-30	AT103-100	100 (4")	3	
539-112-30	AT103-150	150 (6")		
539-113-30	AT103-200	200 (8")		
539-114-30	AT103-250	250 (10")		
539-115-30	AT103-300	300 (12")		
539-116-30	AT103-350	350 (14")		
539-117-30	AT103-400	400 (16")		
539-118-30	AT103-450	450 (18")		
539-119-30	AT103-500	500 (20")		
539-121-30	AT103-600	600 (24")		
539-123-30	AT103-700	700 (28")		
539-124-30	AT103-750	750 (30")		
539-125-30	AT103-800	800 (32")	5	
539-126-30	AT103-900	900 (36")		
539-127-30	AT103-1000	1000 (40")		
539-128-30	AT103-1100	1100 (44")		
539-129-30	AT103-1200	1200 (48")		
539-130-30	AT103-1300	1300 (52")		
539-131-30	AT103-1400	1400 (56")		
539-132-30	AT103-1500	1500 (60")		
539-133-30	AT103-1600	1600 (64")		
539-134-30	AT103-1700	1700 (68")		
539-135-30	AT103-1800	1800 (72")		
539-136-30	AT103-2000	2000 (80")		
539-137-30	AT103-2200	2200 (88")	7	
539-138-30	AT103-2400	2400 (96")		
539-139-30	AT103-2500	2500 (100")		
539-140-30	AT103-2600	2600 (104")		
539-141-30	AT103-2800	2800 (112")		
539-142-30	AT103-3000	3000 (120")		
539-143-30	AT103-3250	3250 (130")		
539-144-30	AT103-3500	3500 (140")		
539-145-30	AT103-3750	3750 (150")		
539-146-30	AT103-4000	4000 (160")		
539-147-30	AT103-4250	4250 (170")		
539-148-30	AT103-4500	4500 (180")		
539-149-30	AT103-4750	4750 (190")	10	
539-150-30	AT103-5000	5000 (200")		
539-151-30	AT103-5250	5250 (210")		
539-152-30	AT103-5500	5500 (220")		
539-153-30	AT103-5750	5750 (230")		
539-154-30	AT103-6000	6000 (240")		
				15

* Models for the effective range 3250mm or more are made-to-order.



Refer to the Linear Scale DRO Systems (Catalog No.E13000) for more details.

Linear Scales

Designed to capture positional coordinates from slides on machine tools and precision instruments including semiconductor production equipment

Linear Scales AT116 SERIES 539 — Economy and Slim Type

- Suitable for milling machines, XY tables, jigs, etc.
- Dimensionally compatible with **AT113** linear scale units.



SPECIFICATIONS

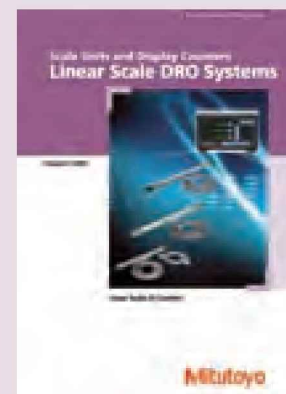
Model	AT116
Effective range	100 to 1500mm (20 models)
Accuracy (20°C)	(5+5L ₀ /1000)μm
Output signal	Two 90° phase-shifted sinusoidal signals
Maximum response speed	50m/min
Signal output pitch	20μm
Scale reference point	Output in 50mm pitch
Protection Level	IP53
Operating temperature	0 to 45°C

* The indication accuracy does not include quantizing error. L₀: Effective range (mm)

AT116		Effective range L ₀ (mm)	Signal cable length (m)
Order No.	Model		
539-271-30	AT116-100	100 (4")	3.5
539-272-30	AT116-150	150 (6")	
539-273-30	AT116-200	200 (8")	
539-274-30	AT116-250	250 (10")	
539-275-30	AT116-300	300 (12")	
539-276-30	AT116-350	350 (14")	
539-277-30	AT116-400	400 (16")	
539-278-30	AT116-450	450 (18")	
539-279-30	AT116-500	500 (20")	
539-281-30	AT116-600	600 (24")	
539-283-30	AT116-700	700 (28")	
539-284-30	AT116-750	750 (30")	
539-285-30	AT116-800	800 (32")	
539-286-30	AT116-900	900 (36")	
539-287-30	AT116-1000	1000 (40")	5
539-288-30	AT116-1100	1100 (44")	
539-289-30	AT116-1200	1200 (48")	
539-290-30	AT116-1300	1300 (52")	
539-291-30	AT116-1400	1400 (56")	
539-292-30	AT116-1500	1500 (60")	



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



Refer to the Linear Scale DRO Systems (Catalog No.E13000) for more details.



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

Linear Scales AT113 SERIES 539 — Slim Type

- Slim type with unit sectional dimensions of 22×35mmmm.
- Connectable to the **KA-200** counter, **KLD-200** counter, or **PSU-200**.



SPECIFICATIONS

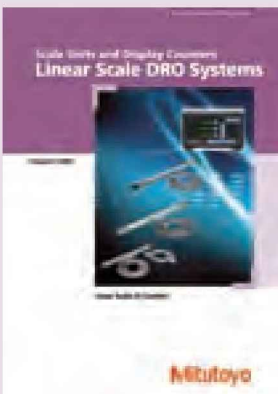
Model	AT113
Effective range	100 to 1500mm (20 models)
Accuracy (20°C)	(5+5L _o /1000)μm
Output signal	Two 90° phase-shifted sinusoidal signals
Maximum response speed	120m/min
Signal output pitch	20μm
Scale reference point	Output in 50mm pitch
Protection Level	IP53
Operating temperature	0 to 45°C

* High precision model **AT113F** (JIS Class 0, 3+3L_o/1000)μm is also available to special order.

* Ultrahigh precision model **AT113S** (2+2L_o/1000)μm is also available to special order for the effective range 100 to 500mm.

* The indication accuracy does not include quantizing error. L_o: Effective range (mm)

AT113		Effective range L _o (mm)	Signal cable length (m)
Order No.	Model		
539-201-30	AT113-100	100 (4")	3
539-202-30	AT113-150	150 (6")	
539-203-30	AT113-200	200 (8")	
539-204-30	AT113-250	250 (10")	
539-205-30	AT113-300	300 (12")	
539-206-30	AT113-350	350 (14")	
539-207-30	AT113-400	400 (16")	
539-208-30	AT113-450	450 (18")	
539-209-30	AT113-500	500 (20")	
539-211-30	AT113-600	600 (24")	
539-213-30	AT113-700	700 (28")	
539-214-30	AT113-750	750 (30")	
539-215-30	AT113-800	800 (32")	
539-216-30	AT113-900	900 (36")	
539-217-30	AT113-1000	1000 (40")	5
539-218-30	AT113-1100	1100 (44")	
539-219-30	AT113-1200	1200 (48")	
539-220-30	AT113-1300	1300 (52")	
539-221-30	AT113-1400	1400 (56")	
539-222-30	AT113-1500	1500 (60")	



Refer to the Linear Scale DRO Systems (Catalog No.E13000) for more details.

Linear Scales

Designed to capture positional coordinates from slides on machine tools and precision instruments including semiconductor production equipment

Linear Scales AT112-F SERIES 539 — Super Slim Type

- Super slim type with unit sectional dimensions of 15.4×30mm.
- Connectable to the **KA-200** counter, **KLD-200** counter, or **PSU-200**.



SPECIFICATIONS

Model	AT112-F
Effective range	50 to 1020mm (19 models)
Accuracy (20°C)	(3+3L ₀ /1000)μm
Output signal	Two 90° phase-shifted sinusoidal signals
Maximum response speed	50m/min
Signal output pitch	20μm
Scale reference point	Output in 50mm pitch*1
Protection Level	IP53
Operating temperature	0 to 45°C

* Ultra-high precision model **AT112S** (2+2L₀/1000)μm is also available to special order for the effective range 50 to 320mm.

* The indication accuracy does not include quantizing error. L₀: Effective range (mm)

*1: Models whose effective range is 50mm or 70mm: Center point

Models whose effective range is 120mm or more: 50mm pitch starting at a point 35mm from the "▼" mark on the left seen from the front.

AT112-F		Effective range L ₀ (mm)	Signal cable length (m)
Order No.	Model		
539-251-10	AT112-50F	50 (1.5")	3
539-252-10	AT112-70F	70 (2.5")	
539-253-10	AT112-120F	120 (4.5")	
539-254-10	AT112-170F	170 (6.5")	
539-255-10	AT112-220F	220 (8.5")	
539-256-10	AT112-270F	270 (10.5")	
539-257-10	AT112-320F	320 (12.5")	
539-258-10	AT112-370F	370 (14.5")	
539-259-10	AT112-420F	420 (16.5")	
539-260-10	AT112-470F	470 (18.5")	
539-261-10	AT112-520F	520 (20")	
539-262-10	AT112-570F	570 (22")	
539-263-10	AT112-620F	620 (24")	
539-264-10	AT112-670F	670 (26")	
539-265-10	AT112-720F	720 (28")	
539-266-10	AT112-770F	770 (30")	
539-267-10	AT112-820F	820 (32")	
539-268-10	AT112-920F	920 (36")	
539-269-10	AT112-1020F	1020 (40")	



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



Refer to the Linear Scale DRO Systems (Catalog No.E13000) for more details.