New Products

Digimatic Holtest

Refer to pages C-3 to C-6 for details.

Holtest

Refer to pages C-7 to C-12 for details.

ABSOLUTE Borematic

Refer to pages C-13 to C-16 for details.

Inside Micrometers (Caliper Type)

Refer to pages C-23 to C-24 for details.

Bore Gages

Refer to pages C-33 to C-36 for details.

Bore Gages for Blind Holes

Refer to pages C-41 to C-42 for details.

Holtest/ABSOLUTE Borematic

Inside Micrometers

Bore Gages

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Holtest

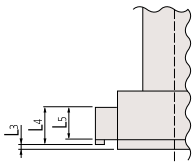
For easy and accurate measurement of inside diameters

Digimatic Holtest SERIES 468 — Three-point Internal Micrometers

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- Three-point internal micrometer with large LCD readout. (Character height 7.4 mm)
- Titanium-coated measuring pins provide excellent durability and impact resistance.
- Only one SR44 battery is required and battery life is approx. 1.2 years under normal use.
- ABSolute and INCremental measurement modes allow highly efficient operation.
- The IP65 protection rating allows the instrument to be used in the presence of splashing coolant.
- Measurements can be made close to the bottom of a blind hole.
- Deep holes can be measured by attaching an Extension Rod (optional).
- A function lock prevents accidental change of reference point.
- Measurement data output enables operation with Statistical Process Control (SPC) and measurement control systems. (Refer to page A-3)
- An interface input tool is available for transferring measurement data, under keyboard control, directly to commercial spreadsheet software. (Refer to page A-5)
- Interchangeable-Head Sets (interchangeable measuring heads type) covering an extended measuring range using multiple heads and Non-interchangeable-Head Sets are available.
- For details of Setting Rings, refer to page C-47.

Range (mm)	L_3 (mm)	L_4 (mm)	L_5 (mm)
6 - 12	2 or below	—	2.5
12 - 20	0.3 or below	5.6	3.5
20 - 30		8.3	5.2
30 - 50		13.0	10.0
50 - 100		17.0	14.0
100 - 300	12.4 or below	21.0	13.8



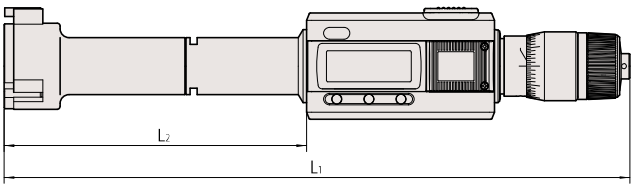
468-161

468-168

468-174

DIMENSIONS

Unit: mm



Range	L_2*	L_1
6 - 8, 8 - 10, 10 - 12 mm	59	175 - 177
12 - 16, 16 - 20 mm	84	197.5 - 201.5
20 - 25, 25 - 30 mm	93	206.9 - 211.9
30 - 40, 40 - 50 mm	103.8	214.7 - 224.7
50 - 63, 62 - 75, 75 - 88, 87 - 100 mm	105.4	219.6 - 232.6
100 - 125, 125 - 150, 150 - 175, 175 - 200, 200 - 225, 225 - 250, 250 - 275, 275 - 300 mm	151.4	286.3 - 311.3

* L_2 is maximum depth of measurement possible.
Note: External view differs depending on measurement range.

MeasurLink® ENABLED Data Management Software by Mitutoyo — Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

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

TÜVRheinland CERTIFIED www.tuv.com ID 0000021605

PROPRIETARY INSPECTION CERTIFICATE — An inspection certificate is supplied as standard. Refer to page U-11 for details.

IP Codes

Level 6: Dustproof.
No ingress of dust allowed.
Level 5: Protected against water jets.
Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

- Battery: SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)
- Battery life: Approx. 1.2 years under normal use
- Scale type: Electromagnetic induction-type rotary encoder

Functions

Zero-setting
Origin restoration
Data hold
2-point Preset
Function lock (see illustration of lock symbol below)

inch/mm readout (inch/mm models)
Automatic power ON/OFF
Error alarm
Data output

Optional Accessories

Refer to page A-27 for details.
- **USB** Input Tool Direct (2 m): **06AFM380B**
- Connecting cables for **U-WAVE-T**
  For standard (160 mm): **02AZD790B**
  For foot switch: **02AZE140B**

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

Optional Accessories

Shown mounted on stand using bracket

Mounting bracket
04AZB157

For details of Special-order Products, refer to page C-49.

SPECIFICATIONS

Metric

Order No.	Range*2 (mm)	Resolution (mm)	Maximum permissible error J_{MPE} (μm)*1	Optional Accessories: Extension rod	Optional Accessories: SPC cable
468-161	6 - 8	0.001	±2 (within 2)	**952322** (100 mm)	**05CZA662** (1 m) **05CZA663** (2 m)
468-162	8 - 10				
468-163	10 - 12				
468-164	12 - 16		±3 (within 3)	**952621** (150 mm)	
468-165	16 - 20				
468-166	20 - 25			**952622** (150 mm)	
468-167	25 - 30				
468-168	30 - 40				
468-169	40 - 50				
468-170	50 - 63			**952623** (150 mm)	
468-171	62 - 75		±4 (within 4)		
468-172	75 - 88				
468-173	87 - 100				
468-174	100 - 125		±5 (within 5)		
468-175	125 - 150				
468-176	150 - 175				
468-177	175 - 200				
468-178	200 - 225		±6 (within 6)		
468-179	225 - 250				
468-180	250 - 275				
468-181	275 - 300				

Inch / Metric

Order No.	Range*2 (in)	Resolution	Maximum permissible error J_{MPE} (in)*1	Optional Accessories: Extension rod	Optional Accessories: SPC cable
468-261	0.275 - 0.35	0.00005 in/ 0.001 mm	±0.0001 (within 0.0001)	**952322** (100 mm)	**05CZA662** (1 m) **05CZA663** (2 m)
468-262	0.35 - 0.425				
468-263	0.425 - 0.5				
468-264	0.5 - 0.65		±0.00015 (within 0.00015)	**952621** (150 mm)	
468-265	0.65 - 0.8				
468-266	0.8 - 1			**952622** (150 mm)	
468-267	1 - 1.2				
468-268	1.2 - 1.6				
468-269	1.6 - 2				
468-270	2 - 2.5			**952623** (150 mm)	
468-271	2.5 - 3		±0.0002 (within 0.0002)		
468-272	3 - 3.5				
468-273	3.5 - 4				
468-274	4 - 5	0.0001 in/ 0.001 mm	±0.00025 (within 0.00025)		
468-275	5 - 6				
468-276	6 - 7				
468-277	7 - 8				
468-278	8 - 9		±0.0003 (within 0.0003)		
468-279	9 - 10				
468-280	10 - 11				
468-281	11 - 12				

*1 Additionally, the difference in permissible error allowable is limited to a value within this range, as given in parentheses, and is measured with the entire measuring surface in contact with the object measured.
*2 The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).
Note: Setting rings are optional.

C

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Mitutoyo

Holtest

For easy and accurate measurement of inside diameters

Interchangeable-Head Sets

Metric

Set Order No.	Range* (mm)	Content of set	Accessories (optional)
468-971	6 - 12	Display unit 6 - 12 mm 1 pc. Measuring head 6 - 8 mm 1 pc. 8 - 10 mm 1 pc. 10 - 12 mm 1 pc. Setting ring (ø8, ø10) 1 pc. each Extension rod (100 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	SPC cable with data switch **05CZA662** (1 m) **05CZA663** (2 m)
468-972	12 - 20	Display unit 12 - 20 mm 1 pc. Measuring head 12 - 16 mm 1 pc. 16 - 20 mm 1 pc. Setting ring (ø16) 1 pc. Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	
468-973	20 - 50	Display unit 20 - 50 mm 1 pc. Measuring head 20 - 25 mm 1 pc. 25 - 30 mm 1 pc. 30 - 40 mm 1 pc. 40 - 50 mm 1 pc. Setting ring (ø25, ø40) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	
468-974	50 - 100	Display unit 50 - 100 mm 1 pc. Measuring head 50 - 63 mm 1 pc. 62 - 75 mm 1 pc. 75 - 88 mm 1 pc. 87 - 100 mm 1 pc. Setting ring (ø62, ø87) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	
468-975	100 - 200	Display unit 100 - 200 mm 1 pc. Measuring head 100 - 125 mm 1 pc. 125 - 150 mm 1 pc. 150 - 175 mm 1 pc. 175 - 200 mm 1 pc. Setting ring (ø125, ø175) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	

Inch / Metric

Set Order No.	Range* (in)	Content of set	Accessories (optional)
468-976	0.275 - 0.5	Display unit 0.275 - 0.5 in 1 pc. Measuring head 0.275 - 0.35 in 1 pc. 0.35 - 0.425 in 1 pc. 0.425 - 0.5 in 1 pc. Setting ring 1 pc. each (0.35 in DIA., 0.425 in DIA.) Extension rod (100 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	SPC cable with data switch **05CZA662** (1 m) **05CZA663** (2 m)
468-977	0.5 - 0.8	Display unit 0.5 - 0.8 in 1 pc. Measuring head 0.5 - 0.65 in 1 pc. 0.65 - 0.8 in 1 pc. Setting ring (0.65 in DIA.) 1 pc. Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	
468-978	0.8 - 2	Display unit 0.8 - 2 in 1 pc. Measuring head 0.8 - 1 in 1 pc. 1 - 1.2 in 1 pc. 1.2 - 1.6 in 1 pc. 1.6 - 2 in 1 pc. Setting ring 1 pc. each (1 in DIA., 1.6 in DIA.) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	
468-979	2 - 4	Display unit 2 - 4 in 1 pc. Measuring head 2 - 2.5 in 1 pc. 2.5 - 3 in 1 pc. 3 - 3.5 in 1 pc. 3.5 - 4 in 1 pc. Setting ring 1 pc. each (2.5 in DIA., 3.5 in DIA.) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	
468-980	4 - 8	Display unit 4 - 8 in 1 pc. Measuring head 4 - 5 in 1 pc. 5 - 6 in 1 pc. 6 - 7 in 1 pc. 7 - 8 in 1 pc. Setting ring (5 in DIA., 7 in DIA.) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	

* The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).

468-971

468-972

468-973

468-974

Setting rings are supplied as standard (ø125, ø175) (Packed separately)
468-975

Optional Accessories

Refer to page A-27 for details.

- **USB** Input Tool Direct (2 m): **06AFM380B**
- Connecting cables for **U-WAVE-T**
  For standard (160 mm): **02AZD790B**
  For foot switch: **02AZE140B**

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Non-Interchangeable-Head Sets

Metric

Set Order No.	Range*2 (mm)	Content of set	Accessories (optional) Extension rod	Accessories (optional) SPC cable
468-981	6 - 12	Display unit 6 - 8 mm 1 pc. 8 - 10 mm 1 pc. 10 - 12 mm 1 pc. Setting ring (ø8, ø10) 1 pc. each Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	100 mm 1 pc.	SPC cable with data switch **05CZA662** (1 m) **05CZA663** (2 m)
468-982	12 - 25	Display unit 12 - 16 mm 1 pc. 16 - 20 mm 1 pc. 20 - 25 mm 1 pc. Setting ring (ø16, ø20) 1 pc. each Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 2 pcs.*1	
468-983	25 - 50	Display unit 25 - 30 mm 1 pc. 30 - 40 mm 1 pc. 40 - 50 mm 1 pc. Setting ring (ø30, ø40) 1 pc. each Spanner 1 pc. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 1 pc.	
468-984	50 - 75	Display unit 50 - 63 mm 1 pc. 62 - 75 mm 1 pc. Setting ring (ø62) 1 pc. Spanner 1 pc. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 1 pc.	
468-985	75 - 100	Display unit 75 - 88 mm 1 pc. 87 - 100 mm 1 pc. Setting ring (ø87) 1 pc. Spanner 1 pc. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 1 pc.	

Inch / Metric

Set Order No.	Range*2 (in)	Content of set	Accessories (optional) Extension rod	Accessories (optional) SPC cable
468-986	0.275 - 0.5	Display unit 0.275 - 0.35 in 1 pc. 0.35 - 0.425 in 1 pc. 0.425 - 0.5 in 1 pc. Setting ring 1 pc. each (0.35 in DIA., 0.425 in DIA) Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	100 mm 1 pc.	SPC cable with data switch **05CZA662** (1 m) **05CZA663** (2 m)
468-987	0.5 - 1	Display unit 0.5 - 0.65 in 1 pc. 0.65 - 0.8 in 1 pc. 0.8 - 1 in 1 pc. Setting ring 1 pc. each (0.65 in DIA., 0.8 in DIA) Spanner 2 pcs. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 2 pcs.*1	
468-988	1 - 2	Display unit 1 - 1.2 in 1 pc. 1.2 - 1.6 in 1 pc. 1.6 - 2 in 1 pc. Setting ring 1 pc. each (1.2 in DIA., 1.6 in DIA) Spanner 1 pc. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 1 pc.	
468-989	2 - 3	Display unit 2 - 2.5 in 1 pc. 2.5 - 3 in 1 pc. Setting ring (2.5 in DIA) 1 pc. Spanner 1 pc. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 1 pc.	
468-990	3 - 4	Display unit 3 - 3.5 in 1 pc. 3.5 - 4 in 1 pc. Setting ring (3.5 in DIA) 1 pc. Spanner 1 pc. Hex wrench 1 pc. Phillips screwdriver 1 pc.	150 mm 1 pc.	

*1 Total 2 pcs. of extension rods: 1 pc. of Order No. **952621** (for measuring range 12 to 16 mm, 16 to 20 mm) and Order No. **952622** (for measuring range 20 to 25 mm).
Two extension rods cannot be connected due to the different mounting positions.
*2 The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).

468-981

468-982

468-983

468-984

468-985

Optional Accessories

Refer to page A-27 for details.

- **USB** Input Tool Direct (2 m): **06AFM380B**
- Connecting cables for **U-WAVE-T**
  For standard (160 mm): **02AZD790B**
  For foot switch: **02AZE140B**

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Mitutoyo

Holtest

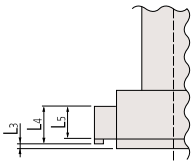
For easy and accurate measurement of inside diameters

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Holtest
SERIES 368 — Three-point/Two-point Internal Micrometers

- Titanium-coated measuring pins on the three-point type (over 6 mm range models) provide excellent durability and impact resistance.
- Three-point bore micrometer with measuring range 6 mm or longer allows stable measurement through automatic centering.
- Measurement can be made close to the bottom of a blind hole.
- Deep holes can be measured by attaching an Extension Rod (optional) which is available on models over 6 mm (0.275 in) measuring range.
- Constant-force device allows repeatable measurement, regardless of operator's skill.
- For details of Setting Rings, refer to page C-47.

Range (mm)	L_3 (mm)	L_4 (mm)	L_5 (mm)
2 - 6	—	—	2
6 - 12	2 or below	—	2.5
12 - 20	0.3 or below	5.6	3.5
20 - 30		8.3	5.2
30 - 50		13.0	10.0
50 - 100		17.0	14.0
100 - 300	12.4 or below	21.0	13.8

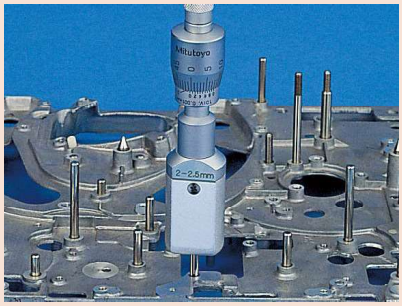


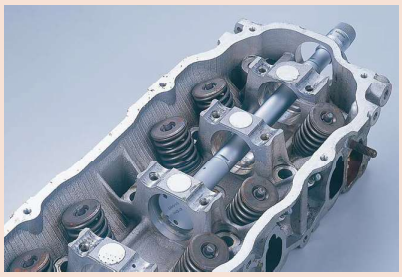
368-001
(Two-point contact model)

368-168

368-170

368-174





Typical application using an extension rod

For details of Special-order Products, refer to page C-49.

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

SPECIFICATIONS

Metric

Order No.	Range*2 (mm)	Graduation (mm)	Maximum permissible error J_{MPE} (μm)*1	Extension Rod (optional)
(Two-point)				
368-001	2 - 2.5	0.001	±2 (within 2)	—
368-002	2.5 - 3			
368-003	3 - 4			
368-004	4 - 5			
368-005	5 - 6			
(Three-point)				
368-161	6 - 8			**952322** (100 mm)
368-162	8 - 10			
368-163	10 - 12			
368-164	12 - 16	0.005	±3 (within 3)	**952621** (150 mm)
368-165	16 - 20			
368-166	20 - 25			**952622** (150 mm)
368-167	25 - 30			
368-168	30 - 40			
368-169	40 - 50			
368-170	50 - 63			**952623** (150 mm)
368-171	62 - 75		±4 (within 4)	
368-172	75 - 88			
368-173	87 - 100			
368-174	100 - 125		±5 (within 5)	
368-175	125 - 150			
368-176	150 - 175			
368-177	175 - 200			
368-178	200 - 225		±6 (within 6)	
368-179	225 - 250			
368-180	250 - 275			
368-181	275 - 300			

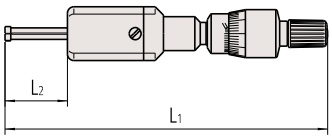
Inch

Order No.	Range*2 (in)	Graduation (in)	Maximum permissible error J_{MPE} (in)*1	Extension Rod (optional)
(Two-point)				
368-021	0.08 - 0.1	0.0001	±0.0001 (within 0.0001)	—
368-022	0.1 - 0.12			
368-023	0.12 - 0.16			
368-024	0.16 - 0.2			
368-025	0.2 - 0.24			
368-026	0.24 - 0.28			
(Three-point)				
368-261	0.275 - 0.35			**952322** (100 mm)
368-262	0.35 - 0.425			
368-263	0.425 - 0.5			
368-264	0.5 - 0.65	0.0002	±0.00015 (within 0.00015)	**952621** (150 mm)
368-265	0.65 - 0.8			
368-266	0.8 - 1			**952622** (150 mm)
368-267	1 - 1.2			
368-268	1.2 - 1.6			
368-269	1.6 - 2			
368-270	2 - 2.5			**952623** (150 mm)
368-271	2.5 - 3		±0.0002 (within 0.0002)	
368-272	3 - 3.5			
368-273	3.5 - 4			
368-274	4 - 5		±0.00025 (within 0.00025)	
368-275	5 - 6			
368-276	6 - 7			
368-277	7 - 8			
368-278	8 - 9		±0.0003 (within 0.0003)	
368-279	9 - 10			
368-280	10 - 11			
368-281	11 - 12			

*1 Additionally, the difference in permissible error allowable is limited to a value within this range, as given in parentheses, and is measured with the entire measuring surface in contact with the object measured.
*2 The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).
Note: Setting rings are optional.

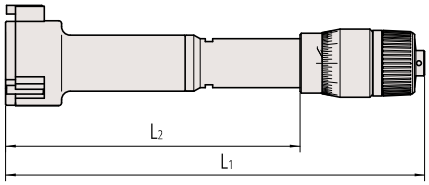
DIMENSIONS

Unit: mm



Range	L_2	L_1
2 - 2.5, 2.5 - 3 mm	12	103.5 - 104
3 - 4, 4 - 5, 5 - 6 mm	22	113 - 114

Note: External appearance differs depending on the measuring range.



Range	L_2	L_1
6 - 8, 8 - 10, 10 - 12 mm	59	102 - 104
12 - 16, 16 - 20 mm	82	126 - 130
20 - 25, 25 - 30 mm	94	137 - 142
30 - 40, 40 - 50 mm	102	145 - 155
50 - 63, 62 - 75, 75 - 88, 87 - 100 mm	105	150 - 163
100 - 125, 125 - 150, 150 - 175, 175 - 200, 200 - 225, 225 - 250, 250 - 275, 275 - 300 mm	161	227 - 252

Note: External appearance differs depending on the measuring range.

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Mitutoyo

Holtest

For easy and accurate measurement of inside diameters

Holtest
SERIES 368 — Three-point/Two-point Internal Micrometers

Non-Interchangeable-Head Sets

Metric

Set Order No.	Range* (mm)	Graduation (mm)	Content of Set
(Two-point) **368-906**	2 - 3	0.001	Micrometer head unit 2 - 2.5 mm 1 pc. 2.5 - 3 mm 1 pc. Setting ring (ø2.5) 1 pc. Hex wrench 1 pc.
368-907	3 - 6		Micrometer head unit 3 - 4 mm 1 pc. 4 - 5 mm 1 pc. 5 - 6 mm 1 pc. Setting ring (ø4, ø5) 1 pc. each Hex wrench 1 pc.
(Three-point) **368-911**	6 - 12		Micrometer head unit 6 - 8 mm 1 pc. 8 - 10 mm 1 pc. 10 - 12 mm 1 pc. Setting ring (ø8, ø10) 1 pc. each Extension rod (100 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-912	12 - 20	0.005	Micrometer head unit 12 - 16 mm 1 pc. 16 - 20 mm 1 pc. Setting ring (ø16) 1 pc. Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-913	20 - 50		Micrometer head unit 20 - 25 mm 1 pc. 25 - 30 mm 1 pc. 30 - 40 mm 1 pc. 40 - 50 mm 1 pc. Setting ring (ø25, ø40) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-914	50 - 100		Micrometer head unit 50 - 63 mm 1 pc. 62 - 75 mm 1 pc. 75 - 88 mm 1 pc. 87 - 100 mm 1 pc. Setting ring (ø62, ø87) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-915	100 - 200		Micrometer head unit 100 - 125 mm 1 pc. 125 - 150 mm 1 pc. 150 - 175 mm 1 pc. 175 - 200 mm 1 pc. Setting ring (ø125, ø175) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.

Inch

Set Order No.	Range* (in)	Graduation (in)	Content of Set
(Two-point) **368-926**	0.08 - 0.12	0.0001	Micrometer head unit 0.08 - 0.1 in 1 pc. 0.1 - 0.12 in 1 pc. Setting ring (0.1 in DIA) 1 pc. Hex wrench 1 pc.
368-927	0.12 - 0.28		Micrometer head unit 0.12 - 0.16 in 1 pc. 0.16 - 0.2 in 1 pc. 0.2 - 0.24 in 1 pc. 0.24 - 0.28 in 1 pc. Setting ring 1 pc. each (0.16 in DIA., 0.24 in DIA) Hex wrench 1 pc.
(Three-point) **368-916**	0.275 - 0.5		Micrometer head unit 0.275 - 0.35 in 1 pc. 0.35 - 0.425 in 1 pc. 0.425 - 0.5 in 1 pc. Setting ring 1 pc. each (0.35 in DIA., 0.5 in DIA) Extension rod (100 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-917	0.5 - 0.8	0.0002	Micrometer head unit 0.5 - 0.65 in 1 pc. 0.65 - 0.8 in 1 pc. Setting ring (0.65 in DIA) 1 pc. Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-918	0.8 - 2		Micrometer head unit 0.8 - 1 in 1 pc. 1 - 1.2 in 1 pc. 1.2 - 1.6 in 1 pc. 1.6 - 2 in 1 pc. Setting ring 1 pc. each (1 in DIA., 1.6 in DIA) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-919	2 - 4		Micrometer head unit 2 - 2.5 in 1 pc. 2.5 - 3 in 1 pc. 3 - 3.5 in 1 pc. 3.5 - 4 in 1 pc. Setting ring 1 pc. each (2.5 in DIA., 3.5 in DIA) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-920	4 - 8		Micrometer head unit 4 - 5 in 1 pc. 5 - 6 in 1 pc. 6 - 7 in 1 pc. 7 - 8 in 1 pc. Setting ring 1 pc. each (5 in DIA., 7 in DIA) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.

* The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).

368-906

368-907

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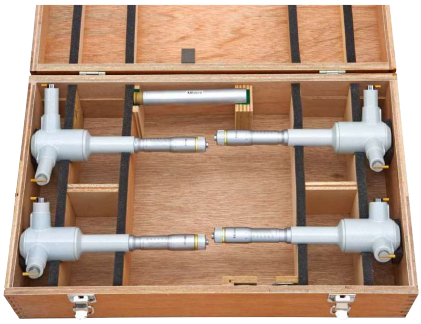
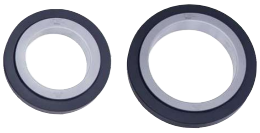
368-911

368-912

368-913

368-914





Setting rings are supplied as standard
(ø125, ø175) (Packed separately)

368-915

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Mitutoyo

Holtest

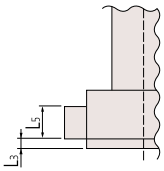
For easy and accurate measurement of inside diameters

An inspection certificate is supplied as standard. Refer to page U-11 for details.

Holtest (Type II)
SERIES 368 — Three-point Internal Micrometers

- Affordable, entry-level Holtest.
- Same accuracy as the titanium-coated Holtest models.
- For details of Setting Rings, refer to page C-47.
- Constant-force device allows repeatable measurement, regardless of operator's skill.

Range (mm)	L_3 (mm)	L_5 (mm)
12 - 20	2.6 or below	3.5
20 - 30	3.4 or below	5.2
30 - 50		10
50 - 100		14
100 - 300	19.6 or below	13.8



- Deep holes can be measured by attaching an Extension Rod (optional).

For details of Special-order Products, refer to page C-49.

368-769

368-770

368-774

SPECIFICATIONS

Metric Individual

Order No.	Range*2 (mm)	Graduation (mm)	Maximum permissible error J_{MPE} (μm)*1	Extension Rod (optional)
368-764	12 - 16	0.005	±3 (within 3)	952621 (150 mm)
368-765	16 - 20			
368-766	20 - 25			952622 (150 mm)
368-767	25 - 30			
368-768	30 - 40			
368-769	40 - 50			
368-770	50 - 63			952623 (150 mm)
368-771	62 - 75		±4 (within 4)	
368-772	75 - 88			
368-773	87 - 100			
368-774	100 - 125		±5 (within 5)	
368-775	125 - 150			
368-776	150 - 175			
368-777	175 - 200			
368-778	200 - 225		±6 (within 6)	
368-779	225 - 250			
368-780	250 - 275			
368-781	275 - 300			

Inch Individual

Order No.	Range*2 (in)	Graduation (in)	Maximum permissible error J_{MPE} (in)*1	Extension Rod (optional)
368-864	0.5 - 0.65	0.0002	±0.00015 (within 0.00015)	952621 (150 mm)
368-865	0.65 - 0.8			
368-866	0.8 - 1			952622 (150 mm)
368-867	1 - 1.2			
368-868	1.2 - 1.6			
368-869	1.6 - 2			
368-870	2 - 2.5			952623 (150 mm)
368-871	2.5 - 3		±0.0002 (within 0.0002)	
368-872	3 - 3.5			
368-873	3.5 - 4			
368-874	4 - 5		±0.00025 (within 0.00025)	
368-875	5 - 6			
368-876	6 - 7			
368-877	7 - 8			
368-878	8 - 9		±0.0003 (within 0.0003)	
368-879	9 - 10			
368-880	10 - 11			
368-881	11 - 12			

*1 Additionally, the difference in permissible error allowable is limited to a value within this range, as given in parentheses, and is measured with the entire measuring surface in contact with the object measured.
*2 The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).
Note: Setting rings are optional.

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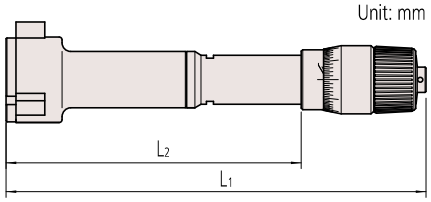
DIMENSIONS

Unit: mm



Range	L_2	L_1
12 - 16, 16 - 20	82	126 - 130
20 - 25, 25 - 30	94	137 - 142
30 - 40, 40 - 50	102	145 - 155
50 - 63, 62 - 75, 75 - 88, 87 - 100	105	150 - 163
100 - 125, 125 - 150, 150 - 175, 175 - 200 200 - 225, 225 - 250, 250 - 275, 275 - 300	161	227 - 252

Note: External appearance differs depending on the measuring range.

Non-Interchangeable-Head Sets

Metric

Order No.	Range* (mm)	Graduation (mm)	Content of Set
368-991	12 - 20	0.005	Micrometer head unit 12 - 16 mm 1 pc. 16 - 20 mm 1 pc. Setting ring (ø16) 1 pc. Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-992	20 - 50		Micrometer head unit 20 - 25 mm 1 pc. 25 - 30 mm 1 pc. 30 - 40 mm 1 pc. 40 - 50 mm 1 pc. Setting ring (ø25, ø40) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-993	50 - 100		Micrometer head unit 50 - 63 mm 1 pc. 62 - 75 mm 1 pc. 75 - 88 mm 1 pc. 87 - 100 mm 1 pc. Setting ring (ø62, ø87) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-994	100 - 200		Micrometer head unit 100 - 125 mm 1 pc. 125 - 150 mm 1 pc. 150 - 175 mm 1 pc. 175 - 200 mm 1 pc. Setting ring (ø125, ø175) 1 pc. each Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.

Inch

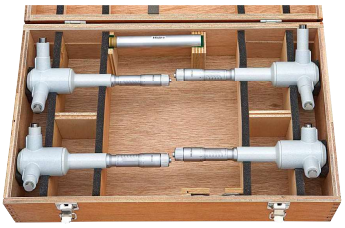
Order No.	Range* (in)	Graduation (in)	Content of Set
368-995	0.5 - 0.8	0.0002	Micrometer head unit 0.5 - 0.65 in 1 pc. 0.65 - 0.8 in 1 pc. Setting ring (0.65 in DIA.) 1 pc. Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-996	0.8 - 2		Micrometer head unit 0.8 - 1 in 1 pc. 1 - 1.2 in 1 pc. 1.2 - 1.6 in 1 pc. 1.6 - 2 in 1 pc. Setting ring 1 pc. each (1 in DIA., 1.6 in DIA.) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-997	2 - 4		Micrometer head unit 2 - 2.5 in 1 pc. 2.5 - 3 in 1 pc. 3 - 3.5 in 1 pc. 3.5 - 4 in 1 pc. Setting ring 1 pc. each (2.5 in DIA., 3.5 in DIA.) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.
368-998	4 - 8		Micrometer head unit 4 - 5 in 1 pc. 5 - 6 in 1 pc. 6 - 7 in 1 pc. 7 - 8 in 1 pc. Setting ring 1 pc. each (5 in DIA., 7 in DIA.) Extension rod (150 mm) 1 pc. Spanner 2 pcs. Hex wrench 1 pc.

* The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).

368-991

368-992

368-993



Setting rings are supplied as standard
(ø125, ø175) (Packed separately)

368-994

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Mitutoyo

Holtest

For easy and accurate measurement of inside diameters

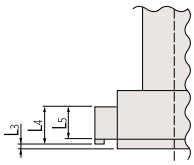
ABSOLUTE Borematic SERIES 568 — ABSOLUTE Digimatic Snap-Open Bore Gages

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- A snap-type digital display, inside-diameter measuring instrument allows quick and easy measurement with lever operation.
- Titanium-coated measuring pins provide excellent durability and impact resistance.
- Three-Point contact measuring head enables highly repeatable measurement data to be obtained.
- Built-in ABS (absolute) scale with absolute origin eliminates the need for origin setting each time power is turned on. In addition, reliability has improved due to elimination of overspeed errors.
- Equipped with GO/NO-GO judgment function, which is enabled when the upper and lower limits are set. In addition, the GO/NO-GO judgment result can be zoomed.

- Dual HOLD function buttons, optimally located, enable high operability.
- 330° rotatable display unit for easy reading at any angle.
- Measurement can be made close to the bottom of a blind hole.

Range (mm)	L_3 (mm)	L_4 (mm)	L_5 (mm)
6 - 12	2 or below	—	2.5
12 - 20	0.3 or below	5.6	3.5
20 - 30		8.3	5.2
30 - 50		13.0	10
50 - 125		17.0	14



- Deep holes can be measured by attaching an Extension Rod (optional).

Extension Rod (optional)

- Digimatic output port enables inclusion in a statistical process control or networked measurement system. (Refer to page A-3 for details)
- Interface Input Tools are available that enable the conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel. (Refer to page A-5 for details)
- Interchangeable-Head Sets (interchangeable measuring heads type) covering an extended measuring range using multiple heads and Non-interchangeable-Head Sets are available.
- For details of Setting Rings, refer to page C-47.

• Large LCD

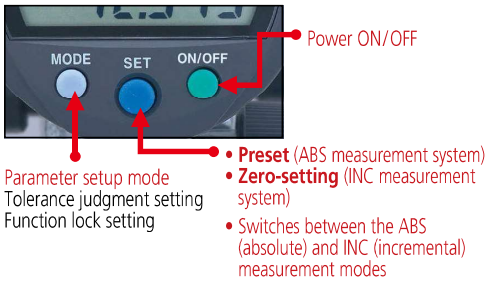
Character height of 11 mm (1.5 times the character area of conventional 8.5 mm products).

• Function Lock

Ensures reliability of measurement by locking the settings to prevent preset function settings from being changed by mistake.

• Three large buttons

The three large-button design employed by **ID-N/ID-B**, the ABSOLUTE coolant proof Digimatic indicators, enables easier and simpler operation.



MeasurLink® ENABLED
Data Management Software by Mitutoyo

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard. Refer to page U-11 for details.

ABSOLUTE™

Technical Data

- Resolution: 0.001 mm or 0.00005 in/0.001 mm
- Response speed: Infinite
- Battery: SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)
- Scale type: Electrostatic capacitance type absolute encoder
- Battery life: Approx. 5,000 hours in continuous use

Functions

GO/NO-GO judgment
GO/NO-GO judgment zoom
2-Point Preset
Zero-setting
Data hold, Error alarm
Low battery voltage alert
Data output
Function Lock
330° rotary display
inch/mm conversion (inch/mm models)

For details of Custom-ordered Products, refer to page C-49.

Optional Accessories

Refer to page A-28 for details

- **USB** Input Tool Direct (2 m): **06AFM380F**
- Connecting cables for **U-WAVE-T**
  For standard (160 mm): **02AZD790F**
  For foot switch: **02AZE140F**

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

SPECIFICATIONS

Metric Individual

Order No.	Range*2 (mm)	Maximum permissible error J_{MPE} (μm)*1	Mass (g)	Accessories (optional)	
				Extension Rod	SPC cable
568-361	6 - 8	±5 (within 5)	480	**952322** (100 mm)	**905338** (1 mm) **905409** (2 mm)
568-362	8 - 10		485		
568-363	10 - 12		485		
568-364	12 - 16		475	**952621** (150 mm)	
568-365	16 - 20		480		
568-366	20 - 25	±6 (within 6)	540	**952622** (150 mm)	
568-367	25 - 30		555		
568-368	30 - 40		565		
568-369	40 - 50		610		
568-370	50 - 63		730	**952623** (150 mm)	
568-371	62 - 75		740		
568-372	75 - 88		790		
568-373	87 - 100		800		
568-374	100 - 113		900		
568-375	112 - 125		910		

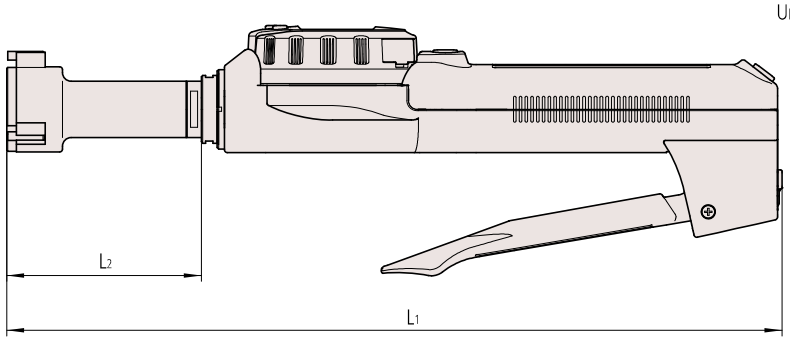
Inch / Metric Individual

Order No.	Range*2 (in)	Maximum permissible error J_{MPE} (in)*1	Mass (g)	Extension Rod (optional)	
				Extension Rod	SPC cable
568-461	0.275 - 0.35	±0.00025 (within 0.00025)	480	**952322** (100 mm)	**905338** (1 mm) **905409** (2 mm)
568-462	0.35 - 0.425		485		
568-463	0.425 - 0.5		485		
568-464	0.5 - 0.65		475	**952621** (150 mm)	
568-465	0.65 - 0.8		480		
568-466	0.8 - 1	±0.0003 (within 0.0003)	540	**952622** (150 mm)	
568-467	1 - 1.2		555		
568-468	1.2 - 1.6		565		
568-469	1.6 - 2		610		
568-470	2 - 2.5		730	**952623** (150 mm)	
568-471	2.5 - 3		740		
568-472	3 - 3.5		790		
568-473	3.5 - 4		800		
568-474	4 - 4.5		900		
568-475	4.5 - 5		910		

*1 Additionally, the difference in permissible error allowable is limited to a value within this range, as given in parentheses, and is measured with the entire measuring surface in contact with the object measured.
*2 The measurement range cannot be enlarged by measuring heads that are not standard-supplied (the accuracy is not guaranteed).
Note: Setting rings are optional.

DIMENSIONS

Unit: mm



Range	L_2	L_1
6 - 8, 8 - 10, 10 - 12 mm	83	284
12 - 16, 16 - 20 mm	53	255
20 - 25, 25 - 30 mm	59	261
30 - 40, 40 - 50 mm	67	269
50 - 63, 62 - 75, 75 - 88, 87 - 100, 100 - 113, 112 - 125 mm	75	277

Note: External appearance differs depending on the measuring range.

C

Holtest

For easy and accurate measurement of inside diameters

MeasurLink® ENABLED
Data Management Software by Mitutoyo

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

ABSOLUTE Borematic SERIES 568 — ABSOLUTE Digimatic Snap-Open Bore Gages

MeasurLink® ENABLED
Data Management Software by Mitutoyo

Interchangeable-Head Bore Gage Sets

Metric

Order No.	Range (mm)	Content of Set
568-924	6 - 12	Display unit 1 pc. Measuring head 6 - 8 mm 1 pc. 8 - 10 mm 1 pc. 10 - 12 mm 1 pc. Attachment 1 pc. Setting ring (ø8, ø10) 1 pc. each Spanner 3 pcs.
568-925	12 - 25	Display unit 1 pc. Measuring head 12 - 16 mm 1 pc. 16 - 20 mm 1 pc. 20 - 25 mm 1 pc. Attachment 2 pcs. Setting ring (ø16, ø20) 1 pc. each Spanner 2 pcs.
568-926	25 - 50	Display unit 1 pc. Measuring head 25 - 30 mm 1 pc. 30 - 40 mm 1 pc. 40 - 50 mm 1 pc. Attachment 1 pc. Setting ring (ø30, ø40) 1 pc. each Spanner 2 pcs.
568-927	50 - 100	Display unit 1 pc. Measuring head 50 - 63 mm 1 pc. 62 - 75 mm 1 pc. 75 - 88 mm 1 pc. 87 - 100 mm 1 pc. Attachment 1 pc. Setting ring (ø62, ø87) 1 pc. each Spanner 2 pcs.

Inch / Metric

Order No.	Range (in)	Content of Set
568-928	0.275 - 0.5	Display unit 1 pc. Measuring head 0.275 - 0.35 in 1 pc. 0.35 - 0.425 in 1 pc. 0.425 - 0.5 in 1 pc. Attachment 1 pc. Setting ring 1 pc. each (0.35 in DIA, 0.425 in DIA) Spanner 3 pcs.
568-929	0.5 - 1	Display unit 1 pc. Measuring head 0.5 - 0.65 in 1 pc. 0.65 - 0.8 in 1 pc. 0.8 - 1 in 1 pc. Attachment 2 pcs. Setting ring 1 pc. each (0.65 in DIA, 0.8 in DIA) Spanner 2 pcs.
568-930	1 - 2	Display unit 1 pc. Measuring head 1 - 1.2 in 1 pc. 1.2 - 1.6 in 1 pc. 1.6 - 2 in 1 pc. Attachment 1 pc. Setting ring (1.2 in DIA, 1.6 in DIA) 1 pc. each Spanner 2 pcs.
568-936	2 - 4	Display unit 1 pc. Measuring head 2 - 2.5 in 1 pc. 2.5 - 3 in 1 pc. 3 - 3.5 in 1 pc. 3.5 - 4 in 1 pc. Attachment 1 pc. Setting ring (2.5 in DIA, 3.5 in DIA) 1 pc. each Spanner 2 pcs.

Non-Interchangeable-Head Snap-Open Bore Gage Sets

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

Metric

Order No.	Range (mm)	Content of Set
568-955	6 - 12	Display unit 6 - 8 mm 1 pc. 8 - 10 mm 1 pc. 10 - 12 mm 1 pc. Setting ring (ø8, ø10) 1 pc. each Spanner 3 pcs.
568-956	12 - 25	Display unit 12 - 16 mm 1 pc. 16 - 20 mm 1 pc. 20 - 25 mm 1 pc. Setting ring (ø16, ø20) 1 pc. each Spanner 2 pcs.
568-957	25 - 50	Display unit 25 - 30 mm 1 pc. 30 - 40 mm 1 pc. 40 - 50 mm 1 pc. Setting ring (ø30, ø40) 1 pc. each Spanner 2 pcs.
568-958	50 - 75	Display unit 50 - 63 mm 1 pc. 62 - 75 mm 1 pc. Setting ring (ø62) 1 pc. Spanner 2 pcs.
568-959	75 - 100	Display unit 75 - 88 mm 1 pc. 87 - 100 mm 1 pc. Setting ring (ø87) 1 pc. Spanner 2 pcs.

Inch / Metric

Order No.	Range (in)	Content of Set
568-965	0.275 - 0.5	Display unit 0.275 - 0.35 in 1 pc. 0.35 - 0.425 in 1 pc. 0.425 - 0.5 in 1 pc. Setting ring 1 pc. each (0.35 in DIA, 0.425 in DIA) Spanner 3 pcs.
568-966	0.5 - 1	Display unit 0.5 - 0.65 in 1 pc. 0.65 - 0.8 in 1 pc. 0.8 - 1 in 1 pc. Setting ring 1 pc. each (0.65 in DIA, 0.8 in DIA) Spanner 2 pcs.
568-967	1 - 2	Display unit 1 - 1.2 in 1 pc. 1.2 - 1.6 in 1 pc. 1.6 - 2 in 1 pc. Setting ring 1 pc. each (1.2 in DIA, 1.6 in DIA) Spanner 2 pcs.
568-968	2 - 3	Display unit 2 - 2.5 in 1 pc. 2.5 - 3 in 1 pc. Setting ring (2.5 in DIA) 1 pc. Spanner 2 pcs.
568-969	3 - 4	Display unit 3 - 3.5 in 1 pc. 3.5 - 4 in 1 pc. Setting ring (3.5 in DIA) 1 pc. Spanner 2 pcs.

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

568-924

568-926

568-955

568-957

568-959

C

Inside Micrometers

For easy and accurate measurement of inside size and diameter

Tubular Inside Micrometers
SERIES 133 — Single Rod Type

- Standard single rod type inside micrometer.
- Carbide measuring faces.
- The sleeve is rotated to adjust the reference point adjustment when setting to a length standard.
- Optional Setting Rings (nominal size below 300 mm), CERA Inside Micro Checker and Gauge Block Accessory Sets are available as reference gages datum adjustment. (Refer to pages C-47, C-26, and E-17 to E20 for details)

133-143

133-144

133-145

133-146

133-147

133-148

133-149

133-150

133-151

133-152

SPECIFICATIONS

Metric Individual

Order No.	Range (mm)	Graduation (mm)	Maximum permissible error J_{MPE} (µm)
133-143	50 - 75	0.01	±3
133-144	75 - 100		±4
133-145	100 - 125		±5
133-146	125 - 150		
133-147	150 - 175		
133-148	175 - 200		
133-149	200 - 225		
133-150	225 - 250		±6
133-151	250 - 275		
133-152	275 - 300		
133-153	300 - 325		±7
133-154	325 - 350		
133-155	350 - 375		
133-156	375 - 400		±8
133-157	400 - 425		
133-158	425 - 450		
133-159	450 - 475		±9
133-160	475 - 500		
133-161	500 - 525		
133-162	525 - 550		±10
133-163	550 - 575		
133-164	575 - 600		
133-165	600 - 625		±11
133-166	625 - 650		
133-167	650 - 675		
133-168	675 - 700		±12
133-169	700 - 725		
133-170	725 - 750		
133-171	750 - 775		±13
133-172	775 - 800		
133-173	800 - 825		
133-174	825 - 850		±14
133-175	850 - 875		
133-176	875 - 900		
133-177	900 - 925		±15
133-178	925 - 950		
133-179	950 - 975		
133-180	975 - 1000		±16

Inch Individual

Order No.	Range (in)	Graduation (in)	Maximum permissible error J_{MPE} (in)
133-223	2 - 3	0.001	±0.00015
133-224	3 - 4		±0.0002
133-225	4 - 5		±0.00025
133-226	5 - 6		
133-227	6 - 7		
133-228	7 - 8		
133-229	8 - 9		
133-230	9 - 10		±0.0003
133-231	10 - 11		
133-232	11 - 12		

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Single Rod Type Inside Micrometer Set

133-902

Metric Micrometer set

Order No.	Range (mm)	Models included
133-901	50 - 150 (4 heads/set)	**133-143 133-144 133-145 133-146** with fitted case
133-902	50 - 300 (10 heads/set)	**133-143 133-144 133-145 133-146 133-147 133-148 133-149 133-150 133-151 133-152** with fitted case

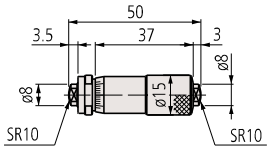
Inch Micrometer set

Order No.	Range (in)	Models included
133-903	2 - 6 (4 heads/set)	**133-223 133-224 133-225 133-226** with fitted case
133-904	2 - 12 (10 heads/set)	**133-223 133-224 133-225 133-226 133-227 133-228 133-229 133-230 133-231 133-232** with fitted case

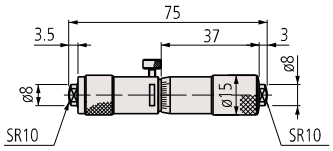
C

DIMENSIONS

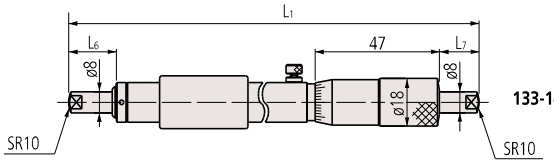
Unit: mm



133-143



133-144



133-145 to **133-180**

Order No.	L_1	L_6	L_7
133-145	100	5	3
133-146	125	5	3
133-147	150	18	15
133-148	175	18	15
133-149	200	18	15
⋮	⋮	⋮	⋮
133-180	975	18	15

Inside Micrometers

For easy and accurate measurement of inside size and diameter

Tubular Inside Micrometers SERIES 137, 337 — Extension Rod Type

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- Wide range of inside measurements possible by combining extension rods and anvils with the micrometer head.
- Two types of measuring faces are available; with or without carbide tip. (Order No. 337-101/301/302/102/303/304 only available with carbide tip)
- The sleeve is rotated to adjust the reference point adjustment when setting to a length standard.
- An inside length standard is required for accurately setting the micrometer.
- Order No. 337-101/301/302/102/303/304 features:
  - IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
  - A large-character LCD display.
  - Storage of 2 preset values for use when setting to an inside length standard.
  - A function lock that prevents accidental changing of the reference setting during measurement.

337-301

137-205

MeasurLink® ENABLED
Data Management Software by Mitutoyo

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

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

TÜVRheinland CERTIFIED
www.tuv.com
ID 0000021605

IP Codes

Level 6: Dust-proof.
No ingress of dust allowed.
Level 5: Protected against water jets.
Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

- Spindle feed error 3 µm/0.00015 in
  Note: "Spindle feed error" refers to the difference between the maximum and minimum indication error values within the measuring range of the micrometer head

Functions (for 337-101/301/302/102/303/304)

Zero-setting
Origin restoration
Data hold
2-point Preset
Function lock
Automatic power ON/OFF
Error alarm
Data output

Technical Data

- Battery and Scale Type
  (for 337-101/301/302/102/303/304)
  SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)
- Battery life: Approx. 1.2 years under normal use
- Scale type: Electromagnetic induction-type rotary encoder

Optional Accessories

Refer to page A-27 for details.

- Connecting cables with **IT/DP/MUX**, etc.
  1 m: **05CZA662**
  2 m: **05CZA663**
- **USB** Input Tool Direct (2 m): **06AFM380B**
- Connecting cables for **U-WAVE-T**
  For standard (160 mm): **02AZD790B**
  For foot switch: **02AZE140B**

SPECIFICATIONS

Metric

Order No.	Range (mm)	Resolution (mm)	Micrometer head stroke (mm)	Extension rods Qty	Extension rods Size (mm)	Display unit (mm)
Digimatic (LCD)						
337-101	200 - 225	0.001	25	—	—	200 - 225
337-301	200 - 1000			6	25, 50, 100 (2 pcs.), 200, 300	
337-302	200 - 1500			7	25, 50, 100, 200, 300 (3 pcs.)	

Inch/Metric

Order No.	Range (in)	Resolution	Micrometer head stroke (in)	Extension rods Qty	Extension rods Size (in)	Display unit (in)
Digimatic (LCD)						
337-102	8 - 9	0.0001 in/ 0.001 mm	1	—	—	8 - 9
337-303	8 - 40			6	1, 2, 4 (2 pcs.), 8, 12	
337-304	8 - 60			7	1, 2, 4, 8, 12 (3 pcs.)	

Metric

Order No.	Range (mm)	Graduation (mm)	Micrometer head stroke (mm)	Extension rods Qty	Extension rods Size (mm)	Main unit (mm)
Analog						
137-201	50 - 150	0.01	13	3	13, 25, 50	50 - 63
137-202	50 - 300			5	13, 25, 50 (2 pcs.), 100	
137-203	50 - 500			6	13, 25, 50 (2 pcs.), 100, 200	
137-204	50 - 1000			8	13, 25, 50 (2 pcs.), 100, 200 (2 pcs.), 300	
137-205	50 - 1500			10	13, 25, 50 (2 pcs.), 100, 200 (3 pcs.), 300 (2 pcs.)	
Analog (With carbide measuring face)						
137-206	50 - 150	0.01	13	3	13, 25, 50	50 - 63
137-207	50 - 300			5	13, 25, 50 (2 pcs.), 100	
137-208	50 - 500			6	13, 25, 50 (2 pcs.), 100, 200	
137-209	50 - 1000			8	13, 25, 50 (2 pcs.), 100, 200 (2 pcs.), 300	
137-210	50 - 1500			10	13, 25, 50 (2 pcs.), 100, 200 (3 pcs.), 300 (2 pcs.)	

Inch

Order No.	Range (in)	Graduation (in)	Micrometer head stroke (in)	Extension rods Qty	Extension rods Size (in)	Main unit (in)
Analog						
137-211	2 - 6	0.001	0.5	3	0.5, 1, 2	2 - 2.5
137-212	2 - 12			5	0.5, 1, 2 (2 pcs.), 4	
137-213	2 - 20			6	0.5, 1, 2 (2 pcs.), 4, 8	
137-214	2 - 40			8	0.5, 1, 2 (2 pcs.), 4, 8 (2 pcs.), 12	
137-215	2 - 60			10	0.5, 1, 2 (2 pcs.), 4, 8 (3 pcs.), 12 (2 pcs.)	
Analog (With carbide measuring face)						
137-216	2 - 6	0.001	0.5	3	0.5, 1, 2	2 - 2.5
137-217	2 - 12			5	0.5, 1, 2 (2 pcs.), 4	
137-218	2 - 20			6	0.5, 1, 2 (2 pcs.), 4, 8	
137-219	2 - 40			8	0.5, 1, 2 (2 pcs.), 4, 8 (2 pcs.), 12	
137-220	2 - 60			10	0.5, 1, 2 (2 pcs.), 4, 8 (3 pcs.), 12 (2 pcs.)	

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

Technical Data

• Spindle feed error 3 µm/0.00015 in

Note: "Spindle feed error" refers to the difference between the maximum and minimum indication error values within the specification range of the micrometer head

Tubular Inside Micrometers
SERIES 137 — Extension Rod Type (main unit)

- Micrometer head for Extension Rod Type inside micrometer.
- The sleeve is rotated to adjust the reference point adjustment when setting to a length standard.
- Optional Setting Rings and Gauge Block Accessory Sets are available as reference gages for datum adjustment. (Refer to pages C-47 and E-17 to E-20 for details)

137-011

SPECIFICATIONS

Metric

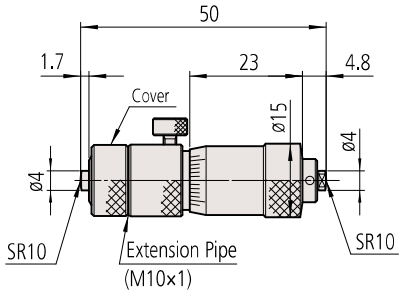
Order No.	Range (mm)	Graduation (mm)	Micrometer head stroke (mm)
137-011 Carbide-tipped **137-013**	50 - 63	0.01	13

Inch

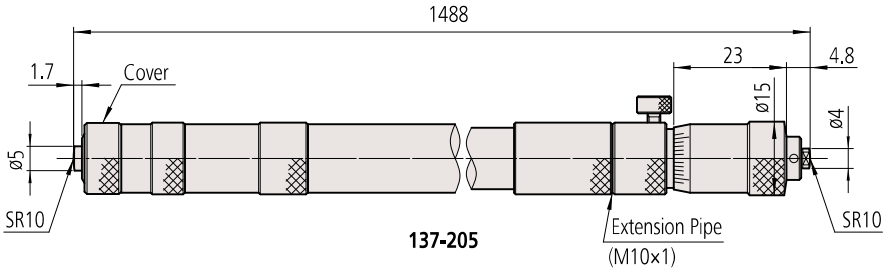
Order No.	Range (in)	Graduation (in)	Micrometer head stroke (in)
137-012 Carbide-tipped **137-014**	2 - 2.5	0.001	0.5

DIMENSIONS

Unit: mm



137-011



137-205

C

Inside Micrometers

For easy and accurate measurement of inside size and diameter

Tubular Inside Micrometers SERIES 139, 339, 140 — Extension Pipe Type

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- Wide range of inside measurements possible by combining Extension Pipes and anvils with the micrometer head.
- Carbide measuring faces.
- The sleeve is rotated to adjust the reference point adjustment when setting to a length standard.
- An inside length standard is required for accurately setting the micrometer.

- Order No. 339-101/301/302/102/303/304 features:
  - IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
  - A large-character LCD display.
  - Storage of 2 preset values for use when setting to an inside length standard.
  - A function lock that prevents accidental changing of the reference setting during measurement.

339-301

139-177

140-158

MeasurLink® ENABLED Data Management Software by Mitutoyo — Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

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

TÜVRheinland CERTIFIED www.tuv.com ID 0000021605

IP Codes

Level 6: Dust-proof.
No ingress of dust allowed.
Level 5: Protected against water jets.
Water projected in jets against the enclosure from any direction shall have no harmful effects.

Technical Data

- Spindle feed error 3 µm/0.00015 in (**139**, **339** Series)
  6 µm/0.0003 in (**140** Series)

Note: "Spindle feed error" refers to the difference between the maximum and minimum indication error values within the measuring range of the micrometer head

Functions (for 339-101/301/302/102/303/304)

Zero-setting
Origin restoration
Data hold
Function lock
Automatic power ON/OFF
2-point Preset
Error alarm
Data output

Technical Data

- Battery and Scale Type
  (for 339-101/301/302/102/303/304)
  SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)
- Battery life: Approx. 1.2 years under normal use
- Scale type: Electromagnetic induction-type rotary encoder

Optional Accessories

Refer to page A-27 for details.

- Connecting cables with **IT/DP/MUX**, etc.
  1 m: **05CZA662**
  2 m: **05CZA663**
- **USB** Input Tool Direct (2 m): **06AFM380B**
- Connecting cables for **U-WAVE-T**
  For standard (160 mm): **02AZD790B**
  For foot switch: **02AZE140B**

SPECIFICATIONS

Metric

Order No.	Range (mm)	Resolution (mm)	Micrometer head stroke (mm)	Extension pipes Qty	Extension pipes Size (mm)	Display unit (mm)
Digimatic (LCD)						
339-101	200 - 225	0.001	25	—	—	200 - 225
339-301	200 - 1000			5	25, 50, 100, 200, 400	
339-302	200 - 2000			8	25, 50, 100, 200 (2 pcs.), 400 (3 pcs.)	

Inch/Metric

Order No.	Range (in)	Resolution	Micrometer head stroke (in)	Extension pipes Qty	Extension pipes Size (in)	Display unit (in)
Digimatic (LCD)						
339-102	8 - 9	0.0001 in/ 0.001 mm	1		—	8 - 9
339-303	8 - 40			5	1, 2, 4, 8, 16	
339-304	8 - 80			8	1, 2, 4, 8 (2 pcs.), 16 (3 pcs.)	

Metric

Order No.	Range (mm)	Graduation (mm)	Micrometer head stroke (mm)	Extension pipes Qty	Extension pipes Size (mm)	Main unit (mm)
Analog						
139-173	100 - 500	0.01	25	4	25, 50, 100, 200	100 - 125
139-174	100 - 900			5	25, 50, 100, 200, 400	
139-175	100 - 1300			6	25, 50, 100, 200, 400 (2 pcs.)	
139-176	100 - 1700			7	25, 50, 100, 200, 400 (3 pcs.)	
139-177	100 - 2100			8	25, 50, 100, 200, 400 (4 pcs.)	
140-157	1000 - 2000		50	5	50, 100 (2 pcs.), 200, 500	1000 - 1050
140-158	1000 - 3000			6	50, 100 (2 pcs.), 200, 500, 1000	
140-159	1000 - 4000			7	50, 100 (2 pcs.), 200, 500, 1000 (2 pcs.)	
140-160	1000 - 5000			8	50, 100 (2 pcs.), 200, 500, 1000 (3 pcs.)	

Inch

Order No.	Range (in)	Graduation (in)	Micrometer head stroke (in)	Extension pipes Qty	Extension pipes Size (in)	Main unit (in)
Analog						
139-178	4 - 20	0.001	1	4	1, 2, 4, 8	4 - 5
139-179	4 - 36			5	1, 2, 4, 8, 16	
139-180	4 - 52			6	1, 2, 4, 8, 16 (2 pcs.)	
139-181	4 - 68			7	1, 2, 4, 8, 16 (3 pcs.)	
139-182	4 - 84			8	1, 2, 4, 8, 16 (4 pcs.)	
140-161	40 - 80		2	5	2, 4 (2 pcs.), 8, 20	40 - 42
140-162	40 - 120			6	2, 4 (2 pcs.), 8, 20, 40	
140-163	40 - 160			7	2, 4 (2 pcs.), 8, 20, 40 (2 pcs.)	
140-164	40 - 200			8	2, 4 (2 pcs.), 8, 20, 40 (3 pcs.)	

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

Tubular Inside Micrometers
SERIES 139 — Extension Pipe Type (main unit)

Technical Data

- Spindle feed error 3 µm/0.00015 in

Note: "Spindle feed error" refers to the difference between the maximum and minimum indication error values within the specification range of the micrometer head

- Micrometer head for Extension Pipe Type inside micrometer.
- The sleeve is rotated to adjust the reference point adjustment when setting to a length standard.
- Optional Setting Rings, CERA Inside Micro Checker and Gauge Block Accessory Sets are available as reference gages for datum adjustment. (Refer to pages C-47, C-26, and E-17 to E-20 for details)

139-001

SPECIFICATIONS

Metric

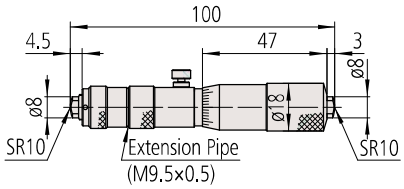
Order No.	Range (mm)	Graduation (mm)	Micrometer head stroke (mm)
139-001	100 - 125	0.01	25

Inch

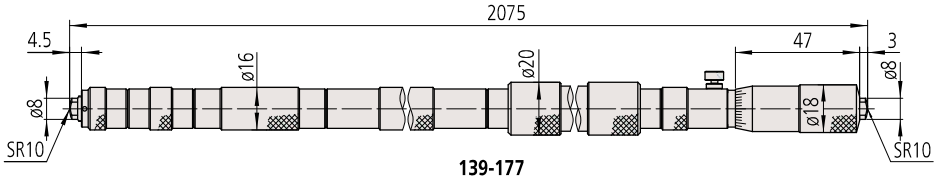
Order No.	Range (in)	Graduation (in)	Micrometer head stroke (in)
139-002	4 - 5	0.001	1

DIMENSIONS

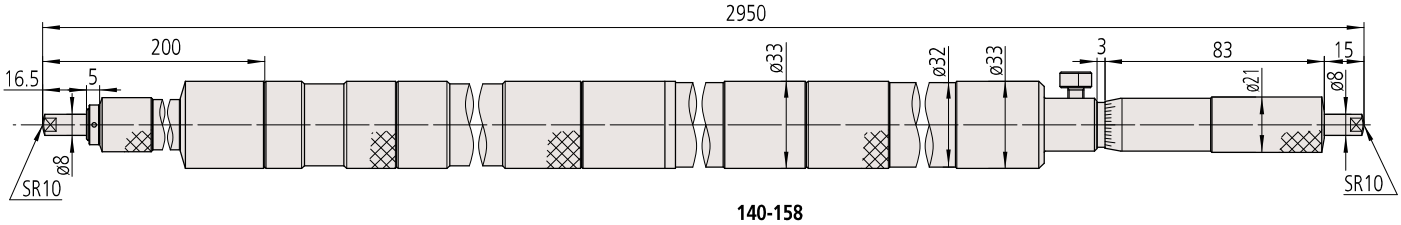
Unit: mm



139-001



139-177



140-158

C

Inside Micrometers

For easy and accurate measurement of inside size and diameter

MeasurLink® ENABLED
Data Management Software by Mitutoyo

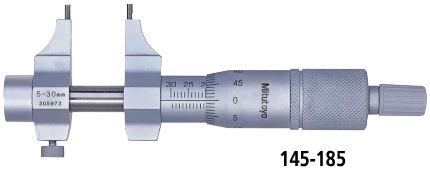
Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

Inside Micrometers SERIES 345, 145 — Caliper Type

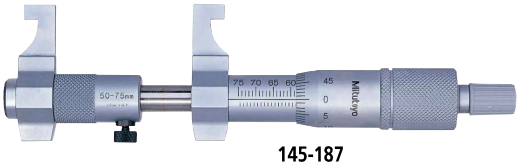
MeasurLink® ENABLED
Data Management Software by Mitutoyo

- Caliper type inside micrometer equipped with round pin or anvil type jaws, according to model.
- Carbide measuring faces.
- Equipped with a constant measuring-force device.
- Optional Setting Rings (nominal size below 300 mm), CERA Inside Micro Checker (more than 25 mm) and Gauge Block Accessory Sets are available as reference gages for datum adjustment. (Refer to pages C-47, C-26, and E-17 to E-20 for details)

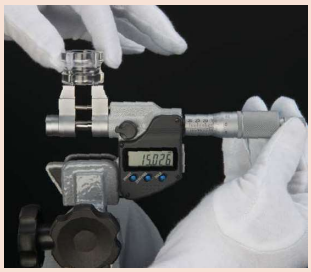
345-250-30



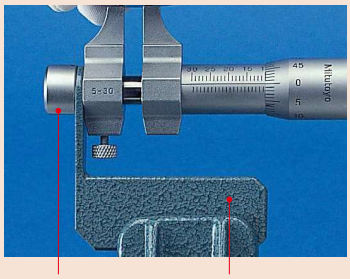
145-185



145-187



Accessories for 145-185 / 186 / 193 / 194 (optional)



Cap (**300401**) Holder (**300400**)

Note 1: This instrument requires the cap and the holder for mounting on a micrometer stand.
Note 2: It may not be applicable to a custom specification.

SPECIFICATIONS

Metric

Order No.	Range (mm)	Resolution (mm)	Maximum permissible error J_{MPE} (µm)	Jaw	Mass (g)
Digimatic (LCD)					
345-250-30	5 - 30	0.001	±5	Pin	320
345-251-30	25 - 50		±6	Anvil	325

Inch / Metric

Order No.	Range (in)	Resolution	Maximum permissible error J_{MPE} (in)	Jaw	Mass (g)
Digimatic (LCD)					
345-350-30	0.2 - 1.2	0.00005 in/ 0.001 mm	±0.00025	Pin	320
345-351-30	1 - 2		±0.0003	Anvil	325

Note: For the functions, refer to **293** Series with SPC data output on page B-8.
This model is NOT water-proof. Also, the origin setting is the free preset type.

Metric

Order No.	Range (mm)	Graduation (mm)	Maximum permissible error J_{MPE} (µm)	Jaw	Mass (g)
Analog					
145-185	5 - 30	0.01	±5	Pin	130
145-186	25 - 50		±6	Anvil	140
145-187	50 - 75		±7	Anvil	160
145-188	75 - 100		±8	Anvil	180
145-189	100 - 125		±9	Anvil	210
145-190	125 - 150			Anvil	230
145-191	150 - 175		±10	Anvil	250
145-192	175 - 200			Anvil	270
145-217	200 - 225		±11	Anvil	310
145-218	225 - 250			Anvil	330
145-219	250 - 275		±12	Anvil	350
145-220	275 - 300			Anvil	370

Inch

Order No.	Range (in)	Graduation (in)	Maximum permissible error J_{MPE} (in)	Jaw	Mass (g)
Analog					
145-193	0.2 - 1.2	0.001	±0.00025	Pin	130
145-194	1 - 2		±0.0003	Anvil	140
145-195	2 - 3		±0.00035	Anvil	160
145-196	3 - 4		±0.0004	Anvil	180

Note: The minimum pitch circle measurement is ø5 mm with pin types (**145-185** and **345-250-30**).

Technical Data

- Battery and Scale Type
  (for 345-250-30/251-30/350-30/351-30)
  SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)
- Battery life: Approx. 2.4 years under normal use
- Scale type: Electromagnetic induction-type rotary encoder

Optional Accessories

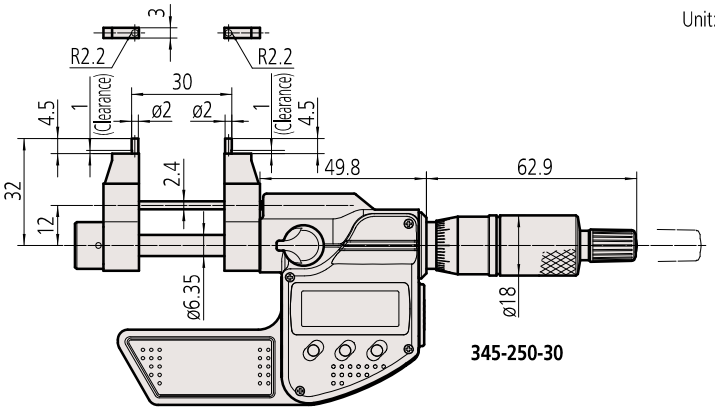
Refer to page A-27 for details.

- Connecting cables with **IT / DP / MUX**, etc.
  1 m: **05CZA662**
  2 m: **05CZA663**
- **USB** Input Tool Direct (2 m): **06AFM380B**
- Connecting cables for **U-WAVE-T**
  For standard (160 mm): **02AZD790B**
  For foot switch: **02AZE140B**

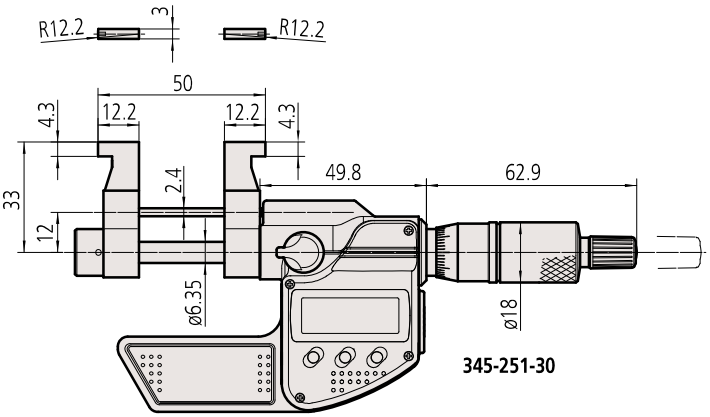
Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

DIMENSIONS

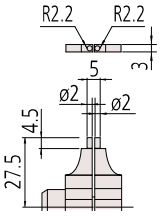
Unit: mm



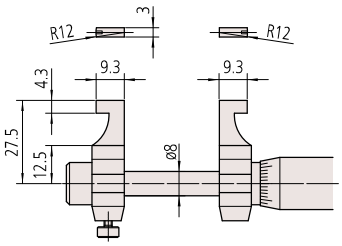
345-250-30



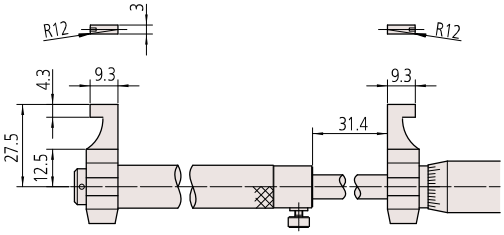
345-251-30



145-185



145-186



145-187 to 145-220

C

Inside Micrometers

For easy and accurate measurement of inside size and diameter

Inside Micrometers
SERIES 141 — Interchangeable Rod Type

- Wide range of inside measurements possible by combining one or more interchangeable rods.
- For models supplied with more than one interchangeable rod, the full measuring range is achieved by combining spacing collars with the rods.
- The sleeve is rotated to adjust the reference point adjustment when setting to a length standard.
- Optional Setting Rings (nominal size below 300 mm), CERA Inside Micro Checker and Gauge Block Accessory Sets are available as reference gages for datum adjustment. (Refer to pages C-47, C-26, and E-17 to E-20 for details)

Technical Data

- Spindle feed error 3 µm/0.00015 in

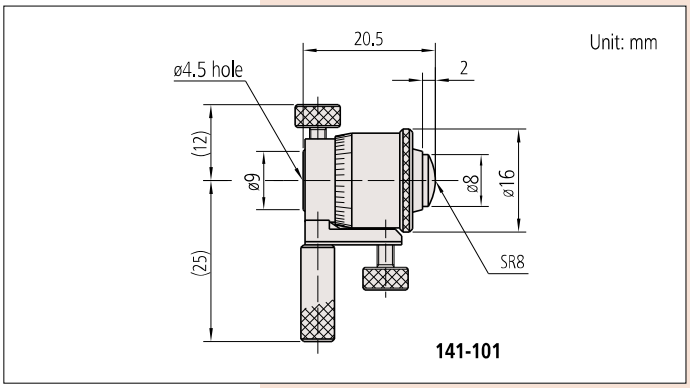
Note: "Spindle feed error" refers to the difference between the maximum and minimum indication error values within the specification range of the micrometer head

141-101

When using one of the extension rods supplied (Measuring range 43 to 50 mm)

When using one of the extension rods supplied (Measuring range 25 to 32 mm)

DIMENSIONS



SPECIFICATIONS

Metric

Order No.	Range (mm)	Graduation (mm)	Micrometer head stroke (mm)	Remarks
141-101 / 141-103*	25 - 50	0.01	7	with 2 rods
141-205 / 141-211*	50 - 200		13	with 3 rods
141-206 / 141-212*	50 - 300			with 5 rods
141-117	200 - 500		25	with 3 rods
141-118	200 - 1000			with 8 rods

* With carbide measuring face

Metric Micrometer head only model

Order No.	Range (mm)	Graduation (mm)	Micrometer head stroke (mm)
141-001 / 141-003*	25 - 32	0.01	7
141-025 / 141-027*	50 - 63		13
141-009 / 141-011*	200 - 225		25

* With carbide measuring face

Inch

Order No.	Range (in)	Graduation (in)	Micrometer head stroke (in)	Remarks
141-102 / 141-104*	1 - 2	0.001	0.25	with 2 rods
141-208 / 141-214*	2 - 8		0.5	with 3 rods
141-233 / 141-215*	2 - 12			with 5 rods
141-121	8 - 20		1	with 3 rods
141-122	8 - 40			with 8 rods

* With carbide measuring face

Inch Micrometer head only model

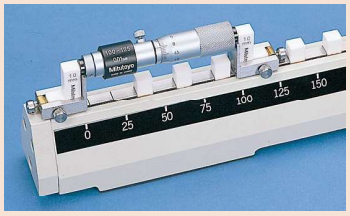
Order No.	Range (in)	Graduation (in)	Micrometer head stroke (in)
141-002 / 141-004*	1 - 1.25	0.001	0.25
141-026 / 141-028*	2 - 2.5		0.5
141-010 / 141-012*	8 - 9		1

* With carbide measuring face

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Typical application



Optional Accessory

- Wooden box
  For 515-585: 602160
  For 515-586: 602163

CERA Inside Micro Checker SERIES 515

- The Inside Micro Checker is designed to act as a setting standard for inside micrometers.
- Applicable for SERIES **133**, **139** and **145** (over 50 mm). Not applicable for SERIES **137**, **141**, **337** and **339**.

515-585

Standard accessory set

Support clamps	**940286***	Pair
Auxiliary block 10 mm		2 pcs.
Collar	**602195**	2 pcs.
Clamp screwdriver	**600324**	1 pc.

* Order No. is equivalent to a pair (2 pcs.)

SPECIFICATIONS

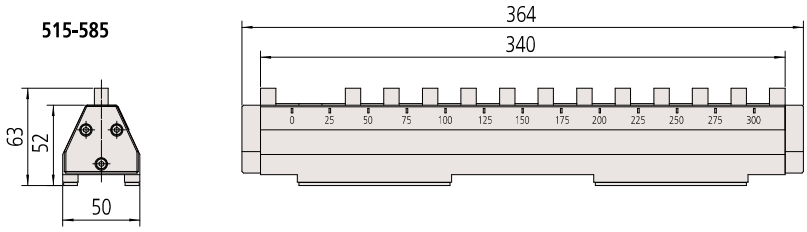
Order No.	Length to check (mm)	Block pitch accuracy
515-585	25 - 300	±(1 + L/150) µm L: Length to check (mm)
515-586	25 - 600	

Note: Please note that the bottom surface and the contact faces are not precisely perpendicular to each other.

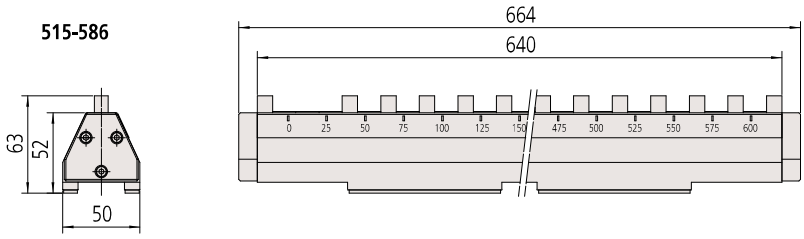
DIMENSIONS

Unit: mm

515-585



515-586



C

Bore Gages

For easy and accurate measurement of inside diameters

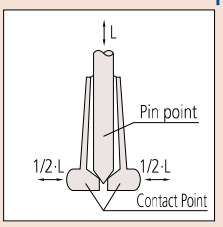
Bore Gages
SERIES 526 — for Extra Small Holes

- These gages are designed to measure the diameters of very small holes.
- The indicator (dial indicator, Digimatic indicator) and dial protection cover are optional. Select an indicator from the recommended dial indicators and Digimatic indicators. Please contact us for advice when using an indicator other than the recommended indicators.
- An optional stand (**215-120-10**) is available for efficient measurement of multiple small holes. (Refer to page C-30 for details)

526-170-11

Note: The dial indicator and the protection cover are optional.

Measurement Principle



Setting Rings (Metric models)

Nominal size

- **Order No. 526-170-11 etc.**
  177-220: 1.0 mm
  177-222: 1.1 mm
  177-225: 1.2 mm
  177-227: 1.3 mm
  177-230: 1.4 mm
- **Order No. 526-160-11 etc.**
  177-236: 1.75 mm
  177-239: 2.00 mm
  177-242: 2.25 mm
  177-208: 2.50 mm
  177-246: 2.75 mm
  177-248: 3.00 mm
  177-250: 3.25 mm
  177-252: 3.50 mm
  177-255: 3.75 mm
- **Order No. 526-150-11 etc.**
  177-204: 4.0 mm
  177-257: 4.5 mm
  177-205: 5.0 mm
  177-263: 5.5 mm
  177-267: 6.0 mm
  177-271: 6.5 mm
  177-275: 7.0 mm

Setting Rings (Inch models)

Nominal size

- **Order No. 526-175-11 etc.**
  177-350: 0.040 in
  177-351: 0.045 in
  177-352: 0.050 in
  177-353: 0.055 in
  177-354: 0.060 in
- **Order No. 526-165-11 etc.**
  177-355: 0.07 in
  177-356: 0.08 in
  177-357: 0.09 in
  177-358: 0.10 in
  177-359: 0.11 in
  177-360: 0.12 in
  177-361: 0.13 in
  177-362: 0.14 in
  177-363: 0.15 in
- **Order No. 526-155-11 etc.**
  177-364: 0.16 in
  177-365: 0.18 in
  177-366: 0.20 in
  177-367: 0.22 in
  177-368: 0.24 in
  177-369: 0.26 in
  177-370: 0.28 in

SPECIFICATIONS

Metric

Order No.	Range (mm)	Accuracy (µm)	Repeatability (µm)	Bore gage	Dial indicator	Dial protection cover	Setting ring
526-170-10	0.95 - 1.55	4	1	526-170-10	Not supplied	Not supplied	Not supplied
526-160-10	1.50 - 3.95	4		526-160-10			
526-150-10	3.70 - 7.30	6		526-150-10			
526-172-10	0.95 - 1.55	4		526-170-10	2109SB-10 (Graduation: 0.001 mm)	21DZA000	
526-162-10	1.50 - 3.95	4		526-160-10			
526-152-10	3.70 - 7.30	6		526-150-10			
526-173-10	0.95 - 1.55	4		526-170-10	2046SB (Graduation: 0.01 mm)	21DZA000	
526-163-10	1.50 - 3.95	4		526-160-10			
526-153-10	3.70 - 7.30	6		526-150-10			
526-170-11	0.95 - 1.55	4		526-170-10	Not supplied	Not supplied	Supplied
526-160-11	1.50 - 3.95	4		526-160-10			
526-150-11	3.70 - 7.30	6		526-150-10			
526-172-11	0.95 - 1.55	4		526-170-10	2109SB-10 (Graduation: 0.001 mm)	21DZA000	
526-162-11	1.50 - 3.95	4		526-160-10			
526-152-11	3.70 - 7.30	6		526-150-10			
526-173-11	0.95 - 1.55	4		526-170-10	2046SB (Graduation: 0.01 mm)	21DZA000	
526-163-11	1.50 - 3.95	4		526-160-10			
526-153-11	3.70 - 7.30	6		526-150-10			

Inch

Order No.	Range (in)	Accuracy (in)	Repeatability (in)	Bore gage	Dial indicator	Dial protection cover	Setting ring
526-175-10	0.037 - 0.061	0.00016	0.00004	526-175-10	Not supplied	Not supplied	Not supplied
526-165-10	0.059 - 0.156	0.00016		526-165-10			
526-155-10	0.146 - 0.287	0.00024		526-155-10			
526-176-10	0.037 - 0.061	0.00016		526-175-10	2923SB-10 (Graduation: 0.0001 in)	21DZA000	
526-166-10	0.059 - 0.156	0.00016		526-165-10			
526-156-10	0.146 - 0.287	0.00024		526-155-10			
526-175-11	0.037 - 0.061	0.00016		526-175-10	Not supplied	Not supplied	Supplied
526-165-11	0.059 - 0.156	0.00016		526-165-10			
526-155-11	0.146 - 0.287	0.00024		526-155-10			
526-176-11	0.037 - 0.061	0.00016		526-175-10	2923SB-10 (Graduation: 0.0001 in)	21DZA000	
526-166-11	0.059 - 0.156	0.00016		526-165-10			
526-156-11	0.146 - 0.287	0.00024		526-155-10			

Note: Setting rings are not supplied with some models. Please purchase them separately if necessary. For details of setting rings, refer to page C-47.

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Optional Accessories

- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000** (See page C-45)
- Setting ring (See page C-47)
- Bore gage stand: **215-120-10** (See page C-30)

Recommended Dial Indicators (see Chapter F)

- Metric models: **2046SB** (0.01 mm)
  2972TB (0.01 mm - One-revolution type)
  2109SB-10 (0.001 mm)
  2900SB-10 (0.001 mm - One-revolution type)
- Inch models: **2922SB** (0.0005 in)
  2977TB (0.0005 in - One-revolution type)
  2923SB-10 (0.0001 in)
  2910SB-10 (0.0001 in - One-revolution type)

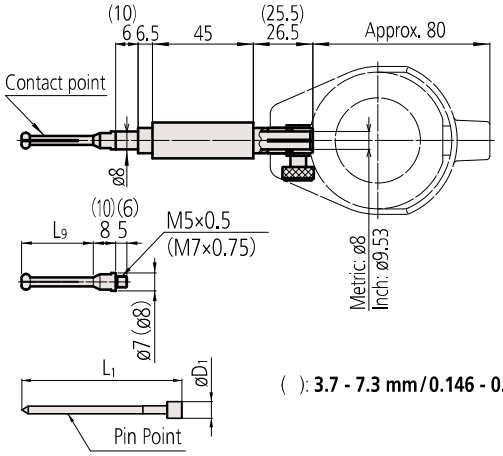
Recommended Digimatic Indicators (see page F-14)

- Metric models: **543-310B** (0.001 mm)
- Inch models: **543-312B** (0.001 mm/0.00005 in)

Note: Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

DIMENSIONS

Unit: mm



( ): **3.7 - 7.3 mm/0.146 - 0.287 in range model**

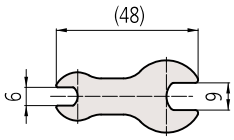
Bore gage (Main body)	Contact point				Pin point		
	Marked No.	Order No.	Range	L9	L1	øD1	Order No.
526-170-10 526-175-10	1.0	**21DAA601A**	0.95 - 1.15 mm/0.037 - 0.045 in	11.5	27.5	2.5	**201435**
	1.1	**21DAA601B**	1.07 - 1.25 mm/0.042 - 0.049 in				
	1.2	**21DAA601C**	1.17 - 1.35 mm/0.046 - 0.053 in				
	1.3	**21DAA601D**	1.27 - 1.45 mm/0.050 - 0.057 in				
	1.4	**21DAA601E**	1.37 - 1.55 mm/0.054 - 0.061 in				
526-160-10 526-165-10	1.75	**21DAA602A**	1.50 - 1.90 mm/0.059 - 0.075 in	17.5	33.8	3.5	**201436**
	2.00	**21DAA602B**	1.80 - 2.20 mm/0.071 - 0.087 in				
	2.25	**21DAA602C**	2.05 - 2.45 mm/0.081 - 0.096 in				
	2.50	**21DAA602D**	2.30 - 2.70 mm/0.091 - 0.106 in	22.5	39.3	3.5	**201437**
	2.75	**21DAA602E**	2.55 - 2.95 mm/0.100 - 0.116 in				
	3.00	**21DAA602F**	2.80 - 3.20 mm/0.110 - 0.126 in				
	3.25	**21DAA602G**	3.05 - 3.45 mm/0.120 - 0.136 in				
	3.50	**21DAA602H**	3.30 - 3.70 mm/0.130 - 0.146 in				
	3.75	**21DAA602J**	3.55 - 3.95 mm/0.140 - 0.156 in				
526-150-10 526-155-10	4.0	**21DAA603A**	3.7 - 4.3 mm/0.146 - 0.169 in	32	53	5.5	**201438**
	4.5	**21DAA603B**	4.2 - 4.8 mm/0.165 - 0.189 in				
	5.0	**21DAA603C**	4.7 - 5.3 mm/0.185 - 0.209 in				
	5.5	**21DAA603D**	5.2 - 5.8 mm/0.205 - 0.228 in				
	6.0	**21DAA603E**	5.7 - 6.3 mm/0.224 - 0.248 in				
	6.5	**21DAA603F**	6.2 - 6.8 mm/0.244 - 0.268 in				
	7.0	**21DAA603G**	6.7 - 7.3 mm/0.264 - 0.287 in				

Note: Pin point and contact point are consumable parts. Please replace them with new one when degrading of accuracy, operation, or measuring range.

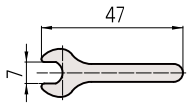
Unit: mm

Spanner

210188



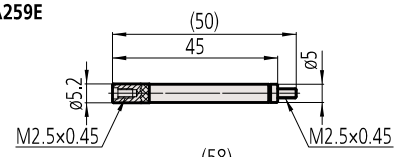
102148



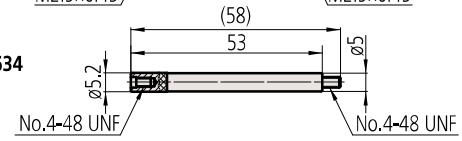
Thickness: 1.5

Extension rod

21AAA259E



213634



( ): **3.7 - 7.3 mm/0.146 - 0.287 in range model**

Bore gage	Spanner	Extension rod
526-170-10	**210188**	**21AAA259E**
526-160-10		
526-150-10	**102148**	
526-175-10	**210188**	**213634**
526-165-10		
526-155-10	**102148**	

Note: This is not a component for extending the probing depth. (Standard Accessory)

C

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages
SERIES 526 — for Extra Small Holes

- These gages are designed to measure the diameters of very small holes.
- The indicator (dial indicator, Digimatic indicator) and dial protection cover are optional. Select an indicator from the recommended dial indicators and Digimatic indicators. Please contact us for advice when using an indicator other than the recommended indicators.
- An optional stand (**215-120-10**) is available for efficient measurement of multiple small holes. (Refer to page C-30 for details)

526-101

Note: The dial indicator and the protection cover are optional.

SPECIFICATIONS

Metric

Order No.	Range (mm)	Accuracy (µm)	Repeatability (µm)	Bore gage	Dial indicator	Dial protection cover	Setting ring
526-101	7 - 10	4	2	**526-101**	Not supplied	Not supplied	Not supplied
526-102	10 - 18	6		**526-102**			
526-124	7 - 10	4		**526-101**	**2109SB-10** (Graduation: 0.001 mm)	**21DZA000**	
526-125	10 - 18	6		**526-102**			
526-126	7 - 10	4		**526-101**	**2046SB** (Graduation: 0.01 mm)		
526-127	10 - 18	6		**526-102**			

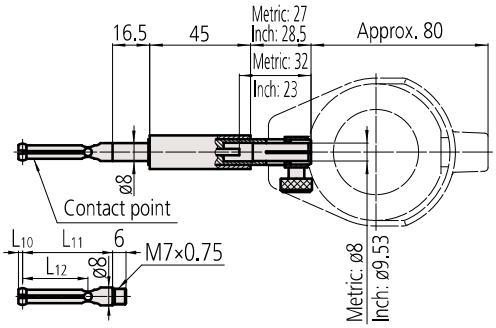
Inch

Order No.	Range (in)	Accuracy (in)	Repeatability (in)	Bore gage	Dial indicator	Dial protection cover	Setting ring
526-103	0.3 - 0.4	0.00016	0.00008	**526-103**	Not supplied	Not supplied	Not supplied
526-104	0.4 - 0.7	0.00024		**526-104**			
526-122	0.3 - 0.4	0.00016		**526-103**	**2923SB-10** (Graduation: 0.0001 in)	**21DZA000**	
526-123	0.4 - 0.7	0.00024		**526-104**			
526-119	0.3 - 0.4	0.00016		**526-103**	**2922SB** (Graduation: 0.0005 in)	**21DZA000**	
526-120	0.4 - 0.7	0.00024		**526-104**			

Note: Setting rings are not supplied.
Please purchase them separately if necessary. For details of the setting rings, refer to page C-47.

DIMENSIONS

Unit: mm

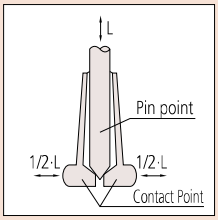


STANDARD ACCESSORIES

Bore gage (Main body)	Contact point						Spanner
	Marked No.	Order No.	Range	L_{10}	L_{11}	L_{12}	Order No.
526-101 **526-103**	1	**102469**	7.0 - 7.5 mm/0.28 - 0.30 in	1.8	40	29.2	**102148**
	2	**102470**	7.5 - 8.0 mm/0.30 - 0.32 in				
	3	**102471**	8.0 - 8.5 mm/0.32 - 0.34 in				
	4	**102472**	8.5 - 9.0 mm/0.34 - 0.36 in				
	5	**102473**	9.0 - 9.5 mm/0.36 - 0.38 in				
	6	**102474**	9.5 - 10.0 mm/0.38 - 0.40 in				
526-102 **526-104**	1	**102454**	10 - 11 mm/0.40 - 0.44 in	2.1	46	38	**102148**
	2	**102455**	11 - 12 mm/0.44 - 0.48 in	2.7			
	3	**102456**	12 - 13 mm/0.48 - 0.52 in				
	4	**102457**	13 - 14 mm/0.52 - 0.56 in				
	5	**102458**	14 - 15 mm/0.56 - 0.60 in				
	6	**102459**	15 - 16 mm/0.60 - 0.64 in				
	7	**102460**	16 - 17 mm/0.64 - 0.68 in				
	8	**102461**	17 - 18 mm/0.68 - 0.72 in				

Note: Contact point is consumable part. Please replace it with new one when degrading of accuracy, operation, or measuring range.

Measurement Principle



Optional Accessories

- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000** (See page C-45)
- Setting ring (See page C-47)
- Bore gage stand: **215-120-10** (See page C-30)

Recommended Dial Indicators (see Chapter F)

- Metric models: **2046SB** (0.01 mm)
  2972TB (0.01 mm - One-revolution type)
  2109SB-10 (0.001 mm)
  2900SB-10 (0.001 mm - One-revolution type)
- Inch models: **2922SB** (0.0005 in)
  2977TB (0.0005 in - One-revolution type)
  2923SB-10 (0.0001 in)
  2910SB-10 (0.0001 in - One-revolution type)

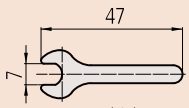
Recommended Digimatic Indicators (see Chapter F)

- Metric models: **543-310B** (**ID-C112GXB**: 0.001 mm)
- Inch models: **543-312B** (**ID-C112GEXB**: 0.001 mm/0.00005 in)

Note: Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

Spanner
102148

Unit: mm



Thickness: 1.5

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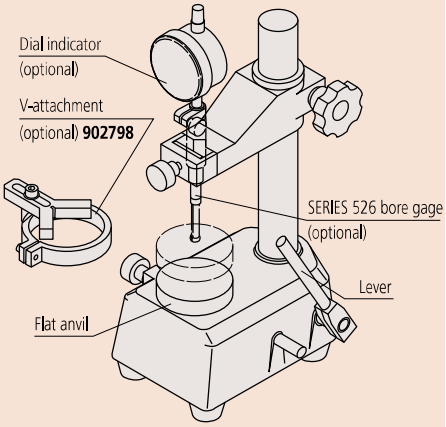
Operating Method

- Pulling the lever forwards moves the platen upwards and the instrument goes into measurement mode.
- The V-attachment (optional) aids positioning the workpiece on the platen and is useful when measuring a large number of the same size of workpiece.



Optional Accessory

- V-attachment: **902798**

Bore Gage Stand
SERIES 215

- Optimal for efficient measurement of multiple small holes with a bore gage. (SERIES **526**)

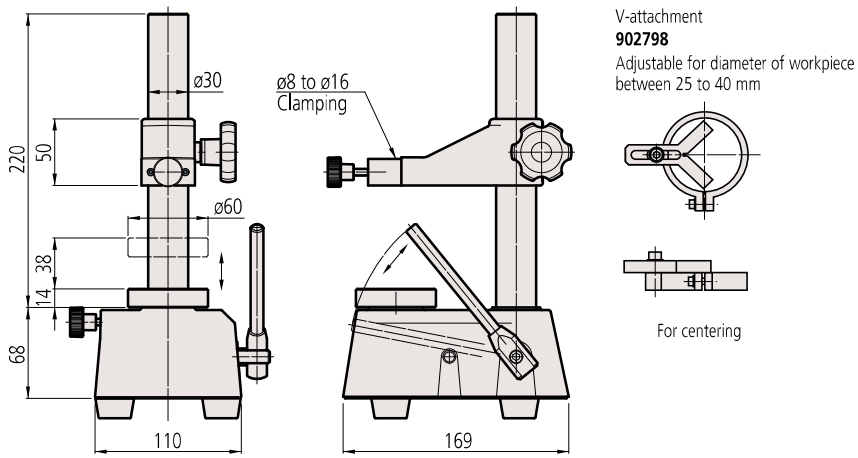
215-120-10

SPECIFICATIONS

Order No.	Measuring table displacement (mm)	Measuring table
215-120-10	38	Anvil (ø60 mm)

DIMENSIONS

Unit: mm



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Bore Gages

For easy and accurate measurement of inside diameters

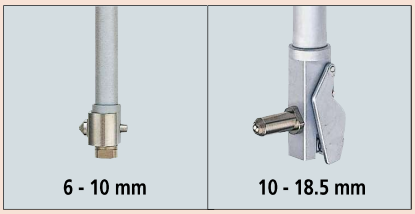
Bore Gages
SERIES 511 — for Small Holes

- These gages are designed to measure the diameters of very small holes.
- The indicator (dial indicator, Digimatic indicator) and dial protection cover are optional. Select an indicator from the recommended dial indicators and Digimatic indicators. Please contact us for advice when using an indicator other than the recommended indicators.
- Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to page C-47)

511-201

Note: The dial indicator and protection cover are optional.

Contact Points



Technical Data

- Accuracy: Metric models: 5 µm
  Inch models: 0.0002 in
- Repeatability: Metric models: 2 µm
  Inch models: 0.00008 in
- Adjacent error: Metric models: 2 µm
  Inch models: 0.00008 in

Optional Accessories

- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000** (See page C-45)

Recommended Digimatic Indicators (see Chapter F)

- Metric models: **2046SB** (0.01 mm)
  2972TB (0.01 mm - One-revolution type)
  2109SB-10 (0.001 mm)
  2900SB-10 (0.001 mm - One-revolution type)
- Inch models: **2922SB** (0.0005 in)
  2977TB (0.0005 in - One-revolution type)
  2923SB-10 (0.0001 in)
  2910SB-10 (0.0001 in - One-revolution type)

Recommended Digimatic Indicators (see Chapter F)

- Metric models: **543-310B** (**ID-C112GXB**: 0.001 mm)
- Inch models: **543-312B** (**ID-C112GEXB**: 0.001 mm/0.00005 in)

Note: Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

SPECIFICATIONS

Metric

Order No.	Range (mm)	Stroke of contact point (mm)	Measuring force (N)	Guide force (N)	Content of set					Probing depth (mm)
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	
511-209	6 - 10	0.5	2 or less	—	**511-209**	Not supplied	Not supplied	9 pcs.	Not supplied	50
511-201	10 - 18.5	0.6		6 or less	**511-201**				1 pc.	100
511-210	6 - 10	0.5	2 or less	—	**511-209**	**2109SB-10** (Graduation: 0.001 mm)	**21DZA000**	9 pcs.	Not supplied	50
511-203	10 - 18.5	0.6		6 or less	**511-201**				1 pc.	100
511-211	6 - 10	0.5	2 or less	—	**511-209**	**2046SB** (Graduation: 0.01 mm)	**21DZA000**	9 pcs.	Not supplied	50
511-204	10 - 18.5	0.6		6 or less	**511-201**				1 pc.	100

Inch

Order No.	Range (in)	Stroke of contact point (in)	Measuring force (N)	Guide force (N)	Content of set					Probing depth (in)
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	
511-214	0.24 - 0.4	0.020	2 or less	—	**511-214**	Not supplied	Not supplied	9 pcs.	Not supplied	2
511-205	0.4 - 0.74	0.024		6 or less	**511-205**				1 pc.	4
511-212	0.24 - 0.4	0.020	2 or less	—	**511-214**	**2923SB-10** (Graduation: 0.0001 in)	**21DZA000**	9 pcs.	Not supplied	2
511-206	0.4 - 0.74	0.024		6 or less	**511-205**				1 pc.	4
511-213	0.24 - 0.4	0.020	2 or less	—	**511-214**	**2922SB** (Graduation: 0.0005 in)	**21DZA000**	9 pcs.	Not supplied	2
511-207	0.4 - 0.74	0.024		6 or less	**511-205**				1 pc.	4

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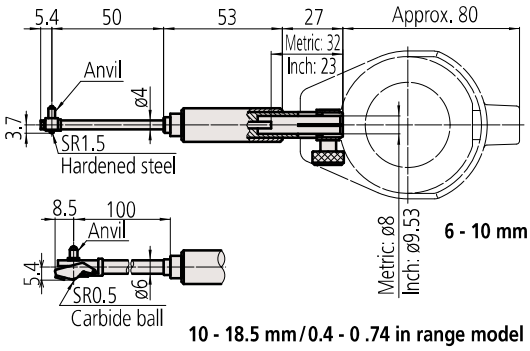
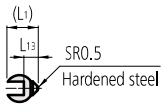
DIMENSIONS

Unit: mm

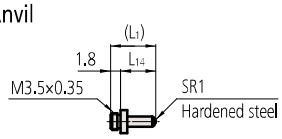


Unit: mm

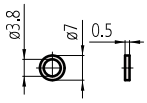
511-209/511-214
Anvil



511-201/511-205
Anvil



Interchangeable washer
(Supplied only with **511-201/511-205**)



204355

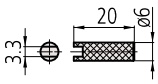
STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable Washer	Spanner
	Marked No.	**Order No.**	Indication of measuring size	L_1	L_{13}	**Order No.**	**Order No.**
511-209 511-214	1	**952168**	6.0 mm/0.24 in	4.7	1.2	Not supplied	**206709**
	2	**952169**	6.5 mm/0.26 in	5.3	1.7		
	3	**952170**	7.0 mm/0.28 in	5.8	2.2		
	4	**952414**	7.5 mm/0.30 in	6.3	2.7		
	5	**952415**	8.0 mm/0.32 in	6.8	3.2		
	6	**952416**	8.5 mm/0.34 in	7.3	3.7		
	7	**952417**	9.0 mm/0.36 in	7.8	4.2		
	8	**952418**	9.5 mm/0.38 in	8.3	4.7		
	9	**952419**	10.0 mm/0.40 in	8.8	5.2		

Bore gage (Main body)	Anvil					Interchangeable Washer	Spanner
	Marked No.	**Order No.**	Indication of measuring size	L_1	L_{14}	**Order No.**	**Order No.**
511-201 511-205	1	**204356**	10 mm/0.40 in	3.8	2	**204355**	**204354**
	2	**204357**	11 mm/0.44 in	4.8	3		
	3	**204358**	12 mm/0.48 in	5.8	4		
	4	**204359**	13 mm/0.52 in	6.8	5		
	5	**204360**	14 mm/0.56 in	7.8	6		
	6	**204361**	15 mm/0.60 in	8.8	7		
	7	**204362**	16 mm/0.64 in	9.8	8		
	8	**204363**	17 mm/0.68 in	10.8	9		
	9	**204364**	18 mm/0.72 in	11.8	10		

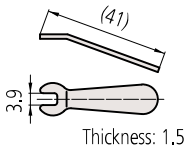
Spanner

206709



204354

Unit: mm



C

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

- Longer plunger stroke with no effect on accuracy.
- Carbide is used for the contact point ensuring high durability and wear resistance.
- This model reduces the influence of heat from the operator's hand by 50 % by increasing the grip size and making the grip hollow-structured, thereby retaining high-accuracy measurement.
- The indicator (dial indicator, Digimatic indicator) and dial protection cover are optional. Select an indicator from the recommended dial indicators and Digimatic indicators. Please contact us for advice when using an indicator other than the recommended indicators.
- Optional Extension Rods can be attached for measuring deep holes. (For details, refer to page C-45)
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-46 and C-47)

511-702

511-703

Note: The dial indicator and the protection cover are optional.

SPECIFICATIONS

Metric

Order No.	Range (mm)	Stroke of contact point (mm)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner	Probing depth (mm)
511-701	18 - 35	1.2	4 or less	6 or less	511-701	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	100
511-702	35 - 60				511-702			6 pcs.	4 pcs.		Not supplied	150
511-703	50 - 150	1.6	5 or less	10 or less	511-703			11 pcs.		1 pc.		
511-704	100 - 160				511-704			13 pcs.		Not supplied		
511-705	160 - 250		6 or less	15 or less	511-705			6 pcs.	7 pcs.			250
511-706	250 - 400				511-706			5 pcs.		1 pc.		
511-721	18 - 35	1.2	4 or less	6 or less	511-701	2109SB-10 (Graduation: 0.001 mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	100
511-722	35 - 60				511-702			6 pcs.	4 pcs.		Not supplied	150
511-723	50 - 150	1.6	5 or less	10 or less	511-703			11 pcs.		1 pc.		
511-724	100 - 160				511-704			13 pcs.		Not supplied		
511-725	160 - 250		6 or less	15 or less	511-705			6 pcs.	7 pcs.			250
511-726	250 - 400				511-706			5 pcs.		1 pc.		
511-711	18 - 35	1.2	4 or less	6 or less	511-701	2046SB (Graduation: 0.01 mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	100
511-712	35 - 60				511-702			6 pcs.	4 pcs.		Not supplied	150
511-713	50 - 150	1.6	5 or less	10 or less	511-703			11 pcs.		1 pc.		
511-714	100 - 160				511-704			13 pcs.		Not supplied		
511-715	160 - 250		6 or less	15 or less	511-705			6 pcs.	7 pcs.			250
511-716	250 - 400				511-706			5 pcs.		1 pc.		
511-921	18 - 150	—	—	—	511-701	2046SB	21DZA000	—	—	—	—	—
511-922					511-702	2109SB-10						
511-925-10					511-703	543-310B						

Inch

Order No.	Range (in)	Stroke of contact point (in)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner	Probing depth (in)
511-731	0.7 - 1.4	0.047	4 or less	6 or less	511-731	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	4
511-732	1.4 - 2.5				511-732			6 pcs.	4 pcs.		Not supplied	6
511-733	2.0 - 6.0	0.063	5 or less	10 or less	511-733			11 pcs.		1 pc.		
511-734	4.0 - 6.5				511-734			13 pcs.		Not supplied		
511-735	6.5 - 10.0		6 or less	15 or less	511-735			6 pcs.	7 pcs.			10
511-736	10.0 - 16.0				511-736			5 pcs.		1 pc.		
511-751	0.7 - 1.4	0.047	4 or less	6 or less	511-731	2923SB-10 (Graduation: 0.0001 in)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	4
511-752	1.4 - 2.5				511-732			6 pcs.	4 pcs.		Not supplied	6
511-753	2.0 - 6.0	0.063	5 or less	10 or less	511-733			11 pcs.		1 pc.		
511-754	4.0 - 6.5				511-734			13 pcs.		Not supplied		
511-755	6.5 - 10.0		6 or less	15 or less	511-735			6 pcs.	7 pcs.			10
511-756	10.0 - 16.0				511-736			5 pcs.		1 pc.		
511-741	0.7 - 1.4	0.047	4 or less	6 or less	511-731	2922SB (Graduation: 0.0005 in)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	4
511-742	1.4 - 2.5				511-732			6 pcs.	4 pcs.		Not supplied	6
511-743	2.0 - 6.0	0.063	5 or less	10 or less	511-733			11 pcs.		1 pc.		
511-744	4.0 - 6.5				511-734			13 pcs.		Not supplied		
511-745	6.5 - 10.0		6 or less	15 or less	511-735			6 pcs.	7 pcs.			10
511-746	10.0 - 16.0				511-736			5 pcs.		1 pc.		
511-931	0.7 - 6.0	—	—	—	511-731	2922SB	21DZA000	—	—	—	—	—
511-932					511-732	2923SB-10						
511-935-10					511-733	543-312B						

Note 1: A 50 mm sub-anvil is supplied with **511-703**, and a 75 mm sub-anvil is supplied with **511-706**.
Note 2: A 2 in sub-anvil is supplied with **511-733**, and a 3 in sub-anvil is supplied with **511-736**.
Note 3: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

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Anvil

A carbide ball is used for the contact point. It is more abrasion resistant than a hardened steel ball and, as its surface is smoother than that of a carbide tip, the workpiece is less liable to be marked.

Comparison of abrasion resistance

Hardened steel ball (conventional model)

Abrasion depth: 0.1 mm
750 HV or more

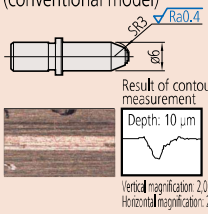
Carbide ball (current model)

Abrasion depth: 0.001 mm
1350 HV or more

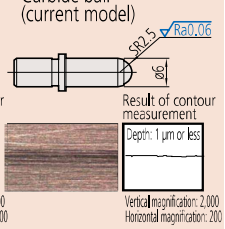
Inspection method
- Load a 0.5 N weight on the anvil, and slide for 1,000 m on abrasive paper of 9 µm (#2000) particle size.

Comparison of marks on the workpiece

Carbide tip (conventional model)



Carbide ball (current model)



Inspection method
- Load a 4 N weight on the anvil, and slide on the aluminum plate back and forth for 20 times.

The grip is highly resistant to heat transfer from the operator's hand.

Technical Data

- Accuracy: Metric models 2 µm
  Inch models 0.00008 in
- Repeatability: Metric models 0.5 µm
  Inch models 0.00002 in
- Adjacent error: Metric models 1 µm
  Inch models 0.00004 in

Optional Accessories

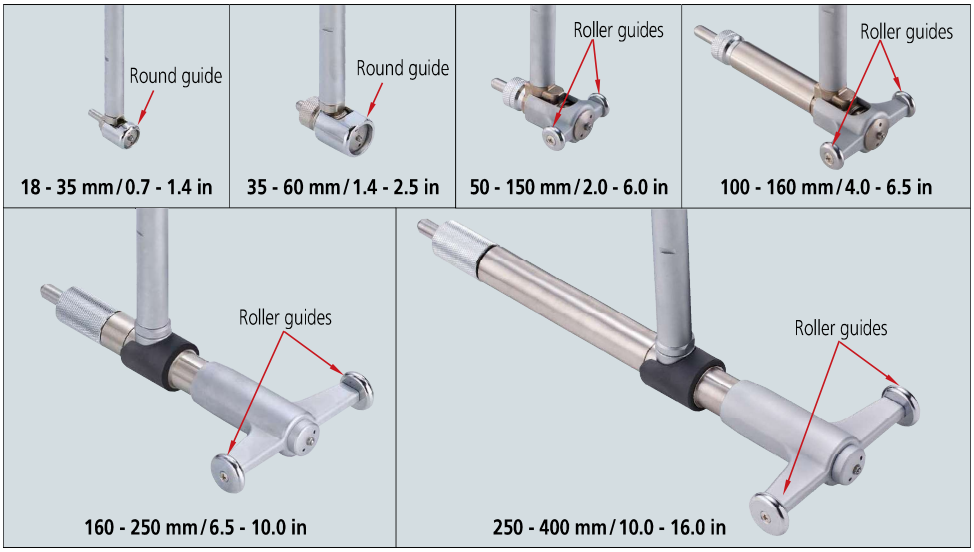
- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000** (See page C-45)

Recommended Dial Indicators (see Chapter F)

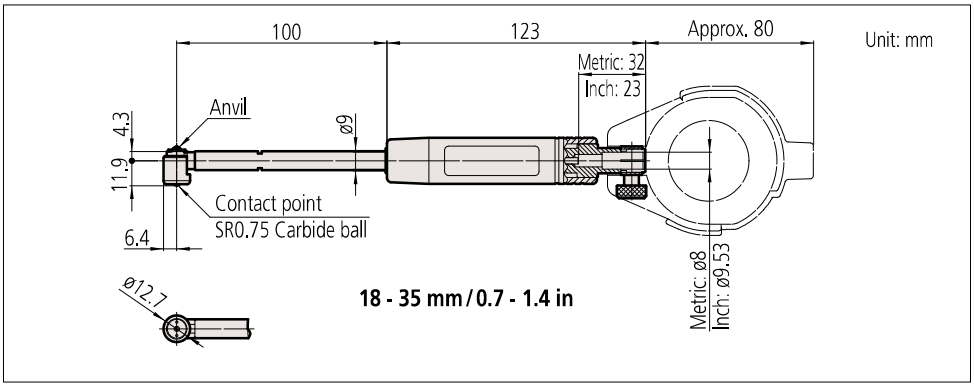
- Metric models: **2046SB** (0.01 mm)
  2972TB (0.01 mm - One revolution type)
  2109SB-10 (0.001 mm)
  2900SB-10 (0.001 mm - One-revolution type)
- Inch models: **2922SB** (0.0005 in)
  2977TB (0.0005 in- One-revolution type)
  2923SB-10 (0.0001 in)
  2910SB-10 (0.0001 in - One-revolution type)

Note: Indicators equipped with rubber bellows, such as waterproof types, cannot be used.

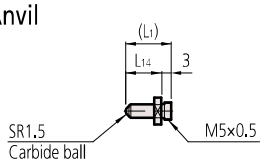
Contact Points



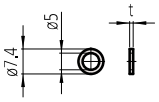
DIMENSIONS



Anvil

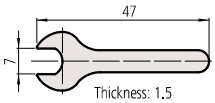


Interchangeable washer



Spanner
102148

Unit: mm



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Spanner
	Marked No.	**Order No.**	Indication of measuring size	L_1	L_{14}	**Order No.**	t	**Order No.**
511-701 **511-731**	1	**21DZA213A**	18 mm/0.71 in	5.5	2.5	**205623** **205624**	0.5 mm/0.02 in 1.0 mm/0.04 in	**102148**
	2	**21DZA213B**	20 mm/0.79 in	7.5	4.5			
	3	**21DZA213C**	22 mm/0.87 in	9.5	6.5			
	4	**21DZA213D**	24 mm/0.94 in	11.5	8.5			
	5	**21DZA213E**	26 mm/1.02 in	13.5	10.5			
	6	**21DZA213F**	28 mm/1.10 in	15.5	12.5			
	7	**21DZA213G**	30 mm/1.18 in	17.5	14.5			
	8	**21DZA213H**	32 mm/1.26 in	19.5	16.5			
	9	**21DZA213J**	34 mm/1.34 in	21.5	18.5			

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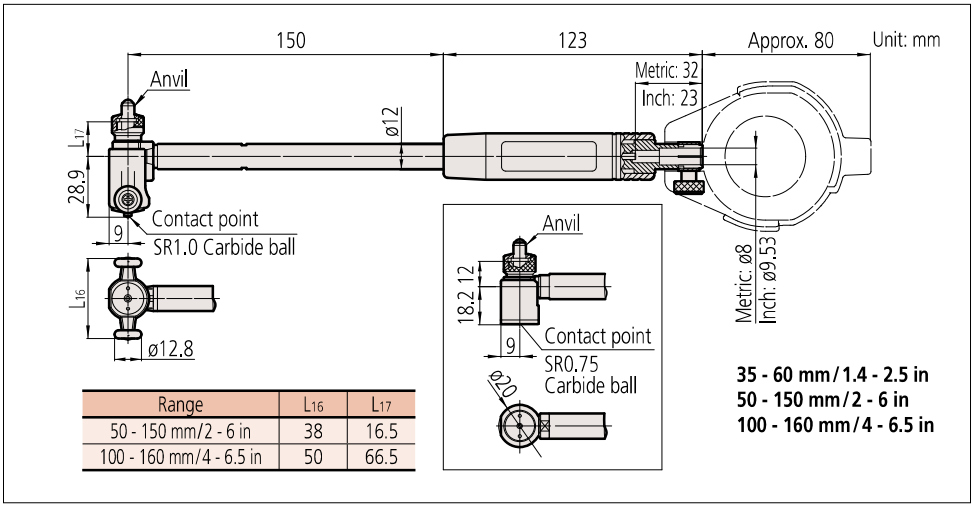
Mitutoyo

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

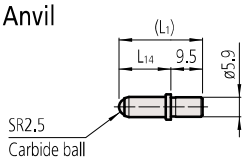
DIMENSIONS



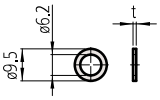
Range	L16	L17
50 - 150 mm/2 - 6 in	38	16.5
100 - 160 mm/4 - 6.5 in	50	66.5

Unit: mm

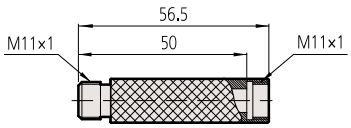
Anvil



Interchangeable washer



Sub-anvil
(Supplied only for **511-703/733**)



102178

Note: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	Order No.	Indication of measuring size	L1	L14	Order No.	t	Order No.
511-702 511-732	1	**21DZA232A**	35 mm/1.38 in	15	5.5	205457 205458 205459 205460	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in	
	2	**21DZA232B**	40 mm/1.57 in	20	10.5			
	3	**21DZA232C**	45 mm/1.77 in	25	15.5			
	4	**21DZA232D**	50 mm/1.97 in	30	20.5			
	5	**21DZA232E**	55 mm/2.17 in	35	25.5			
	6	**21DZA232F**	60 mm/2.36 in	40	30.5			
511-703 511-733 ( ) Using 50 mm/2 in Sub-Anvil	1	**21DZA232A**	50 mm (100 mm)/1.97 in (3.94 in)	15	5.5			102178 (50 mm/2 in)
	2	**21DZA232B**	55 mm (105 mm)/2.17 in (4.13 in)	20	10.5			
	3	**21DZA232C**	60 mm (110 mm)/2.36 in (4.33 in)	25	15.5			
	4	**21DZA232D**	65 mm (115 mm)/2.55 in (4.53 in)	30	20.5			
	5	**21DZA232E**	70 mm (120 mm)/2.74 in (4.72 in)	35	25.5			
	6	**21DZA232F**	75 mm (125 mm)/2.93 in (4.92 in)	40	30.5			
	7	**21DZA232G**	80 mm (130 mm)/3.12 in (5.12 in)	45	35.5			
	8	**21DZA232H**	85 mm (135 mm)/3.31 in (5.31 in)	50	40.5			
	9	**21DZA232J**	90 mm (140 mm)/3.50 in (5.51 in)	55	45.5			
	10	**21DZA232L**	95 mm (145 mm)/3.69 in (5.71 in)	60	50.5			
	11	**21DZA232M**	100 mm (150 mm)/3.88 in (5.91 in)	65	55.5			
511-704 511-734	1	**21DZA232A**	100 mm/3.94 in	15	5.5			
	2	**21DZA232B**	105 mm/4.13 in	20	10.5			
	3	**21DZA232C**	110 mm/4.33 in	25	15.5			
	4	**21DZA232D**	115 mm/4.53 in	30	20.5			
	5	**21DZA232E**	120 mm/4.72 in	35	25.5			
	6	**21DZA232F**	125 mm/4.92 in	40	30.5			
	7	**21DZA232G**	130 mm/5.12 in	45	35.5			
	8	**21DZA232H**	135 mm/5.31 in	50	40.5			
	9	**21DZA232J**	140 mm/5.51 in	55	45.5			
	10	**21DZA232L**	145 mm/5.71 in	60	50.5			
	11	**21DZA232M**	150 mm/5.91 in	65	55.5			
	12	**21DZA232N**	155 mm/6.10 in	70	60.5			
	13	**21DZA232P**	160 mm/6.30 in	75	65.5			

Recommended Digimatic Indicators (see Chapter F)

- Metric models: **543-310B** (**ID-C112GXB**: 0.001 mm)
- Inch models: **543-312B** (**ID-C112GEXB**: 0.001 mm/0.00005 in)

- The ID measurement can be performed easily since the minimum value is detected automatically.
- Up to three combinations of master value and tolerance value can be set.
- Nine measurement results (maximum) can be saved and recalled from memory (when no external device is connected).
  Refer to page F-14 for details.

Bore Gage Checker

515-590

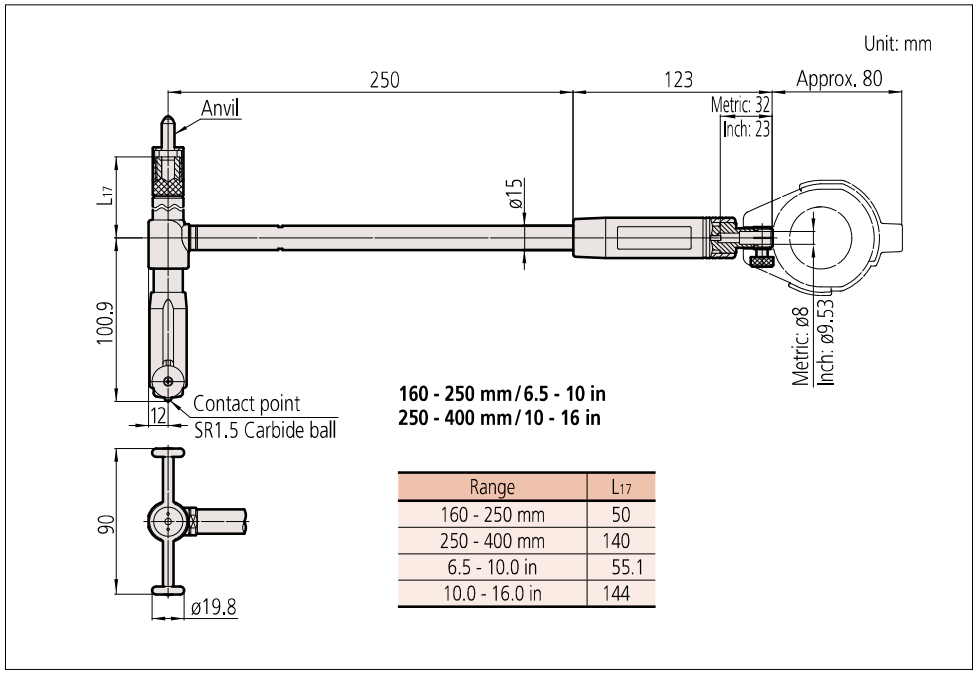
- The Bore Gage Checker allows easy setting of dial bore gages with ranges of 18 mm (0.7 in) through 400 mm (16 in) using gauge blocks.
  Refer to page C-46 for details.

515-590

Standard configuration: Stand, Attachment A, B, C 1 pc. for each, Parallel Jaw (2 pcs.)

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

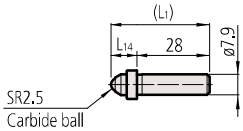
DIMENSIONS



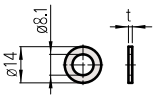
Range	L17
160 - 250 mm	50
250 - 400 mm	140
6.5 - 10.0 in	55.1
10.0 - 16.0 in	144

Unit: mm

Anvil

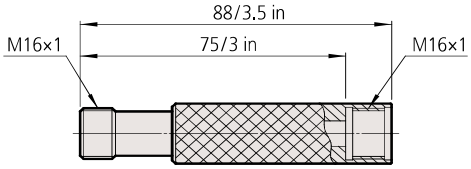


Interchangeable washer



Sub-anvil

Supplied only for **511-706** (**202974**) and **511-736** (**202975**)



202974 (**511-706**)
202975 (**511-736**)

Note: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	**Order No.**	Indication of measuring size	L1	L14	**Order No.**	t	**Order No.**
511-705 **511-735**	1	**21DZA241A**	160 mm/6.50 in	38	10	**205467** **205461** **205462** **205463** **205464** **205465** **205466**	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in 4.0 mm/0.16 in 5.0 mm/0.20 in 6.0 mm/0.24 in	
	2	**21DZA241B**	175 mm/7.09 in	53	25			
	3	**21DZA241C**	190 mm/7.68 in	68	40			
	4	**21DZA241D**	205 mm/8.27 in	83	55			
	5	**21DZA241E**	220 mm/8.86 in	98	70			
	6	**21DZA241F**	235 mm/9.45 in	113	85			
511-706 **511-736** ( ) Using 75 mm/3 in Sub-Anvil	1	**21DZA241A**	250 mm (325 mm)/10.00 in (13.00 in)	38	10			Metric:**202974** (75 mm) Inch:**202975** (3.0 in)
	2	**21DZA241B**	265 mm (340 mm)/10.59 in (13.59 in)	53	25			
	3	**21DZA241C**	280 mm (355 mm)/11.18 in (14.18 in)	68	40			
	4	**21DZA241D**	295 mm (370 mm)/11.77 in (14.77 in)	83	55			
	5	**21DZA241E**	310 mm (385 mm)/12.36 in (15.36 in)	98	70			

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Mitutoyo

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages
SERIES 511 — Short Leg Type

- Compact and lightweight due to the short length below the grip.
- Longer plunger stroke with no effect on accuracy.
- Carbide contact point ensures high durability and wear resistance.
- This model reduces the influence of heat from the operator's hand by approx. 50 % by increasing the grip size and making the grip hollow-structured, thereby retaining high-accuracy measurement.
- The indicator (dial indicator, Digimatic indicator) and dial protection cover are optional. Select an indicator from the recommended dial indicators and Digimatic indicators. Please contact us for advice when using an indicator other than the recommended indicators.
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-46 and C-47)

511-761

511-762

511-763

511-761

Note: The dial indicator and the protection cover are optional.

511-763

Note: The dial indicator and the protection cover are optional.

Technical Data

- Accuracy: Metric models 2 µm
  Inch models 0.00008 in
- Repeatability: Metric models 0.5 µm
  Inch models 0.00002 in
- Adjacent error: Metric models 1 µm
  Inch models 0.00004 in

Optional Accessories

- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000**
  (See page C-45)

Recommended Dial Indicators (see Chapter F)

- Metric models: **2046SB** (0.01 mm)
  2972TB (0.01 mm - One revolution type)
  2109SB-10 (0.001 mm)
  2900SB-10 (0.001 mm - One-revolution type)
- Inch models: **2922SB** (0.0005 in)
  2977TB (0.0005 in - One-revolution type)
  2923SB-10 (0.0001 in)
  2910SB-10 (0.0001 in - One-revolution type)

Note: Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

SPECIFICATIONS

Metric

Order No.	Range (mm)	Stroke of contact point (mm)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner	Probing depth (mm)
511-761	18 - 35	1.2	4 or less	6 or less	**511-761**	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	50
511-762	35 - 60				**511-762**			6 pcs.	4 pcs.		Not supplied	
511-763	50 - 150	1.6	5 or less	10 or less	**511-763**			11 pcs.		1 pc.		
511-764	100 - 160				**511-764**			13 pcs.		Not supplied		
511-771	18 - 35	1.2	4 or less	6 or less	**511-761**	**2109SB-10** (Graduation: 0.001 mm)	**21DZA000**	9 pcs.	2 pcs.	Not supplied	1 pc.	50
511-772	35 - 60				**511-762**			6 pcs.	4 pcs.		Not supplied	
511-773	50 - 150	1.6	5 or less	10 or less	**511-763**			11 pcs.		1 pc.		
511-774	100 - 160				**511-764**			13 pcs.		Not supplied		
511-766	18 - 35	1.2	4 or less	6 or less	**511-761**	**2046SB** (Graduation: 0.01 mm)	**21DZA000**	9 pcs.	2 pcs.	Not supplied	1 pc.	50
511-767	35 - 60				**511-762**			6 pcs.	4 pcs.		Not supplied	
511-768	50 - 150	1.6	5 or less	10 or less	**511-763**			11 pcs.		1 pc.		
511-769	100 - 160				**511-764**			13 pcs.		Not supplied		

Inch

Order No.	Range (in)	Stroke of contact point (in)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner	Probing depth (in)
511-781	0.7 - 1.4	0.047	4 or less	6 or less	**511-781**	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	2
511-782	1.4 - 2.5				**511-782**			6 pcs.	4 pcs.		Not supplied	
511-783	2.0 - 6.0	0.063	5 or less	10 or less	**511-783**			11 pcs.		1 pc.		
511-784	4.0 - 6.5				**511-784**			13 pcs.		Not supplied		
511-791	0.7 - 1.4	0.047	4 or less	6 or less	**511-781**	**2923SB-10** (Graduation: 0.0001 in)	**21DZA000**	9 pcs.	2 pcs.	Not supplied	1 pc.	2
511-792	1.4 - 2.5				**511-782**			6 pcs.	4 pcs.		Not supplied	
511-793	2.0 - 6.0	0.063	5 or less	10 or less	**511-783**			11 pcs.		1 pc.		
511-794	4.0 - 6.5				**511-784**			13 pcs.		Not supplied		
511-786	0.7 - 1.4	0.047	4 or less	6 or less	**511-781**	**2922SB** (Graduation: 0.0005 in)	**21DZA000**	9 pcs.	2 pcs.	Not supplied	1 pc.	2
511-787	1.4 - 2.5				**511-782**			6 pcs.	4 pcs.		Not supplied	
511-788	2.0 - 6.0	0.063	5 or less	10 or less	**511-783**			11 pcs.		1 pc.		
511-789	4.0 - 6.5				**511-784**			13 pcs.		Not supplied		

Note 1: A 50 mm sub-anvil is supplied with **511-763**.
Note 2: A 2 in sub-anvil is supplied with **511-783**.
Note 3: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

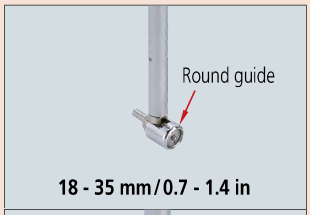
Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

Recommended Digimatic Indicators (see Chapter F)

- Metric models: **543-310B** (**ID-C112GXB**: 0.001 mm)
- Inch models: **543-312B** (**ID-C112GEXB**: 0.001 mm/0.00005 in)

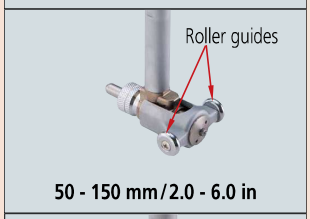
- The ID measurement can be performed easily since the minimum value is detected automatically.
- Up to three combinations of master value and tolerance value can be set.
- Nine measurement results (maximum) can be saved and recalled from memory (when no external device is connected).
  Refer to page F-14 for details.

Contact Points

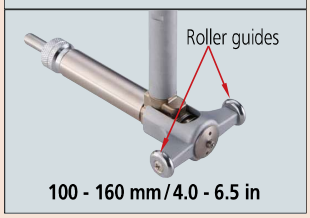


18 - 35 mm/0.7 - 1.4 in

35 - 60 mm/1.4 - 2.5 in

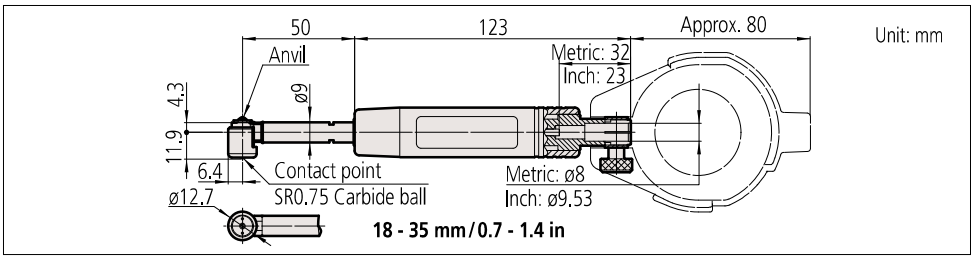


50 - 150 mm/2.0 - 6.0 in

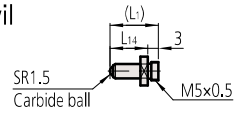


100 - 160 mm/4.0 - 6.5 in

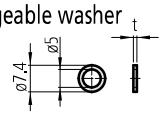
DIMENSIONS



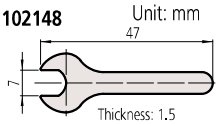
Anvil



Interchangeable washer



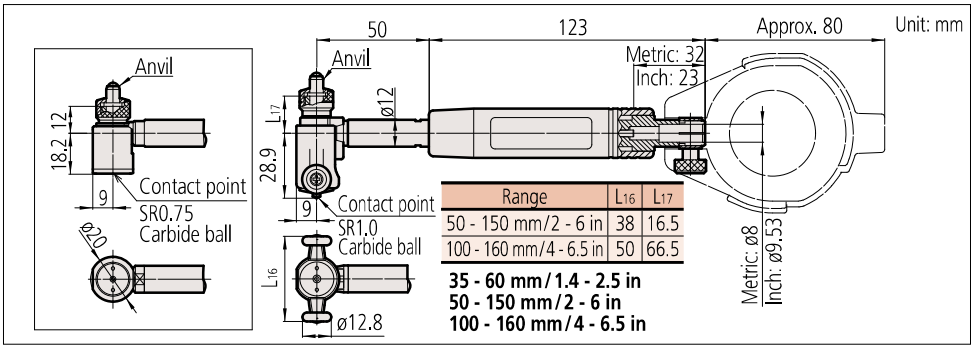
Spanner **102148**



STANDARD ACCESSORIES

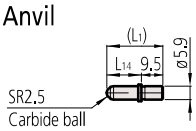
Bore gage (Main body)	Anvil					Interchangeable washer		Spanner
	Marked No.	**Order No.**	Indication of measuring size	L_1	L_{14}	**Order No.**	t	**Order No.**
511-761 **511-781**	1	**21DZA213A**	18 mm/0.71 in	5.5 mm/0.22 in	2.5 mm/0.10 in	**205623** **205624**	0.5 mm/0.02 in 1.0 mm/0.04 in	**102148**
	2	**21DZA213B**	20 mm/0.79 in	7.5 mm/0.30 in	4.5 mm/0.18 in			
	3	**21DZA213C**	22 mm/0.87 in	9.5 mm/0.37 in	6.5 mm/0.26 in			
	4	**21DZA213D**	24 mm/0.94 in	11.5 mm/0.45 in	8.5 mm/0.33 in			
	5	**21DZA213E**	26 mm/1.02 in	13.5 mm/0.53 in	10.5 mm/0.41 in			
	6	**21DZA213F**	28 mm/1.10 in	15.5 mm/0.61 in	12.5 mm/0.49 in			
	7	**21DZA213G**	30 mm/1.18 in	17.5 mm/0.69 in	14.5 mm/0.57 in			
	8	**21DZA213H**	32 mm/1.26 in	19.5 mm/0.77 in	16.5 mm/0.65 in			
	9	**21DZA213J**	34 mm/1.34 in	21.5 mm/0.85 in	18.5 mm/0.73 in			

DIMENSIONS

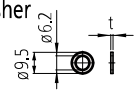


Range	L_{16}	L_{17}
50 - 150 mm/2 - 6 in	38	16.5
100 - 160 mm/4 - 6.5 in	50	66.5

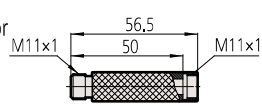
Anvil



Interchangeable washer



Sub-anvil (Supplied only for **511-763** and **511-783**.)



102178

Note: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	**Order No.**	Indication of measuring size	L_1	L_{14}	**Order No.**	t	**Order No.**
511-762 **511-782**	1	**21DZA232A**	35 mm/1.38 in	15	5.5	**205457** **205458** **205459** **205460**	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in	
	2	**21DZA232B**	40 mm/1.57 in	20	10.5			
	3	**21DZA232C**	45 mm/1.77 in	25	15.5			
	4	**21DZA232D**	50 mm/1.97 in	30	20.5			
	5	**21DZA232E**	55 mm/2.17 in	35	25.5			
	6	**21DZA232F**	60 mm/2.36 in	40	30.5			
511-763 **511-783** ( ) Using 50 mm/2 in Sub-Anvil	1	**21DZA232A**	50 mm (100 mm)/1.97 in (3.94 in)	15	5.5			**102178** (50 mm/2 in)
	2	**21DZA232B**	55 mm (105 mm)/2.17 in (4.13 in)	20	10.5			
	3	**21DZA232C**	60 mm (110 mm)/2.36 in (4.33 in)	25	15.5			
	4	**21DZA232D**	65 mm (115 mm)/2.55 in (4.53 in)	30	20.5			
	5	**21DZA232E**	70 mm (120 mm)/2.74 in (4.72 in)	35	25.5			
	6	**21DZA232F**	75 mm (125 mm)/2.93 in (4.92 in)	40	30.5			
	7	**21DZA232G**	80 mm (130 mm)/3.12 in (5.12 in)	45	35.5			
	8	**21DZA232H**	85 mm (135 mm)/3.31 in (5.31 in)	50	40.5			
	9	**21DZA232J**	90 mm (140 mm)/3.50 in (5.51 in)	55	45.5			
	10	**21DZA232L**	95 mm (145 mm)/3.69 in (5.71 in)	60	50.5			
	11	**21DZA232M**	100 mm (150 mm)/3.88 in (5.91 in)	65	55.5			
511-764 **511-784**	1	**21DZA232A**	100 mm/3.94 in	15	5.5			
	2	**21DZA232B**	105 mm/4.13 in	20	10.5			
	3	**21DZA232C**	110 mm/4.33 in	25	15.5			
	4	**21DZA232D**	115 mm/4.53 in	30	20.5			
	5	**21DZA232E**	120 mm/4.72 in	35	25.5			
	6	**21DZA232F**	125 mm/4.92 in	40	30.5			
	7	**21DZA232G**	130 mm/5.12 in	45	35.5			
	8	**21DZA232H**	135 mm/5.31 in	50	40.5			
	9	**21DZA232J**	140 mm/5.51 in	55	45.5			
	10	**21DZA232L**	145 mm/5.71 in	60	50.5			
	11	**21DZA232M**	150 mm/5.91 in	65	55.5			
	12	**21DZA232N**	155 mm/6.10 in	70	60.5			
	13	**21DZA232P**	160 mm/6.30 in	75	65.5			

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Mitutoyo

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages
SERIES 511 — with Micrometer Head

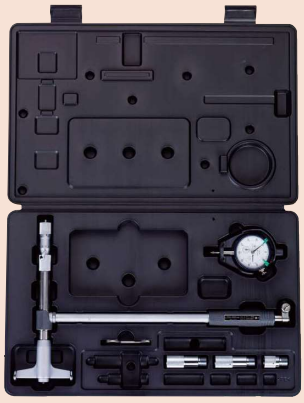
- Micrometer head is attached to the anvil for accurate dimensional setting.
- Longer plunger stroke with no effect on accuracy.
- Carbide is used for the contact point ensuring high durability and wear resistance.
- This model reduces the influence of heat from the operator's hand by approx. 50 % by increasing the grip size and making the grip hollow-structured, thereby retaining high-accuracy measurement.
- Wide measuring range with sub-anvils.
- The indicator (dial indicator, Digimatic indicator) and dial protection cover are optional. Select an indicator from the recommended dial indicators and Digimatic indicators. Please contact us for advice when using an indicator other than the recommended indicators.
- Optional Extension Rods can be attached for measuring deep holes. (For details, refer to page C-45)
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-46 and C-47)

511-803

511-804

511-804

Note: The dial indicator and the protection cover are optional.



511-806

Note: The dial indicator and the protection cover are optional.

C

SPECIFICATIONS

Metric

Order No.	Range (mm)	Stroke of contact point (mm)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Content of set: Dial indicator	Content of set: Dial protection cover	Content of set: Micrometer head	Content of set: Sub-Anvil	Content of set: Spanner	Probing depth (mm)
511-803	60 - 100	1.6	5 or less	10 or less	**511-803**	Not supplied	Not supplied	1 pc.	2 pcs.	3 pcs.	150
511-804	100 - 160				**511-804**				3 pcs.	2 pcs.	
511-805	150 - 250		6 or less	15 or less	**511-805**				4 pcs.		250
511-806	250 - 400				**511-806**				3 pcs.		
511-807	400 - 600			20 or less	**511-807**				2 pcs.		
511-808	600 - 800				**511-808**				2 pcs.		
511-823	60 - 100	1.6	5 or less	10 or less	**511-803**	**2109SB-10** (Graduation: 0.001 mm)	**21DZA000**	1 pc.	2 pcs.	3 pcs.	150
511-824	100 - 160				**511-804**				3 pcs.	2 pcs.	
511-825	150 - 250		6 or less	15 or less	**511-805**				4 pcs.		250
511-826	250 - 400				**511-806**				3 pcs.		
511-827	400 - 600			20 or less	**511-807**				2 pcs.		
511-828	600 - 800				**511-808**				2 pcs.		
511-813	60 - 100	1.6	5 or less	10 or less	**511-803**	**2046SB** (Graduation: 0.01 mm)	**21DZA000**	1 pc.	2 pcs.	3 pcs.	150
511-814	100 - 160				**511-804**				3 pcs.	2 pcs.	
511-815	150 - 250		6 or less	15 or less	**511-805**				4 pcs.		250
511-816	250 - 400				**511-806**				3 pcs.		
511-817	400 - 600			20 or less	**511-807**				2 pcs.		
511-818	600 - 800				**511-808**				2 pcs.		

Inch

Order No.	Range (in)	Stroke of contact point (in)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Content of set: Dial indicator	Content of set: Dial protection cover	Content of set: Micrometer head	Content of set: Sub-Anvil	Content of set: Spanner	Probing depth (in)
511-833	2.4 - 4.0	0.063	5 or less	10 or less	**511-833**	Not supplied	Not supplied	1 pc.	2 pcs.	3 pcs.	6
511-834	4.0 - 6.4				**511-834**				3 pcs.	2 pcs.	
511-835	6.0 - 10.0		6 or less	15 or less	**511-835**				4 pcs.		10
511-836	10.0 - 16.0				**511-836**				3 pcs.		
511-837	16.0 - 24.0			20 or less	**511-837**				2 pcs.		
511-838	24.0 - 32.0				**511-838**				2 pcs.		
511-853	2.4 - 4.0	0.063	5 or less	10 or less	**511-833**	**2923SB-10** (Graduation: 0.0001 in)	**21DZA000**	1 pc.	2 pcs.	3 pcs.	4
511-854	4.0 - 6.4				**511-834**				3 pcs.	2 pcs.	6
511-855	6.0 - 10.0		6 or less	15 or less	**511-835**				4 pcs.		
511-856	10.0 - 16.0				**511-836**				3 pcs.		
511-857	16.0 - 24.0			20 or less	**511-837**				2 pcs.		10
511-858	24.0 - 32.0				**511-838**				2 pcs.		
511-843	2.4 - 4.0	0.063	5 or less	10 or less	**511-833**	**2922SB** (Graduation: 0.0005 in)	**21DZA000**	1 pc.	2 pcs.	3 pcs.	4
511-844	4.0 - 6.4				**511-834**				3 pcs.	2 pcs.	6
511-845	6.0 - 10.0		6 or less	15 or less	**511-835**				4 pcs.		
511-846	10.0 - 16.0				**511-836**				3 pcs.		
511-847	16.0 - 24.0			20 or less	**511-837**				2 pcs.		10
511-848	24.0 - 32.0				**511-838**				2 pcs.		

Note 1: Storage boxes for **511-807/808/837/838** models are made of wood. The boxes of other models are made of plastic.
Note 2: It is not permissible to expand measuring range using sub-anvils other than as supplied as standard accessories. (The measurement accuracy in such cases is not guaranteed.)

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Technical Data

- Accuracy: Metric models 2 µm
  Inch models 0.00008 in
- Repeatability: Metric models 0.5 µm
  Inch models 0.00002 in
- Adjacent error: Metric models 1 µm
  Inch models 0.00004 in

Optional Accessories

- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000** (See page C-45)

Recommended Dial Indicators (see Chapter F)

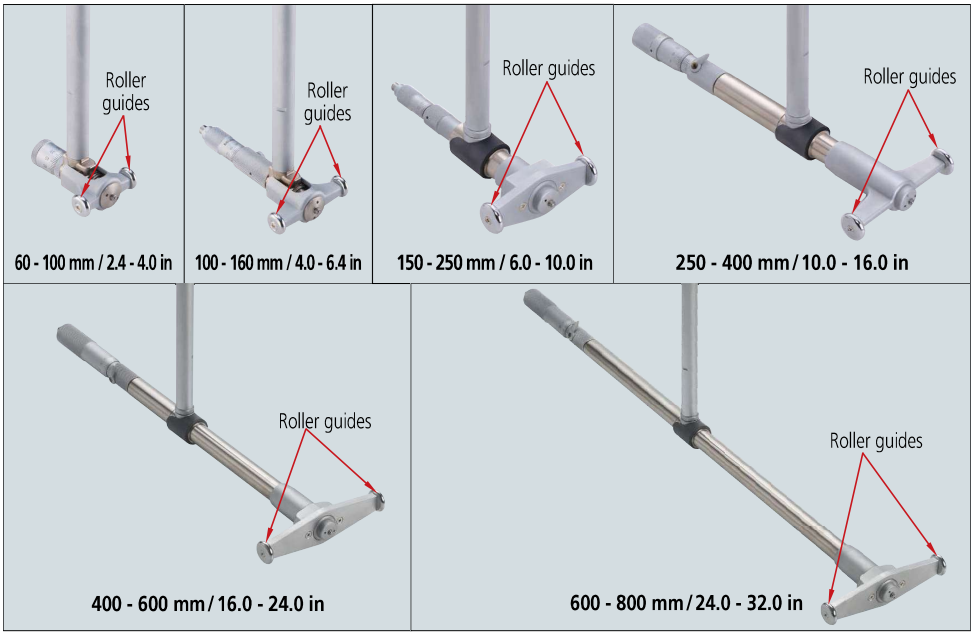
- Metric models: **2046SB** (0.01 mm)
  2972TB (0.01 mm - One-revolution type)
  2109SB-10 (0.001 mm)
  2900SB-10 (0.001 mm - One-revolution type)
- Inch models: **2922SB** (0.0005 in)
  2977TB (0.0005 in - One-revolution type)
  2923SB-10 (0.0001 in)
  2910SB-10 (0.0001 in - One-revolution type)

Recommended Digimatic Indicators (see Chapter F)

- Metric models: **543-310B** (**ID-C112GXB**: 0.001 mm)
- Inch models: **543-312B** (**ID-C112GEXB**: 0.001 mm/0.00005 in)

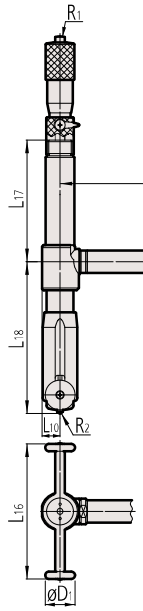
Note: Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

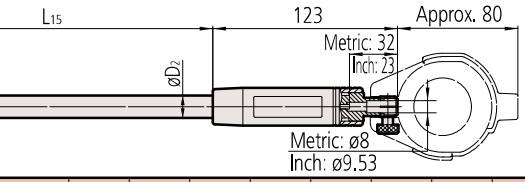
Contact Points



DIMENSIONS

Unit: mm

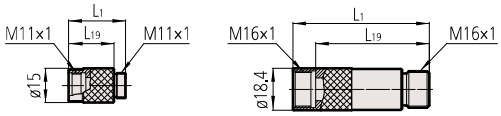




Range	L15	R1	L18	R2	L10	L16	øD1	øD2	L17
60 - 100 mm	150	SR8	28.9	SR1.0	9	38	ø12.8	ø12	7
100 - 160 mm		SR10				50			16.5
150 - 250 mm	250		70.3	SR1.5	15	78	ø19.8	ø15	25.1
250 - 400 mm			100.9		12	90			81
400 - 600 mm			200.9		16	120			85
600 - 800 mm			300.9						185
2.4 - 4 in	150	SR8	28.9	SR1.0	9	38	ø12.8	ø12	7
4 - 6.4 in		SR10				50			16.5
6 - 10 in	250		70.3	SR1.5	15	78	ø19.8	ø15	25.9
10 - 16 in			100.9		12	90			81
16 - 24 in			200.9		16	120			85
24 - 32 in			300.9						188.2

Unit: mm

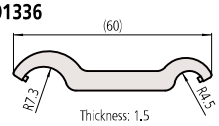
Sub-anvil



Note: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

Spanner

301336



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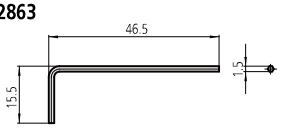

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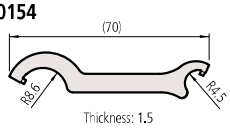

STANDARD ACCESSORIES

Metric

Bore gage (Main body)	Micrometer head			Sub-Anvil				Spanner
	Order No.	Stroke (mm)	Screw size	Marked No. (mm)	Order No.	L1 (mm)	L19 (mm)	Order No.
511-803	21DZA267	10	M11×1	10	208892	15	10	301336 (2 pcs.) 202863 (1 pc.)
				20	208894	25	20	
511-804	21DZA268	13	M11×1	10	208892	15	10	301336 (2 pcs.)
				20	208894 (2 pcs.)	25	20	
511-805	21DZA268	13	M11×1	10	208892	15	10	301336 (2 pcs.)
				20	208894 (2 pcs.)	25	20	
				50	21DAA492	55	50	
511-806	953118	25	M16×1	25	208926	35	25	200154 (2 pcs.)
				50	208928 (2 pcs.)	60	50	
511-807	953120	50	M16×1	50	208928	60	50	200154 (2 pcs.)
				100	208932	110	100	
511-808	953120	50	M16×1	50	208928	60	50	200154 (2 pcs.)
				100	208932	110	100	

Inch

Bore gage (Main body)	Micrometer head			Sub-Anvil				Spanner
	Order No.	Stroke (in)	Screw size	Marked No. (in)	Order No.	L1 (in)	L19 (in)	Order No.
511-833	21DZA272	0.4	M11×1	0.4	208893	0.6	0.4	301336 (2 pcs.) 202863 (1 pc.)
				0.8	208895	1.0	0.8	
511-834	21DZA273	0.5	M11×1	0.4	208893	0.6	0.4	301336 (2 pcs.)
				0.8	208895 (2 pcs.)	1.0	0.8	
511-835	21DZA273	0.5	M11×1	0.4	208893	0.6	0.4	301336 (2 pcs.)
				0.8	208895 (2 pcs.)	1.0	0.8	
				2	21DAA493	2.2	2	
511-836	21DZA275	1.0	M16×1	1	208927	1.4	1	200154 (2 pcs.)
				2	208929 (2 pcs.)	2.4	2	
511-837	902313	2.0	M16×1	2	208929	2.4	2	200154 (2 pcs.)
				4	208933	4.4	4	
511-838	902313	2.0	M16×1	2	208929	2.4	2	200154 (2 pcs.)
				4	208933	4.4	4	

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Mitutoyo

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages
SERIES 511 — for Blind Holes

- Capable of ID (inside diameter) measurement close to the bottom of a hole.
- Carbide contact point ensuring high durability and wear resistance.
- Grip is large and hollow to reduce effect of body heat on high-accuracy measurements.
- The indicator (dial indicator, Digimatic indicator) and dial protection cover are optional. Select an indicator from the recommended dial indicators and Digimatic indicators. Please contact us for advice when using an indicator other than the recommended indicators.
- Optional Extension Rods can be attached for measuring deep holes. (For details, refer to page C-45)
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-46 and C-47)

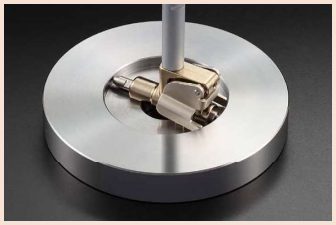
511-415 511-416 511-417

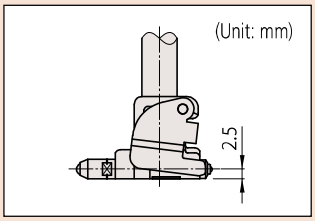
511-416

Note: The dial indicator and protection cover are optional.

511-417

Note: The dial indicator and protection cover are optional.





Technical Data

- Accuracy: Metric models 4 µm
  Inch models 0.00016 in
- Repeatability: Metric models 1 µm
  Inch models 0.00004 in
- Adjacent error: Metric models 1 µm
  Inch models 0.00004 in

Optional Accessories

- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000** (See page C-45)

Recommended Dial Indicators (see Chapter F)

- Metric models: **2046SB** (0.01 mm)
  2972TB (0.01 mm - One-revolution type)
  2109SB-10 (0.001 mm)
  2900SB-10 (0.001 mm - One-revolution type)
- Inch models: **2922SB** (0.0005 in)
  2977TB (0.0005 in - One-revolution type)
  2923SB-10 (0.0001 in)
  2910SB-10 (0.0001 in - One-revolution type)

Recommended Digimatic Indicators (see Chapter F-14)

- Metric models: **543-310B** (0.001 mm)
- Inch models: **543-312B** (0.001 mm/0.00005 in)

Note: Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

SPECIFICATIONS

Metric

Order No.	Range (mm)	Stroke of contact point (mm)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Content of set: Dial indicator	Content of set: Dial protection cover	Content of set: Anvil	Content of set: Washer	Probing depth (mm)
511-415	15 - 35	1.2	4 or less	6 or less	**511-415**	Not supplied	Not supplied	11 pcs.	1 pc.	150
511-416	35 - 60				**511-416**			6 pcs.	4 pcs.	
511-417	50 - 150		5 or less	10 or less	**511-417**			11 pcs.		
511-425	15 - 35	1.2	4 or less	6 or less	**511-415**	**2046SB** (Graduation: 0.01 mm)	**21DZA000**	11 pcs.	1 pc.	150
511-426	35 - 60				**511-416**			6 pcs.	4 pcs.	
511-427	50 - 150		5 or less	10 or less	**511-417**			11 pcs.		
511-435	15 - 35	1.2	4 or less	6 or less	**511-415**	**2109SB-10** (Graduation: 0.001 mm)	**21DZA000**	11 pcs.	1 pc.	150
511-436	35 - 60				**511-416**			6 pcs.	4 pcs.	
511-437	50 - 150		5 or less	10 or less	**511-417**			11 pcs.		

Inch

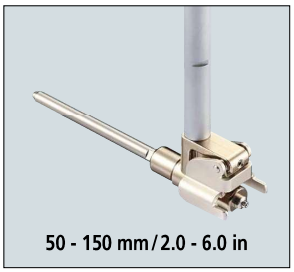
Order No.	Range (in)	Stroke of contact point (in)	Measuring force (N)	Guide force (N)	Content of set: Bore gage	Content of set: Dial indicator	Content of set: Dial protection cover	Content of set: Anvil	Content of set: Washer	Probing depth (in)
511-418	0.6 - 1.4	0.047	4 or less	6 or less	**511-418**	Not supplied	Not supplied	11 pcs.	1 pc.	6
511-419	1.4 - 2.4				**511-419**			6 pcs.	4 pcs.	
511-420	2.0 - 6.0		5 or less	10 or less	**511-420**			11 pcs.		
511-428	0.6 - 1.4	0.047	4 or less	6 or less	**511-418**	**2922SB** (Graduation: 0.0005 in)	**21DZA000**	11 pcs.	1 pc.	6
511-429	1.4 - 2.4				**511-419**			6 pcs.	4 pcs.	
511-430	2.0 - 6.0		5 or less	10 or less	**511-420**			11 pcs.		
511-438	0.6 - 1.4	0.047	4 or less	6 or less	**511-418**	**2923SB-10** (Graduation: 0.0001 in)	**21DZA000**	11 pcs.	1 pc.	6
511-439	1.4 - 2.4				**511-419**			6 pcs.	4 pcs.	
511-440	2.0 - 6.0		5 or less	10 or less	**511-420**			11 pcs.		

Note 1: A 10 mm (0.4 in) sub-anvil is supplied with **511-415/425/435/418/428/438** and a 50 mm (2 in) sub-anvil is supplied with **511-417/427/437/420/430/440**.
Note 2: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

Contact Points

15 - 35 mm / 0.6 - 1.4 in

35 - 60 mm / 1.4 - 2.4 in



50 - 150 mm / 2.0 - 6.0 in

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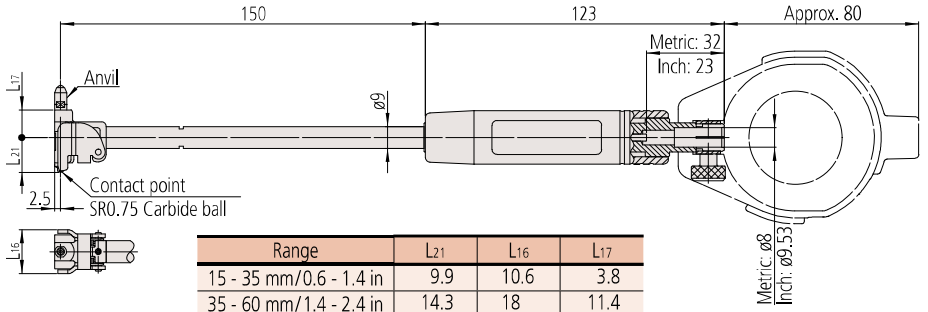
Recommended Digimatic Indicators (see Chapter F)

- Metric models: **543-310B** (**ID-C112GXB**: 0.001 mm)
- Inch models: **543-312B** (**ID-C112GEXB**: 0.001 mm/0.00005 in)
- The ID measurement can be performed easily since the minimum value is detected automatically.
- Up to three combinations of master value and the tolerance value can be set.
- Nine measurement results (maximum) can be saved and recalled from memory (when no external device is connected).
  Refer to page F-14 for details.

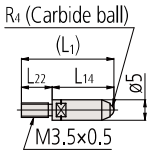
DIMENSIONS

Unit: mm

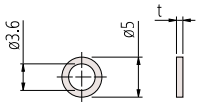


Range	L21	L16	L17
15 - 35 mm/0.6 - 1.4 in	9.9	10.6	3.8
35 - 60 mm/1.4 - 2.4 in	14.3	18	11.4
50 - 150 mm/2.0 - 6.0 in	22.7	22	18

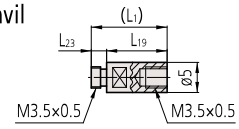
Anvil



Interchangeable washer



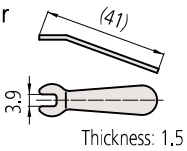
Sub-anvil



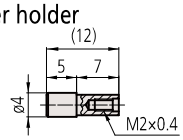
Unit: mm

Note: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

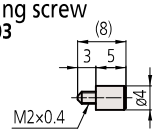
Spanner
204354



Washer holder
212202



Locking screw
212203



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil							Interchangeable washer		Sub-Anvil		
	Marked No.	Order No.	Indication of measuring size	L1	L22	R4	L14	Order No.	t	Order No.	L23	L19
511-415 **511-418** ( ) Using 10 mm/0.4 in Sub-Anvil	1	**21DZA376A**	15 mm (25 mm)/0.59 in (0.98 in)	4.5	2.5	SR1	2	**212127**	0.5 mm/0.02 in	**21DAA563**	2.5	10 mm/0.4 in
	2	**21DZA376B**	16 mm (26 mm)/0.63 in (1.02 in)	5.5			3					
	3	**21DZA376C**	17 mm (27 mm)/0.67 in (1.06 in)	6.5			4					
	4	**21DZA376D**	18 mm (28 mm)/0.71 in (1.10 in)	7.5			5					
	5	**21DZA376E**	19 mm (29 mm)/0.75 in (1.14 in)	8.5			6					
	6	**21DZA376F**	20 mm (30 mm)/0.79 in (1.18 in)	9.5		SR1.5	7					
	7	**21DZA376G**	21 mm (31 mm)/0.83 in (1.22 in)	10.5			8					
	8	**21DZA376H**	22 mm (32 mm)/0.87 in (1.26 in)	11.5			9					
	9	**21DZA376J**	23 mm (33 mm)/0.91 in (1.30 in)	12.5			10					
	10	**21DZA376L**	24 mm (34 mm)/0.94 in (1.34 in)	13.5			11					
	11	**21DZA376M**	25 mm (35 mm)/0.98 in (1.38 in)	14.5			12					
511-416 **511-419**	1	**21DZA404A**	35 mm/1.38 in	17.5	7.5	SR1.5	10	**212127** **212128** **212129** **212130**	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in			
	2	**21DZA404B**	40 mm/1.57 in	22.5			15					
	3	**21DZA404C**	45 mm/1.77 in	27.5			20					
	4	**21DZA404D**	50 mm/1.97 in	32.5			25					
	5	**21DZA404E**	55 mm/2.17 in	37.5			30					
	6	**21DZA404F**	60 mm/2.36 in	42.5			35					
511-417 **511-420** ( ) Using 50 mm/2 in Sub-Anvil	1	**21DZA404A**	50 mm (100 mm)/1.97 in (3.94 in)	17.5	7.5	SR1.5	10	**212127** **212128** **212129** **212130**	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in	**21DAA596**	7.5	50 mm/2 in
	2	**21DZA404B**	55 mm (105 mm)/2.17 in (4.13 in)	22.5			15					
	3	**21DZA404C**	60 mm (110 mm)/2.36 in (4.33 in)	27.5			20					
	4	**21DZA404D**	65 mm (115 mm)/2.56 in (4.53 in)	32.5			25					
	5	**21DZA404E**	70 mm (120 mm)/2.76 in (4.72 in)	37.5			30					
	6	**21DZA404F**	75 mm (125 mm)/2.95 in (4.92 in)	42.5			35					
	7	**21DZA404G**	80 mm (130 mm)/3.15 in (5.12 in)	47.5			40					
	8	**21DZA404H**	85 mm (135 mm)/3.35 in (5.31 in)	52.5			45					
	9	**21DZA404J**	90 mm (140 mm)/3.54 in (5.51 in)	57.5			50					
	10	**21DZA404L**	95 mm (145 mm)/3.74 in (5.71 in)	62.5			55					
	11	**21DZA404M**	100 mm (150 mm)/3.94 in (5.91 in)	67.5			60					

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Mitutoyo

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages
SERIES 511 — ABSOLUTE Digimatic Bore Gages

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- These ABSOLUTE Digimatic bore gages are exclusively designed for inside diameter measurement.
- ABS (ABSOLUTE) type bore gages are not subject to overspeed error.
- Up to four Extension Rods (optional) can be connected for measuring at the bottom of a hole 2 m deep.
- The display and grip can be rotated up to 320° and the display can be inclined up to 90°, so that it is easily readable from any direction.
- The minimum value holding function provides easy measurement of hole diameter.
- The gauge block set for master setting allows quick and accurate zero-point setting.
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-46 and C-47)

511-501

SPECIFICATIONS

Metric

Order No.		511-501	511-502
Range		45 - 100 mm	100 - 160 mm
Stroke of contact point		1.2 mm	
Resolution		0.001 mm	
Accuracy	Overall*1	0.003 mm or less	
	Adjacent error	0.002 mm or less	
	Repeatability	0.002 mm or less	
Measuring force		5 N or less	
Guide force		10 N or less	
Battery		SR44 (2 pcs.), **938882** For initial operational checks (standard accessory)	
Battery life*2		Approx. 2,000 hours under normal use.	
Scale type		ABSOLUTE electrostatic linear encoder	
Sampling frequency*3		50 times/s	
Dust / Water protection level*4		IP53 (IEC60529/JIS D0207, C0920)	
Display		· 7 segments 6 digits decimal numeric with minus sign, in/mm · Tolerance judge indication · Analog indication	
Net weight		500 g	570 g

Inch

Order No.		511-521	511-522
Range		1.8 - 4.0 in	4.0 - 6.5 in
Stroke of contact point		0.048 in/1.2 mm	
Resolution		0.00005 in/0.001 mm	
Accuracy	Overall*1	0.0001 in/0.003 mm or less	
	Adjacent error	0.00008 in/0.002 mm or less	
	Repeatability	0.0001 in/0.002 mm or less	
Measuring force		5 N or less	
Guide force		10 N or less	
Battery		SR44 (2 pcs.), **938882** For initial operational checks (standard accessory)	
Battery life*2		Approx. 2,000 hours under normal use.	
Scale type		ABSOLUTE electrostatic linear encoder	
Sampling frequency*3		50 times/s	
Dust / Water protection level*4		IP53 (IEC60529/JIS D0207, C0920)	
Display		· 7 segments 6 digits decimal numeric with minus sign, in/mm · Tolerance judge indication · Analog indication	
Net weight		500 g	570 g

*1 A quantizing error is excluded.
*2 When the usage time per day is eight hours.
*3 If the contact point detecting speed is over 50 µm/s, the peak value may not be displayed correctly.
*4 The level indicated is valid only if the output connector cap is installed.

MeasurLink® ENABLED
Data Management Software by Mitutoyo

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

ABSOLUTE™

Function

- Preset function
- Master value registration (3 values maximum)
- Tolerance judgment
- Upper/lower limit registration (3 values maximum)
- Minimum value holding
- Data output
- Display rotation (320°)
- Display inclination (90°, 7 steps)
- Low battery alarm display
- Error display

Optional Accessories

- Extension rod
  250 mm (10 in): **21DZA089**
  500 mm (20 in): **21DZA081**
  Up to four extension rods can be jointed, and a maximum length of 2 m is allowed.
- Example of Connection
  Using four 500 mm extension rods
- SPC Cable:
  1 m: **905338**
  2 m: **905409**
  Refer to pages A-27 to A-29
- **USB** Input Tool Direct (2 m): **06AFM380F**
  Refer to page A-28
- **USB** Keyboard Signal Conversion Type Communication Conversion Type: **264-016**
- **RS-232C** Communication Conversion Type: **264-007**
  Refer to page A-14
- Connecting Cables for **U-WAVE-T** (160 mm): **02AZD790F**
  For foot switch: **02AZE140F**
  Refer to page A-20
- Digimatic Mini-Processor **DP-1VA LOGGER**: **264-505**

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Gauge Blocks and Block Sets for Setting the Origin or Master Value (optional)

• Typical application

• Rectangular gauge blocks
Note: Available only for **511-501/521**
516-118-10
516-118-60 with calibration certificate

Description*		Order No.	Qty
Nominal length (mm)	1	**611611-021**	1
	2	**611612-021**	1
	3	**611613-021**	1
	5	**611615-021**	1
	10	**611671-021**	1
	20	**611672-021**	1
	30	**611673-021**	1
	40	**611674-021**	1
Flat jaw		**630030**	1 pair (2 pcs.)
Holder 160 mm		**619004**	1
Certificate of inspection			1

* Equivalent to JIS B 7506 Grade 0

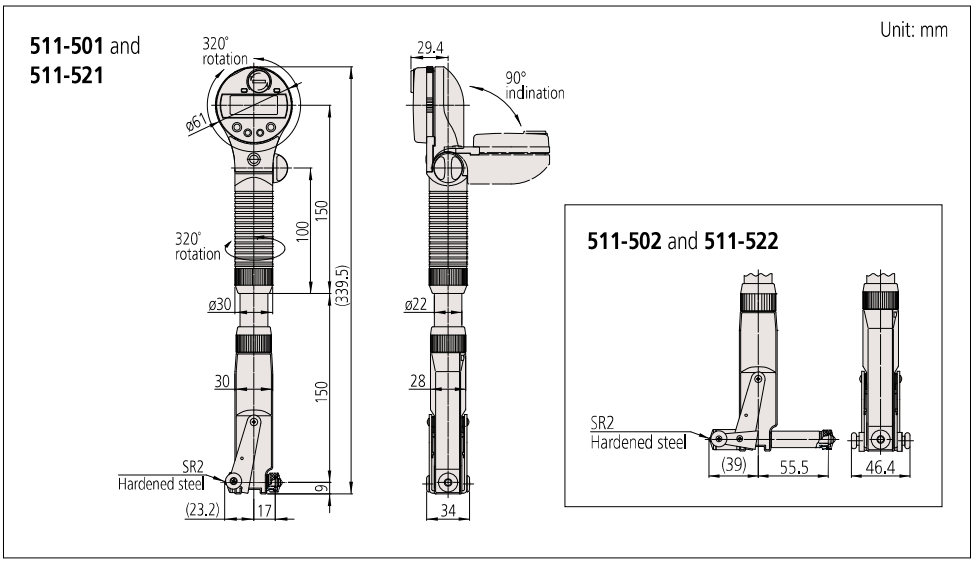
• Square gauge blocks
Note: Available only for **511-501/521**
516-119-10
516-119-60 with calibration certificate

Description*		Order No.	Qty
Nominal length (mm)	1	**614611-021**	1
	2	**614612-021**	1
	3	**614613-021**	1
	5	**614615-021**	1
	10	**614671-021**	1
	20	**614672-021**	1
	30	**614673-021**	1
	40	**614674-021**	1
Flat jaw		**619072**	1 pair (2 pcs.)
Tie rod 3 in		**619062**	1
Tie rod 2 1/4 in		**619063**	1
Tie rod 1 1/2 in		**619064**	1
Flat head screw 1 1/4 in		**619057**	2
Flat head screw 5/8 in		**619058**	2
Certificate of inspection			1

* Equivalent to JIS B 7506 Grade 0

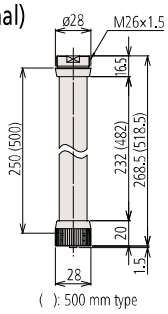
DIMENSIONS

Unit: mm



Extension rod (optional)

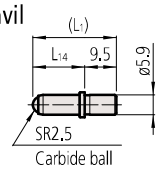
Unit: mm



STANDARD ACCESSORIES

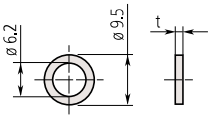
Bore gage (Main body)	Anvil Marked No.	Order No.	Indication of measuring size	L_1 (mm)	L_{14} (mm)	Interchangeable washer Order No.	t
511-501 511-521	1	**21DZA232A**	45 mm/1.8 in	15	5.5	**205457 205458 205459 205460**	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in
	2	**21DZA232B**	50 mm/2.0 in	20	10.5		
	3	**21DZA232C**	55 mm/2.2 in	25	15.5		
	4	**21DZA232D**	60 mm/2.4 in	30	20.5		
	5	**21DZA232E**	65 mm/2.6 in	35	25.5		
	6	**21DZA232F**	70 mm/2.8 in	40	30.5		
	7	**21DZA232G**	75 mm/3.0 in	45	35.5		
	8	**21DZA232H**	80 mm/3.2 in	50	40.5		
	9	**21DZA232J**	85 mm/3.4 in	55	45.5		
	10	**21DZA232L**	90 mm/3.6 in	60	50.5		
	11	**21DZA232M**	95 mm/3.8 in	65	55.5		
	12	**21DZA232N**	100 mm/4.0 in	70	60.5		
511-502 511-522	1	**21DZA232A**	100 mm/4.0 in	15	5.5	**205457 205458 205459 205460**	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in
	2	**21DZA232B**	105 mm/4.2 in	20	10.5		
	3	**21DZA232C**	110 mm/4.4 in	25	15.5		
	4	**21DZA232D**	115 mm/4.6 in	30	20.5		
	5	**21DZA232E**	120 mm/4.8 in	35	25.5		
	6	**21DZA232F**	125 mm/5.0 in	40	30.5		
	7	**21DZA232G**	130 mm/5.2 in	45	35.5		
	8	**21DZA232H**	135 mm/5.4 in	50	40.5		
	9	**21DZA232J**	140 mm/5.6 in	55	45.5		
	10	**21DZA232L**	145 mm/5.8 in	60	50.5		
	11	**21DZA232M**	150 mm/6.0 in	65	55.5		
	12	**21DZA232N**	155 mm/6.2 in	70	60.5		
	13	**21DZA232P**	160 mm/6.4 in	75	65.5		

Anvil



Interchangeable washer

Unit: mm



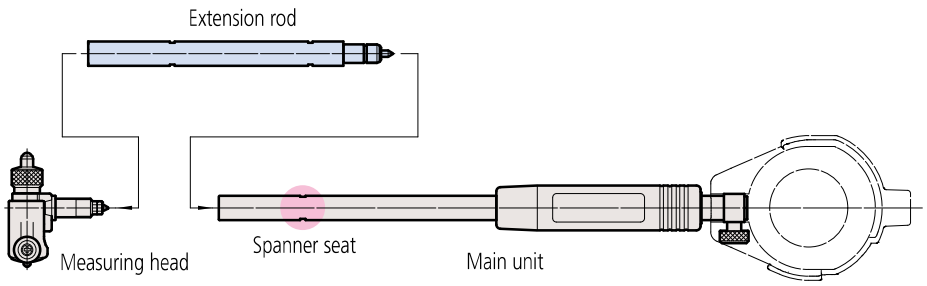
C

Bore Gages

For easy and accurate measurement of inside diameters

Extension Rod
SERIES 511 — Accessories for Bore Gages

- Extension Rods (optional) are available to assist in deep-hole measurement.
- If two or more Extension Rods are connected together, measurement errors may occur due to flexure of the rod assembly. Therefore it is best to use no more than a single Extension Rod.
- Extension Rods are available up to 1,000 mm in length.
- Cannot be connected to products with special sizes or special specifications.
- When using a 500 mm (or longer) Extension Rod, use the bore gage in an upright position.
- The accuracy and security of the assembly should be confirmed after connecting an Extension Rod.



Note: To remove the measuring head, use the spanner with extension rods. With the spanner engaged with the spanner seat on the main unit sleeve, dismount the head.

C

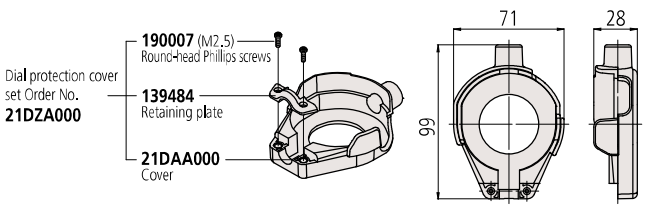
SPECIFICATIONS

Applicable model Order No.	Extension rod length (mm) 125	250	500	750	1000	Extension rod diameter (mm)	Spanner Order No.
511-701/511-731 511-415/511-418 511-416/511-419 511-417/511-420	953549	953550	953551	—	—	ø9	102148 (2 pcs.)
511-702/511-732 511-703/511-733 511-704/511-734 511-803/511-833 511-804/511-834	953552	953553	953554	953555	953556	ø12	212556 (2 pcs.)
511-705/511-735 511-706/511-736 511-805/511-835 511-806/511-836 511-807/511-837 511-808/511-838	953557	952361	953558	953559	953560	ø15	212556 (2 pcs.)

Note 1: If an extension rod is attached, the measuring accuracy may degrade due to factors such as rod deflection.
Note 2: Spanner is supplied as standard.

Protection cover

- Both the flat backplate of a dial indicator and backplate with a lug can be attached to a protection cover. It can also be attached to Digimatic Indicators (**543-310B**, **543-312B**).



Unit: mm

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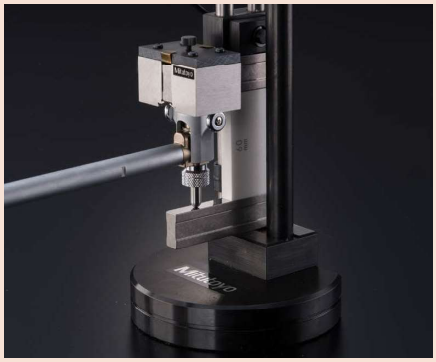
Typical application



Technical Data

- Flatness of parallel jaw 0.5 µm (Parallelism 1 µm)

Standard Accessories

Parallel jaw 2 pcs.	**630030**
Attachment A	**940088**
Attachment B	**940089**
Attachment C	**940090**

Bore Gage Checker SERIES 515

- The Bore Gage Checker allows easy setting of dial bore gages with ranges of 18 mm (0.7 in) through 400 mm (16 in) using gauge blocks.
- Can be used in both vertical and horizontal positions.

515-590

Standard configuration: Stand
Attachment A, B, C 1 pc. for each
Parallel jaw (2 pcs.)

SPECIFICATIONS

Order No.	Applicable range
515-590	18 - 400 mm (0.7 - 16 in)

C

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Mitutoyo

Bore Gages

For easy and accurate measurement of inside diameters

Setting Rings

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

- Used for quick and accurate setting of dial bore gages, Holtest, and inside micrometers.
- Actual diameter is marked in 0.001 mm increments. (Dimension measuring position is the center of the height T.)

Steel Setting Rings

177-146

177-300

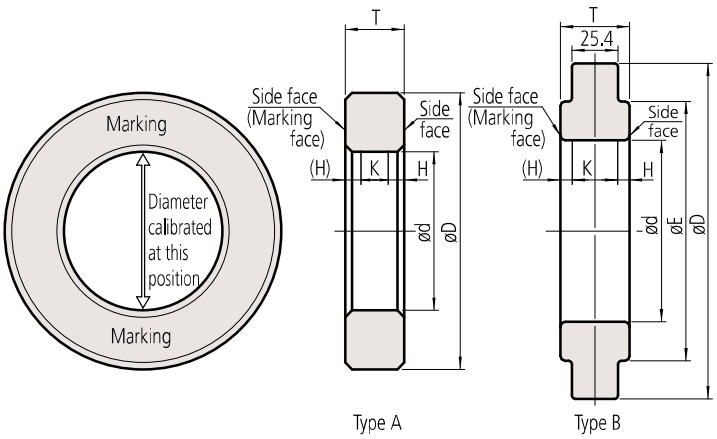
CERA Setting Rings

177-429

177-432

DIMENSIONS

Unit: mm



Suffix

177-*-62**: With Inspection Certificate (provides a record of the calibrated diameter) and Calibration Certificate

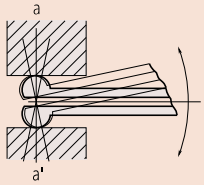
177-*-82**: With Inspection Certificate (provides a record of the calibrated diameter), Calibration Certificate, and Traceability System Chart

Note 1: The Inspection Certificate is not a substitute for a calibration certificate as it is undated.

Note 2: A more detailed inspection certificate describing roundness and cylindricity is available on request.

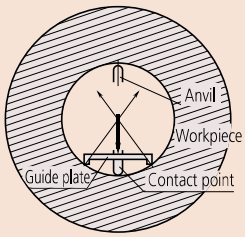
How to Read the Indicated Value

- **SERIES 526**



The **526** Series contact points have high curvature. Alignment with the diameter (a-a') is achieved by rotating the gage head in the direction indicated by the arrow, and the reading is the maximum value read from the dial indicator.

- **SERIES 511**



The **511** Series provides a guide plate to align the setting ring diameter with the measurement axis of the bore gage.

C

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SPECIFICATIONS

Steel Setting Rings

Metric

Order No.	Nominal size ød (mm)	Dimensions (mm) øD	øE	T	Type	Accuracy: Tolerance between the nominal size and the actual diameter (µm)	Uncertainty of marked diameter value*1 (µm)	Roundness/ Cylindricity*2 (µm)	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-220	1	20	—	4	A	±10	1.5	1.0	1.6	0.8
177-222	1.1	20	—	4	A	±10	1.5	1.0	1.6	0.8
177-225	1.2	20	—	4	A	±10	1.5	1.0	1.6	0.8
177-227	1.3	20	—	4	A	±10	1.5	1.0	1.6	0.8
177-230	1.4	20	—	4	A	±10	1.5	1.0	1.6	0.8
177-236	1.75	25	—	5	A	±10	1.5	1.0	1.6	1.8
177-239	2	25	—	5	A	±10	1.5	1.0	1.6	1.8
177-242	2.25	25	—	5	A	±10	1.5	1.0	1.6	1.8
177-208	2.5	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-246	2.75	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-248	3	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-250	3.25	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-252	3.5	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-255	3.75	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-204	4	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-257	4.5	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-205	5	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-263	5.5	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-267	6	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-271	6.5	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-275	7	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-125	8	32	—	10	A	±10	1.5	1.0	2.0	6.0
177-279	9	32	—	10	A	±10	1.5	1.0	2.0	6.0
177-126	10	32	—	10	A	±10	1.5	1.0	2.0	6.0
177-284	12	32	—	10	A	±10	1.5	1.0	2.0	6.0
177-132	14	38	—	10	A	±10	1.5	1.0	2.0	6.0

Order No.	Nominal size ød (mm)	Dimensions (mm) øD	øE	T	Type	Accuracy: Tolerance between the nominal size and the actual diameter (µm)	Uncertainty of marked diameter value*1 (µm)	Roundness/ Cylindricity*2 (µm)	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-177	16	45	—	10	A	±10	1.5	1.0	2.0	6.0
177-133	17	45	—	10	A	±10	1.5	1.0	2.0	6.0
177-285	18	45	—	10	A	±10	1.5	1.0	2.0	6.0
177-286	20	45	—	10	A	±10	1.5	1.0	2.0	6.0
177-139	25	53	—	15	A	±10	1.5	1.0	3.2	8.6
177-288	30	71	—	15	A	±10	1.5	1.0	3.2	8.6
177-140	35	71	—	15	A	±10	1.5	1.0	3.2	8.6
177-290	40	71	—	15	A	±10	1.5	1.0	3.2	8.6
177-178	45	85	—	15	A	±10	1.5	1.0	3.7	7.6
177-146	50	85	—	20	A	±20	1.5	1.0	3.7	12.6
177-292	60	112	—	20	A	±20	1.5	1.0	3.7	12.6
177-314	62	112	—	20	A	±20	1.5	1.5	3.7	12.6
177-147	70	112	—	20	A	±20	1.5	1.5	3.7	12.6
177-316	75	125	—	25	A	±20	1.5	1.5	4.2	16.6
177-294	80	125	—	25	A	±20	1.5	1.5	4.2	16.6
177-318	87	140	—	25	A	±20	1.5	1.5	4.2	16.6
177-148	90	140	—	25	A	±20	1.5	1.5	4.2	16.6
177-296	100	160	—	25	A	±20	1.5	2.0	4.2	16.6
177-298	125	210	168	38.1 (25.4)	B	±20	2.5	2.0	5.3	27.5
177-300	150	235	187		B	±20	2.5	2.0	5.3	27.5
177-302	175	260	215		B	±20	2.5	2.5	5.3	27.5
177-304	200	311	244		B	±20	2.5	2.5	5.3	27.5
177-306	225	337	264		B	±20	2.5	2.5	5.3	27.5
177-308	250	362	290		B	±20	2.5	3.0	5.3	27.5
177-310	275	413	321		B	±20	2.5	3.0	5.3	27.5
177-312	300	438	340		B	±20	2.5	3.0	5.3	27.5

Inch

Order No.	Nominal size ød (in)	Dimensions (mm) øD	øE	T	Type	Accuracy: Tolerance between the nominal size and the actual diameter (in)	Uncertainty of marked diameter value*1 (in)	Roundness/ Cylindricity*2 (in)	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-209	0.1	25	—	7	A	±0.0004	0.00006	0.00004	1.7	3.6
177-206	0.16	25	—	7	A	±0.0004	0.00006	0.00004	1.7	3.6
177-207	0.24	25	—	7	A	±0.0004	0.00006	0.00004	1.7	3.6
177-281	0.275	25	—	7	A	±0.0004	0.00006	0.00004	2.0	3.0
177-179	0.35	32	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-283	0.425	32	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-180	0.5	32	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-181	0.6	38	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-182	0.65	45	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-183	0.7	45	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-287	0.8	45	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-184	1	53	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-289	1.2	71	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-185	1.4	71	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-291	1.6	71	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-186	1.8	85	—	15	A	±0.0004	0.00006	0.00004	3.7	7.6

Order No.	Nominal size ød (in)	Dimensions (mm) øD	øE	T	Type	Accuracy: Tolerance between the nominal size and the actual diameter (in)	Uncertainty of marked diameter value*1 (in)	Roundness/ Cylindricity*2 (in)	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-187	2	85	—	20	A	±0.0008	0.00006	0.00004	3.7	12.6
177-293	2.4	112	—	20	A	±0.0008	0.00006	0.00004	3.7	12.6
177-315	2.5	112	—	20	A	±0.0008	0.00006	0.00006	4.2	11.6
177-188	2.8	112	—	20	A	±0.0008	0.00006	0.00006	4.2	11.6
177-317	3	125	—	25	A	±0.0008	0.00006	0.00006	4.2	16.6
177-295	3.2	125	—	25	A	±0.0008	0.00006	0.00006	4.2	16.6
177-319	3.5	140	—	25	A	±0.0008	0.00006	0.00006	4.2	16.6
177-189	3.6	140	—	25	A	±0.0008	0.00006	0.00006	4.2	16.6
177-297	4	160	—	25	A	±0.0008	0.00006	0.00008	4.2	16.6
177-299	5	210	168	38.1	B	±0.0008	0.00010	0.00008	5.3	27.5
177-301	6	235	187	38.1	B	±0.0008	0.00010	0.00008	5.3	27.5
177-303	7	260	215	38.1	B	±0.0008	0.00010	0.00010	5.3	27.5
177-305	8	311	244	38.1	B	±0.0008	0.00010	0.00010	5.3	27.5
177-307	9	337	264	38.1	B	±0.0008	0.00010	0.00010	5.3	27.5
177-309	10	362	290	38.1	B	±0.0008	0.00010	0.00012	5.3	27.5
177-311	11	413	321	38.1	B	±0.0008	0.00010	0.00012	5.3	27.5
177-313	12	438	340	38.1	B	±0.0008	0.00010	0.00012	5.3	27.5

CERA Setting Rings

Metric

Order No.	Nominal size ød (mm)	Dimensions (mm) øD	øE	T	Type	Accuracy: Tolerance between the nominal size and the actual diameter (µm)	Uncertainty of marked diameter value*1 (µm)	Roundness/ Cylindricity*2 (µm)	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-418	4	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-420	6	25	—	7	A	±10	1.5	1.0	1.7	3.6
177-423	8	32	—	10	A	±10	1.5	1.0	2.0	6.0
177-424	10	32	—	10	A	±10	1.5	1.0	2.0	6.0
177-425	12	32	—	10	A	±10	1.5	1.0	2.0	6.0
177-427	16	45	—	10	A	±10	1.5	1.0	2.0	6.0
177-429	20	45	—	10	A	±10	1.5	1.0	2.0	6.0
177-430	25	53	—	15	A	±10	1.5	1.0	3.2	8.6
177-431	30	71	—	15	A	±10	1.5	1.0	3.2	8.6
177-432	35	71	—	15	A	±10	1.5	1.0	3.2	8.6
177-433	40	71	—	15	A	±10	1.5	1.0	3.2	8.6
177-434	45	85	—	15	A	±10	1.5	1.0	3.7	7.6

Inch

Order No.	Nominal size ød (in)	Dimensions (mm) øD	øE	T	Type	Accuracy: Tolerance between the nominal size and the actual diameter (in)	Uncertainty of marked diameter value*1 (in)	Roundness/ Cylindricity*2 (in)	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-518	0.16	25	—	7	A	±0.0004	0.00006	0.00004	1.7	3.6
177-520	0.24	25	—	7	A	±0.0004	0.00006	0.00004	1.7	3.6
177-522	0.275	25	—	7	A	±0.0004	0.00006	0.00004	1.7	3.6
177-523	0.35	32	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-524	0.425	32	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-525	0.5	32	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-527	0.65	45	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-529	0.8	45	—	10	A	±0.0004	0.00006	0.00004	2.0	6.0
177-530	1	53	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-531	1.2	71	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-532	1.4	71	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-533	1.6	71	—	15	A	±0.0004	0.00006	0.00004	3.2	8.6
177-534	1.8	85	—	15	A	±0.0004	0.00006	0.00004	3.7	7.6

*1 Actual diameter is marked in 0.001 mm increments. (Dimension measuring position is the center of the height T.)
*2 Cylindricity is defined as per JIS B 0621 Definitions and designations of geometrical deviations, Section 4.4 "Cylindricity." Cylindricity is measured using three cross-sections between the top and bottom face of a ring, namely, close to the face near each side and the center.

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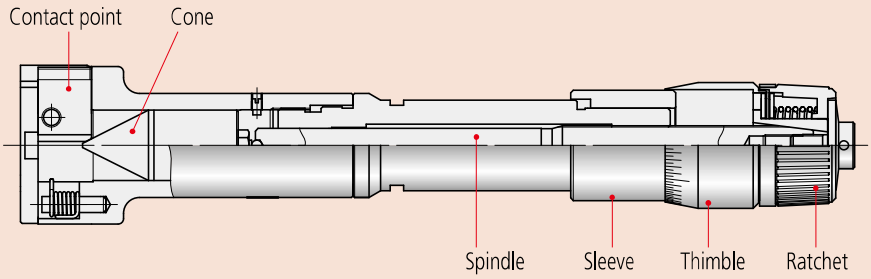
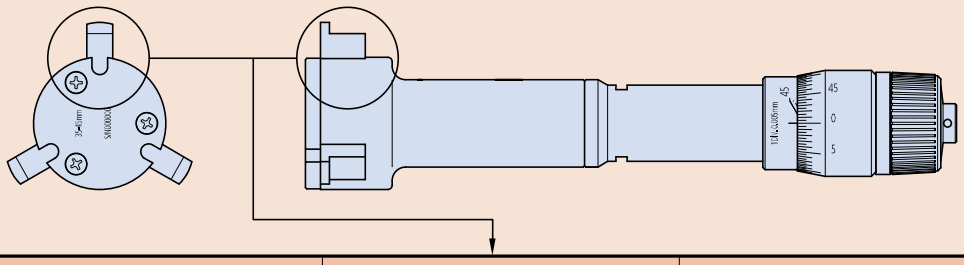
Mitutoyo

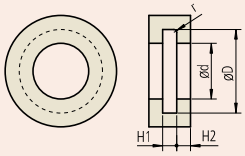
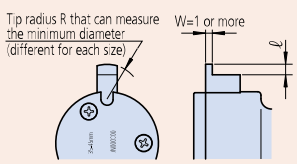
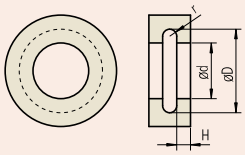
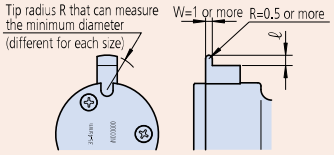
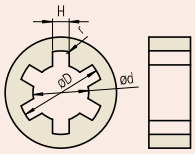
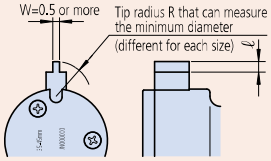
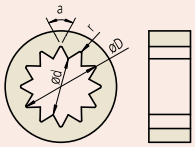
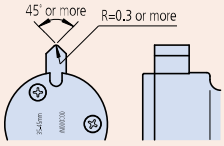
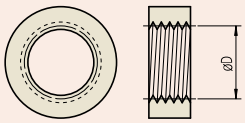
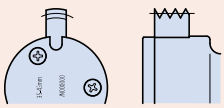
Nomenclature (Holtest)



Custom-ordered Products (Holtest / Boremetic)

Mitutoyo can custom-build an inside micrometer best suited to your special application. Please feel free to contact Mitutoyo about the possibilities - even if only one custom-manufactured piece is required. Please note that, depending on circumstances, such a micrometer will usually need to be used with a master setting ring for accuracy assurance. (A custom-ordered micrometer can be made compatible with a master ring supplied by the customer. Please consult Mitutoyo.)

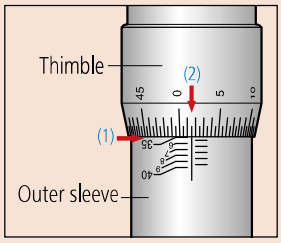


Type of feature	Workpiece profile (example)	Contact point tip profile (example)	Remarks
Square groove			• Allows measurement of the diameter of variously shaped inside grooves and splines. • Minimum measurable groove diameter is approximately 16 mm (differs depending on the workpiece profile.) • Dimension ℓ should be as follows: For W=less than 2 mm: ℓ=less than 2 mm For W=2 mm or more: ℓ=2 mm as the standard value which can be modified according to circumstances. • The number of splines or serrations is limited to a multiple of 3. • Details of the workpiece profile should be provided at the time of placing a custom-order. • If your application needs a measuring range different from that of the standard inside micrometer an additional initial cost for the master ring gage will be required.
Round groove			
Spline			
Serration			
Threaded hole			• Allows measurement of the effective diameter of an internal thread. • Measurable internal threads are restricted according to the type, nominal dimension, and pitch of the thread. Please contact Mitutoyo with the specification of the thread to be measured for advice.

How to Read the Scale

Graduation 0.005 mm

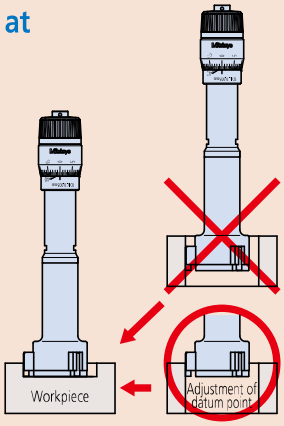
(1) Outer sleeve	35	mm
(2) Thimble	0.015	mm
Reading	35.015	mm



Changes in measured values at different measuring points

The accuracy of a Holtest is maximized if the same part of the anvils is used for measurement as was used for standardizing the instrument with a setting ring.

When you use the tip of the anvil for measurement, adjust the datum point using the tip of the anvil.

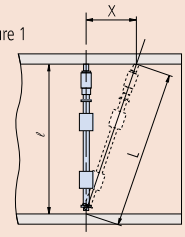


Measurement error due to temperature effects on an inside micrometer

The accuracy of an inside micrometer is degraded if its temperature is significantly different from. To help prevent this situation occurring wear gloves and only hold the micrometer by the heat insulators to reduce the transfer of heat from the operator's hands.

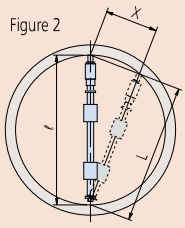
Effect of misalignment on accuracy (Inside Micrometer)

Figure 1



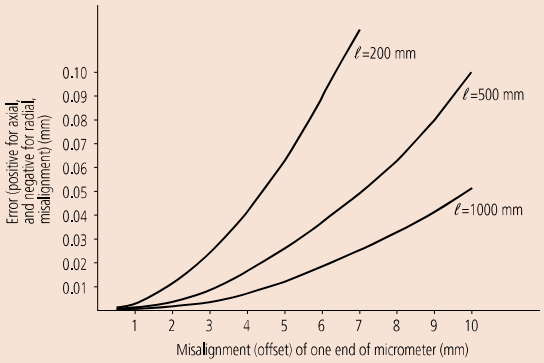
ℓ: Inside diameter to be measured
L: Length measured with axial offset X
X: Offset in axial direction
△ℓ: Error in measurement
△ℓ: $L-\ell=\sqrt{\ell^2+X^2}-\ell$

Figure 2



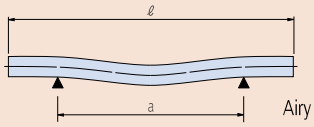
ℓ: Inside diameter to be measured
L: Length measured with radial offset X
X: Offset in radial direction
△ℓ: Error in measurement
△ℓ: $L-\ell=\sqrt{\ell^2-X^2}-\ell$

If the Inside Micrometer is misaligned in the axial or radial direction by an offset distance X when a measurement is taken, as in Figures 1 and 2, then that measurement will be in error as shown in the graph below (constructed from the formulae given above). The error is positive for axial misalignment and negative for radial misalignment.



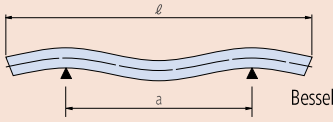
Airy and Bessel Points

When a length standard bar or inside micrometer lies horizontally, supported as simply as possible at two points, it bends under its own weight into a shape that depends on the spacing of those points. There are two distances between the points that control this deformation in useful ways, as shown below.



Airy points (a≒0.577ℓ)

The ends of a bar (or micrometer) can be made exactly horizontal by spacing the two supports symmetrically as shown above. These points are known as the 'Airy Points' and are commonly used to ensure that the ends of a length bar are parallel to one another, so that the length is well defined.

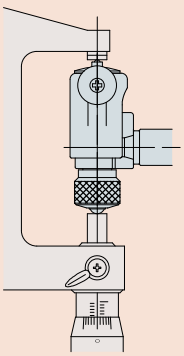


Bessel points (a≒0.559ℓ)

The change in length of a bar (or micrometer) due to bending can be minimized by spacing the two supports symmetrically as shown above. These points are known as the 'Bessel Points' and may be useful when using a long inside micrometer.

Reference point setting (2-point gages)

- Reference point setting with a ring gage or cylinder master gage
  Insert the bore gage into the ring gage, vertically or horizontally swing the bore gage, and set the zero point to the point where the indicator reads the maximum value. (Rotate the dial face for a dial gage and perform presetting or zero setting for a Digimatic indicator.)
- Reference point setting with outside micrometer and gauge block
  Hold a gauge block (of the reference dimension) between a micrometer's measuring faces as if measuring the block. Clamp the micrometer's spindle and then pull out the gauge block. Insert the bore gage between the micrometer's measuring faces. Maneuver the bore gage to the position where the indicator reads a minimum and then set the pointer to read zero (or a preset value required) by rotating the bezel.
- Reference point setting with outside micrometer only
  Fix the micrometer in a vertical attitude with its head side (spindle side) downward (see illustration below), and then adjust the distance between the measuring faces to the reference dimension. At this time, do not clamp the micrometer spindle. Insert the bore gage between the micrometer's measuring faces. Maneuver the bore gage to the position where the indicator reads a minimum and then set the pointer to read zero (or a preset value required) by rotating the bezel. Zero-setting with a micrometer requires a certain degree of dexterity because no self-centering action is available, as is the case when using a setting gage.
  Zero-setting is also possible by performing the same procedure using the gauge block, height master, or bore gage zero checker in addition to the outside micrometer.



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