

New Products



Digimatic Holtest

Refer to pages C-3–C-6 for details.



Holtest

Refer to pages C-7–C-12 for details.



ABSOLUTE Borematic

Refer to pages C-13–C-16 for details.



Inside Micrometers (Caliper Type)

Refer to pages C-23–C-24 for details.



Bore Gages

Refer to pages C-31–C-38 for details.



Digimatic Bore Gages

Refer to pages C-41–C-42 for details.



Holtest ABSOLUTE Borematic

Holtest ABSOLUTE Borematic



Inside Micrometers

Inside Micrometers



Bore Gages

Bore Gages



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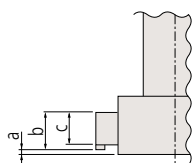
Holtest

For easy and accurate measurement of inside diameters

Digimatic Holtest SERIES 468 — Three-point Internal Micrometers

- Three-point internal micrometer with large LCD readout. (Character height 7.5mm)
- Titanium-coated measuring pins provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- One SR44 battery is required and battery life is approx. 1.2 years under normal use.
- ABSolute and INCremental measurement modes allow highly efficient operation.
- The IP65 protection rating allows the instrument to be used in the presence of splashing coolant.
- Measurements can be made close to the bottom of a blind hole.
- Deep holes can be measured by attaching an extension rod (optional).
- A function lock prevents accidental change of reference point.
- Measurement data output enables operation with Statistical Process Control (SPC) and measurement control systems. Refer to page A-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 Setting Rings, refer to page C-45.

Range (mm)	a (mm)	b (mm)	c (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

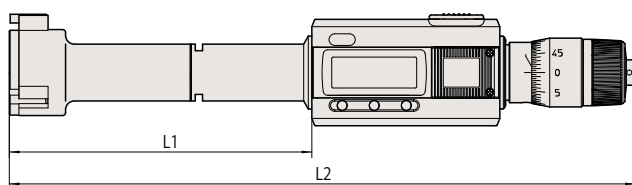


468-168



468-174

DIMENSIONS



Unit: mm

Order No.	L1	L2
468-161, 468-162, 468-163	59	175 - 177
468-164, 468-165	84	197.5 - 201.5
468-166, 468-167	93	206.9 - 211.9
468-168, 468-169	103.8	214.7 - 224.7
468-170, 468-171, 468-172, 468-173	105.4	219.6 - 232.6
468-174, 468-175, 468-176, 468-177, 468-178, 468-179, 468-180, 468-181	151.4	286.3 - 311.3

1) L1 is maximum depth of measurement possible.
2) External view differs depending on measurement range.



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



• Dust-tight and water jet protected IP65



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

IP Codes

Level 6: Dust-proof.

Degree of protection against solid foreign objects. No ingress of dust allowed.

Level 5: Protected against water jets.

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

Technical Data

Display: LCD

Battery: SR44 (1 pc.), **938882**.

Functions

Zero-setting
Origin restoration
Data hold
2-point Preset
Function lock



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

Optional accessories

Refer to page A-21 for details.

- USB Input Tool Direct (2m): **06ADV380B**
- Connecting cables for **U-WAVE-T**
For standard (160mm): **02AZD790B**
For foot switch: **02AZE140B**

Optional accessories

Shown mounted on stand using bracket



Mounting bracket
No.04AZB157

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

SPECIFICATIONS

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

*1 Excluding quantizing error.

Accuracy: values measured with the entire measuring face.

Maximum difference: differences between the maximum and minimum values.

*2 Setting ring and extension rod: optional.

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)

Inch/Metric								
Order No.	Range	Resolution	Accuracy* ¹	Optional Accessories* ²				
				Extension rod	SPC cable			
468-261	.275" - .35"	.00005"/ 0.001mm	±.0001" (within .0001")	952322 (100mm)	05CZA662 (1m) 05CZA663 (2m)			
468-262	.35" - .425"							
468-263	.425" - .5"			952621 (150mm)				
468-264	.5" - .65"							
468-265	.65" - .8"		±.00015" (within .00015")	952622 (150mm)				
468-266	.8" - 1"							
468-267	1" - 1.2"			952623 (150mm)				
468-268	1.2" - 1.6"							
468-269	1.6" - 2"							
468-270	2" - 2.5"							
468-271	2.5" - 3"							
468-272	3" - 3.5"	.0001"/ 0.001mm	±.00025" (within .00025")					
468-273	3.5" - 4"							
468-274	4" - 5"							
468-275	5" - 6"							
468-276	6" - 7"							
468-277	7" - 8"							
468-278	8" - 9"							
468-279	9" - 10"							
468-280	10" - 11"							
468-281	11" - 12"							

*1 Excluding quantizing error.

Accuracy: values measured across the entire measuring face.

Maximum difference: differences between the maximum and minimum values.

*2 Setting ring and extension rod: optional.

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measuring accuracy in such cases is not guaranteed.)



Interchangeable-Head Sets (interchangeable measuring heads type)

* For details, refer to page C-5.



Non-interchangeable-Head Sets

** For details, refer to page C-6.

Holtest

For easy and accurate measurement of inside diameters

Interchangeable-Head Sets

Metric				Inch/Metric			
Set Order No.	Range*	Content of set	Accessories (optional)	Set Order No.	Range*	Content of set	Accessories (optional)
468-971	6 - 12mm	Display unit 6 - 12mm 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)	468-976	.275-.5"	Display unit .275-.5" 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)
		Measuring head 6 - 8mm 1 pc				Measuring head .275-.35" 1 pc	
		8 - 10mm 1 pc				.35-.425" 1 pc	
		10 - 12mm 1 pc				.425-.5" 1 pc	
		Setting ring (ø8, ø10) 1 pc each				Setting ring (.35"DIA., .425"DIA.) 1 pc each	
468-972	12 - 20mm	Extension rod (100mm) 1 pc		468-977	.5-.8"	Extension rod (100mm) 1 pc	
		Spanner 2 pcs				Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	
468-973	20 - 50mm	Display unit 12 - 20mm 1 pc		468-978	.8-2"	Display unit .5-.8" 1 pc	
		Measuring head 12 - 16mm 1 pc				Measuring head .5-.65" 1 pc	
		16 - 20mm 1 pc				.65-.8" 1 pc	
		Setting ring (ø16) 1 pc				Setting ring (.65"DIA.) 1 pc	
		Extension rod (150mm) 1 pc				Extension rod (150mm) 1 pc	
468-974	50 - 100mm	Spanner 2 pcs		468-979	2-4"	Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	
468-975	100 - 200mm	Display unit 20 - 50mm 1 pc		468-980	4-8"	Display unit .8-2" 1 pc	
		Measuring head 20 - 25mm 1 pc				Measuring head .8-1" 1 pc	
		25 - 30mm 1 pc				1-1.2" 1 pc	
		30 - 40mm 1 pc				1.2-1.6" 1 pc	
		40 - 50mm 1 pc				1.6-2" 1 pc	
468-976	120 - 200mm	Setting ring (ø25, ø40) 1 pc each		468-981	4-8"	Setting ring (1"DIA., 1.6"DIA.) 1 pc each	
		Extension rod (150mm) 1 pc				Extension rod (150mm) 1 pc	
		Spanner 2 pcs				Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	
468-977	120 - 200mm	Display unit 50 - 100mm 1 pc		468-982	4-8"	Display unit 2-4" 1 pc	
		Measuring head 50 - 63mm 1 pc				Measuring head 2-2.5" 1 pc	
		62 - 75mm 1 pc				2.5-3" 1 pc	
		75 - 88mm 1 pc				3-3.5" 1 pc	
		87 - 100mm 1 pc				3.5-4" 1 pc	
468-978	120 - 200mm	Setting ring (ø62, ø87) 1 pc each		468-983	4-8"	Setting ring (2.5"DIA., 3.5"DIA.) 1 pc each	
		Extension rod (150mm) 1 pc				Extension rod (150mm) 1 pc	
		Spanner 2 pcs				Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	
468-979	120 - 200mm	Display unit 100 - 200mm 1 pc		468-984	4-8"	Display unit 4-8" 1 pc	
		Measuring head 100 - 125mm 1 pc				Measuring head 4-5" 1 pc	
		125 - 150mm 1 pc				5-6" 1 pc	
		150 - 175mm 1 pc				6-7" 1 pc	
		175 - 200mm 1 pc				7-8" 1 pc	
468-980	120 - 200mm	Setting ring (ø125, ø175) 1 pc each		468-985	4-8"	Setting ring (5"DIA., 7"DIA.) 1 pc each	
		Extension rod (150mm) 1 pc				Extension rod (150mm) 1 pc	
		Spanner 2 pcs				Spanner 2 pcs	
		Hex wrench 1 pc				Hex wrench 1 pc	
		Phillips screw driver 1 pc				Phillips screw driver 1 pc	

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads.
(The measuring accuracy in such cases is not guaranteed.)



468-971



468-972



468-973



468-974



Standard accessory Setting
Rings (ø125, ø175)

468-975

Optional accessories

Refer to page A-21 for details.
USB Input Tool Direct (2m): **06ADV380B**
Connecting cables for **U-WAVE-T**
For standard (160mm): **02AZD790B**
For foot switch: **02AZE140B**

Non-Interchangeable-Head Sets

Metric					Inch/Metric				
Set Order No.	Range*2	Content of set	Accessories (optional)		Set Order No.	Range*2	Content of set	Accessories (optional)	
			Extension rod	SPC cable				Extension rod	SPC cable
468-981	6 - 12mm	Display unit 6 - 8mm 1 pc 8 - 10mm 1 pc 10 - 12mm 1 pc Setting ring (ø8, ø10) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	100mm 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)	468-986	.275"-.5"	Display unit .275-.35" 1 pc .35-.425" 1 pc .425-.5" 1 pc Setting ring (.35" DIA., .425" DIA) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	100mm 1 pc	SPC cable with data switch 05CZA662 (1m) 05CZA663 (2m)
468-982	12 - 25mm	Display unit 12 - 16mm 1 pc 16 - 20mm 1 pc 20 - 25mm 1 pc Setting ring (ø16, ø20) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	150mm 2 pcs*1		468-987	.5"-1"	Display unit .5-.65" 1 pc .65-.8" 1 pc .8-1" 1 pc Setting ring (.65" DIA., .8" DIA) 1 pc each Spanner 2 pcs Hex wrench 1 pc Phillips screw driver 1 pc	150mm 2 pcs*1	
468-983	25 - 50mm	Display unit 25 - 30mm 1 pc 30 - 40mm 1 pc 40 - 50mm 1 pc Setting ring (ø30, ø40) 1 pc each Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc		468-988	1"-2"	Display unit 1-1.2" 1 pc 1.2-1.6" 1 pc 1.6-2" 1 pc Setting ring (1.2" DIA., 1.6" DIA) 1 pc each Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc	
468-984	50 - 75mm	Display unit 50 - 63mm 1 pc 62 - 75mm 1 pc Setting ring (ø62) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc		468-989	2"-3"	Display unit 2-2.5" 1 pc 2.5-3" 1 pc Setting ring (2.5" DIA) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc	
468-985	75 - 100mm	Display unit 75 - 88mm 1 pc 87 - 100mm 1 pc Setting ring (ø87) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc		468-990	3"-4"	Display unit 3-3.5" 1 pc 3.5-4" 1 pc Setting ring (3.5" DIA) 1 pc Spanner 1 pc Hex wrench 1 pc Phillips screw driver 1 pc	150mm 1 pc	

*1 Total 2 pcs of extension rods: 1 pcs of Part **No. 952621** (for measuring range 12 to 16mm, 16 to 20mm) and Part **No. 952622** (for measuring range 20 to 25mm).
Two extension rods cannot be connected due to the different mounting positions.

*2 It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads. (The measurement accuracy in such cases is not guaranteed.)



468-981



468-982



468-983



468-984



468-985

Optional accessories

Refer to page A-21 for details.

USB Input Tool Direct (2m): **06ADV380B**

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

For standard (160mm): **02AZD790B**

For foot switch: **02AZE140B**

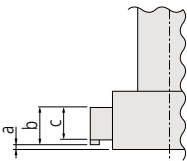
Holtest

For easy and accurate measurement of inside diameters

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

- Titanium-coated measuring pins on the three-point type (over 6mm range models) provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Three-point bore micrometer with measuring range 6mm or longer allows stable measurement through automatic centering.
- Can measure deep holes using an Extension rod (optional) which is available on models over 6mm (.275") measuring range.
- Ratchet Stop ensures constant-force, repeatable measurement.
- Setting Rings for accurately setting the instrument are optional. Refer to page C-45 for details.

Range (mm)	a (mm)	b (mm)	c (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



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



Application using an extension rod



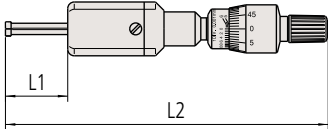
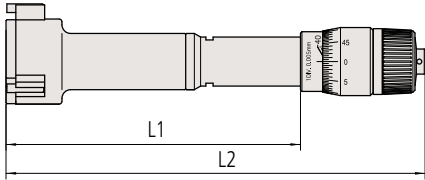
For details of Special-order Products,
refer to page C-49.

SPECIFICATIONS

Metric					Inch				
Order No.	Range	Graduation	Accuracy*	Extension Rod (optional)	Order No.	Range	Graduation	Accuracy*	Extension Rod (optional)
(Two-point) 368-001	2 - 2.5mm	0.001mm	±2µm (within 2µm)	—	(Two-point) 368-021	.08" - .1"	.0001"	±.0001" (within .0001")	—
368-002	2.5 - 3mm				368-022	.1" - .12"			
368-003	3 - 4mm				368-023	.12" - .16"			
368-004	4 - 5mm				368-024	.16" - .2"			
368-005	5 - 6mm				368-025	.2" - .24"			
					368-026	.24" - .28"			
(Three-point) 368-161	6 - 8mm	0.001mm	±2µm (within 2µm)	100mm (952322)	(Three-point) 368-261	.275" - .35"	.0001"	±.0001" (within .0001")	100mm (952322)
368-162	8 - 10mm				368-262	.35" - .425"			
368-163	10 - 12mm				368-263	.425" - .5"			
368-164	12 - 16mm				368-264	.5" - .65"			
368-165	16 - 20mm				368-265	.65" - .8"			
368-166	20 - 25mm				368-266	.8" - 1"			
368-167	25 - 30mm	0.005mm	±3µm (within 3µm)	150mm (952622)	368-267	1" - 1.2"	.0002"	±.00015" (within .00015")	150mm (952622)
368-168	30 - 40mm				368-268	1.2" - 1.6"			
368-169	40 - 50mm				368-269	1.6" - 2"			
368-170	50 - 63mm				368-270	2" - 2.5"			
368-171	62 - 75mm				368-271	2.5" - 3"			
368-172	75 - 88mm				368-272	3" - 3.5"			
368-173	87 - 100mm	0.005mm	±3µm (within 3µm)	150mm (952622)	368-273	3.5" - 4"	.0002"	±.00015" (within .00015")	150mm (952622)
368-174	100 - 125mm				368-274	4" - 5"			
368-175	125 - 150mm				368-275	5" - 6"			
368-176	150 - 175mm				368-276	6" - 7"			
368-177	175 - 200mm				368-277	7" - 8"			
368-178	200 - 225mm				368-278	8" - 9"			
368-179	225 - 250mm	0.005mm	±5µm (within 5µm)	150mm (952623)	368-279	9" - 10"	.0002"	±.00025" (within .00025")	150mm (952623)
368-180	250 - 275mm				368-280	10" - 11"			
368-181	275 - 300mm				368-281	11" - 12"			

* Instrumental error (maximum error)

DIMENSIONS

			Unit: mm
Range	L1	L2	
2 - 2.5, 2.5 - 3mm	12	103.5 - 104	
3 - 4, 4 - 5, 5 - 6mm	22	113 - 114	
External appearance differs depending on the measuring range.			
			
Range	L1	L2	
6 - 8, 8 - 10, 10 - 12mm	59	102 - 104	
12 - 16, 16 - 20mm	82	126 - 130	
20 - 25, 25 - 30mm	94	137 - 142	
30 - 40, 40 - 50mm	102	145 - 155	
50 - 63, 62 - 75, 75 - 88, 87 - 100mm	105	150 - 163	
100 - 125, 125 - 150, 150 - 175, 175 - 200, 200 - 225, 225 - 250, 250 - 275, 275 - 300mm	161	227 - 252	
External appearance differs depending on the measuring range.			

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*	Graduation	Content of Set
(Two-point) 368-906	2 - 3mm	0.001mm	Micrometer head unit 2 - 2.5mm 1 pc 2.5 - 3mm 1 pc Setting ring (ø2.5) 1 pc Hex wrench 1 pc
368-907	3 - 6mm		Micrometer head unit 3 - 4mm 1 pc 4 - 5mm 1 pc 5 - 6mm 1 pc Setting ring (ø4, ø5) 1pc each Hex wrench 1 pc
(Three-point) 368-911	6 - 12mm		Micrometer head unit 6 - 8mm 1 pc 8 - 10mm 1 pc 10 - 12mm 1 pc Setting ring (ø8, ø10) 1pc each Extension rod (100mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-912	12 - 20mm	0.005mm	Micrometer head unit 12 - 16mm 1 pc 16 - 20mm 1 pc Setting ring (ø16) 1 pc Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-913	20 - 50mm		Micrometer head unit 20 - 25mm 1 pc 25 - 30mm 1 pc 30 - 40mm 1 pc 40 - 50mm 1 pc Setting ring (ø25, ø40) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-914	50 - 100mm		Micrometer head unit 50 - 63mm 1 pc 62 - 75mm 1 pc 75 - 88mm 1 pc 87 - 100mm 1 pc Setting ring (ø62, ø87) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-915	100 - 200mm		Micrometer head unit 100 - 125mm 1 pc 125 - 150mm 1 pc 150 - 175mm 1 pc 175 - 200mm 1 pc Setting ring (ø125, ø175) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc

Inch			
Set Order No.	Range*	Graduation	Content of Set
(Two-point) 368-926	.08" - .12"	.0001"	Micrometer head unit .08-1" 1 pc .1-.12" 1 pc Setting ring (.1" DIA) 1 pc Hex wrench 1 pc
368-927	.12" - .28"		Micrometer head unit .12-.16" 1 pc .16-.2" 1 pc .2-.24" 1 pc .24-.28" 1 pc Setting ring (.16" DIA., .24" DIA) 1pc each Hex wrench 1 pc
(Three-point) 368-916	.275" - .5"		Micrometer head unit .275-.35" 1 pc .35-.425" 1 pc .425-.5" 1 pc Setting ring (.35" DIA., .5" DIA) 1pc each Extension rod (100mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-917	.5" - .8"	.0002"	Micrometer head unit .5-.65" 1 pc .65-.8" 1 pc Setting ring (.65" DIA) 1 pc Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-918	.8" - 2"		Micrometer head unit .8-1" 1 pc 1-1.2" 1 pc 1.2-1.6" 1 pc 1.6-2" 1 pc Setting ring (1" DIA., 1.6" DIA) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-919	2" - 4"		Micrometer head unit 2-2.5" 1 pc 2.5-3" 1 pc 3-3.5" 1 pc 3.5-4" 1 pc Setting ring (2.5" DIA., 3.5" DIA) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-920	4" - 8"		Micrometer head unit 4-5" 1 pc 5-6" 1 pc 6-7" 1 pc 7-8" 1 pc Setting ring (5" DIA., 7" DIA) 1pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads.
(The measuring accuracy in such cases is not guaranteed.)



368-906



368-907



368-911



368-912



368-913



368-914



Setting rings supplied as standard (ø125, ø175)

368-915

Holtest

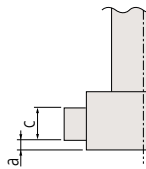
For easy and accurate measurement of inside diameters

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

- Hardened tool-steel anvils (instead of titanium-coated carbide) allow a more economically priced tool.
- Same accuracy as the titanium-coated Holtest models.
- For details of setting rings, refer to page C-45.
- Constant-force device allows repeatable measurement.

- Measurement can be made close to the bottom of a blind hole.

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



- Can measure deep holes using an Extension Rod (optional).



368-769



368-770



368-774

SPECIFICATIONS

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

Inch individual				
Order No.	Range* ²	Graduation	Accuracy* ¹	Extension Rod (optional)
368-864	.5" - .65"	.0002"	±.0001" (within .0001")	150mm (952621)
368-865	.65" - .8"			
368-866	.8" - 1"		±.00015" (within .00015")	150mm (952622)
368-867	1" - 1.2"			
368-868	1.2" - 1.6"			
368-869	1.6" - 2"			
368-870	2" - 2.5"			
368-871	2.5" - 3"			
368-872	3" - 3.5"		±.00025" (within .00025")	150mm (952623)
368-873	3.5" - 4"			
368-874	4" - 5"			
368-875	5" - 6"			
368-876	6" - 7"			
368-877	7" - 8"			
368-878	8" - 9"			
368-879	9" - 10"			
368-880	10" - 11"			
368-881	11" - 12"			

*1 Accuracy: values measured with the entire measuring face

Maximum difference: differences between the maximum and minimum values

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

Note: Setting rings are optional.



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

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

DIMENSIONS

Unit: mm			
		Range	
		L1	L2
		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	161 227 - 252
		200 - 225, 225 - 250, 250 - 275, 275 - 300	

External appearance differs depending on the measuring range.

Metric

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

Inch

Order No.	Range*	Graduation	Content of Set
368-995	.5" - .8"	.0002"	Micrometer head unit .5-.65" 1 pc .65-.8" 1 pc Setting ring (.65" DIA.) 1 pc Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-996	.8" - 2"		Micrometer head unit .8-1" 1 pc 1-1.2" 1 pc 1.2-1.6" 1 pc 1.6-2" 1 pc Setting ring (1" DIA., 1.6" DIA.) 1 pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-997	2" - 4"		Micrometer head unit 2-2.5" 1 pc 2.5-3" 1 pc 3-3.5" 1 pc 3.5-4" 1 pc Setting ring (2.5" DIA., 3.5" DIA.) 1 pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc
368-998	4" - 8"		Micrometer head unit 4-5" 1 pc 5-6" 1 pc 6-7" 1 pc 7-8" 1 pc Setting ring (5" DIA., 7" DIA.) 1 pc each Extension rod (150mm) 1 pc Spanner 2 pcs Hex wrench 1 pc

* It is not advisable to use measuring heads other than as supplied as a standard accessory, or widen a measuring range by using any other multiple sub-measuring heads.
(The measuring accuracy in such cases is not guaranteed.)



368-991



368-992



368-993



Setting rings supplied as standard (ø125, ø175)
368-994

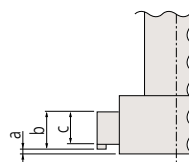
Holtest

For easy and accurate measurement of inside diameters

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

- A snap-type digital display, inside-diameter measuring instrument allows easy and speedy measurement by lever operation.
- Titanium-coated measuring pins provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Three-Point contact measuring head enables highly repeatable measurement data to be obtained.
- The ABSOLUTE linear encoder eliminates overspeed errors.
- GO/NO-GO judgment function.
- Dual HOLD function buttons, optimally located, enable high operability.
- 330-degree rotatable display unit for easy reading at any angle.
- Measurement can be made close to the bottom of a blind hole.

Range (mm)	a (mm)	b (mm)	c (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	14
50 - 125		17.0	13.8



- Can measure deep holes by attaching an optional extension rod.



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 Bore Gages are available in part sets and full sets.
- For details of Setting rings, refer to page C-45.



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

ABSOLUTE

Absolute Encoder

Technical Data

Resolution: 0.001mm or .00005"/0.001mm
Display: LCD
Response speed: Infinite
Battery: SR44 (1 pc.), **938882**
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-21 for details
USB Input Tool Direct (2m): 06ADV380F
Connecting cables for **U-WAVE-T**
For standard (160mm): **02AZD790F**
For foot switch: **02AZE140F**

SPECIFICATIONS

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

*1 Excluding quantizing error

Instrumental error excluding quantizing error (maximum error)

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

Note: Setting rings are optional.

Inch	individual				
Order No.	Range*2	Accuracy*1	Mass	Extension Rod (optional)*2	
				Extension Rod	SPC cable
568-461	.275" - .35"	±.00025" (within .00025")	480g	100mm (952322)	1mm (905338) 2mm (905409)
568-462	.35" - .425"		485g		
568-463	.425" - .5"		475g	150mm (952621)	
568-464	.5" - .65"		480g		
568-465	.65" - .8"	±.0003" (within .0003")	540g	150mm (952622)	
568-466	.8" - 1"		555g		
568-467	1" - 1.2"		565g		
568-468	1.2" - 1.6"		610g	150mm (952623)	
568-469	1.6" - 2"		730g		
568-470	2" - 2.5"		740g		
568-471	2.5" - 3"		790g		
568-472	3" - 3.5"		800g		
568-473	3.5" - 4"		900g		
568-474	4" - 4.5"		910g		
568-475	4.5" - 5"				

FEATURES

Large LCD



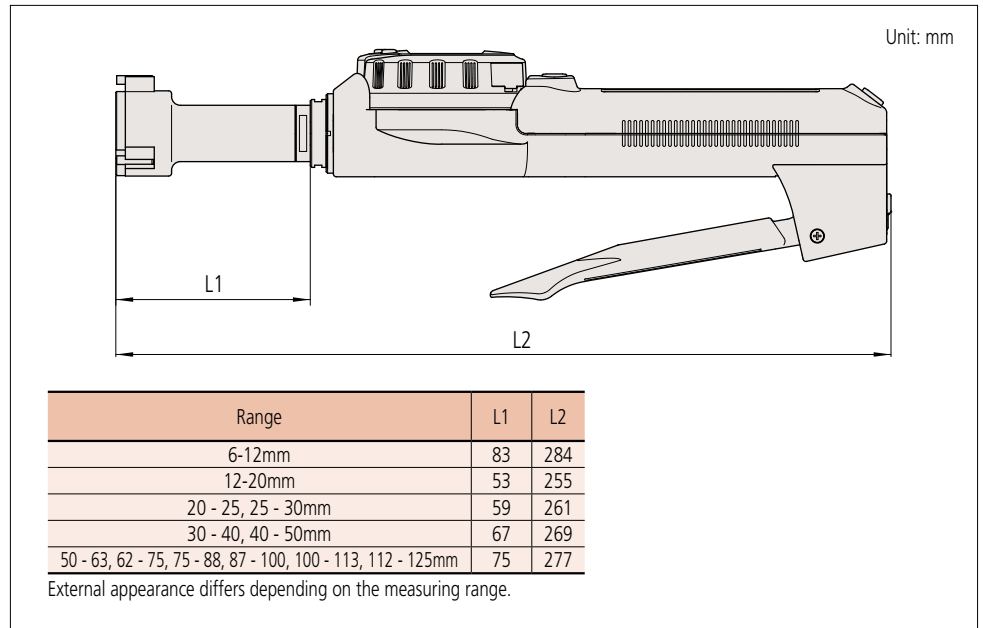
Function lock



Three large buttons



DIMENSIONS



Interchangeable-Head Bore Gage Sets

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

Metric			Inch		
Order No.	Range	Content of Set	Order No.	Range	Content of Set
568-924	6 - 12mm	Display unit	568-928	.275" - .5"	Display unit
		Measuring head			Measuring head
		6 - 8mm			.275-.35"
		8 - 10mm			.35-.425"
		10 - 12mm			.425-.5"
		Attachment			Attachment
568-925	12 - 25mm	Setting ring (ø8, ø10)	568-929	.5" - 1"	Setting ring
		Spanner			(.35" DIA, .425" DIA)
					Spanner
568-926	25 - 50mm	Display unit	568-930	1" - 2"	Display unit
		Measuring head			Measuring head
		25 - 30mm			1-1.2"
		30 - 40mm			1.2-1.6"
		40 - 50mm			1.6-2"
		Attachment			Attachment
568-927	50 - 100mm	Setting ring (ø30, ø40)	568-936	2" - 4"	Setting ring (1.2" DIA, 1.6" DIA)
		Spanner			Spanner
568-924	6 - 12mm	Display unit	568-928	.275" - .5"	Display unit
		Measuring head			Measuring head
		6 - 8mm			.275-.35"
		8 - 10mm			.35-.425"
		10 - 12mm			.425-.5"
		Attachment			Attachment
568-925	12 - 25mm	Setting ring (ø8, ø10)	568-929	.5" - 1"	Setting ring
		Spanner			(.35" DIA, .425" DIA)
					Spanner
568-926	25 - 50mm	Display unit	568-930	1" - 2"	Display unit
		Measuring head			Measuring head
		25 - 30mm			1-1.2"
		30 - 40mm			1.2-1.6"
		40 - 50mm			1.6-2"
		Attachment			Attachment
568-927	50 - 100mm	Setting ring (ø30, ø40)	568-936	2" - 4"	Setting ring (1.2" DIA, 1.6" DIA)
		Spanner			Spanner

Holtest

For easy and accurate measurement of inside diameters

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

Non-Interchangeable-Head Snap-Open Bore Gage Sets

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

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

Inch		
Order No.	Range	Content of Set
568-965	.275" - .5"	Display unit
		.275-.35" 1 pc
		.35-.425" 1 pc
		.425-.5" 1 pc
		Setting ring (.35" DIA, .425" DIA) 1 pc each Spanner 3 pcs
568-966	.5" - 1"	Display unit
		.5-.65" 1 pc
		.65-.8" 1 pc
		.8-1" 1 pc
		Setting ring (.65" DIA, .8" DIA) 1 pc each Spanner 2 pcs
568-967	1" - 2"	Display unit
		1-1.2" 1 pc
		1.2-1.6" 1 pc
		1.6-2" 1 pc
		Setting ring (1.2" DIA, 1.6" DIA) 1 pc each Spanner 2 pcs
568-968	2" - 3"	Display unit
		2-2.5" 1 pc
		2.5-3" 1 pc
		Setting ring (2.5" DIA) 1 pc
		Spanner 2 pcs
568-969	3" - 4"	Display unit
		3-3.5" 1 pc
		3.5-4" 1 pc
		Setting ring (3.5" DIA) 1 pc
		Spanner 2 pcs



568-924



568-926



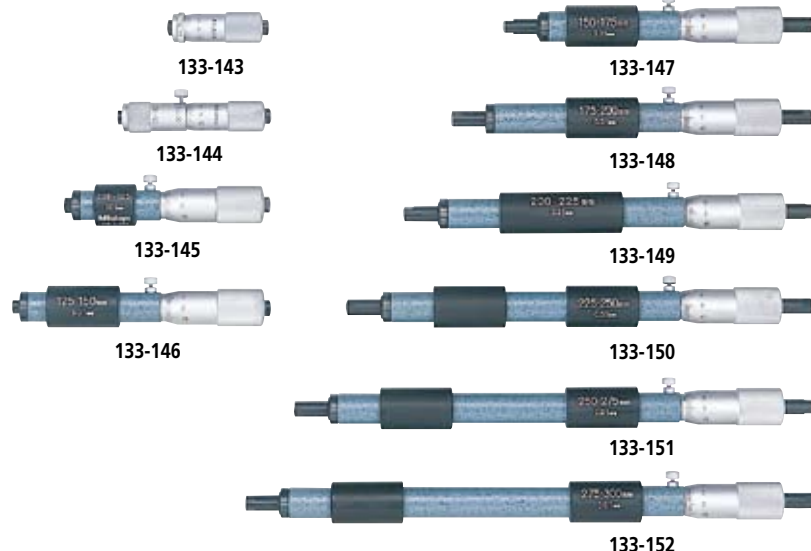
568-959

Inside Micrometers

For easy and accurate measurement of inside diameters

Tubular Inside Micrometers SERIES 133 — Single Rod Type

- Standard single rod type inside micrometer.
- Carbide measuring faces.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An inside-length standard is required for accurately setting the micrometer.



Optional Accessory



SPECIFICATIONS

Metric Individual			
Order No.	Range	Graduation	Accuracy
133-143	50 - 75mm	0.01mm	±3μm
133-144	75 - 100mm		±4μm
133-145	100 - 125mm		±5μm
133-146	125 - 150mm		
133-147	150 - 175mm		
133-148	175 - 200mm		
133-149	200 - 225mm		±6μm
133-150	225 - 250mm		
133-151	250 - 275mm		
133-152	275 - 300mm		±7μm
133-153	300 - 325mm		
133-154	325 - 350mm	0.01mm	±8μm
133-155	350 - 375mm		
133-156	375 - 400mm		±9μm
133-157	400 - 425mm		
133-158	425 - 450mm		
133-159	450 - 475mm		
133-160	475 - 500mm		±10μm
133-161	500 - 525mm		
133-162	525 - 550mm		
133-163	550 - 575mm		±11μm
133-164	575 - 600mm		
133-165	600 - 625mm	0.01mm	±12μm
133-166	625 - 650mm		
133-167	650 - 675mm		
133-168	675 - 700mm		

Metric Individual			
Order No.	Range	Graduation	Accuracy
133-169	700 - 725mm	0.01mm	±12μm
133-170	725 - 750mm		±13μm
133-171	750 - 775mm		
133-172	775 - 800mm		
133-173	800 - 825mm		±14μm
133-174	825 - 850mm		
133-175	850 - 875mm		
133-176	875 - 900mm		±15μm
133-177	900 - 925mm		
133-178	925 - 950mm		
133-179	950 - 975mm		±16μm
133-180	975 - 1000mm		

Inch Individual			
Order No.	Range	Graduation	Accuracy
133-223	2" - 3"	.001"	±.00015"
133-224	3" - 4"		±.0002"
133-225	4" - 5"		±.00025"
133-226	5" - 6"		
133-227	6" - 7"		
133-228	7" - 8"		
133-229	8" - 9"		±.0003"
133-230	9" - 10"		
133-231	10" - 11"		
133-232	11" - 12"		

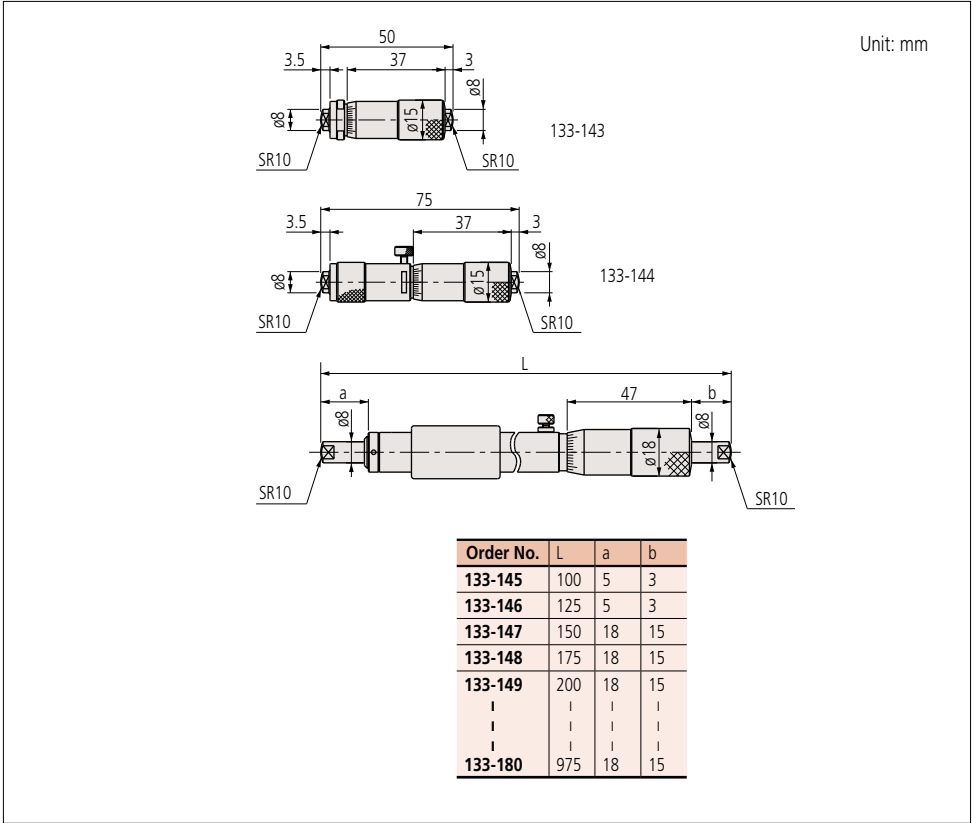
Single Rod Type Inside Micrometer Set



133-902

Metric Micrometer set			Inch Micrometer set		
Order No.	Range	Models included	Order No.	Range	Models included
133-901	50 - 150mm (4 heads/set)	133-143 133-144 133-145 133-146 with fitted case	133-903	2" - 6" (4 heads/set)	133-223 133-224 133-225 133-226 with fitted case
133-902	50 - 300mm (10 heads/set)	133-143 133-144 133-145 133-146 133-147 133-148 133-149 133-150 133-151 133-152 with fitted case	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

DIMENSIONS

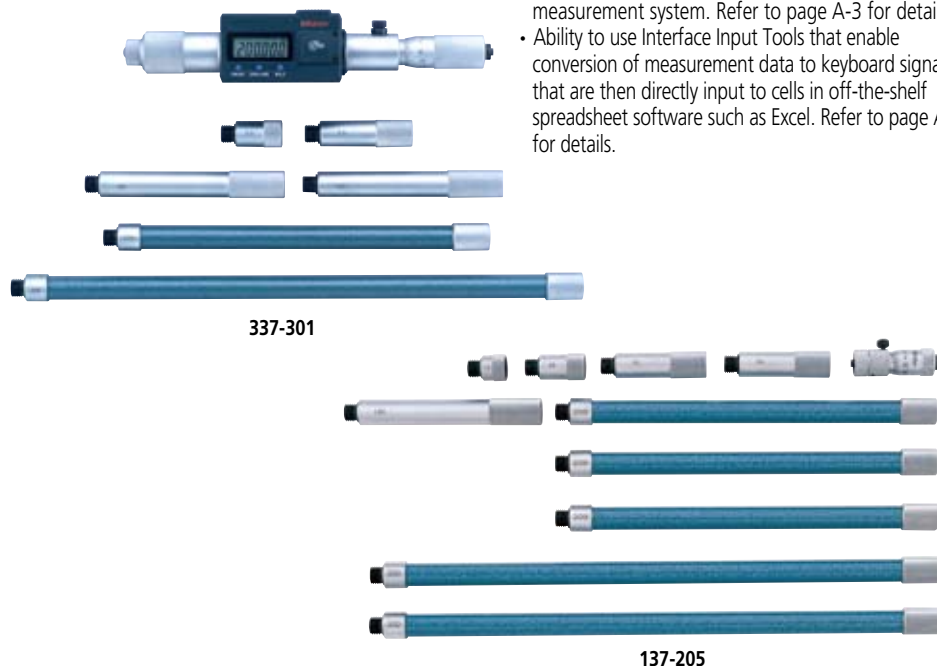


Inside Micrometers

For easy and accurate measurement of inside diameters

Tubular Inside Micrometers SERIES 137, 337 — Extension Rod Type

- Wide range of inside measurements possible by combining extension rods and anvils with the micrometer head.
- Carbide measuring faces are available.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An inside length standard is required for accurately setting the micrometer.
- Order No. 337-301/2 features:
 - IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
 - A large-character LCD display.
 - Storage of 2 preset values for use when setting to an inside length standard.
 - A function lock that prevents accidental changing of the reference setting during measurement.
 - An output port for measurement data that enables inclusion in a statistical process control or networked measurement system. Refer to page A-3 for details.
 - Ability to use Interface Input Tools that enable conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel. Refer to page A-5 for details.



SPECIFICATIONS

Metric						
Order No.	Range	Resolution	Micrometer head stroke	Extension rods Qty	Extension rods Size	Display unit
Digimatic (LCD)						
337-101	200 - 225mm	0.001mm	25mm	—	—	200 - 225mm
337-301	200 - 1000mm			6	25, 50, 100 (2 pcs.), 200, 300mm	
337-302	150 - 300mm			7	25, 50, 100, 200, 300 (3 pcs.)mm	

Inch/Metric						
Order No.	Range	Resolution	Micrometer head stroke	Extension rods Qty	Extension rods Size (inch)	Display unit
Digimatic (LCD)						
337-102	8" - 9"	.0001"/0.001mm	1"	—	—	8 - 9"
337-303	8" - 40"			6	1", 2", 4" (2 pcs.), 8", 12"	
337-304	8" - 60"			7	1", 2", 4", 8", 12" (3 pcs.)	

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

* with carbide measuring face

Inch						
Order No.	Range	Graduation	Micrometer head stroke	Extension rods Qty	Extension rods Size (inch)	Main unit
Analog						
137-211/137-016*	2" - 6"	.001"	.5"	3	.5", 1", 2"	2 - 2.5"
137-212/137-217*	2" - 12"			5	.5", 1", 2" (2 pcs.), 4"	
137-213/137-218*	2" - 20"			6	.5", 1", 2" (2 pcs.), 4", 8"	
137-214/137-219*	2" - 40"			8	.5", 1", 2" (2 pcs.), 4", 8" (2 pcs.), 12"	
137-215/137-220*	2" - 60"			10	.5", 1", 2" (2 pcs.), 4", 8" (3 pcs.), 12" (2 pcs.)	

* with carbide measuring face



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



• Dust-tight • water jet protected IP65

IP Codes

Level 6: Dust-proof.

No ingress of dust allowed.

Level 5: Protected against water jets.

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

Technical Data

Accuracy

±(3 + number of rods + maximum measurement length/50) μm (fraction rounded up)

Excluding quantizing error (only for Digimatic)



Functions (for 337-301/337-302)

Zero-setting

Origin restoration

Data hold

2-point Preset

Function lock

Automatic power ON/OFF

Error alarm

Data output

Battery (for 337-301/2)

SR44 (1 pc.), 938882

Optional accessories

Refer to page A-21 for details.

Connecting cables with IT/DP/MUX, etc.

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct (2m): 06ADV380B

Connecting cables for U-WAVE-T

For standard (160mm): 02AZD790B

For foot switch: 02AZE140B

Tubular Inside Micrometers

SERIES 137 — Extension Rod Type (main unit)

- Micrometer head for Extension Rod Type inside micrometer.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An inside length standard is required for accurately setting the micrometer.

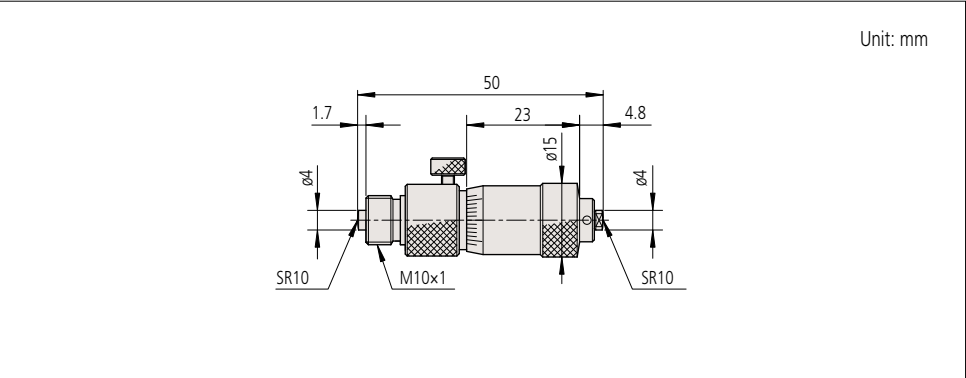


137-011

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Accuracy	Head adjustment range
137-011	50 - 63mm	0.01mm	±3µm	13mm
Carbide-tipped 137-013				
Inch				
Order No.	Range	Graduation	Accuracy	Head adjustment range
137-012	2" - 2.5"	.001"	±.00015"	.5"
Carbide-tipped 137-014				

DIMENSIONS



Inside Micrometers

For easy and accurate measurement of inside diameters

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

- Wide range of inside diameter measurements possible by combining extension pipes and anvils with the micrometer head.
- Carbide measuring faces are available.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An inside length standard is required for accurately setting the micrometer.
- Order No. 339-301/2 features:
 - IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
 - A large-character LCD display.
 - Storage of 2 preset values for use when setting to an inside length standard.
 - A function lock that prevents accidental changing of the reference setting during measurement.
 - An output port for measurement data that enables inclusion in a statistical process control or networked measurement system. Refer to page A-3 for details.
 - Ability to use Interface Input Tools that enable conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel. Refer to page A-5 for details.



339-301



139-177

SPECIFICATIONS

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

Inch/Metric						
Order No.	Range	Resolution	Head adjustment range	Extension pipes		Display unit
				Qty	Size	
Digimatic (LCD)						
339-102	8" - 9"	.0001"/ 0.001mm	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.)	



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



• Dust-tight + water jet protected IP65

IP Codes

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

Technical Data

- Accuracy
- 339 series**
±(3 + number of pipes + maximum measurement length/50)μm (fraction rounded up)
- 139 series**
±(3 + number of pipes + maximum measurement length/50)μm (fraction rounded up)
- 140 series**
±(7 + number of pipes + maximum measurement length/50)μm (fraction rounded up)
- Excluding quantizing error (only for Digimatic)



Functions (for 339-301/339-302)

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

Battery (for 337-301/337-302)

SR44 (1 pc.), 938882

Optional accessories

Refer to page A-21 for details
Connecting cables with IT/DP/MUX, etc.

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct (2m): 06ADV380B

Connecting cables for U-WAVE-T

For standard (160mm): 02AZD790B

For foot switch: 02AZE140B

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

Inch						
Order No.	Range	Graduation	Head adjustment range	Extension pipes		Main unit
				Qty	Size	
Analog						
139-178	4" - 20"	.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.)	

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

- Micrometer head for Extension Pipe Type inside micrometer.
- The sleeve is rotated to adjust the index line position when setting to a length standard
- An inside length standard is required for accurately setting the micrometer.



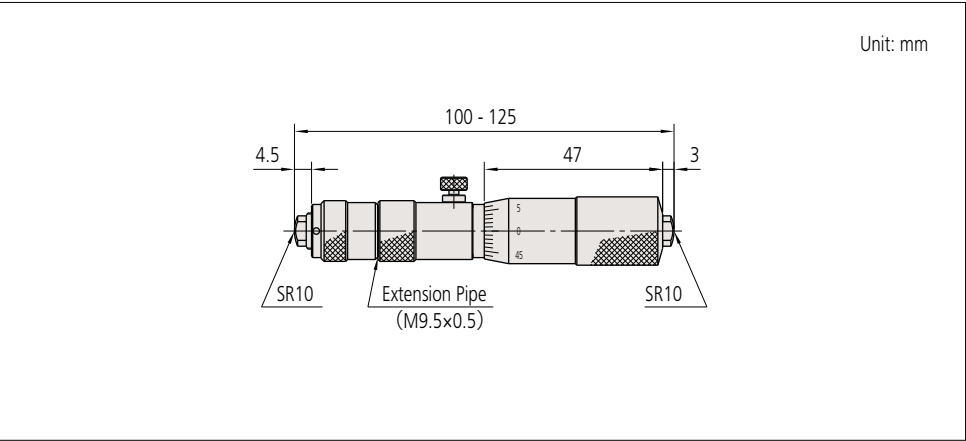
139-001

SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Accuracy	Head adjustment range
139-001	100 - 125mm	0.01mm	±3μm	25mm

Inch				
Order No.	Range	Graduation	Accuracy	Head adjustment range
139-002	4" - 5"	.001"	±.00015"	1"

DIMENSIONS



Inside Micrometers

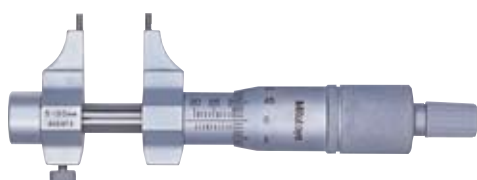
For easy and accurate measurement of inside diameters

Inside Micrometers SERIES 345, 145 — Caliper Type

- Carbide measuring faces.
- Equipped with a constant measuring-force device.
- An inside-length standard is required for accurately setting the micrometer.



345-250-10



145-185



145-187

SPECIFICATIONS

Metric				
Order No.	Range	Resolution	Accuracy*	Mass
Digimatic (LCD)				
345-250-10	5 - 30mm	0.001mm	±5μm	305g
345-251-10	25 - 50mm		±6μm	310g

* Excluding quantizing error

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

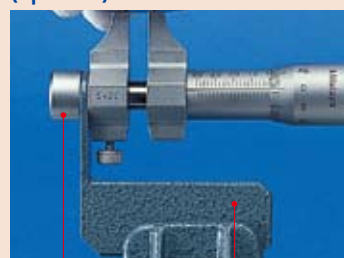
Inch/Metric				
Order No.	Range	Resolution	Accuracy*	Mass
Digimatic (LCD)				
345-350-10	.2" - 1.2"	.00005"/0.001mm	±.00025"	305g
345-351-10	1" - 2"	0.001mm	±.0003"	310g

* Excluding quantizing error

Inch				
Order No.	Range	Graduation	Accuracy	Mass
Analog				
145-193	.2" - 1.2"	.001"	±.00025"	130g
145-194	1" - 2"		±.0003"	140g
145-195	2" - 3"		±.00035"	160g
145-196	3" - 4"		±.0004"	180g



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



Cap (No.300401) Holder (No.300400)

* This instrument requires the cap and the holder for mounting on a micrometer stand.

Optional accessories

Refer to page A-21 for details

Connecting cables for Input Tool/ Digimatic Mini-Processor, etc.

1m: 05CZA662

2m: 05CZA663

USB Input Tool Direct (2m): 06ADV380B

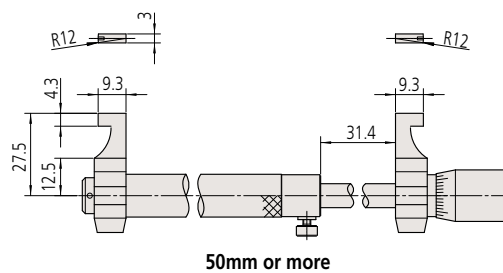
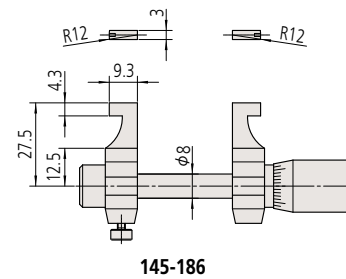
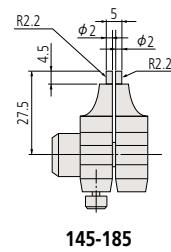
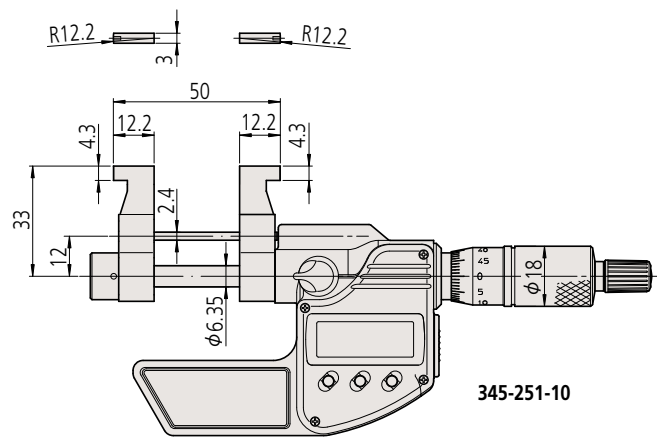
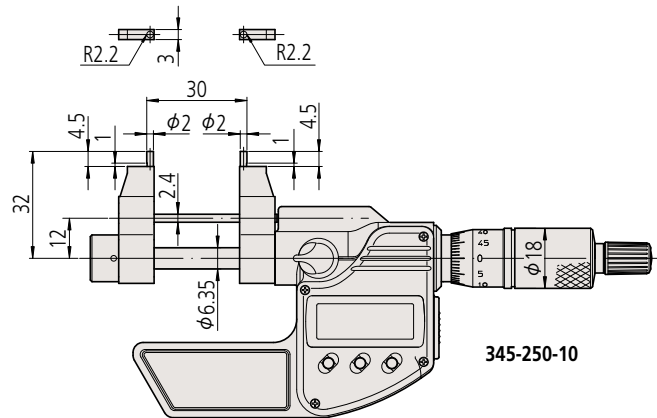
Connecting cables for U-WAVE-T

For standard (160mm): 02AZD790B

For foot switch: 02AZE140B

DIMENSIONS

Unit: mm



For easy and accurate measurement of inside diameters

- Wide range of inside diameter measurements possible by combining one or more interchangeable rods.
- Each interchangeable rod is marked with its measuring range.

- For models supplied with more than one interchangeable rod, the full measuring range is achieved by combining spacing collars with the rods.
- Both micrometer head and rods are satin-chrome finished throughout.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An inside-length standard is required for accurately setting the micrometer.



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

141-101

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

Accuracy
 $\pm(6 + \text{maximum measurement length}/50)\mu\text{m}$
 (fraction rounded up)



Unit: mm

20.5

2

ø4.5 hole

(12)

ø9

ø16

SR8

141-101

Metric

Order No.	Range	Graduation	Head adjustment range	Remarks
141-001 / 141-003*	25 - 32mm	0.01mm	7mm	—
141-101 / 141-103*	25 - 50mm			with 2 rods
141-025 / 141-027*	50 - 63mm		13mm	—
141-205 / 141-211*	50 - 200mm			with 3 rods
141-206 / 141-212*	50 - 300mm			with 5 rods
141-009 / 141-011*	200 - 225mm		25mm	—
141-117	200 - 500mm			with 3 rods
141-118	200 - 1000mm			with 8 rods

* with carbide measuring face

Inch

Order No.	Range	Graduation	Head adjustment range	Remarks
141-002 / 141-004*	1" - 1.25"	.001"	.25"	—
141-102 / 141-104*	1" - 2"			with 2 rods
141-026 / 141-028*	2" - 2.5"		.5"	—
141-208 / 141-214*	2" - 8"			with 3 rods
141-233 / 141-215*	2" - 12"			with 5 rods
141-010 / 141-012*	8" - 9"			—
141-121	8" - 20"		1"	with 3 rods
141-122	8" - 40"			with 8 rods

* with carbide measuring face



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

Application

– The two auxiliary gauge blocks are held against the appropriate measuring blocks by the support clamps, which also provide accurate location for the inside micrometer by means of the V-grooved extensions.



Inside Micro Checker SERIES 515

- The Inside Micro Checker is designed to act as a setting standard for inside micrometers.
- Each measuring block is made of zirconia-based ceramic and it is free from deterioration and dimensional changes over time.
- Can be used for calibration in conjunction with a set of gauge blocks (optional).



515-585

Standard accessory set



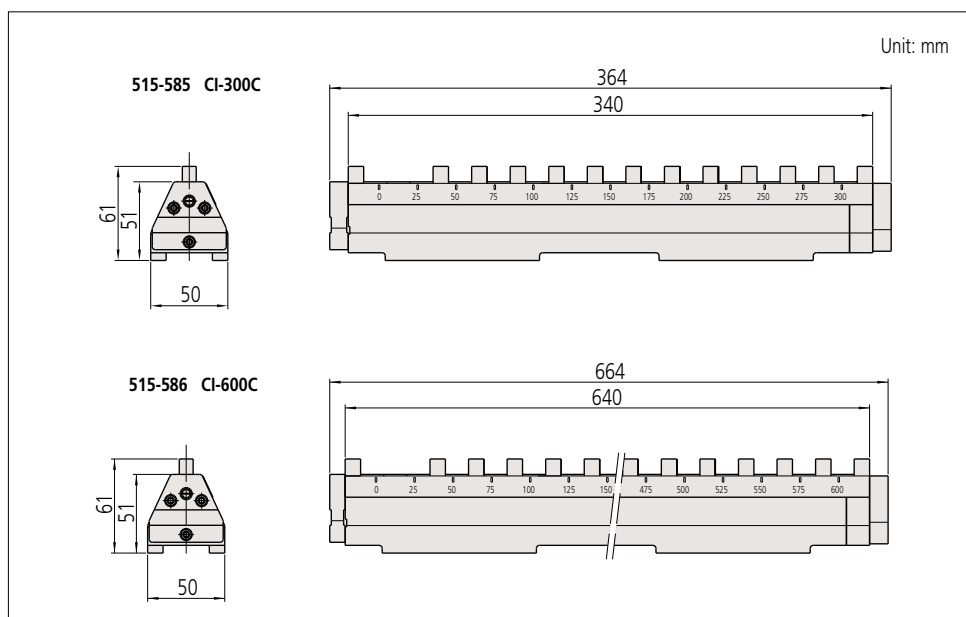
A pair of support clamps **940286**
Auxiliary block 10mm 2pcs. **602195**
Collar 2pcs. **600324**
Clamp screwdriver 1pc. **600324**

SPECIFICATIONS

Order No.	Length to check	Block pitch accuracy
515-585	25-300mm	$\pm(1+L/150) \mu\text{m}$ L: Length to check (mm)
515-586	25-600mm	

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

DIMENSIONS



Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 526 — for Extra Small Holes

- These gages are designed to measure the diameters of very small holes. The radial displacement of the split-ball anvil is converted to axial displacement of the measuring rod, which is shown on the dial indicator.
- Dial indicators and protection covers are optionally available. Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial indicators or Digimatic indicators other than recommended models.
- An optional stand (215-120-10) is available for efficient measurement of multiple small holes. Refer to page C-48 for details.



526-170

* The dial indicator and the protection cover are optional.

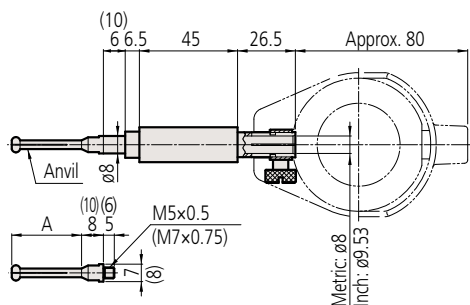
SPECIFICATIONS

Metric								
Order No.	Range	Bore gage	Dial indicator	Dial protection cover	Anvil	Pin point	Setting ring	Probing depth
526-170	0.95-1.55mm	526-170	Not supplied	Not supplied	5 pcs.	1 pc.	5 pcs.	11.5mm
526-160	1.50-4.00mm	526-160			9 pcs.	2 pcs.	9 pcs.	17.5, 22.5mm
526-150	3.70-7.30mm	526-150			7 pcs.	1 pc.	7 pcs.	32.0mm
526-172	0.95-1.55mm	526-170	2109SB-10 (Graduation 0.001mm)	21DZA000	5 pcs.	1 pc.	5 pcs.	11.5mm
526-162	1.50-4.00mm	526-160			9 pcs.	2 pcs.	9 pcs.	17.5, 22.5mm
526-152	3.70-7.30mm	526-150			7 pcs.	1 pc.	7 pcs.	32.0mm
526-173	0.95-1.55mm	526-170	2046SB (Graduation: 0.01mm)	21DZA000	5 pcs.	1 pc.	5 pcs.	11.5mm
526-163	1.50-4.00mm	526-160			9 pcs.	2 pcs.	9 pcs.	17.5, 22.5mm
526-153	3.70-7.30mm	526-150			7 pcs.	1 pc.	7 pcs.	32.0mm

Inch								
Order No.	Range	Bore gage	Dial indicator	Dial protection cover	Anvil	Pin point	Setting ring	Probing depth
526-175	.037-.061"	526-175	Not supplied	Not supplied	5 pcs.	1 pc.	5 pcs.	.45"
526-165	.60-.155"	526-165			9 pcs.	2 pcs.	9 pcs.	.68, .88"
526-155	.145-.29"	526-155			7 pcs.	1 pc.	7 pcs.	1.25"
526-176	.037-.061"	526-175	2923SB-10 (Graduation: .0001")	21DZA000	5 pcs.	1 pc.	5 pcs.	.45"
526-166	.60-.155"	526-165			9 pcs.	2 pcs.	9 pcs.	.68, .88"
526-156	.145-.29"	526-155			7 pcs.	1 pc.	7 pcs.	1.25"

DIMENSIONS

Unit: mm

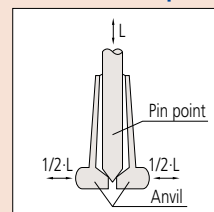


() : 3.7 - 7.3mm / .145 - .29 range model

STANDARD ACCESSORIES

Bore gage (Main body)	Marked No.	Parts No.	Anvil Measuring range	A	Pin point	Setting ring mm/inch
526-170 526-175	1.0	201414	0.95-1.15mm	.037-.045"	11.5mm/.45"	1.0mm/.04"
	1.1	201415	1.07-1.25mm	.042-.049"		1.1mm/.045"
	1.2	201416	1.17-1.35mm	.046-.053"		1.2mm/.05"
	1.3	201417	1.27-1.45mm	.050-.057"		1.3mm/.055"
	1.4	201418	1.37-1.55mm	.054-.061"		1.4mm/.06"
526-160 526-165	1.75	201419	1.50-1.90mm	.060-.075"	17.5mm/.68"	1.75mm/.07"
	2.00	201420	1.80-2.20mm	.070-.085"		2.00mm/.08"
	2.25	201421	2.05-2.45mm	.080-.095"		2.25mm/.09"
	2.50	201422	2.25-2.75mm	.090-.105"		2.50mm/.10"
	2.75	201423	2.50-3.00mm	.100-.115"		2.75mm/.11"
	3.00	201424	2.75-3.25mm	.110-.125"	22.5mm/.88"	3.00mm/.12"
	3.25	201425	3.00-3.50mm	.120-.135"		3.25mm/.13"
	3.50	201426	3.25-3.75mm	.130-.145"		3.50mm/.14"
	3.75	201427	3.50-4.00mm	.140-.155"		3.75mm/.15"
526-150 526-155	4.0	201428	3.70-4.30mm	.145-.170"	32.0mm/1.25"	4.0mm/.16"
	4.5	201429	4.20-4.80mm	.165-.190"		4.5mm/.18"
	5.0	201430	4.70-5.30mm	.185-.210"		5.0mm/.20"
	5.5	201431	5.20-5.80mm	.205-.230"		5.5mm/.22"
	6.0	201432	5.70-6.30mm	.225-.250"		6.0mm/.24"
	6.5	201433	6.20-6.80mm	.245-.270"		6.5mm/.26"
	7.0	201434	6.70-7.30mm	.265-.290"		7.0mm/.28"

Measurement principle



Technical Data

Accuracy
Metric models: 4μm
Inch models: .00016"
Repeatability
Metric models: 2μm
Inch models: .00008"

Optional Accessories

- Dial indicator (See Chapter F)
- 21DZA000: Dial protection cover
- Setting ring (See page C-45)
- 215-120-10: Stand for small holes

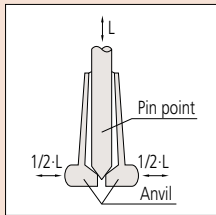
Recommended dial indicators

Metric models: 2046SB (0.01mm)
2972 (0.001mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: 2922SB (.0005")
2977 (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators

Metric models: 543-264B (ID-C112GB: 0.001mm)
Inch models: 543-266B (ID-C112GB: 0.001mm/.00005")

Measurement principle



Technical Data

Accuracy

Metric models: 7-10mm, 4μm / 10-18mm, 6μm

Inch models: .3-.4", .00016" / .4-.7", .00024"

Repeatability

Metric models: 2μm

Inch models: .00008"

Optional accessories

-: Dial indicator (See Chapter F)

21DZA000: Dial protection cover

-: Setting ring (See page C-45)

215-120-10: Stand for small holes

Recommended dial indicators

Metric models: **2046SB** (0.01mm)

2972 (0.001mm - One-revolution type)

2109SB-10 (0.001mm)

2900SB-10 (0.001mm - One-revolution type)

Inch models: **2922SB** (.0005")

2977 (.0005" - One-revolution type)

2923SB-10 (.0001")

2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators

Metric models: **543-264B** (ID-C112GB, 0.001mm)

Inch models: **543-266B** (ID-C112GEB, 0.001mm/.00005")

Bore Gages SERIES 526 — for Extra Small Holes



526-101

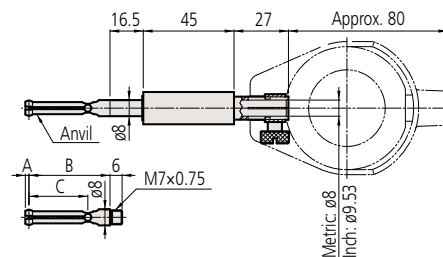
* The dial indicator and the protection cover are optional.

SPECIFICATIONS

Metric						
Order No.	Range	Content of set				Probing depth
		Bore gage	Dial indicator	Dial protection cover	Anvil	
526-101	7-10mm	526-101	Not supplied	Not supplied	6 pcs.	32mm
526-102	10-18mm	526-102			8 pcs.	62mm
526-124	7-10mm	526-101	2109SB-10 (Graduation: 0.001mm)	21DZA000	6 pcs.	32mm
526-125	10-18mm	526-102			8 pcs.	62mm
526-126	7-10mm	526-101	2046SB (Graduation: 0.01mm)	21DZA000	6 pcs.	32mm
526-127	10-18mm	526-102			8 pcs.	62mm

Inch						
Order No.	Range	Content of set				Probing depth
		Bore gage	Dial indicator	Dial protection cover	Anvil	
526-103	.3-.4"	526-103	Not supplied	Not supplied	6 pcs.	1.25"
526-104	.4-.7"	526-104			8 pcs.	2.42"
526-122	.3-.4"	526-101	2923SB-10 (Graduation: .0001")	21DZA000	6 pcs.	1.25"
526-123	.4-.7"	526-102			8 pcs.	2.42"
526-119	.3-.4"	526-101	2922SB (Graduation: .0005")	21DZA000	6 pcs.	1.25"
526-120	.4-.7"	526-102			8 pcs.	2.42"

DIMENSIONS



Unit: mm

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					
	Marked No.	Parts No.	Measuring range	A	B	C
526-101 526-103	1	102469	7.0 - 7.5mm	.28 - .30"	1.8mm/.07"	40mm/1.57"
	2	102470	7.5 - 8.0mm	.30 - .32"		
	3	102471	8.0 - 8.5mm	.32 - .34"		
	4	102472	8.5 - 9.0mm	.34 - .36"		
	5	102473	9.0 - 9.5mm	.36 - .38"		
	6	102474	9.5 - 10.0mm	.38 - .40"		
526-102 526-104	1	102454	10 - 11mm	.40 - .44"	2.7mm/.11"	46mm/1.81"
	2	102455	11 - 12mm	.44 - .48"		
	3	102456	12 - 13mm	.48 - .52"		
	4	102457	13 - 14mm	.52 - .56"		
	5	102458	14 - 15mm	.56 - .60"		
	6	102459	15 - 16mm	.60 - .64"		
	7	102460	16 - 17mm	.64 - .68"		
	8	102461	17 - 18mm	.68 - .72"		

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511 — for Small Holes

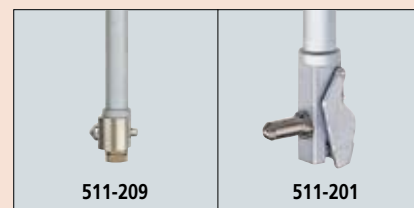
- The interchangeable anvils used on this gage are made of high-grade tool steel.
- The dial indicator is fully protected by a rugged cover.
- Dial indicators and protection covers are optionally available. Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial indicators or Digimatic indicators other than recommended models.
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-44 and C-45.)



511-201

The dial indicator and protection cover are optional.

Close-up view of anvils and contact points



Technical Data

Accuracy: Metric models: 5µm
Inch models: .0002"
Repeatability: Metric modes: 2µm
Inch models: .00008"
Adjacent error: Metric modes: 2µm
Inch models: .00008"

Optional Accessories

– : Dial indicator (See Chapter F)
21DZA000: Dial protection cover

Recommended dial indicators

Metric models: **2046SB** (0.01mm)
2972 (0.001mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: **2922SB** (.0005")
2977 (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators

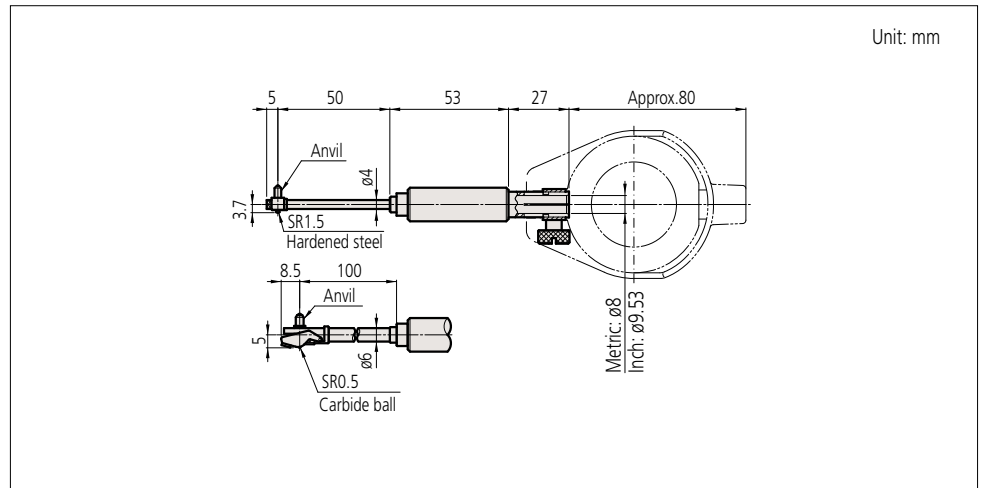
Metric models: **543-264B** (ID-C112GB: 0.001mm)
Inch models: **543-266B** (ID-C112GEB: 0.001mm/.00005")

SPECIFICATIONS

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

Inch										
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set					Probing depth
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	
511-214	.24-.4"	.020"	2N or less	—	511-214	Not supplied	Not supplied	9 pcs.	Not supplied	2"
511-205	.4-.74"	.024"		6N or less	511-205				1 pc.	4"
511-212	.24-.4"	.020"	2N or less	—	511-214	2923SB-10 (Graduation: .0001")	21DZA000	9 pcs.	Not supplied	2"
511-206	.4-.74"	.024"		6N or less	511-205				1 pc.	4"
511-213	.24-.4"	.020"	2N or less	—	511-214	2922SB (Graduation: .0005")	21DZA000	9 pcs.	Not supplied	2"
511-207	.4-.74"	.024"		6N or less	511-205				1 pc.	4"

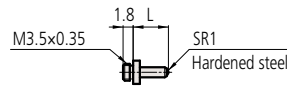
DIMENSIONS



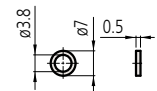
511-209
Anvil



511-201
Anvil



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



No.204355

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable Washer
	Marked No.	Parts No.	Size		L	Parts No.
511-209 511-214	1	952168	6.0mm	.24"	1.2mm/.05"	Not supplied
	2	952169	6.5mm	.26"	1.7mm/.07"	
	3	952170	7.0mm	.28"	2.2mm/.09"	
	4	952414	7.5mm	.30"	2.7mm/.11"	
	5	952415	8.0mm	.32"	3.2mm/.13"	
	6	952416	8.5mm	.34"	3.7mm/.15"	
	7	952417	9.0mm	.36"	4.2mm/.17"	
	8	952418	9.5mm	.38"	4.7mm/.19"	
	9	952419	10.0mm	.40"	5.2mm/.21"	
511-201 511-205	1	204356	10.0mm	.40"	2mm/.08"	204355
	2	204357	11.0mm	.44"	3mm/.12"	
	3	204358	12.0mm	.48"	4mm/.16"	
	4	204359	13.0mm	.52"	5mm/.20"	
	5	204360	14.0mm	.56"	6mm/.24"	
	6	204361	15.0mm	.60"	7mm/.28"	
	7	204362	16.0mm	.64"	8mm/.32"	
	8	204363	17.0mm	.68"	9mm/.36"	
	9	204364	18.0mm	.72"	10mm/.40"	

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

- Now offers a longer plunger stroke while maintaining original 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.
- Optional extension rods can be attached for measuring deep holes. (For details, refer to page C-43.)
- Dial indicators and protection covers are optionally available.
- Some dial indicators are not usable with bore gages or protection covers.
- 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-44 and C-45.)



Dial indicators and protection covers are optional.

SPECIFICATIONS

Metric											
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set						
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Wrench
511-701	18-35mm	1.2mm	4N or less	6N or less	511-701	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.
511-702	35-60mm				511-702			6 pcs.		Not supplied	
511-703	50-150mm		5N or less	10N or less	511-703			11 pcs.	4 pcs.	1 pc.	Not supplied
511-704	100-160mm				511-704			13 pcs.		Not supplied	
511-705	160-250mm		6N or less	15N or less	511-705			6 pcs.	7 pcs.	Not supplied	250mm
511-706	250-300mm				511-706			5 pcs.		1 pc.	
511-721	18-35mm	1.2mm	4N or less	6N or less	511-701	2109SB-10 (Graduation: 0.001mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.
511-722	35-60mm				511-702			6 pcs.		Not supplied	
511-723	50-150mm		5N or less	10N or less	511-703			11 pcs.	4 pcs.	1 pc.	Not supplied
511-724	100-160mm				511-704			13 pcs.		Not supplied	
511-725	160-250mm		6N or less	15N or less	511-705			6 pcs.	7 pcs.	Not supplied	250mm
511-726	250-300mm				511-706			5 pcs.		1 pc.	
511-711	18-35mm	1.2mm	4N or less	6N or less	511-701	2046SB (Graduation: 0.01mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.
511-712	35-60mm				511-702			6 pcs.		Not supplied	
511-713	50-150mm		5N or less	10N or less	511-703			11 pcs.	4 pcs.	1 pc.	Not supplied
511-714	100-160mm				511-704			13 pcs.		Not supplied	
511-715	160-250mm		6N or less	15N or less	511-705			6 pcs.	7 pcs.	Not supplied	250mm
511-716	250-300mm				511-706			5 pcs.		1 pc.	
511-921	18-150mm	—	—	—	511-701	2046SB	21DZA000	—	—	—	—
511-922					511-702	2109SB-10		—	—	—	—
511-925					511-703	543-264B		—	—	—	—

Inch											
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set						
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Wrench
511-731	.7-1.4"	.047"	4N or less	6N or less	511-731	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.
511-732	1.4-2.5"				511-732			6 pcs.		Not supplied	
511-733	2.0-6.0"		5N or less	10N or less	511-733			11 pcs.	4 pcs.	1 pc.	Not supplied
511-734	4.0-6.5"				511-734			13 pcs.		Not supplied	
511-735	6.5-10.0"		6N or less	15N or less	511-735			6 pcs.	7 pcs.	Not supplied	10"
511-736	10.0-16.0"				511-736			5 pcs.		1 pc.	
511-751	.7-1.4"	.047"	4N or less	6N or less	511-731	2923SB-10 (Graduation: .0001")	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.
511-752	1.4-2.5"				511-732			6 pcs.		Not supplied	
511-753	2.0-6.0"		5N or less	10N or less	511-733			11 pcs.	4 pcs.	1 pc.	Not supplied
511-754	4.0-6.5"				511-734			13 pcs.		Not supplied	
511-755	6.5-10.0"		6N or less	15N or less	511-735			6 pcs.	7 pcs.	Not supplied	10"
511-756	10.0-16.0"				511-736			5 pcs.		1 pc.	
511-741	.7-1.4"	.047"	4N or less	6N or less	511-731	2922SB (Graduation: .0005")	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.
511-742	1.4-2.5"				511-732			6 pcs.		Not supplied	
511-743	2.0-6.0"		5N or less	10N or less	511-733			11 pcs.	4 pcs.	1 pc.	Not supplied
511-744	4.0-6.5"				511-734			13 pcs.		Not supplied	
511-745	6.5-10.0"		6N or less	15N or less	511-735			6 pcs.	7 pcs.	Not supplied	10"
511-746	10.0-16.0"				511-736			5 pcs.		1 pc.	
511-931	.7-6.0"	—	—	—	511-731	2922SB	21DZA000	—	—	—	—
511-932					511-732	2923SB-10		—	—	—	—
511-935					511-733	543-266B		—	—	—	—

Notes: 1) A 50mm sub-anvil is supplied with 511-703, and a 75mm sub-anvil is supplied with 511-706.

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



New grip improves accuracy during prolonged use

Technical Data

Accuracy:	Metric models 2µm Inch models .00008"
Repeatability:	Metric models 0.5µm Inch models .00002"
Adjacent error:	Metric models 1µm Inch models .00004"

Optional Accessories

–: Dial indicator (See Chapter F)
21DZA000: Dial protection cover

Recommended dial indicators

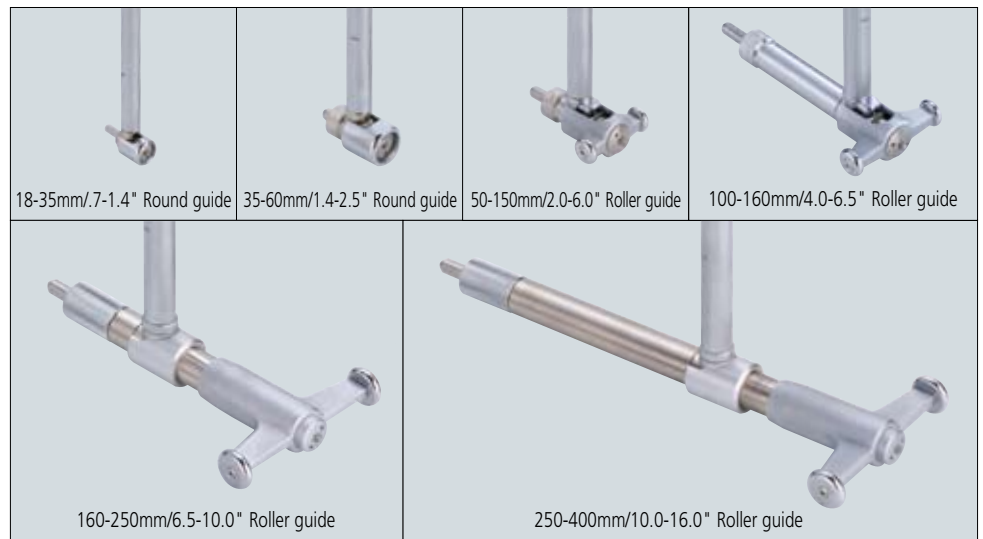
Metric models: **2046SB** (0.01mm)
2972 (0.001mm - One revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)

Inch models: **2922SB** (.0005")
2977 (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

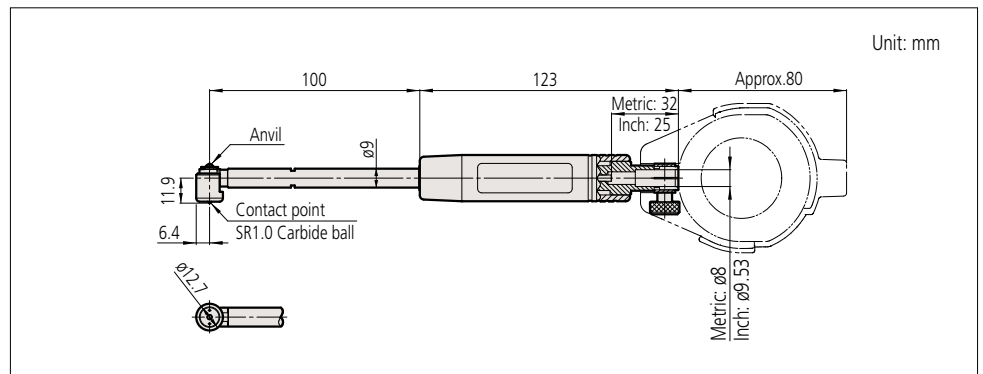
Recommended digimatic indicators

Metric models: **543-264B** (ID-C112GB: 0.001mm)
Inch models: **543-266B** (ID-C112GEB: 0.001mm/0.0005")

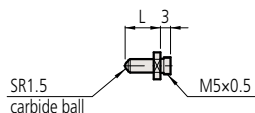
Contact Points



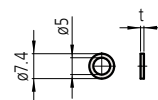
DIMENSIONS



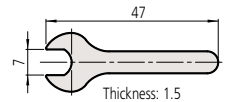
Anvil



Interchangeable washer



Wrench
102148



STANDARD ACCESSORIES

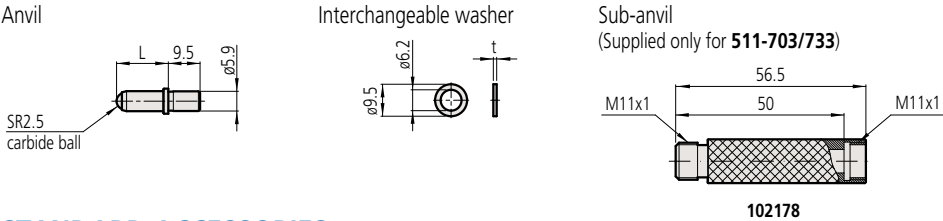
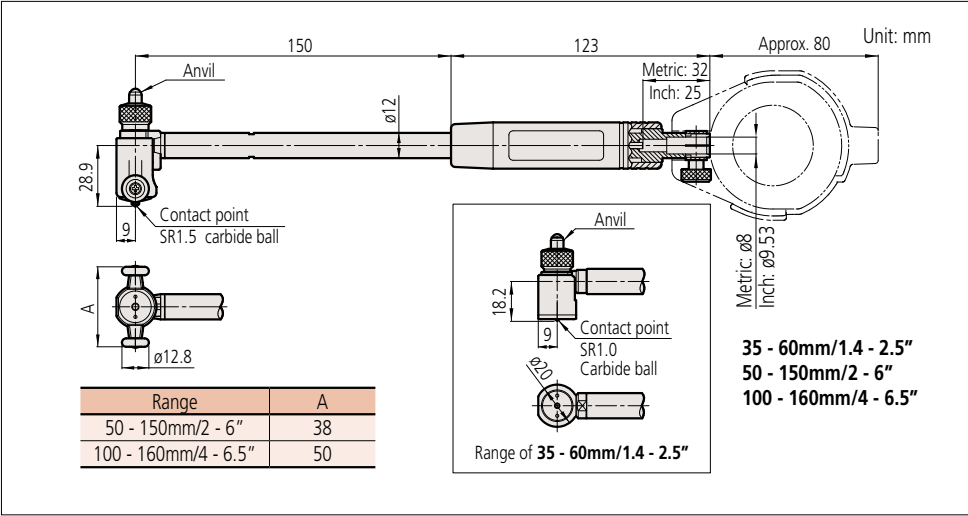
Bore gage (Main body)	Anvil						Interchangeable washer		Wrench
	Marked No.	Parts No.	Size		L		Parts No.	t	Parts No.
511-701 511-731	1	21DZA213A	18mm	.71"	2.5mm	.10"	205623 205624	0.5mm/.02" 1.0mm/.04"	102148
	2	21DZA213B	20mm	.79"	4.5mm	.18"			
	3	21DZA213C	22mm	.87"	6.5mm	.26"			
	4	21DZA213D	24mm	.94"	8.5mm	.33"			
	5	21DZA213E	26mm	1.02"	10.5mm	.41"			
	6	21DZA213F	28mm	1.10"	12.5mm	.49"			
	7	21DZA213G	30mm	1.18"	14.5mm	.57"			
	8	21DZA213H	32mm	1.26"	16.5mm	.65"			
	9	21DZA213J	34mm	1.34"	18.5mm	.73"			

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

DIMENSIONS



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	Parts No.	Size		L	Parts No.	t	Parts No.
511-702 511-732	1	21DZA232A	35mm	1.38"	5.5mm .22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"	
	2	21DZA232B	40mm	1.57"	10.5mm .41"			
	3	21DZA232C	45mm	1.77"	15.5mm .61"			
	4	21DZA232D	50mm	1.97"	20.5mm .81"			
	5	21DZA232E	55mm	2.17"	25.5mm 1.00"			
	6	21DZA232F	60mm	2.36"	30.5mm 1.20"			
511-703 511-733 () Used 50mm/2" Sub-Anvil	1	21DZA232A	50mm (100mm)	1.97" (3.94")	5.5mm .22"			102178 (50mm/2")
	2	21DZA232B	55mm (105mm)	2.17" (4.13")	10.5mm .41"			
	3	21DZA232C	60mm (110mm)	2.36" (4.33")	15.5mm .61"			
	4	21DZA232D	65mm (115mm)	2.55" (4.53")	20.5mm .81"			
	5	21DZA232E	70mm (120mm)	2.74" (4.72")	25.5mm 1.00"			
	6	21DZA232F	75mm (125mm)	2.93" (4.92")	30.5mm 1.20"			
	7	21DZA232G	80mm (130mm)	3.12" (5.12")	35.5mm 1.40"			
	8	21DZA232H	85mm (135mm)	3.31" (5.31")	40.5mm 1.59"			
	9	21DZA232J	90mm (140mm)	3.50" (5.51")	45.5mm 1.79"			
	10	21DZA232L	95mm (145mm)	3.69" (5.71")	50.5mm 1.99"			
	11	21DZA232M	100mm (150mm)	3.88" (5.91")	55.5mm 2.19"			
511-704 511-734	1	21DZA232A	100mm	3.94"	5.5mm .22"			
	2	21DZA232B	105mm	4.13"	10.5mm .41"			
	3	21DZA232C	110mm	4.33"	15.5mm .61"			
	4	21DZA232D	115mm	4.53"	20.5mm .81"			
	5	21DZA232E	120mm	4.72"	25.5mm 1.00"			
	6	21DZA232F	125mm	4.92"	30.5mm 1.20"			
	7	21DZA232G	130mm	5.12"	35.5mm 1.40"			
	8	21DZA232H	135mm	5.31"	40.5mm 1.59"			
	9	21DZA232J	140mm	5.51"	45.5mm 1.79"			
	10	21DZA232L	145mm	5.71"	50.5mm 1.99"			
	11	21DZA232M	150mm	5.91"	55.5mm 2.19"			
	12	21DZA232N	155mm	6.10"	60.5mm 2.38"			
	13	21DZA232P	160mm	6.30"	65.5mm 2.58"			

Unit: mm

250

123

Approx. 80

Anvil

Metric: 32
Inch: 25

Ø15

Metric: Ø8
Inch: Ø9.53

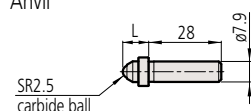
100.9

Contact point
SR1.5 carbide ball

12

90

Ø19.8



Technical drawing of a bolted connection. The drawing shows a side view of a bolted joint. The total length of the assembly is 88 3/5 inches. The distance between the bolt heads is 75 3/5 inches. The bolts are labeled M16x1.

Bore gage (Main body)	Anvil						Interchangeable washer		Sub-Anvil
	Marked No.	Parts No.	Size		L		Parts No.	t	Parts No
511-705 511-735	1	212142	160mm	6.30"	10.0mm	.39"	205467 205461 205462 205463 205464 205465 205466	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12" 4.0mm/.16" 5.0mm/.20" 6.0mm/.24"	/
	2	212143	175mm	6.89"	25.0mm	.98"			
	3	212144	190mm	7.48"	40.0mm	1.57"			
	4	212145	205mm	8.07"	55.0mm	2.17"			
	5	212146	220mm	8.66"	70.0mm	2.76"			
	6	212152	235mm	9.25"	85.0mm	3.35"			
511-706 511-736 () Used 75mm/3" Sub-Anvil	1	212142	250mm (325mm)	9.84" (12.80")	10.0mm	.39"	205464 205465 205466	6.0mm/.24"	Metric: 202974 (75mm) Inch: 202975 (3.0")
	2	212143	265mm (340mm)	10.43" (13.39")	25.0mm	.98"			
	3	212144	280mm (355mm)	11.02" (13.98")	40.0mm	1.57"			
	4	212145	295mm (370mm)	11.61" (14.57")	55.0mm	2.17"			
	5	212146	310mm (385mm)	12.20" (15.16")	70.0mm	2.76"			
	6	212152	330mm (405mm)	12.99" (16.01")	85.0mm	3.35"			

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.
 - Now offers a longer plunger stroke while maintaining original accuracy.
 - Carbide is used for the contact point ensuring high durability and wear resistance.
 - High-accuracy measurement is aided by a large grip with a sponge-like structure that reduces heat transfer from the operator's hand by 50%.
 - Optional extension rods can be attached for measuring deep holes. (For details, refer to page C-43.)
 - Dial indicators and protection covers are optionally available.
- Some dial indicators are not usable with bore gages or protection covers.
- 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-44 and C-45.)



Dial indicators and protection covers are optional.

SPECIFICATIONS

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

Inch												
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set							Probing depth
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner	
511-781	.7-1.4"	.047"	4N or less	6N 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	Not supplied	
511-783	2.0-6.0"				511-783			11 pcs.		1 pc.		
511-784	4.0-6.5"				511-784			13 pcs.		Not supplied		
511-791	.7-1.4"	.047"	4N or less	6N or less	511-781	2923SB-10 (Graduation: .0001")	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	2"
511-792	1.4-2.5"				511-782			6 pcs.	4 pcs.	Not supplied	Not supplied	
511-793	2.0-6.0"				511-783			11 pcs.		1 pc.		
511-794	4.0-6.5"				511-784			13 pcs.		Not supplied		
511-786	.7-1.4"	.047"	4N or less	6N or less	511-781	2922SB (Graduation: .0005")	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	2"
511-787	1.4-2.5"				511-782			6 pcs.	4 pcs.	Not supplied	Not supplied	
511-788	2.0-6.0"				511-783			11 pcs.		1 pc.		
511-789	4.0-6.5"				511-784			13 pcs.		Not supplied		

Notes: 1) A 10mm sub-anvil is supplied with 511-761, and a 50mm sub-anvil is supplied with 511-764.

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

Technical Data

Accuracy: Metric models 2µm
Inch models .00008"
Repeatability: Metric models 0.5µm
Inch models .00002"
Adjacent error: Metric models 1µm
Inch models .00004"

Optional Accessories

-: Dial indicator (See Chapter F)
21DZA000: Dial protection cover

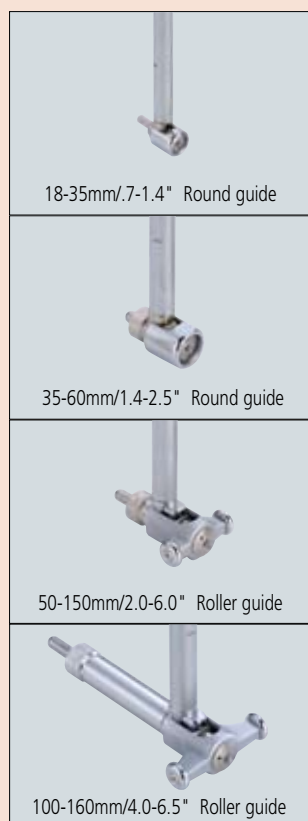
Recommended dial indicators

Metric models: **2046SB** (0.01mm)
2972 (.001mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (.001mm - One-revolution type)
Inch models: **2922SB** (.0005")
2977 (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

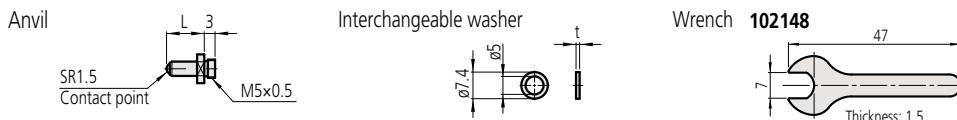
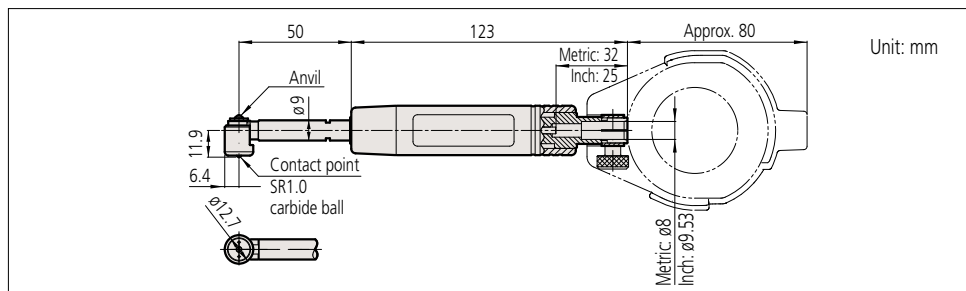
Recommended digimatic indicators

Metric models: **543-264B** (ID-C112GB, 0.001mm)
Inch models: **543-266B** (ID-C112GEB, 0.001mm/.00005")

Contact Points



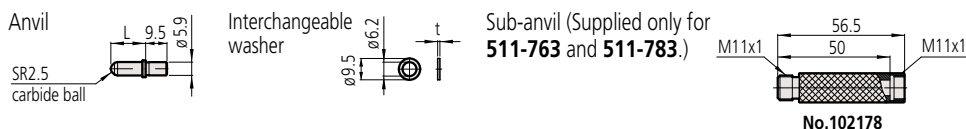
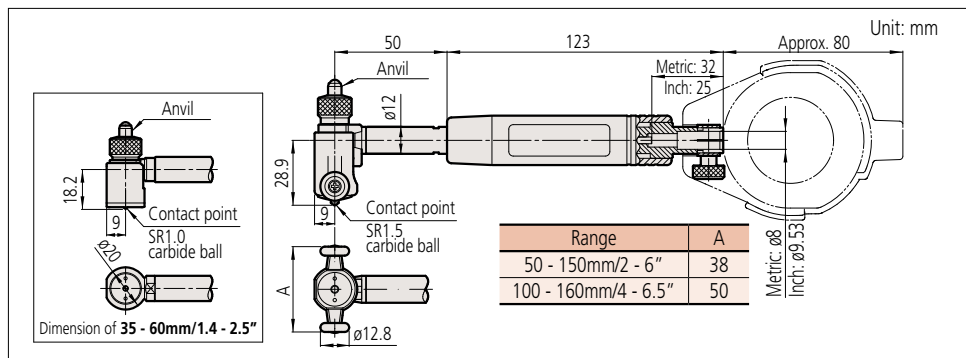
DIMENSIONS



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil				Interchangeable washer		Wrench	
	Marked No.	Parts No.	Size	L	Parts No.	t	Parts No.	
511-761 511-781	1	21DZA213A	18mm	.71"	2.5mm	.10"	205623 205624	102148
	2	21DZA213B	20mm	.79"	4.5mm	.18"		
	3	21DZA213C	22mm	.87"	6.5mm	.26"		
	4	21DZA213D	24mm	.94"	8.5mm	.33"		
	5	21DZA213E	26mm	1.02"	10.5mm	.41"		
	6	21DZA213F	28mm	1.10"	12.5mm	.49"		
	7	21DZA213G	30mm	1.18"	14.5mm	.57"		
	8	21DZA213H	32mm	1.26"	16.5mm	.65"		
	9	21DZA213J	34mm	1.34"	18.5mm	.73"		

DIMENSIONS



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil				Interchangeable washer		Sub-Anvil	
	Marked No.	Parts No.	Size	L	Parts No.	t	Parts No.	
511-762 511-782	1	21DZA232A	35mm	1.38"	5.5mm	.22"		
	2	21DZA232B	40mm	1.57"	10.5mm	.41"		
	3	21DZA232C	45mm	1.77"	15.5mm	.61"		
	4	21DZA232D	50mm	1.97"	20.5mm	.81"		
	5	21DZA232E	55mm	2.17"	25.5mm	1.00"		
	6	21DZA232F	60mm	2.36"	30.5mm	1.20"		
511-763 511-783 () Used 50mm/2" Sub-Anvil	1	21DZA232A	50mm (100mm)	1.97" (3.94")	5.5mm	.22"	205457 205458 205459 205460	102178 (50mm/2")
	2	21DZA232B	55mm (105mm)	2.17" (4.13")	10.5mm	.41"		
	3	21DZA232C	60mm (110mm)	2.36" (4.33")	15.5mm	.61"		
	4	21DZA232D	65mm (115mm)	2.55" (4.53")	20.5mm	.81"		
	5	21DZA232E	70mm (120mm)	2.74" (4.72")	25.5mm	1.00"		
	6	21DZA232F	75mm (125mm)	2.93" (4.92")	30.5mm	1.20"		
	7	21DZA232G	80mm (130mm)	3.12" (5.12")	35.5mm	1.40"		
	8	21DZA232H	85mm (135mm)	3.31" (5.31")	40.5mm	1.59"		
	9	21DZA232J	90mm (140mm)	3.50" (5.51")	45.5mm	1.79"		
	10	21DZA232L	95mm (145mm)	3.69" (5.71")	50.5mm	1.99"		
	11	21DZA232M	100mm (150mm)	3.88" (5.91")	55.5mm	2.19"		
511-764 511-784	1	21DZA232A	100mm	3.94"	5.5mm	.22"		
	2	21DZA232B	105mm	4.13"	10.5mm	.41"		
	3	21DZA232C	110mm	4.33"	15.5mm	.61"		
	4	21DZA232D	115mm	4.53"	20.5mm	.81"		
	5	21DZA232E	120mm	4.72"	25.5mm	1.00"		
	6	21DZA232F	125mm	4.92"	30.5mm	1.20"		
	7	21DZA232G	130mm	5.12"	35.5mm	1.40"		
	8	21DZA232H	135mm	5.31"	40.5mm	1.59"		
	9	21DZA232J	140mm	5.51"	45.5mm	1.79"		
	10	21DZA232L	145mm	5.71"	50.5mm	1.99"		
	11	21DZA232M	150mm	5.91"	55.5mm	2.19"		
	12	21DZA232N	155mm	6.10"	60.5mm	2.38"		
	13	21DZA232P	160mm	6.30"	65.5mm	2.58"		

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages

SERIES 511 — with Micrometer Head

- Micrometer head is attached to the anvil for accurate dimensional setting.
 - Now offers a longer plunger stroke while maintaining original accuracy.
 - Carbide is used for the contact point ensuring high durability and wear resistance.
 - High-accuracy measurement is aided by a large grip with a sponge-like structure that reduces heat transfer from the operator's hand by 50%.
 - Wide measuring range with sub-anvils.
 - Optional extension rods can be attached for measuring deep holes. (For details, refer to page C-43.)
 - Dial indicators and protection covers are optionally available.
- Some dial indicators are not usable with bore gages or protection covers.
- 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-44 and C-45.)



511-804



511-806

Dial indicators and protection covers are optional.

SPECIFICATIONS

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

Inch											
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set						Probing depth
					Bore gage	Dial indicator	Dial protection cover	Micro meter head	Sub-Anvil	Wrench	
511-833	2.4-4.0"	.063"	5N or less	10N 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.		
511-835	6.0-10.0"		6N or less	15N or less	511-835				4 pcs.	2 pcs.	10"
511-836	10.0-16.0"				511-836				3 pcs.		
511-837	16.0-24.0"				511-837				2 pcs.		
511-838	24.0-32.0"		20N or less		511-838				2 pcs.		
511-853	2.4-4.0"	.063"	5N or less	10N or less	511-833	2923SB-10 (Graduation: .0001")	21DZA000	1 pc.	2 pcs.	3 pcs.	4"
511-854	4.0-6.4"				511-834				3 pcs.		
511-855	6.0-10.0"		6N or less	15N or less	511-835				4 pcs.	2 pcs.	6"
511-856	10.0-16.0"				511-836				3 pcs.		
511-857	16.0-24.0"				511-837				2 pcs.		
511-858	24.0-32.0"		20N or less		511-838				2 pcs.		10"
511-843	2.4-4.0"	.063"	5N or less	10N or less	511-833	2922SB (Graduation: .0005")	21DZA000	1 pc.	2 pcs.	3 pcs.	4"
511-844	4.0-6.4"				511-834				3 pcs.		
511-845	6.0-10.0"		6N or less	15N or less	511-835				4 pcs.	2 pcs.	6"
511-846	10.0-16.0"				511-836				3 pcs.		
511-847	16.0-24.0"				511-837				2 pcs.		
511-848	24.0-32.0"		20N or less		511-838				2 pcs.		10"

Notes: 1) Storage boxes for 511-807/808/837/838 models are made of wood. The boxes of other models are made of plastic.

2) It is not permissible to expand measuring range using sub-anvils other than as supplied as standard accessories. (The measurement accuracy in such cases is not guaranteed.)

Technical Data

Accuracy: Metric models 2µm
Inch models .00008"
Repeatability: Metric models 0.5µm
Inch models .00002"
Adjacent error: Metric models 1µm
Inch models .00004"

Optional Accessories

–: Dial indicator (See Chapter F)
21DZA000: Dial protection cover

Recommended dial indicators

Metric models: **2046SB** (0.01mm)
2972 (0.001mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
2922SB (.0005")
Inch models: **2977** (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

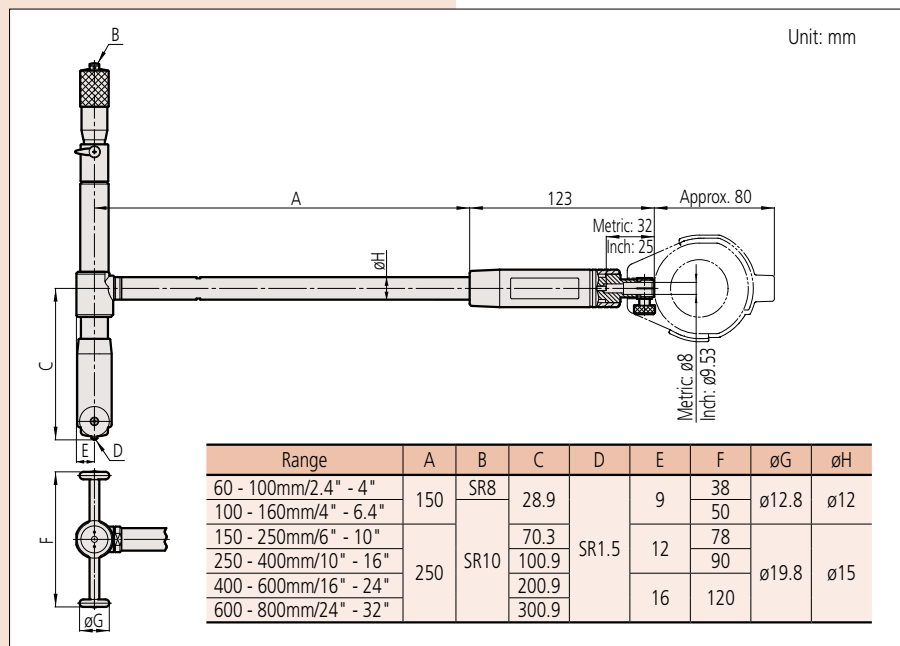
Recommended digimatic indicators

Metric models: **543-264B** (ID-C112GB: 0.001mm)
Inch models: **543-266B** (ID-C112GEB: 0.001mm/.00005")

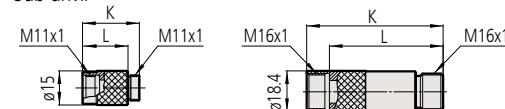
Contact Points



DIMENSIONS

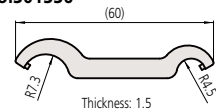


Sub-anvil

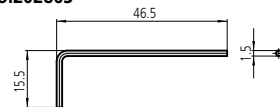


Wrench

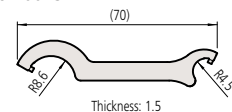
No.301336



No.202863



No.200154



STANDARD ACCESSORIES

Metric								
Bore gage (Main body)	Micrometer head			Sub-Anvil				Wrench Parts No.
	Parts No.	Stroke	Screw size	Marked No.	Parts No.	K	L	
511-803	21DZA267	10mm	M11x1	10mm	208892	15mm	10mm	301336 (2 pcs.)
				20mm	208894	25mm	20mm	
511-804	21DZA268	13mm	M11x1	10mm	208892	15mm	10mm	301336 (2 pcs.)
				20mm	208894 (2 pcs.)	25mm	20mm	
511-805	21DZA268	13mm	M11x1	10mm	208892	15mm	10mm	301336 (2 pcs.)
				20mm	208894 (2 pcs.)	25mm	20mm	
				50mm	21DAA492	55mm	50mm	
				25mm	208926	35mm	25mm	
511-806	953118	25mm	M16x1	50mm	208928 (2 pcs.)	60mm	50mm	200154 (2 pcs.)
511-807	953120	50mm	M16x1	50mm	208928	60mm	50mm	200154 (2 pcs.)
				100mm	208932	110mm	100mm	
511-808	953120	50mm	M16x1	50mm	208928	60mm	50mm	200154 (2 pcs.)
				100mm	208932	110mm	100mm	

Inch								
Bore gage (Main body)	Micrometer head			Sub-Anvil				Wrench Parts No.
	Parts No.	Stroke	Screw size	Marked No.	Parts No.	K	L	
511-833	21DZA272	.4"	M11x1	.4"	208893	.6"	.4"	301336 (2 pcs.)
				.8"	208895	1.0"	.8"	
511-834	21DZA273	.5"	M11x1	.4"	208893	.6"	.4"	301336 (2 pcs.)
				.8"	208895 (2 pcs.)	1.0"	.8"	
511-835	21DZA273	.5"	M11x1	.4"	208892	.6"	.4"	301336 (2 pcs.)
				.8"	208894 (2 pcs.)	1.0"	.8"	
				2"	21DAA493	2.2"	2"	
				1"	208927	1.4"	1"	
511-836	21DZA275	1.0"	M16x1	2"	208929 (2 pcs.)	2.4"	2"	200154 (2 pcs.)
				4"	208933	4.4"	4"	
511-837	902313	2.0"	M16x1	2"	208929	2.4"	2"	200154 (2 pcs.)
				4"	208933	4.4"	4"	
511-838	902313	2.0"	M16x1	2"	208929	2.4"	2"	200154 (2 pcs.)
				4"	208933	4.4"	4"	

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511 — for Blind Holes

- Micrometer head attached for accurate dimensional setting.
- Carbide-tipped contact point for durability.
- Wide measuring range with sub-anvils.



511-402

The dial indicator and protection cover are optional.

SPECIFICATIONS

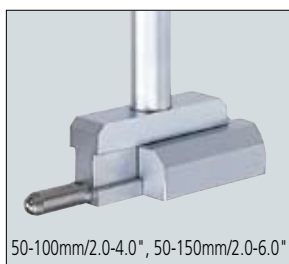
Metric									
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set				Probing depth
					Bore gage	Dial indicator	Dial protection cover	Anvil	Washer
511-401	15-35mm	1.2mm	4N or less	6N or less	511-401	Not supplied	Not supplied	11 pcs.	1 pc.
511-402	35-60mm		5N or less	10N or less	511-402			6 pcs.	4 pcs.
511-403	50-100mm				511-403			11 pcs.	
511-404	50-150mm				511-404			11 pcs.	
511-421	15-35mm	1.2mm	4N or less	6N or less	511-401	2109SB-10 (Graduation: 0.001mm)	21DZA000	11 pcs.	1 pc.
511-422	35-60mm		5N or less	10N or less	511-402			6 pcs.	4 pcs.
511-423	50-100mm				511-403			11 pcs.	
511-424	50-150mm				511-404			11 pcs.	
511-411	15-35mm	1.2mm	4N or less	6N or less	511-401	2046SB (Graduation: 0.01mm)	21DZA000	11 pcs.	1 pc.
511-412	35-60mm		5N or less	10N or less	511-402			6 pcs.	4 pcs.
511-413	50-100mm				511-403			11 pcs.	
511-414	50-150mm				511-404			11 pcs.	

Notes: 1) A 10mm sub-anvil is supplied with 511-401, and a 50mm sub-anvil is supplied with 511-404.

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.)



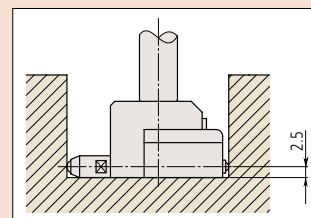
15-35mm/6-1.4"



50-100mm/2.0-4.0", 50-150mm/2.0-6.0"



511-402



Technical Data

Accuracy: Metric models 5μm
Inch models .0002"
Repeatability: Metric models 2μm
Inch models .00008"
Adjacent error: Metric models 2μm
Inch models .00008"

Optional Accessories

—: Dial indicator (See Chapter F)
21DZA000: Dial protection cover

Recommended dial indicators

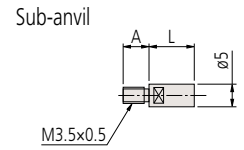
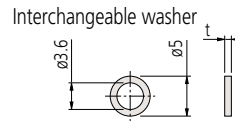
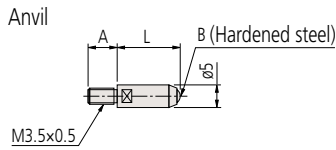
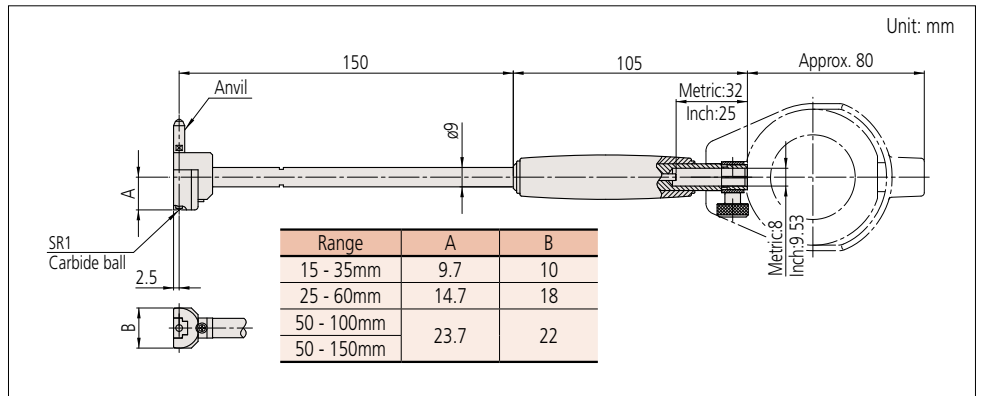
Metric models: 2046SB (0.01mm)
2972 (0.001mm - One-revolution type)
2109SB-10 (0.001mm)
2900SB-10 (0.001mm - One-revolution type)
Inch models: 2922SB (.0005")
2977 (.0005" - One-revolution type)
2923SB-10 (.0001")
2910SB-10 (.0001" - One-revolution type)

Recommended digimatic indicators

Metric models: 543-264B (ID-C112GB: 0.001mm)
Inch models: 543-266B (ID-C112GEB: 0.001mm/.00005")

Inch									
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set				Probing depth
					Bore gage	Dial indicator	Dial protection cover	Anvil	Washer
511-406	.6-1.4"	.047"	4N or less	6N or less	511-406	Not supplied	Not supplied	11 pcs.	1 pc.
511-407	1.4-2.4"		5N or less	10N or less	511-407			6 pcs.	4 pcs.
511-408	2.0-4.0"				511-408			11 pcs.	
511-409	2.0-6.0"				511-409			11 pcs.	
511-441	.6-1.4"	.047"	4N or less	6N or less	511-406	2923SB-10 (Graduation: .0001")	21DZA000	11 pcs.	1 pc.
511-442	1.4-2.4"		5N or less	10N or less	511-407			6 pcs.	4 pcs.
511-443	2.0-4.0"				511-408			11 pcs.	
511-444	2.0-6.0"				511-409			11 pcs.	
511-431	.6-1.4"	.047"	4N or less	6N or less	511-406	2922SB (Graduation: .0005")	21DZA000 (Graduation: .0005")	11 pcs.	1 pc.
511-432	1.4-2.4"		5N or less	10N or less	511-407			6 pcs.	4 pcs.
511-433	2.0-4.0"				511-408			11 pcs.	
511-434	2.0-6.0"				511-409			11 pcs.	

DIMENSIONS



STANDERD ACCESSORIES

Metric											
Bore gage (Main body)	Anvil						Interchangeable washer		Sub-Anvil		
	Marked No.	Parts No.	Size	A	B	L	Parts No.	t	Parts No.	A	L
511-401 () Used 2.5mm Sub-Anvil	1	212131	15mm (25mm)	2.5 mm	SR1 mm	2mm	212127	0.5mm	212175	2.5mm	10mm
	2	212132	16mm (26mm)			3mm					
	3	212133	17mm (27mm)			4mm					
	4	212134	18mm (28mm)			5mm					
	5	212135	19mm (29mm)			6mm					
	6	212136	20mm (30mm)			7mm					
	7	212137	21mm (31mm)	2.5 mm	SR1.5 mm	8mm					
	8	212138	22mm (32mm)			9mm					
	9	212139	23mm (33mm)			10mm					
	10	212140	24mm (34mm)			11mm					
	11	212141	25mm (35mm)			12mm					
511-402 () Used 2.5mm Sub-Anvil	1	212142	35mm	7.5 mm	SR1.5 mm	10mm	212127	0.5mm	212177	7.5mm	50mm
	2	212143	40mm			15mm					
	3	212144	45mm			20mm					
	4	212145	50mm			25mm					
	5	212146	55mm			30mm					
	6	212147	60mm			35mm					
511-403 () Used 2.5mm Sub-Anvil	1	212142	50mm	7.5 mm	SR1.5 mm	10mm	212127	0.5mm	212177	7.5mm	50mm
	2	212143	55mm			15mm					
	3	212144	60mm			20mm					
	4	212145	65mm			25mm					
	5	212146	70mm			30mm					
	6	212147	75mm			35mm					
	7	212148	80mm			40mm					
	8	212149	85mm			45mm					
	9	212150	90mm			50mm					
	10	212151	95mm			55mm					
	11	212152	100mm			60mm					
511-404 () Used 2.5mm Sub-Anvil	1	212142	50mm (100mm)	7.5 mm	SR1.5 mm	10mm	212127	0.5mm	212177	7.5mm	50mm
	2	212143	55mm (105mm)			15mm					
	3	212144	60mm (110mm)			20mm					
	4	212145	65mm (115mm)			25mm					
	5	212146	70mm (120mm)			30mm					
	6	212147	75mm (125mm)			35mm					
	7	212148	80mm (130mm)			40mm					
	8	212149	85mm (135mm)			45mm					
	9	212150	90mm (140mm)			50mm					
	10	212151	95mm (145mm)			55mm					
	11	212152	100mm (150mm)			60mm					

Inch											
Bore gage (Main body)	Anvil						Interchangeable washer		Sub-Anvil		
	Marked No.	Parts No.	Size	A	B	L	Parts No.	t	Parts No.	A	L
511-406 () Used .4" Sub- Anvil	1	212153	.60" (1.00")	.1"	SR.04"	.09"	212127	.02"	212176	.1"	.4"
	2	212154	.64" (1.04")			.13"					
	3	212155	.68" (1.08")			.17"					
	4	212156	.72" (1.12")			.21"					
	5	212157	.76" (1.16")			.25"					
	6	212158	.80" (1.20")			.29"					
	7	212159	.84" (1.24")	.1"	SR.06"	.33"					
	8	212160	.88" (1.28")			.37"					
	9	212161	.92" (1.32")			.41"					
	10	212162	.96" (1.36")			.45"					
	11	212163	1.00" (1.40")			.49"					
511-407 () Used .4" Sub- Anvil	1	212164	1.4"	.3"	SR.06"	.42"	212127	.02"	212178	.3"	2"
	2	212165	1.6"			.62"					
	3	212166	1.8"			.82"					
	4	212167	2.0"			1.02"					
	5	212168	2.2"			1.22"					
	6	212169	2.4"			1.42"					
511-408 () Used .4" Sub- Anvil	1	212164	2.0"	.3"	SR.06"	.42"	212127	.02"	212178	.3"	2"
	2	212165	2.2"			.62"					
	3	212166	2.4"			.82"					
	4	212167	2.6"			1.02"					
	5	212168	2.8"			1.22"					
	6	212169	3.0"			1.42"					
	7	212170	3.2"			1.62"					
	8	212171	3.4"			1.82"					
	9	212172	3.6"			2.02"					
	10	212173	3.8"			2.22"					
	11	212174	4.0"			2.42"					
511-409 () Used .4" Sub- Anvil	1	212164	2.0" (4.0")	.3"	SR.06"	.42"	212127	.02"	212178	.3"	2"
	2	212165	2.2" (4.2")			.62"					
	3	212166	2.4" (4.4")			.82"					
	4	212167	2.6" (4.6")			1.02"					
	5	212168	2.8" (4.8")			1.22"					
	6	212169	3.0" (5.0")			1.42"					
	7	212170	3.2" (5.2")			1.62"					
	8	212171	3.4" (5.4")			1.82"					
	9	212172	3.6" (5.6")			2.02"					
	10	212173	3.8" (5.8")			2.22"					
	11	212174	4.0" (6.0")			2.42"					

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages

SERIES 511 — Absolute Digimatic Bore Gages

- These ABSOLUTE Digimatic bore gages are exclusively designed for inside diameter measurement.
- Up to four extension rods (250mm or 500mm) can be used for measuring at the bottom of a hole 2m deep.
- The display and grip can be rotated up to 320 degrees and the display can be inclined up to 90 degrees, so that it is easily readable from any direction.
- The minimum value holding function provides easy measurement of hole diameter.
- Setting the Bore Gage to a master value using a gauge block set allows quick and accurate setting.
- A Bore Gage Checker and a range of Setting Rings are available to aid in accurately setting a gage before making a measurement. (For details, refer to pages C-44 and C-45.)



SPECIFICATIONS

Metric

Order No.	Range	Stroke of contact point	Measuring force	Guide force	Resolution	Content of set			Probing depth
						Anvil	Interchangeable washer	Battery (SR44)	
511-501	45-100mm	1.2mm	5N or less	10N or less	0.001mm	12 pcs.	4 pcs.	2 pcs.	150mm
511-502	100-160mm					13 pcs.	4 pcs.	2 pcs.	

Inch

Order No.	Range	Stroke of contact point	Measuring force	Guide force	Resolution	Content of set			Probing depth
						Anvil	Interchangeable washer	Battery (SR44)	
511-521	1.8-4.0"	.047"	5N or less	6N or less	.0005"/	12 pcs.	4 pcs.	2 pcs.	6"
511-522	4.0-6.5"				0.001mm	13 pcs.	4 pcs.	2 pcs.	

- Notes: 1) Normal use is assumed to be 8 hours per day.
 2) The correct peak value may not be displayed if the anvil's speed exceeds 50 µm/s.
 3) IP53 indicates resistance to dust and dripping water, but only applies when the connector cap is in place.

ABSOLUTE

Absolute Encoder

Technical Data

Accuracy: Metric models 3µm
 Inch models .00012"
 Excluding quantizing error
 Repeatability: Metric models 2µm
 Inch models .00008"
 Adjacent error: Metric models 2µm
 Inch models .00008"
 Battery life: Approx. 2000 hours under normal use.
 Display: LCD character height 8.5mm
 Scale type: ABSOLUTE electrostatic linear encoder
 Max. response speed: Unlimited

Function

Presetting, Preset, Power on/off, inch/mm conversion (inch/mm type only), Data output, GO/±NG tolerance judgment Min value holding, Data hold
 Alarm:
 Low battery voltage, scale contamination, over-flow error, tolerance limit setting error

Optional Accessories

21DZA089: Extension rod 250 mm (10")
21DZA081: Extension rod 500 mm (20")
516-118-10: Setup metric rectangular gauge block set
516-119-10: Setup metric square gauge block set
905338: SPC cable (1m)
905409: SPC cable (2m)
02AZD790F: SPC cable for U-WAVE (160mm)
 ——— : Setting ring (See page C-45.)

Gauge blocks and block sets for setting the origin or master value (optional)

Usage example



Rectangular gauge blocks

516-118

516-118-30 with calibration certificate

Description		Order No.	Qty
Nominal length (mm)	1	611611-02	1
	2	611612-02	1
	3	611613-02	1
	5	611615-02	1
	10	611671-02	1
	20	611672-02	1
	30	611673-02	1
	40	611674-02	1
Flat jaw		630030	1 pair (2 pcs)
Holder 160 mm		619004	1
Position detecting system			1

* Equivalent to JIS B 7506 Grade 0

Square gauge blocks

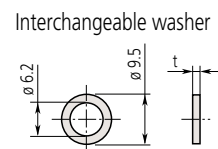
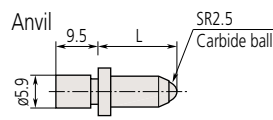
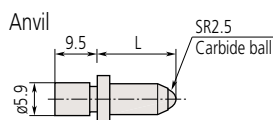
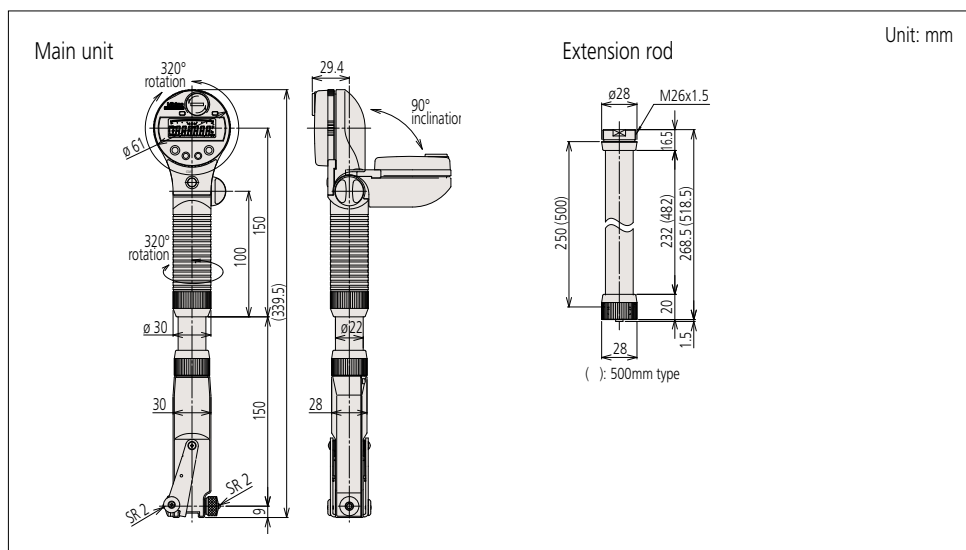
516-119

516-119-30 with calibration certificate

Description		Order No.	Qty
Nominal length (mm)	1	611611-02	1
	2	611612-02	1
	3	611613-02	1
	5	611615-02	1
	10	611671-02	1
	20	611672-02	1
	30	611673-02	1
	40	611674-02	1
Flat jaw		619072	1 pair (2 pcs)
Tie rod 3"		619062	1
Tie rod 2 1/4"		619064	1
Tie rod 1 1/2"		619057	1
Flat head screw 1 1/4"		619058	2
Flat head screw 5/8"			2
Position detecting system			1

* Equivalent to JIS B 7506 Grade 0

DIMENSIONS



STANDARD ACCESSORIES

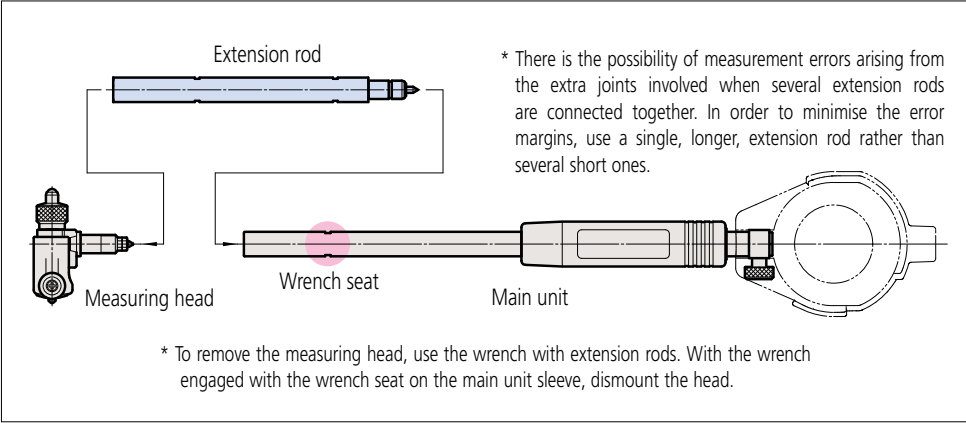
Bore gage (Main body)	Marked No.	Parts No.	Anvil			Interchangeable washer	
			Size	L		Parts No.	t
511-501 511-521	1	21DZA232A	45mm	1.8"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"
	2	21DZA232B	50mm	2.0"	10.5mm/.42"		
	3	21DZA232C	55mm	2.2"	15.5mm/.61"		
	4	21DZA232D	60mm	2.4"	20.5mm/.81"		
	5	21DZA232E	65mm	2.6"	25.5mm/1.00"		
	6	21DZA232F	70mm	2.8"	30.5mm/1.20"		
	7	21DZA232G	75mm	3.0"	35.5mm/1.40"		
	8	21DZA232H	80mm	3.2"	40.5mm/1.59"		
	9	21DZA232J	85mm	3.4"	45.5mm/1.79"		
	10	21DZA232L	90mm	3.6"	50.5mm/1.99"		
	11	21DZA232M	95mm	3.8"	55.5mm/2.19"		
	12	21DZA232N	100mm	4.0"	60.5mm/2.38"		
511-502 511-522	1	21DZA232A	100mm	4.0"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"
	2	21DZA232B	105mm	4.2"	10.5mm/.42"		
	3	21DZA232C	110mm	4.4"	15.5mm/.61"		
	4	21DZA232D	115mm	4.6"	20.5mm/.81"		
	5	21DZA232E	120mm	4.8"	25.5mm/1.00"		
	6	21DZA232F	125mm	5.0"	30.5mm/1.20"		
	7	21DZA232G	130mm	5.2"	35.5mm/1.40"		
	8	21DZA232H	135mm	5.4"	40.5mm/1.59"		
	9	21DZA232J	140mm	5.6"	45.5mm/1.79"		
	10	21DZA232L	145mm	5.8"	50.5mm/1.99"		
	11	21DZA232M	150mm	6.0"	55.5mm/2.19"		
	12	21DZA232N	155mm	6.2"	60.5mm/2.38"		
	13	21DZA232P	160mm	6.4"	65.5mm/2.58"		

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.
- The extension rod length is available up to 1000mm.
- When using a 500mm (or longer) extension rod, use the bore gage in an upright position.
- The accuracy and security of the assembly should be confirmed after connecting a rod.

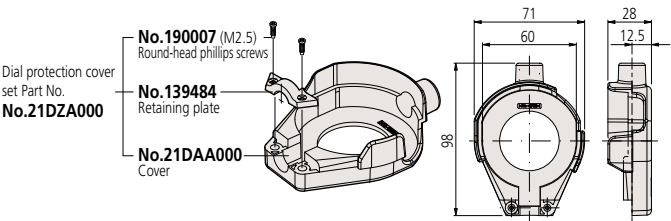


SPECIFICATIONS

Applicable model	Extension rod length					Extension rod diameter	Wrench part No.
Order No.	125m	250m	500m	750m	1000m		
511-701	953549	953550	953551	—	—	ø9mm	102148
511-702	953552	953553	953554	953555	953556	ø12mm	212556
511-703							
511-704							
511-803							
511-804	953557	952361	953558	953559	953560	ø15mm	212556
511-705							
511-706							
511-805							
511-806							
511-807							
511-808							

Protection cover

- Both the flat backplate of a dial indicator and backplate with a lug can be attached to a protection cover.



Usage example



Technical Data

Flatness of parallel jaw
0.5 μ m (Parallelism 1 μ m)

Bore Gage Checker SERIES 515

- The Bore Gage Checker allows easy setting of dial bore gages with ranges of 18mm (.7") through 400mm (16") using gauge blocks.



515-590

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

SPECIFICATIONS

Order No.	Applicable range
515-590	18 - 400mm (.7"-16")

Bore Gages

For easy and accurate measurement of inside diameters

Setting Rings

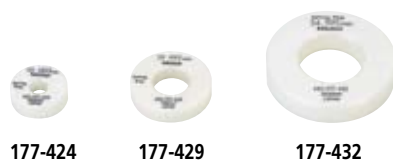
SERIES 177 — Accessories for Inside Micrometers, Holtest and Dial Bore Gages

- Used for quick and accurate setting of dial bore gages, Holtest, and inside micrometers.
- If a setting ring of an optimal size is prepared, it can be used for calibration.

Steel Setting Rings

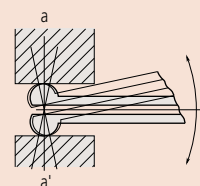


Ceramic Setting Rings



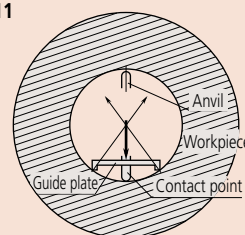
How to read the indicated value

Series 526



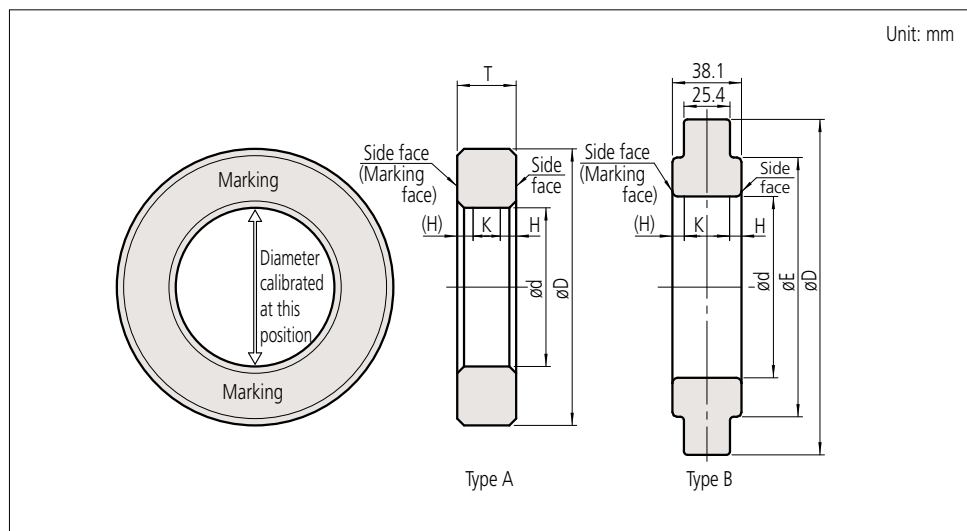
The 526 series has a gage head with high curvature. Alignment with the diameter (a-a') is achieved by rotating the gage head in the direction indicated by the arrow, and the reading is the maximum value read from the dial indicator.

Series 511



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

DIMENSIONS



SPECIFICATIONS

Steel Setting Rings

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

Inch										
Order No.	Nominal size øD	Dimensions (mm)			Type	Accuracy				
		øD	øE	T		Tolerance between the nominal size and the actual diameter (inch)	Uncertainty of marked diameter value (inch)*1	Roundness/ Cylindricity (inch)*2	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-209	.1"	25	—	7	A	±.0004"	±.00006"	.00004"	1.5	4.0
177-206	.16"	25	—	7	A	±.0004"	±.00006"	.00004"	1.5	4.0
177-207	.24"	25	—	7	A	±.0004"	±.00006"	.00004"	1.5	4.0
177-281	.275"	25	—	7	A	±.0004"	±.00006"	.00004"	1.8	3.4
177-179	.35"	32	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-283	.425"	32	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-180	.5"	32	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-181	.6"	38	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-182	.65"	45	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-183	.7"	45	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-287	.8"	45	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-184	1"	53	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-289	1.2"	71	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-185	1.4"	71	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-291	1.6"	71	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-186	1.8"	85	—	15	A	±.0004"	±.00006"	.00004"	3.5	8.0

Cera Setting Rings

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

*1 Actual diameter is marked in 0.001 mm increments.

*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 sides and the center.

Order No.	Nominal size ød	Dimensions (mm)			Type	Accuracy				
		øD	øE	T		Tolerance between the nominal size and the actual diameter (μm)	Uncertainty of marked diameter value (μm)*1	Roundness/ Cylindricity (μm)*2	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-177	16mm	45	—	10	A	±10	±1.5	1	2.0	6.0
177-133	17mm	45	—	10	A	±10	±1.5	1	2.0	6.0
177-285	18mm	45	—	10	A	±10	±1.5	1	2.0	6.0
177-286	20mm	45	—	10	A	±10	±1.5	1	2.0	6.0
177-139	25mm	53	—	15	A	±10	±1.5	1	3.2	8.6
177-288	30mm	71	—	15	A	±10	±1.5	1	3.2	8.6
177-140	35mm	71	—	15	A	±10	±1.5	1	3.2	8.6
177-290	40mm	71	—	15	A	±10	±1.5	1	3.2	8.6
177-178	45mm	85	—	15	A	±10	±1.5	1	3.7	7.6
177-146	50mm	85	—	20	A	±20	±1.5	1	3.7	12.6
177-292	60mm	112	—	20	A	±20	±1.5	1	3.7	12.6
177-314	62mm	112	—	20	A	±20	±1.5	1.5	3.7	12.6
177-147	70mm	112	—	20	A	±20	±1.5	1.5	3.7	12.6
177-316	75mm	125	—	25	A	±20	±1.5	1.5	4.2	16.6
177-294	80mm	125	—	25	A	±20	±1.5	1.5	4.2	16.6
177-318	87mm	140	—	25	A	±20	±1.5	1.5	4.2	16.6
177-148	90mm	140	—	25	A	±20	±1.5	1.5	4.2	16.6
177-296	100mm	160	—	25	A	±20	±1.5	2	4.2	16.6
177-298	125mm	210	168	38.1 (25.4)	B	±20	±2.5	2	5.3	27.5
177-300	150mm	235	187		B	±20	±2.5	2	5.3	27.5
177-302	175mm	260	215		B	±20	±2.5	2.5	5.3	27.5
177-304	200mm	311	244		B	±20	±2.5	2.5	5.3	27.5
177-306	225mm	337	264		B	±20	±2.5	2.5	5.3	27.5
177-308	250mm	362	290		B	±20	±2.5	3	5.3	27.5
177-310	275mm	413	321		B	±20	±2.5	3	5.3	27.5
177-312	300mm	438	340		B	±20	±2.5	3	5.3	27.5

Order No.	Nominal size ød	Dimensions (mm)			Type	Accuracy				
		øD	øE	T		Tolerance between the nominal size and the actual diameter (inch)	Uncertainty of marked diameter value (inch)*1	Roundness/ Cylindricity (inch)*2	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-187	2"	85	—	20	A	±.0008"	±.00006"	.00004"	3.5	13.0
177-293	2.4"	112	—	20	A	±.0008"	±.00006"	.00004"	3.5	13.0
177-315	2.5"	112	—	20	A	±.0008"	±.00006"	.00006"	4.0	12.0
177-188	2.8"	112	—	20	A	±.0008"	±.00006"	.00006"	4.0	12.0
177-317	3"	125	—	25	A	±.0008"	±.00006"	.00006"	4.0	17.0
177-295	3.2"	125	—	25	A	±.0008"	±.00006"	.00006"	4.0	17.0
177-319	3.5"	140	—	25	A	±.0008"	±.00006"	.00006"	4.0	17.0
177-189	3.6"	140	—	25	A	±.0008"	±.00006"	.00006"	4.0	17.0
177-297	4"	160	—	25	A	±.0008"	±.00006"	.00008"	4.0	17.0
177-299	5"	210	168	38.1	B	±.0008"	±.00010"	.00008"	5.0	28.1
177-301	6"	235	187	38.1	B	±.0008"	±.00010"	.00008"	5.0	28.1
177-303	7"	260	215	38.1	B	±.0008"	±.00010"	.00010"	5.0	28.1
177-305	8"	311	244	38.1	B	±.0008"	±.00010"	.00010"	5.0	28.1
177-307	9"	337	264	38.1	B	±.0008"	±.00010"	.00010"	5.0	28.1
177-309	10"	362	290	38.1	B	±.0008"	±.00010"	.00012"	5.0	28.1
177-311	11"	413	321	38.1	B	±.0008"	±.00010"	.00012"	5.0	28.1
177-313	12"	438	340	38.1	B	±.0008"	±.00010"	.00012"	5.0	28.1

Inch										
Order No.	Nominal size ød	Dimensions (mm)			Type	Accuracy				
		øD	øE	T		Tolerance between the nominal size and the actual diameter (inch)	Uncertainty of marked diameter value (inch)*1	Roundness/ Cylindricity (inch)*2	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-518	.16"	25	—	7	A	±.0004"	±.00006"	.00004"	1.5	4.0
177-520	.24"	25	—	7	A	±.0004"	±.00006"	.00004"	1.5	4.0
177-522	.275"	25	—	7	A	±.0004"	±.00006"	.00004"	1.5	4.0
177-523	.35"	32	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-524	.425"	32	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-525	.5"	32	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-527	.65"	45	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-529	.8"	45	—	10	A	±.0004"	±.00006"	.00004"	1.8	6.4
177-530	1"	53	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-531	1.2"	71	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-532	1.4"	71	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-533	1.6"	71	—	15	A	±.0004"	±.00006"	.00004"	3.0	9.0
177-534	1.8"	85	—	15	A	±.0004"	±.00006"	.00004"	3.0	8.0

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gage Measuring Machine

- Ring gages can be measured efficiently with high accuracy for inside diameters from 6 to 120mm and thicknesses up to 40mm.



565-201

The dedicated stand is optional.

SPECIFICATIONS

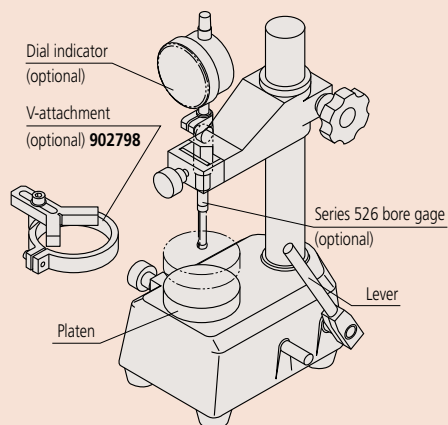
Range	ID: 6mm - 120mm
Resolution	0.0001mm (0.1μm)
Accuracy (20°C)	$\pm(0.3+5D/1000)\mu\text{m}$ D=Difference in the nominal dimensions between a master gage and a ring gage (mm)
Repeatability ($\pm 2\sigma$)	$\pm 0.2\mu\text{m}$
Measuring unit	Laser Holoscale
Measuring force	Approx. 0.2N
Workpiece size	OD: 20mm to 200mm Thickness: Up to 40mm
Ambient temperature	20°C $\pm 0.5^\circ\text{C}$
Air requirement	400KPa
Air consumption	Approx. 30 liters per minute
Dimensions (W x D x H)	720 x 494 x 875mm

Optional Accessories

- Vibration isolation stand (air spring type)
- Dedicated stand
- Master gage 6mm
- Master gage 12.5mm
- Master gage 75mm
- Master gage 120mm

Operating method

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



Bore Gage Stand SERIES 215

- Optimal for efficient measurement of multiple small holes with a bore gage (series 526).
- V-attachment (**902798**) is available for centering a large number of workpieces quickly (option).
- With platen (60mm).

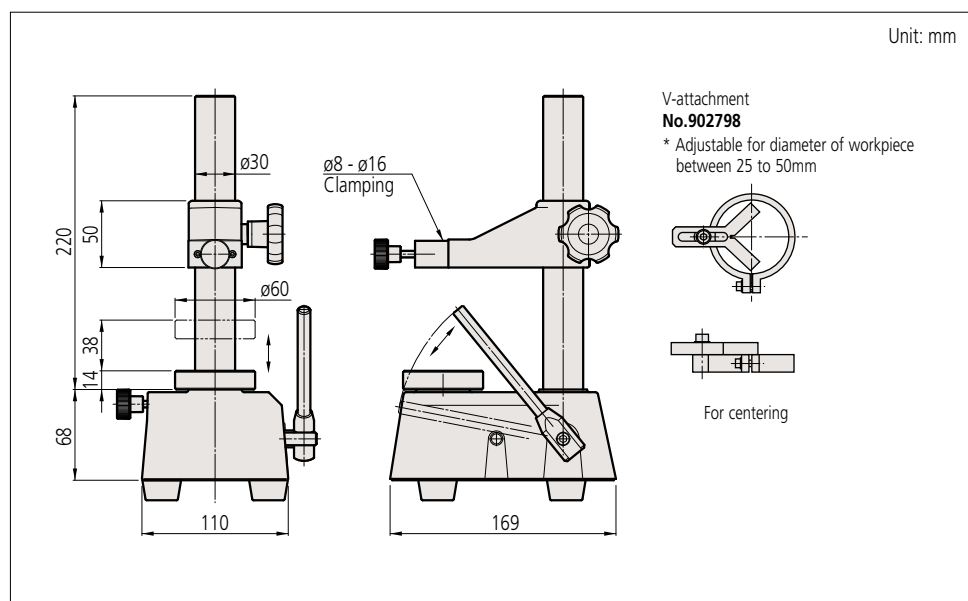


215-120-10

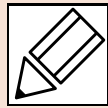
SPECIFICATIONS

Order No.	Measuring table displacement	Measuring table
215-120-10	38 mm	Flat measuring table (ø60mm)

DIMENSIONS

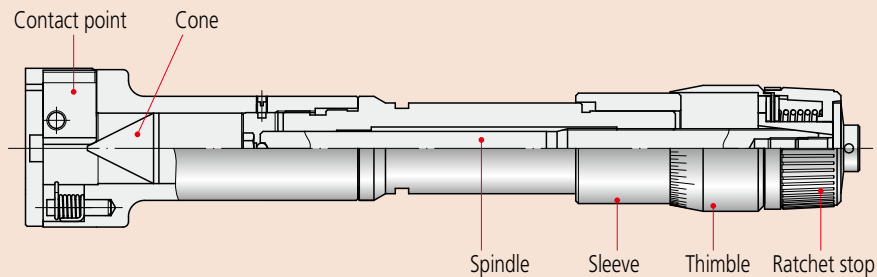


Quick Guide to Precision Measuring Instruments



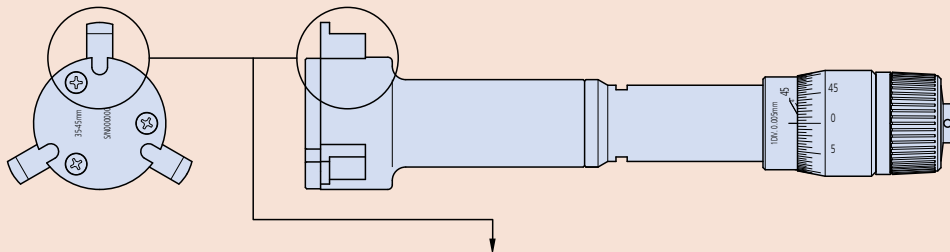
Internal Micrometers

Nomenclature



Custom-ordered Products (Holtest / Borematic)

Mitutoyo can custom-build an internal 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.)

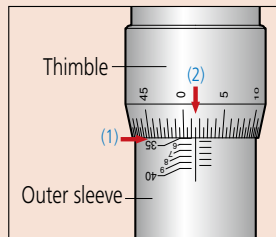


Type of feature	Workpiece profile (example)	Contact point tip profile (example)	Remarks
Square groove			● Allows measurement of the diameter of variously shaped inside grooves and splines. ● Minimum measurable groove diameter is approximately 16mm (differs depending on the workpiece profile.) ● Dimension l should be as follows: For W = less than 2mm: l = less than 2mm For W = 2mm or more: l = 2mm 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 internal micrometer an additional initial cost for the master ring gage will be required.
Round groove			
Spline			
Serration			
Threaded hole			

How to Read the Scale

Graduation 0.005mm

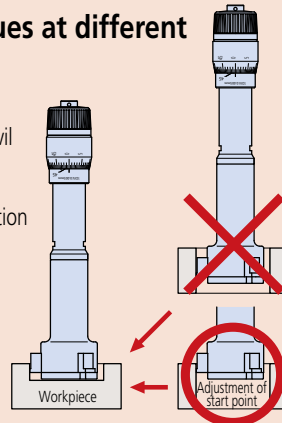
(1) Outer sleeve	35 mm
(2) Thimble	0.015 mm
Reading	35.015 mm



Changes in measured values at different measuring points

When Holtest is used, the measured value differs between measurement across the anvil and the measurement only at the tip of the anvil due to the product mechanism. Adjust the start point under the same condition before measurement.

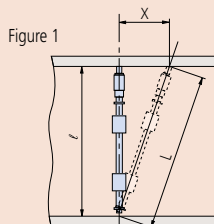
When you use the tip of the anvil for measurement, adjust the start point for using the tip of the anvil.



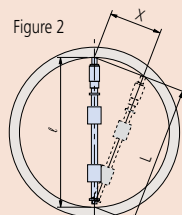
Measurement error due to temperature variation of micrometer

Heat transfer from the operator to the micrometer should be minimized to avoid any significant measuring error due to temperature difference between the workpiece and micrometer. If the micrometer is held directly by hand when measuring, use gloves or hold the heat-insulator (if fitted).

Misalignment Errors

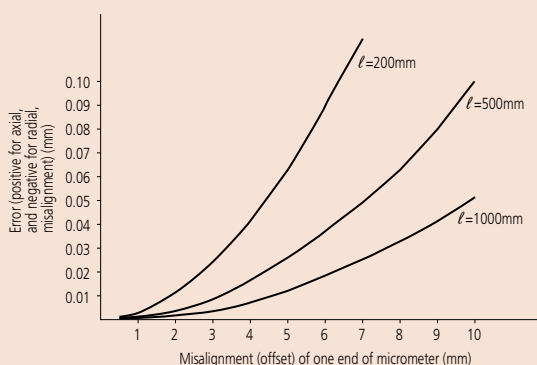


l : Inside diameter to be measured
 L : Length measured with axial offset X
 X : Offset in axial direction
 Δl : Error in measurement
 Δl : $L - l = \sqrt{l^2 + X^2} - l$



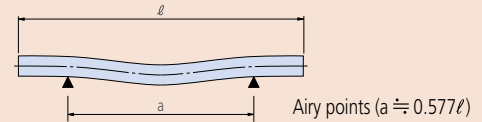
l : Inside diameter to be measured
 L : Length measured with radial offset X
 X : Offset in radial direction
 Δl : Error in measurement
 Δl : $L - l = \sqrt{l^2 + X^2} - l$

If an 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.

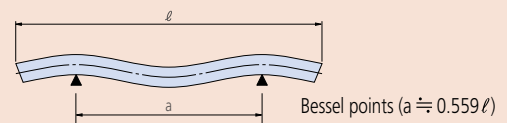


Airy and Bessel Points

When a length standard bar or internal 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.



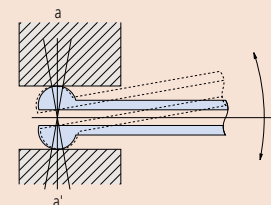
The ends of a bar (or micrometer) can be made exactly horizontal by spacing the two supports symmetrically as shown above. These points are known as the 'Airy Points' and are commonly used to ensure that the ends of a length bar are parallel to one another, so that the length is well defined.



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.

Bore Gages

- Mitutoyo bore gages for small holes feature contact elements with a large curvature so they can be easily positioned for measuring the true diameter (in the direction a-a') of a hole. The true diameter is the minimum value seen on the dial gage while rocking the bore gage as indicated by the arrow.



- The spring-loaded guide plate on a Mitutoyo two-point bore gage automatically ensures radial alignment so that only an axial rocking movement is needed to find the minimum reading (true diameter).

