



Bore Gage (without dial indicator & dial protection cover)

Order No.	Range
511-701	18-35mm
511-702	35-60mm
511-703	50-150mm
511-704	100-160mm
511-705	160-250mm
511-706	250-400mm

Bore Gage (Complete Set)

Order No.	Range	Graduation
511-711-20	18-35mm	0.01mm
511-712-20	35-60mm	0.01mm
511-713-20	50-150mm	0.01mm
511-714-20	100-160mm	0.01mm
511-715-20	160-250mm	0.01mm
511-716-20	250-400mm	0.01mm

Order No.	Range	Graduation
511-721-20	18-35mm	0.001mm
511-722-20	35-60mm	0.001mm
511-723-20	50-150mm	0.001mm
511-724-20	100-160mm	0.001mm
511-725-20	160-250mm	0.001mm
511-726-20	250-400mm	0.001mm

Bore Gages

Bore Gages SERIES 511

- This series includes models for highly accurate measurement of $\varnothing 18$ to 400 mm inside diameters.
- The contact point and anvil have a carbide ball tip that is highly durable and abrasion-resistant.
- The grip minimizes the variation of indicator values by reducing heat transfer from the operator's hand.
- Optional extension rods are available for measuring deep holes. Customized products with a longer rod below the grip are also available upon request.



511-702

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

SPECIFICATIONS

Metric										
Order No.	Range (mm)	Stroke of contact point (mm)	Accuracy* (μm)	Repeatability* (μm)	Adjacent error* (μm)	Measuring force (N)	Guide force (N)			
511-701	18 - 35	1.2	2	0.5	1	4 or less	6 or less			
511-702	35 - 60					5 or less	10 or less			
511-703	50 - 150	1.6	2	0.5	1	6 or less	15 or less			
511-704	100 - 160					6 or less	15 or less			
511-705	160 - 250	1.2	2	0.5	1	4 or less	6 or less			
511-706	250 - 400					5 or less	10 or less			
511-721-20	18 - 35	1.2	2	0.5	1	6 or less	15 or less			
511-722-20	35 - 60					6 or less	15 or less			
511-723-20	50 - 150	1.6	2	0.5	1	4 or less	6 or less			
511-724-20	100 - 160					5 or less	10 or less			
511-725-20	160 - 250	1.2	2	0.5	1	6 or less	15 or less			
511-726-20	250 - 400					6 or less	15 or less			
511-711-20	18 - 35	1.2	2	0.5	1	4 or less	6 or less			
511-712-20	35 - 60					5 or less	10 or less			
511-713-20	50 - 150	1.6	2	0.5	1	6 or less	15 or less			
511-714-20	100 - 160					6 or less	15 or less			
511-715-20	160 - 250	1.2	2	0.5	1	4 or less	6 or less			
511-716-20	250 - 400					5 or less	10 or less			
511-921-20	18 - 150	See SPECIFICATIONS of 511-701/702/703								
511-922-20										
511-925-10										

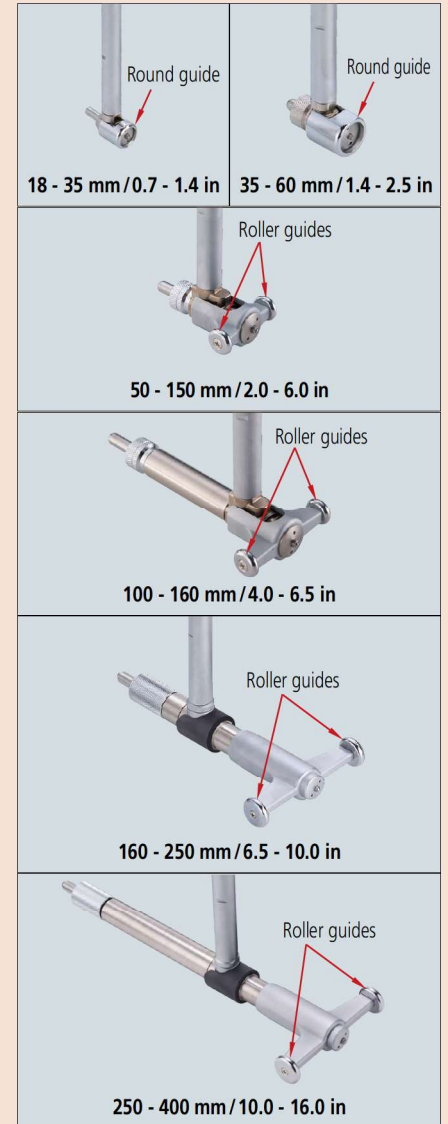
Order No.	Content of set							Probing depth (mm)
	Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner	
511-701	511-701	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	100
511-702	511-702			6 pcs.	4 pcs.	Not supplied	Not supplied	150
511-703	511-703			11 pcs.				
511-704	511-704			13 pcs.	7 pcs.	1 pc.	250	
511-705	511-705			6 pcs.				
511-706	511-706			5 pcs.	1 pc.			
511-721-20	511-701	2109AB-10 (Graduation: 0.001 mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	100
511-722-20	511-702			6 pcs.	4 pcs.	Not supplied	Not supplied	150
511-723-20	511-703			11 pcs.				
511-724-20	511-704			13 pcs.	7 pcs.	Not supplied	250	
511-725-20	511-705			6 pcs.				
511-726-20	511-706			5 pcs.	1 pc.			
511-711-20	511-701	2046AB (Graduation: 0.01 mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	100
511-712-20	511-702			6 pcs.	4 pcs.	Not supplied	Not supplied	150
511-713-20	511-703			11 pcs.				
511-714-20	511-704			13 pcs.	7 pcs.	Not supplied	250	
511-715-20	511-705			6 pcs.				
511-716-20	511-706			5 pcs.	1 pc.			
511-921-20	Set of	2046AB	21DZA000	See SPECIFICATIONS of 511-701/702/703				
511-922-20	511-701/702/703	2109AB-10						
511-925-10		543-310B						

* Accuracy of the bore gage alone.

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

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

Contact Points



Extension Rod

Refer to page C-49.

The dial protection cover, recommended indicators

Refer to page C-50.

Setting rings

Refer to pages C-52 to C-55.

Recommended Digimatic Indicators (see Chapter F)

- Metric type:
543-310B-10 (ID-C112GXB2: 0.001 mm)
- Inch type:
543-312B (ID-C112GEXB: 0.001 mm/0.00005 in)



- The ID measurement can be performed easily since the minimum value is detected automatically.
- Up to three combinations of master value and tolerance value can be set.
- Nine measurement results (maximum) can be saved and recalled from memory (when no external device is connected).
Refer to page F-12 for details.

Anvil

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

Comparison of abrasion resistance

Hardened steel ball
(conventional model)

Carbide ball
(current model)



Abrasion depth: 0.1 mm
750 HV or more



Abrasion depth: 0.001 mm
1350 HV or more

Inspection method

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

Comparison of marks on the workpiece

Carbide tip
(conventional model)

Carbide ball
(current model)



Result of contour measurement

Depth: 10 µm

Vertical magnification: 2,000
Horizontal magnification: 200

Result of contour measurement

Depth: 1 µm or less

Vertical magnification: 2,000
Horizontal magnification: 200

Inspection method

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

SPECIFICATIONS

Inch							
Order No.	Range (in)	Stroke of contact point (in)	Accuracy* (in)	Repeatability* (in)	Adjacent error* (in)	Measuring force (N)	Guide force (N)
511-731	0.7 - 1.4	0.047	0.00008	0.00002	0.00004	4 or less	6 or less
511-732	1.4 - 2.5					5 or less	10 or less
511-733	2.0 - 6.0	0.063				6 or less	15 or less
511-734	4.0 - 6.5						
511-735	6.5 - 10.0						
511-736	10.0 - 16.0						
511-751-20	0.7 - 1.4	0.047	0.00008	0.00002	0.00004	4 or less	6 or less
511-752-20	1.4 - 2.5					5 or less	10 or less
511-753-20	2.0 - 6.0	0.063				6 or less	15 or less
511-754-20	4.0 - 6.5						
511-755-20	6.5 - 10.0						
511-756-20	10.0 - 16.0						
511-741-20	0.7 - 1.4	0.047	0.00008	0.00002	0.00004	4 or less	6 or less
511-742-20	1.4 - 2.5					5 or less	10 or less
511-743-20	2.0 - 6.0	0.063				6 or less	15 or less
511-744-20	4.0 - 6.5						
511-745-20	6.5 - 10.0						
511-746-20	10.0 - 16.0						
511-931-20	0.7 - 6.0	See SPECIFICATIONS of 511-731/732/733					
511-932-20							
511-935-10							

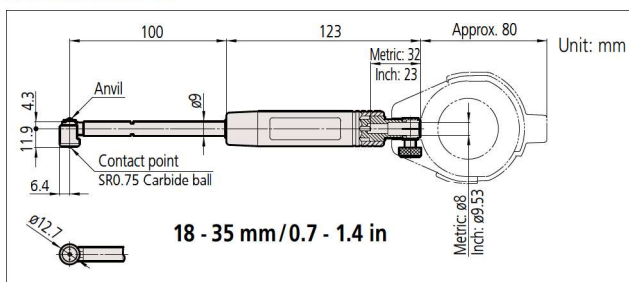
Order No.	Content of set							Probing depth (in)	
	Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner		
511-731	511-731	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	4	
511-732	511-732			6 pcs.	4 pcs.		1 pc.	Not supplied	6
511-733	511-733			11 pcs.		Not supplied			
511-734	511-734			13 pcs.			7 pcs.		
511-735	511-735			6 pcs.	1 pc.				
511-736	511-736	5 pcs.							
511-751-20	511-731	2923AB-10 (Graduation: 0.0001 in)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	4	
511-752-20	511-732			6 pcs.	4 pcs.		1 pc.	Not supplied	6
511-753-20	511-733			11 pcs.		Not supplied			
511-754-20	511-734			13 pcs.			7 pcs.		
511-755-20	511-735			6 pcs.	1 pc.				
511-756-20	511-736	5 pcs.							
511-741-20	511-731	2922AB (Graduation: 0.0005 in)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	4	
511-742-20	511-732			6 pcs.	4 pcs.		1 pc.	Not supplied	6
511-743-20	511-733			11 pcs.		Not supplied			
511-744-20	511-734			13 pcs.			7 pcs.		
511-745-20	511-735			6 pcs.	1 pc.				
511-746-20	511-736	5 pcs.							
511-931-20	Set of	2922AB	21DZA000	See SPECIFICATIONS of 511-731/732/733					
511-932-20	511-731/	2923AB-10							
511-935-10	732/733	543-312B							

* Accuracy of the bore gage alone.

Note 1: A 2 in sub-anvil is supplied with 511-733, and a 3 in sub-anvil is supplied with 511-736.

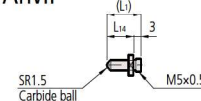
Note 2: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

DIMENSIONS

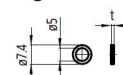


Unit: mm

Anvil

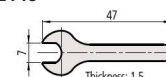


Interchangeable washer



t (mm)	Order No.
0.5	205623
1	205624

Spanner 102148



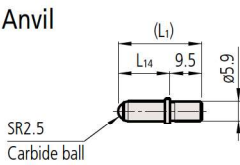
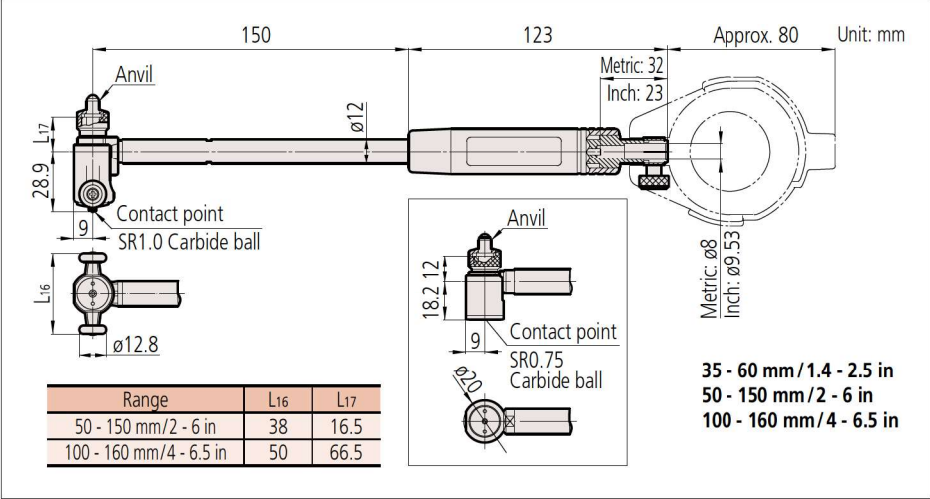
STANDARD ACCESSORIES

Bore gage (Main body)	Anvil				
	Marked No.	Order No.	Indication of measuring size	L1	L14
511-701 511-731	1	21DZA213A	18 mm/0.71 in	5.5	2.5
	2	21DZA213B	20 mm/0.79 in	7.5	4.5
	3	21DZA213C	22 mm/0.87 in	9.5	6.5
	4	21DZA213D	24 mm/0.94 in	11.5	8.5
	5	21DZA213E	26 mm/1.02 in	13.5	10.5
	6	21DZA213F	28 mm/1.10 in	15.5	12.5
	7	21DZA213G	30 mm/1.18 in	17.5	14.5
	8	21DZA213H	32 mm/1.26 in	19.5	16.5
	9	21DZA213J	34 mm/1.34 in	21.5	18.5

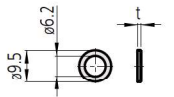
Bore Gages

Bore Gages
SERIES 511

DIMENSIONS

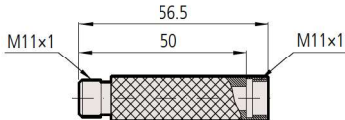


Interchangeable washer



t (mm)	Order No.
0.5	205457
1	205458
2	205459
3	205460

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



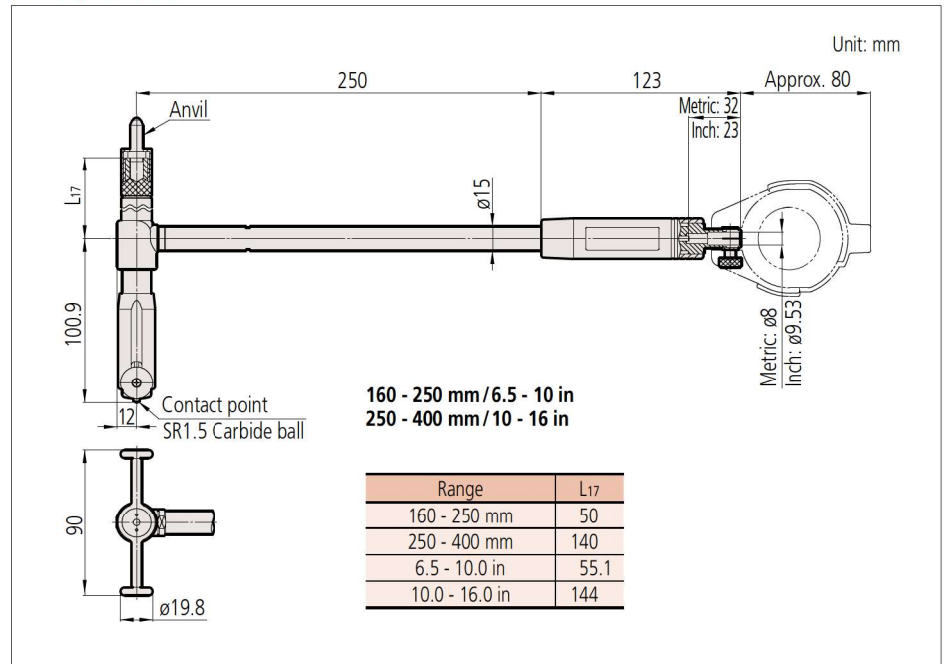
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Note: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

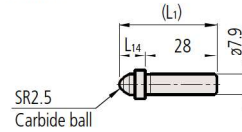
STANDARD ACCESSORIES

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

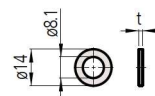
DIMENSIONS



Anvil



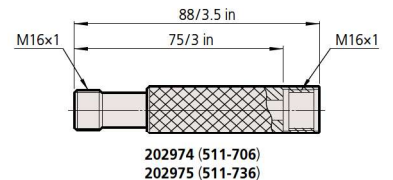
Interchangeable washer



t (mm)	Order No.
0.5	205467
1	205461
2	205462
3	205463
4	205464
5	205465
6	205466

Sub-anvil

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



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

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil				
	Marked No.	Order No.	Indication of measuring size	L1	L14
511-705 511-735	1	21DZA241A	160 mm/6.50 in	38	10
	2	21DZA241B	175 mm/7.09 in	53	25
	3	21DZA241C	190 mm/7.68 in	68	40
	4	21DZA241D	205 mm/8.27 in	83	55
	5	21DZA241E	220 mm/8.86 in	98	70
	6	21DZA241F	235 mm/9.45 in	113	85
511-706 511-736 () Using 75 mm/3 in Sub-Anvil	1	21DZA241A	250 mm (325 mm)/10.00 in (13.00 in)	38	10
	2	21DZA241B	265 mm (340 mm)/10.59 in (13.59 in)	53	25
	3	21DZA241C	280 mm (355 mm)/11.18 in (14.18 in)	68	40
	4	21DZA241D	295 mm (370 mm)/11.77 in (14.77 in)	83	55
	5	21DZA241E	310 mm (385 mm)/12.36 in (15.36 in)	98	70