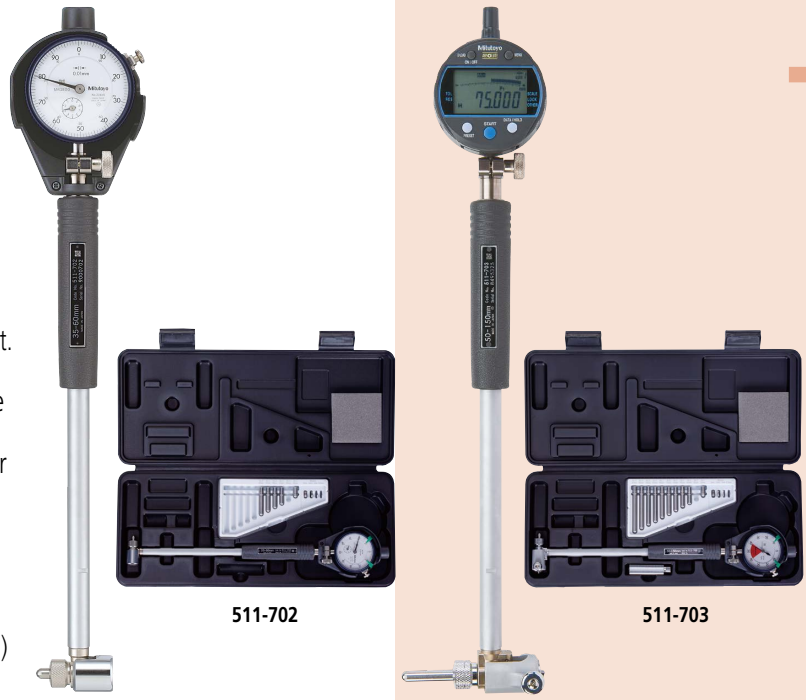


Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

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



511-702

511-703

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

SPECIFICATIONS

Metric													
Order No.	Range (mm)	Stroke of contact point (mm)	Measuring force (N)	Guide force (N)	Content of set							Probing depth (mm)	
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner		
511-701	18 - 35	1.2	4 or less	6 or less	511-701	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	100	
511-702	35 - 60				511-702			6 pcs.					
511-703	50 - 150				511-703			11 pcs.					
511-704	100 - 160		5 or less	10 or less	511-704			13 pcs.	4 pcs.	1 pc.			
511-705	160 - 250				511-705			6 pcs.					
511-706	250 - 400				511-706			5 pcs.					
511-721-20	18 - 35	1.6	4 or less	6 or less	511-701	2109AB-10 (Graduation: 0.001 mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	150	
511-722-20	35 - 60				511-702			6 pcs.					
511-723-20	50 - 150				511-703			11 pcs.					
511-724-20	100 - 160		5 or less	10 or less	511-704			13 pcs.	4 pcs.	1 pc.			
511-725-20	160 - 250				511-705			6 pcs.					
511-726-20	250 - 400				511-706			5 pcs.					
511-711-20	18 - 35	1.2	4 or less	6 or less	511-701	2046AB (Graduation: 0.01 mm)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	100	
511-712-20	35 - 60				511-702			6 pcs.					
511-713-20	50 - 150				511-703			11 pcs.					
511-714-20	100 - 160		5 or less	10 or less	511-704			13 pcs.	4 pcs.	1 pc.			
511-715-20	160 - 250				511-705			6 pcs.					
511-716-20	250 - 400				511-706			5 pcs.					
511-921-20	18 - 150	—	—	—	511-701	2046AB	21DZA000	—	—	—	—	—	
511-922-20					511-702								2109AB-10
511-925-10					511-703								

Inch													
Order No.	Range (in)	Stroke of contact point (in)	Measuring force (N)	Guide force (N)	Content of set							Probing depth (in)	
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner		
511-731	0.7 - 1.4	0.047	4 or less	6 or less	511-731	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	4	
511-732	1.4 - 2.5				511-732			6 pcs.					
511-733	2.0 - 6.0				511-733			11 pcs.					
511-734	4.0 - 6.5		5 or less	10 or less	511-734			13 pcs.	4 pcs.	1 pc.			
511-735	6.5 - 10.0				511-735			6 pcs.					
511-736	10.0 - 16.0				511-736			5 pcs.					
511-751-20	0.7 - 1.4	0.063	4 or less	6 or less	511-731	2923AB-10 (Graduation: 0.0001 in)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	4	
511-752-20	1.4 - 2.5				511-732			6 pcs.					
511-753-20	2.0 - 6.0				511-733			11 pcs.					
511-754-20	4.0 - 6.5		5 or less	10 or less	511-734			13 pcs.	4 pcs.	1 pc.			
511-755-20	6.5 - 10.0				511-735			6 pcs.					
511-756-20	10.0 - 16.0				511-736			5 pcs.					
511-741-20	0.7 - 1.4	0.047	4 or less	6 or less	511-731	2922AB (Graduation: 0.0005 in)	21DZA000	9 pcs.	2 pcs.	Not supplied	1 pc.	4	
511-742-20	1.4 - 2.5				511-732			6 pcs.					
511-743-20	2.0 - 6.0				511-733			11 pcs.					
511-744-20	4.0 - 6.5		5 or less	10 or less	511-734			13 pcs.	4 pcs.	1 pc.			
511-745-20	6.5 - 10.0				511-735			6 pcs.					
511-746-20	10.0 - 16.0				511-736			5 pcs.					
511-931-20	0.7 - 6.0	—	—	—	511-731	2922AB	21DZA000	—	—	—	—	—	
511-932-20					511-732								2923AB-10
511-935-10					511-733								

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

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

Note 3: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

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

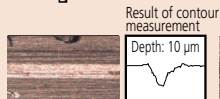
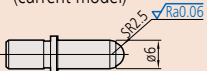
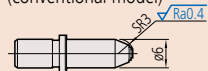
Inspection method

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

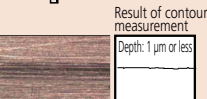
Comparison of marks on the workpiece

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.



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

Technical Data

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

Optional Accessories

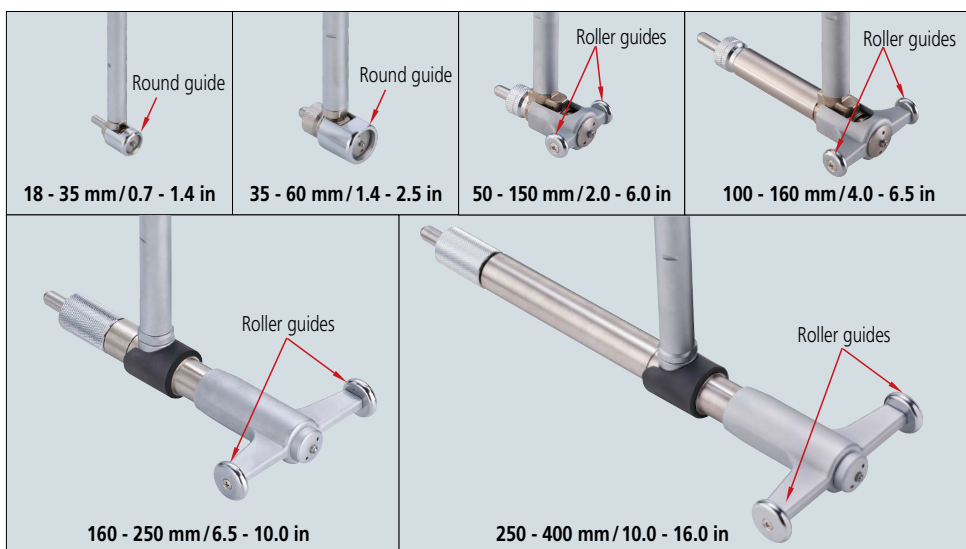
- Dial indicator (See Chapter F)
- Dial protection cover: **21DZA000**
(See page C-45)

Recommended Dial Indicators (see Chapter F)

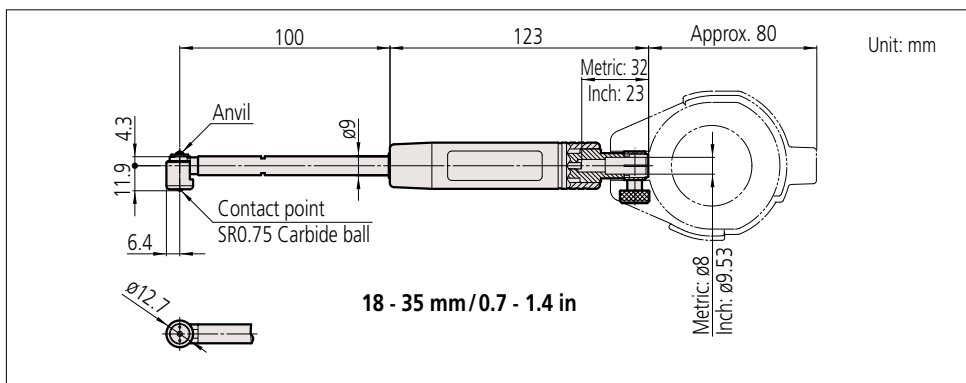
- Metric models: **2046AB** (0.01 mm)
2972AB (0.01 mm - One revolution type)
2109AB-10 (0.001 mm)
2900AB-10 (0.001 mm - One-revolution type)
2922AB (0.0005 in)
- Inch models: **2977AB** (0.0005 in - One-revolution type)
2923AB-10 (0.0001 in)
2910AB-10 (0.0001 in - One-revolution type)

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

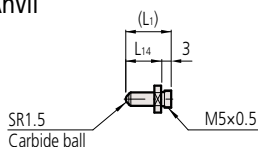
Contact Points



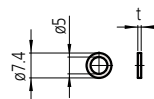
DIMENSIONS



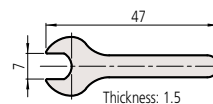
Anvil



Interchangeable washer



Spanner 102148



STANDARD ACCESSORIES

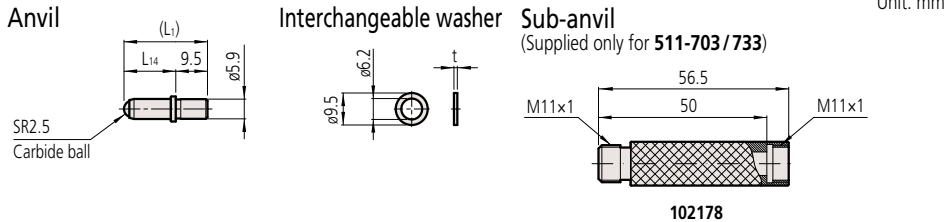
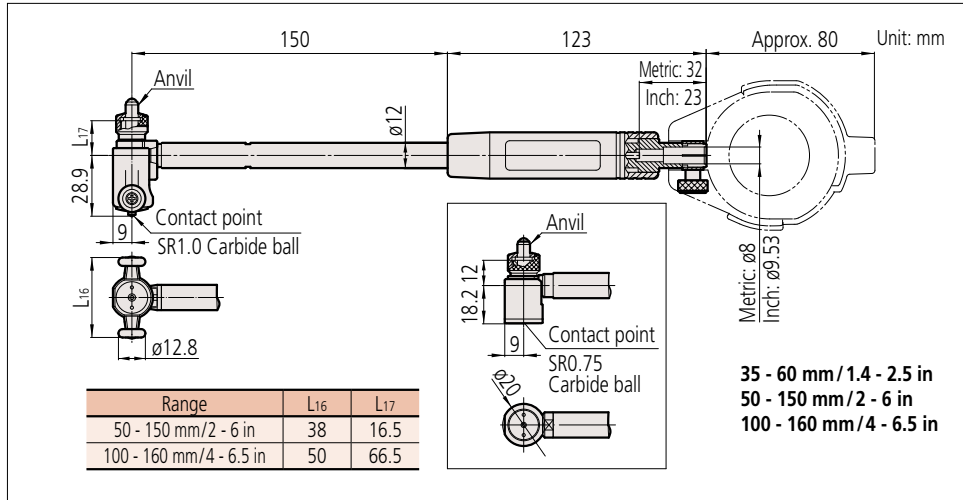
Bore gage (Main body)	Anvil					Interchangeable washer		Spanner
	Marked No.	Order No.	Indication of measuring size	L ₁	L ₁₄	Order No.	t	Order No.
511-701 511-731	1	21DZA213A	18 mm/0.71 in	5.5	2.5	205623 205624	0.5 mm/0.02 in 1.0 mm/0.04 in	102148
	2	21DZA213B	20 mm/0.79 in	7.5	4.5			
	3	21DZA213C	22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

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

DIMENSIONS



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

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	Order No.	Indication of measuring size	L ₁	L ₁₄	Order No.	t	Order No.
511-702 511-732	1	21DZA232A	35 mm / 1.38 in	15	5.5	205457 205458 205459 205460	0.5 mm / 0.02 in 1.0 mm / 0.04 in 2.0 mm / 0.08 in 3.0 mm / 0.12 in	102178 (50 mm / 2 in)
	2	21DZA232B	40 mm / 1.57 in	20	10.5			
	3	21DZA232C	45 mm / 1.77 in	25	15.5			
	4	21DZA232D	50 mm / 1.97 in	30	20.5			
	5	21DZA232E	55 mm / 2.17 in	35	25.5			
	6	21DZA232F	60 mm / 2.36 in	40	30.5			
511-703 511-733 () Using 50 mm / 2 in Sub-Anvil	1	21DZA232A	50 mm (100 mm) / 1.97 in (3.94 in)	15	5.5			
	2	21DZA232B	55 mm (105 mm) / 2.17 in (4.13 in)	20	10.5			
	3	21DZA232C	60 mm (110 mm) / 2.36 in (4.33 in)	25	15.5			
	4	21DZA232D	65 mm (115 mm) / 2.55 in (4.53 in)	30	20.5			
	5	21DZA232E	70 mm (120 mm) / 2.74 in (4.72 in)	35	25.5			
	6	21DZA232F	75 mm (125 mm) / 2.93 in (4.92 in)	40	30.5			
	7	21DZA232G	80 mm (130 mm) / 3.12 in (5.12 in)	45	35.5			
	8	21DZA232H	85 mm (135 mm) / 3.31 in (5.31 in)	50	40.5			
	9	21DZA232J	90 mm (140 mm) / 3.50 in (5.51 in)	55	45.5			
	10	21DZA232L	95 mm (145 mm) / 3.69 in (5.71 in)	60	50.5			
	11	21DZA232M	100 mm (150 mm) / 3.88 in (5.91 in)	65	55.5			
511-704 511-734	1	21DZA232A	100 mm / 3.94 in	15	5.5			
	2	21DZA232B	105 mm / 4.13 in	20	10.5			
	3	21DZA232C	110 mm / 4.33 in	25	15.5			
	4	21DZA232D	115 mm / 4.53 in	30	20.5			
	5	21DZA232E	120 mm / 4.72 in	35	25.5			
	6	21DZA232F	125 mm / 4.92 in	40	30.5			
	7	21DZA232G	130 mm / 5.12 in	45	35.5			
	8	21DZA232H	135 mm / 5.31 in	50	40.5			
	9	21DZA232J	140 mm / 5.51 in	55	45.5			
	10	21DZA232L	145 mm / 5.71 in	60	50.5			
	11	21DZA232M	150 mm / 5.91 in	65	55.5			
	12	21DZA232N	155 mm / 6.10 in	70	60.5			
	13	21DZA232P	160 mm / 6.30 in	75	65.5			

Recommended Digimatic Indicators (see Chapter F)

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



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

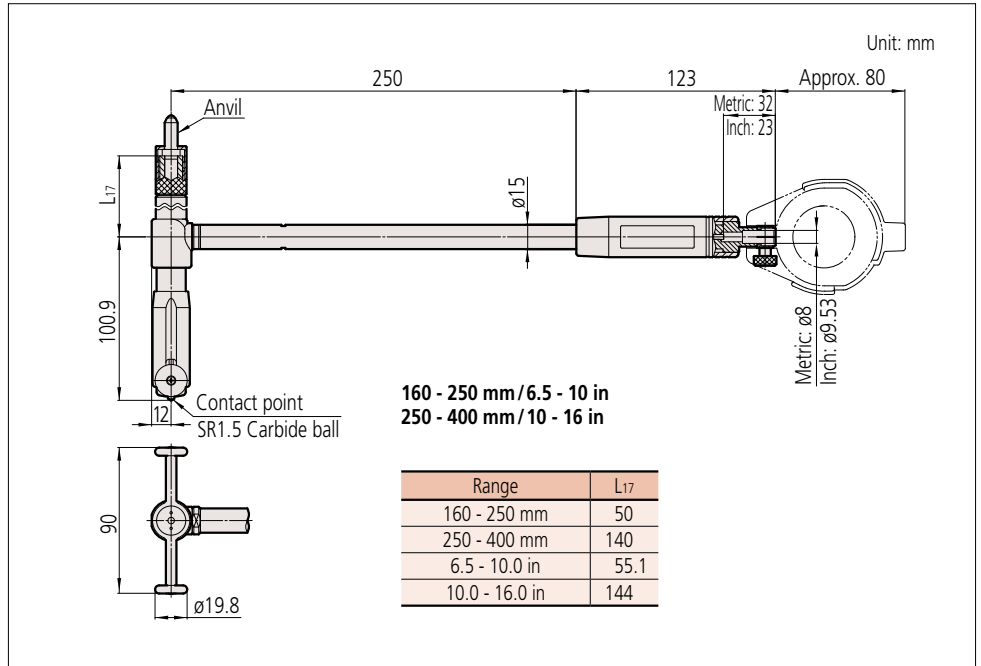
Bore Gage Checker 515-590

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

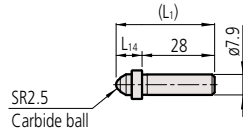


Standard configuration: Stand, Attachment A, B, C 1 pc. for each, Parallel Jaw (2 pcs.)

DIMENSIONS

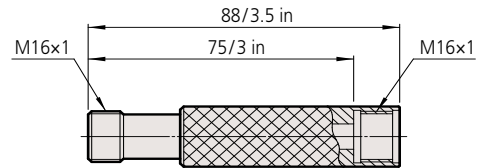
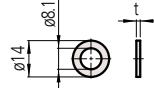


Anvil



Interchangeable washer Sub-anvil

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



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

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

STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	Order No.	Indication of measuring size	L ₁	L ₁₄	Order No.	t	Order No.
511-705 511-735	1	21DZA241A	160 mm/6.50 in	38	10	205467 205461 205462 205463 205464 205465 205466	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in 4.0 mm/0.16 in 5.0 mm/0.20 in 6.0 mm/0.24 in	Metric: 202974 (75 mm) Inch: 202975 (3.0 in)
	2	21DZA241B	175 mm/7.09 in	53	25			
	3	21DZA241C	190 mm/7.68 in	68	40			
	4	21DZA241D	205 mm/8.27 in	83	55			
	5	21DZA241E	220 mm/8.86 in	98	70			
	6	21DZA241F	235 mm/9.45 in	113	85			
511-706 511-736 () Using 75 mm/3 in Sub-Anvil	1	21DZA241A	250 mm (325 mm)/10.00 in (13.00 in)	38	10	205467 205461 205462 205463 205464 205465 205466	0.5 mm/0.02 in 1.0 mm/0.04 in 2.0 mm/0.08 in 3.0 mm/0.12 in 4.0 mm/0.16 in 5.0 mm/0.20 in 6.0 mm/0.24 in	Metric: 202974 (75 mm) Inch: 202975 (3.0 in)
	2	21DZA241B	265 mm (340 mm)/10.59 in (13.59 in)	53	25			
	3	21DZA241C	280 mm (355 mm)/11.18 in (14.18 in)	68	40			
	4	21DZA241D	295 mm (370 mm)/11.77 in (14.77 in)	83	55			
	5	21DZA241E	310 mm (385 mm)/12.36 in (15.36 in)	98	70			