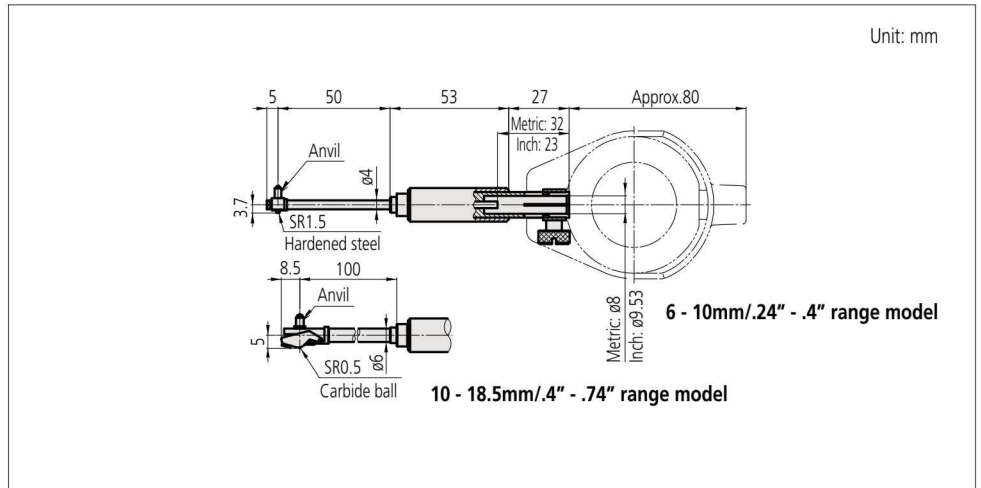
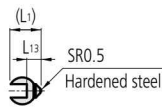


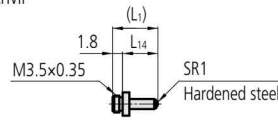
DIMENSIONS



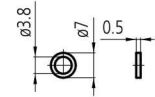
511-209/511-214
Anvil



511-201/511-205
Anvil



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



No.204355

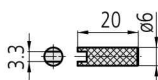
STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable Washer Parts No.	Spanner Parts No.
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₃		
511-209 511-214	1	952168	6.0mm/.24"	4.7mm/.19"	1.2mm/.05"	Not supplied	206709
	2	952169	6.5mm/.26"	5.3mm/.21"	1.7mm/.07"		
	3	952170	7.0mm/.28"	5.8mm/.23"	2.2mm/.09"		
	4	952414	7.5mm/.30"	6.3mm/.25"	2.7mm/.11"		
	5	952415	8.0mm/.32"	6.8mm/.27"	3.2mm/.13"		
	6	952416	8.5mm/.34"	7.3mm/.29"	3.7mm/.15"		
	7	952417	9.0mm/.36"	7.8mm/.31"	4.2mm/.17"		
	8	952418	9.5mm/.38"	8.3mm/.33"	4.7mm/.19"		
	9	952419	10.0mm/.40"	8.8mm/.35"	5.2mm/.21"		

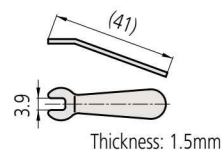
Bore gage (Main body)	Anvil					Interchangeable Washer Parts No.	Spanner Parts No.
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄		
511-201* 511-205	1	204356	10mm/.40"	3.8mm/.15"	2mm/.08"	204355	204354
	2	204357	11mm/.44"	4.8mm/.19"	3mm/.12"		
	3	204358	12mm/.48"	5.8mm/.23"	4mm/.16"		
	4	204359	13mm/.52"	6.8mm/.27"	5mm/.20"		
	5	204360	14mm/.56"	7.8mm/.31"	6mm/.24"		
	6	204361	15mm/.60"	8.8mm/.35"	7mm/.28"		
	7	204362	16mm/.64"	9.8mm/.39"	8mm/.32"		
	8	204363	17mm/.68"	10.8mm/.43"	9mm/.36"		
	9	204364	18mm/.72"	11.8mm/.46"	10mm/.40"		

* Equipped with an anvil fixing plate.

Spanner
No.206709



No.204354

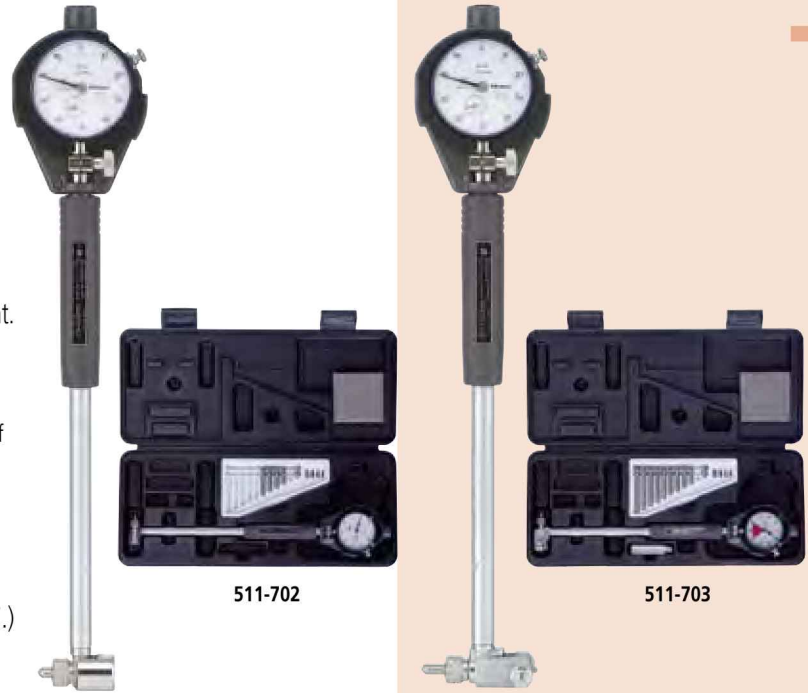


Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

- Longer plunger stroke with no affect 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.
- Alternative indicators may be used in place of those recommended*.
- * Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.
- 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.)



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	
511-701	18-35mm	1.2mm	4N or less	6N or less	511-701	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	100mm
511-702	35-60mm				511-702			6 pcs.				
511-703	50-150mm	1.6mm	5N or less	10N or less	511-703	Not supplied	Not supplied	11 pcs.	4 pcs.	1 pc.	Not supplied	150mm
511-704	100-160mm				511-704			13 pcs.				
511-705	160-250mm				511-705			6 pcs.				
511-706	250-400mm				511-706			5 pcs.				
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.	100mm
511-722	35-60mm				511-702			6 pcs.				
511-723	50-150mm	1.6mm	5N or less	10N or less	511-703	2109SB-10 (Graduation: 0.001mm)	21DZA000	11 pcs.	4 pcs.	1 pc.	Not supplied	150mm
511-724	100-160mm				511-704			13 pcs.				
511-725	160-250mm				511-705			6 pcs.				
511-726	250-400mm				511-706			5 pcs.				
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.	100mm
511-712	35-60mm				511-702			6 pcs.				
511-713	50-150mm	1.6mm	5N or less	10N or less	511-703	2046SB (Graduation: 0.01mm)	21DZA000	11 pcs.	4 pcs.	1 pc.	Not supplied	150mm
511-714	100-160mm				511-704			13 pcs.				
511-715	160-250mm				511-705			6 pcs.				
511-716	250-400mm				511-706			5 pcs.				
511-921	18-150mm	—	—	—	511-701	2046SB	21DZA000	—	—	—	—	—
511-922					511-702	2109SB-10						
511-925-10					511-703	543-310B						

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	
511-731	.7-1.4"	.047"	4N or less	6N or less	511-731	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	4"
511-732	1.4-2.5"				511-732			6 pcs.				
511-733	2.0-6.0"	.063"	5N or less	10N or less	511-733	Not supplied	Not supplied	11 pcs.	4 pcs.	1 pc.	Not supplied	6"
511-734	4.0-6.5"				511-734			13 pcs.				
511-735	6.5-10.0"				511-735			6 pcs.				
511-736	10.0-16.0"				511-736			5 pcs.				
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.	4"
511-752	1.4-2.5"				511-732			6 pcs.				
511-753	2.0-6.0"	.063"	5N or less	10N or less	511-733	2923SB-10 (Graduation: .0001")	21DZA000	11 pcs.	4 pcs.	1 pc.	Not supplied	6"
511-754	4.0-6.5"				511-734			13 pcs.				
511-755	6.5-10.0"				511-735			6 pcs.				
511-756	10.0-16.0"				511-736			5 pcs.				
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.	4"
511-742	1.4-2.5"				511-732			6 pcs.				
511-743	2.0-6.0"	.063"	5N or less	10N or less	511-733	2922SB (Graduation: .0005")	21DZA000	11 pcs.	4 pcs.	1 pc.	Not supplied	6"
511-744	4.0-6.5"				511-734			13 pcs.				
511-745	6.5-10.0"				511-735			6 pcs.				
511-746	10.0-16.0"				511-736			5 pcs.				
511-931	.7-6.0"	—	—	—	511-731	2922SB	21DZA000	—	—	—	—	—
511-932					511-732	2923SB-10						
511-935-10					511-733	543-312B						

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

2) A 2" sub-anvil is supplied with 511-733, and a 3" sub-anvil is supplied with 511-736.

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.)



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

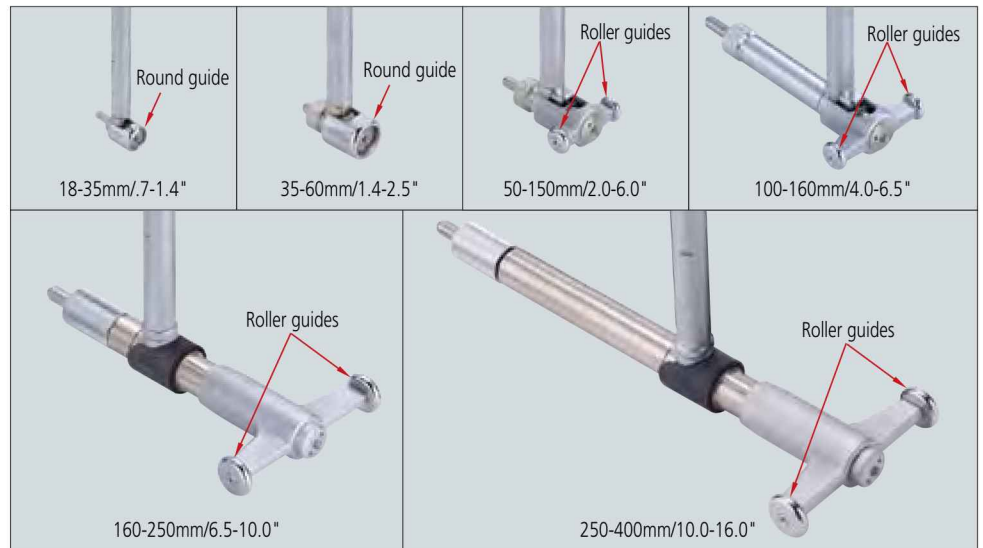
Recommended dial indicators (see Chapter F)

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

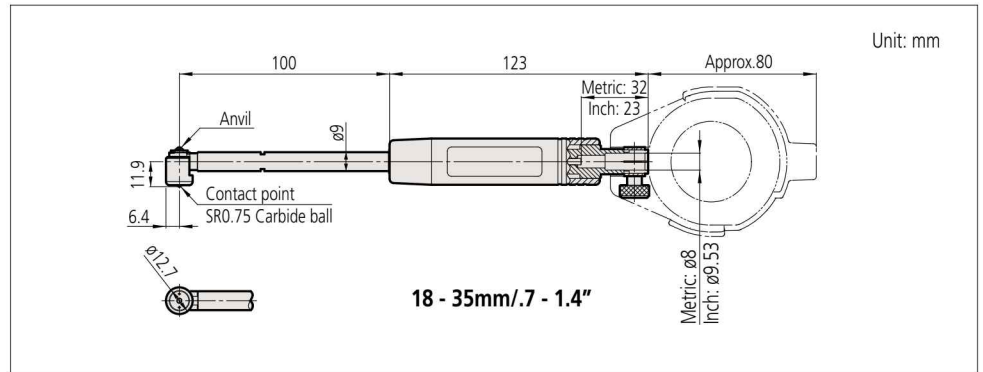
Recommended digimatic indicators (see Chapter F)

Metric models: **543-310B** (ID-C112GXB: 0.001mm)
Inch models: **543-312B** (ID-C112GEXB: 0.001mm/.00005")
* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

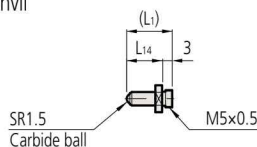
Contact Points



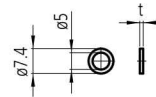
DIMENSIONS



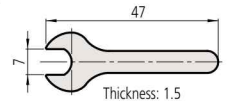
Anvil



Interchangeable washer



Spanner
102148



STANDARD ACCESSORIES

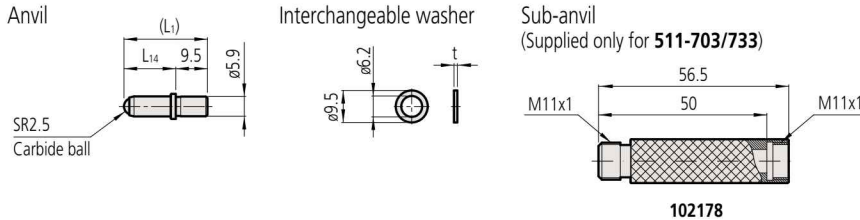
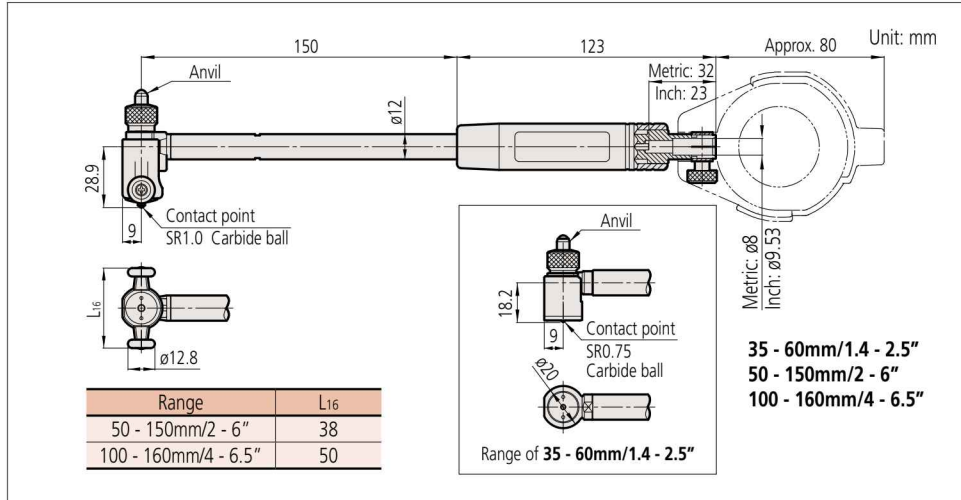
Bore gage (Main body)	Anvil					Interchangeable washer		Spanner
	Marked No.	Parts No.	Indication of measuring size	L1	L14	Parts No.	t	Parts No.
511-701 511-731	1	21DZA213A	18mm/.71"	5.5mm/2.17"	2.5mm/.10"	205623 205624	0.5mm/.02" 1.0mm/.04"	102148
	2	21DZA213B	20mm/.79"	7.5mm/2.95"	4.5mm/.18"			
	3	21DZA213C	22mm/.87"	9.5mm/3.74"	6.5mm/.26"			
	4	21DZA213D	24mm/.94"	11.5mm/4.53"	8.5mm/.33"			
	5	21DZA213E	26mm/1.02"	13.5mm/5.31"	10.5mm/.41"			
	6	21DZA213F	28mm/1.10"	15.5mm/6.10"	12.5mm/.49"			
	7	21DZA213G	30mm/1.18"	17.5mm/6.89"	14.5mm/.57"			
	8	21DZA213H	32mm/1.26"	19.5mm/7.68"	16.5mm/.65"			
	9	21DZA213J	34mm/1.34"	21.5mm/8.46"	18.5mm/.73"			

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511

DIMENSIONS

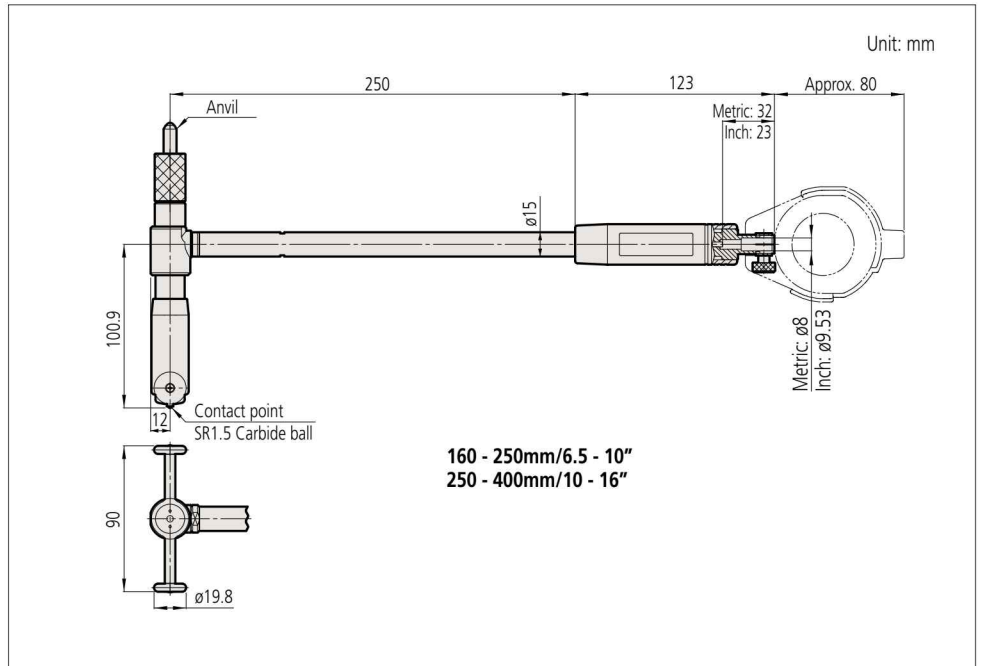


Notes: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-avils. (The measurement accuracy in such cases is not guaranteed.)

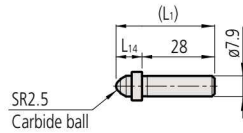
STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil Parts No.
	Marked No.	Parts No.	Indication of measuring size	L1	L14	Parts No.	t	
511-702 511-732	1	21DZA232A	35mm/1.38"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02"	102178 (50mm/2")
	2	21DZA232B	40mm/1.57"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	45mm/1.77"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	50mm/1.97"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	55mm/2.17"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	60mm/2.36"	40mm/1.57"	30.5mm/1.20"			
511-703 511-733 () Used 50mm/2" Sub-Anvil	7	21DZA232G	80mm (130mm)/3.12" (5.12")	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	85mm (135mm)/3.31" (5.31")	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	90mm (140mm)/3.50" (5.51")	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	95mm (145mm)/3.69" (5.71")	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	100mm (150mm)/3.88" (5.91")	65mm/2.56"	55.5mm/2.19"			
511-704 511-734	1	21DZA232A	100mm/3.94"	15mm/.59"	5.5mm/.22"			
	2	21DZA232B	105mm/4.13"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	110mm/4.33"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	115mm/4.53"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	120mm/4.72"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	125mm/4.92"	40mm/1.57"	30.5mm/1.20"			
	7	21DZA232G	130mm/5.12"	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	135mm/5.31"	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	140mm/5.51"	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	145mm/5.71"	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	150mm/5.91"	65mm/2.56"	55.5mm/2.19"			
	12	21DZA232N	155mm/6.10"	70mm/2.76"	60.5mm/2.38"			
13	21DZA232P	160mm/6.30"	75mm/2.95"	65.5mm/2.58"				

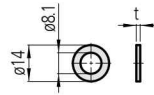
DIMENSIONS



Anvil

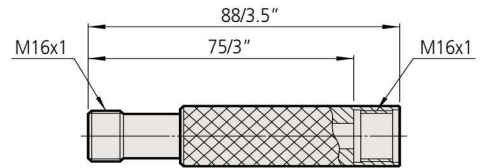


Interchangeable washer



Sub-anvil

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



No. 202974 (511-706)
No. 202975 (511-736)

Notes: 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

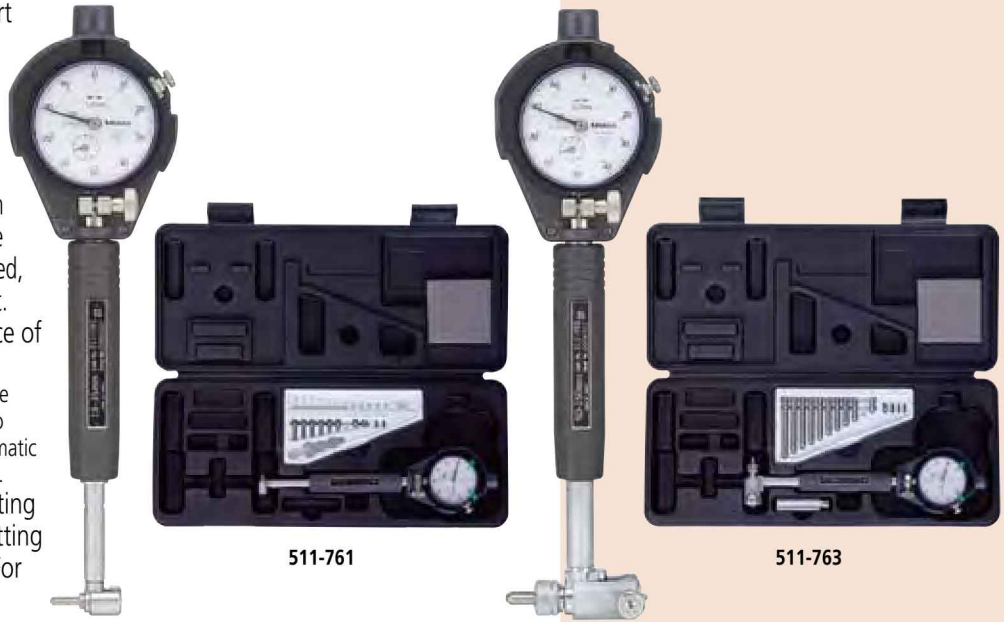
Bore gage (Main body)	Anvil					Interchangeable washer		Sub-Anvil
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	t	Parts No.
511-705 511-735	1	21DZA241A	160mm/6.30"	38mm/1.50"	10mm/.39"	205467 205461 205462 205463 205464 205465 205466	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12" 4.0mm/.16" 5.0mm/.20" 6.0mm/.24"	Metric: 202974 (75mm) Inch: 202975 (3.0")
	2	21DZA241B	175mm/6.89"	53mm/2.09"	25mm/.98"			
	3	21DZA241C	190mm/7.48"	68mm/2.68"	40mm/1.57"			
	4	21DZA241D	205mm/8.07"	83mm/3.27"	55mm/2.17"			
	5	21DZA241E	220mm/8.66"	98mm/3.86"	70mm/2.76"			
	6	21DZA241F	235mm/9.25"	113mm/4.45"	85mm/3.35"			
511-706 511-736 () Used 75mm/3" Sub-Anvil	1	21DZA241A	250mm (325mm)/9.84" (12.80")	38mm/1.50"	10mm/.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"	Metric: 202974 (75mm) Inch: 202975 (3.0")
	2	21DZA241B	265mm (340mm)/10.43" (13.39")	53mm/2.09"	25mm/.98"			
	3	21DZA241C	280mm (355mm)/11.02" (13.98")	68mm/2.68"	40mm/1.57"			
	4	21DZA241D	295mm (370mm)/11.61" (14.57")	83mm/3.27"	55mm/2.17"			
	5	21DZA241E	310mm (385mm)/12.20" (15.16")	98mm/3.86"	70mm/2.76"			

Bore Gages

For easy and accurate measurement of inside diameters

Bore Gages SERIES 511 — Short Leg Type

- Compact and lightweight due to the short length below the grip.
- Longer plunger stroke with no affect on accuracy.
- Carbide 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.
- Alternative indicators may be used in place of those recommended*.
- * Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the 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-46 and C-47.)



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.			1 pc.	
511-763	50-150mm	511-763	11 pcs.	4 pcs.	Not supplied							
511-764	100-160mm	511-764	13 pcs.									
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.	
511-773	50-150mm	511-763	11 pcs.	Not supplied								
511-774	100-160mm	511-764	13 pcs.									
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.	
511-768	50-150mm	511-763	11 pcs.	Not supplied								
511-769	100-160mm	511-764	13 pcs.									

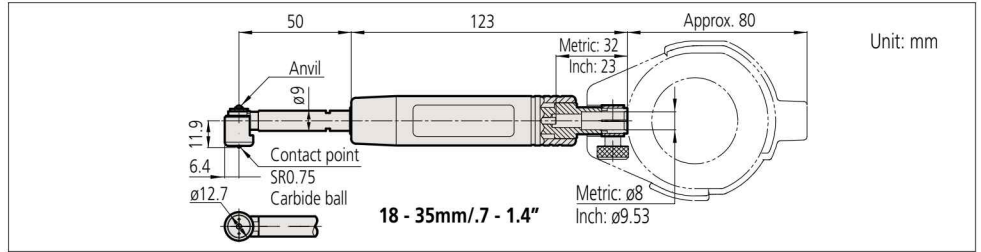
Inch												
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set							Probing depth
					Bore gage	Dial indicator	Dial protection cover	Anvil	Interchangeable Washer	Sub-Anvil	Spanner	
511-781	.7-1.4"	.047"	4N or less	6N or less	511-781	Not supplied	Not supplied	9 pcs.	2 pcs.	Not supplied	1 pc.	2"
511-782	1.4-2.5"				511-782			6 pcs.			4 pcs.	
511-783	2.0-6.0"	511-783	11 pcs.	Not supplied								
511-784	4.0-6.5"	511-784	13 pcs.									
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.	
511-793	2.0-6.0"	511-783	11 pcs.	Not supplied								
511-794	4.0-6.5"	511-784	13 pcs.									
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.	
511-788	2.0-6.0"	511-783	11 pcs.	Not supplied								
511-789	4.0-6.5"	511-784	13 pcs.									

Notes: 1) A 50mm sub-anvil is supplied with 511-763.

2) A 2" sub-anvil is supplied with 511-783.

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.)

DIMENSIONS



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

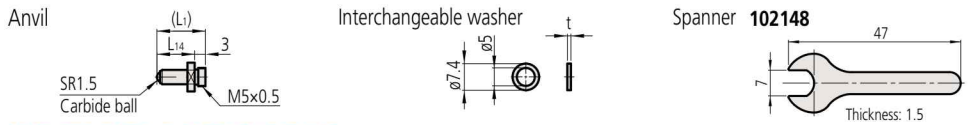
Recommended dial indicators (see Chapter F)

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

Recommended digimatic indicators (see Chapter F)

Metric models: **543-310B** (ID-C112GXB, 0.001mm)
Inch models: **543-312B** (ID-C112GEXB, 0.001mm/.00005")
* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

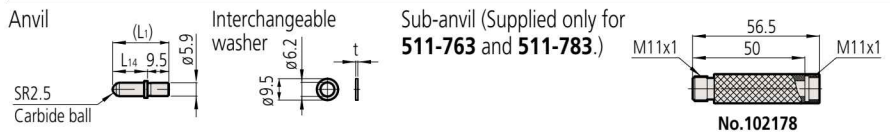
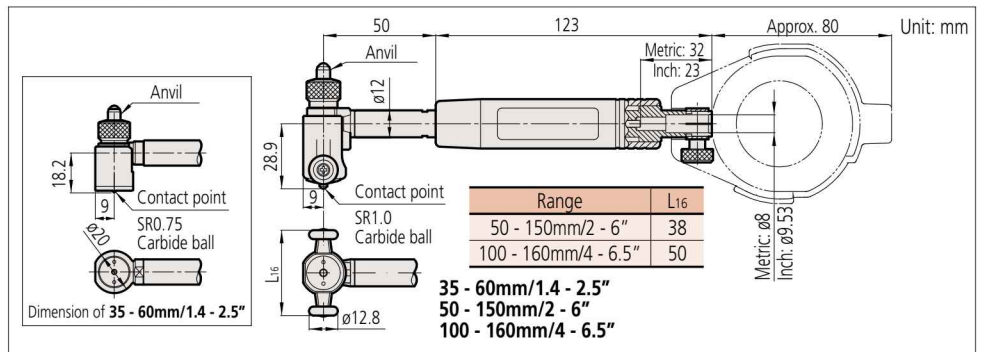
Contact Points



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer		Spanner Parts No.
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	t	
511-761 511-781	1	21DZA213A	18mm/.71"	5.5mm/.22"	2.5mm/.10"	205623 205624	0.5mm/.02" 1.0mm/.04"	102148
	2	21DZA213B	20mm/.79"	7.5mm/.30"	4.5mm/.18"			
	3	21DZA213C	22mm/.87"	9.5mm/.37"	6.5mm/.26"			
	4	21DZA213D	24mm/.94"	11.5mm/.45"	8.5mm/.33"			
	5	21DZA213E	26mm/1.02"	13.5mm/.53"	10.5mm/.41"			
	6	21DZA213F	28mm/1.10"	15.5mm/.61"	12.5mm/.49"			
	7	21DZA213G	30mm/1.18"	17.5mm/.69"	14.5mm/.57"			
	8	21DZA213H	32mm/1.26"	19.5mm/.77"	16.5mm/.65"			
	9	21DZA213J	34mm/1.34"	21.5mm/.85"	18.5mm/.73"			

DIMENSIONS



Notes: 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 Parts No.
	Marked No.	Parts No.	Indication of measuring size	L ₁	L ₁₄	Parts No.	t	
511-762 511-782	1	21DZA232A	35mm/1.38"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"	102178 (50mm/2")
	2	21DZA232B	40mm/1.57"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	45mm/1.77"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	50mm/1.97"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	55mm/2.17"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	60mm/2.36"	40mm/1.57"	30.5mm/1.20"			
511-763 511-783 () Used 50mm/2" Sub-Anvil	1	21DZA232A	50mm (100mm)/1.97" (3.94")	15mm/.59"	5.5mm/.22"			
	2	21DZA232B	55mm (105mm)/2.17" (4.13")	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	60mm (110mm)/2.36" (4.33")	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	65mm (115mm)/2.55" (4.53")	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	70mm (120mm)/2.74" (4.72")	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	75mm (125mm)/2.93" (4.92")	40mm/1.57"	30.5mm/1.20"			
	7	21DZA232G	80mm (130mm)/3.12" (5.12")	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	85mm (135mm)/3.31" (5.31")	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	90mm (140mm)/3.50" (5.51")	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	95mm (145mm)/3.69" (5.71")	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	100mm (150mm)/3.88" (5.91")	65mm/2.56"	55.5mm/2.19"			
511-764 511-784	1	21DZA232A	100mm/3.94"	15mm/.59"	5.5mm/.22"			
	2	21DZA232B	105mm/4.13"	20mm/.79"	10.5mm/.41"			
	3	21DZA232C	110mm/4.33"	25mm/.98"	15.5mm/.61"			
	4	21DZA232D	115mm/4.53"	30mm/1.18"	20.5mm/.81"			
	5	21DZA232E	120mm/4.72"	35mm/1.38"	25.5mm/1.00"			
	6	21DZA232F	125mm/4.92"	40mm/1.57"	30.5mm/1.20"			
	7	21DZA232G	130mm/5.12"	45mm/1.77"	35.5mm/1.40"			
	8	21DZA232H	135mm/5.31"	50mm/1.97"	40.5mm/1.59"			
	9	21DZA232J	140mm/5.51"	55mm/2.17"	45.5mm/1.79"			
	10	21DZA232L	145mm/5.71"	60mm/2.36"	50.5mm/1.99"			
	11	21DZA232M	150mm/5.91"	65mm/2.56"	55.5mm/2.19"			
	12	21DZA232N	155mm/6.10"	70mm/2.76"	60.5mm/2.38"			
	13	21DZA232P	160mm/6.30"	75mm/2.95"	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.
- Longer plunger stroke with no affect 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.
- Wide measuring range with sub-anvils.
- Alternative indicators may be used in place of those recommended*.

* Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.

- 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.) details, refer to pages C-46 and C-47.)



511-803

511-804

Dial indicators and protection covers are optional.



511-804



511-806

SPECIFICATIONS

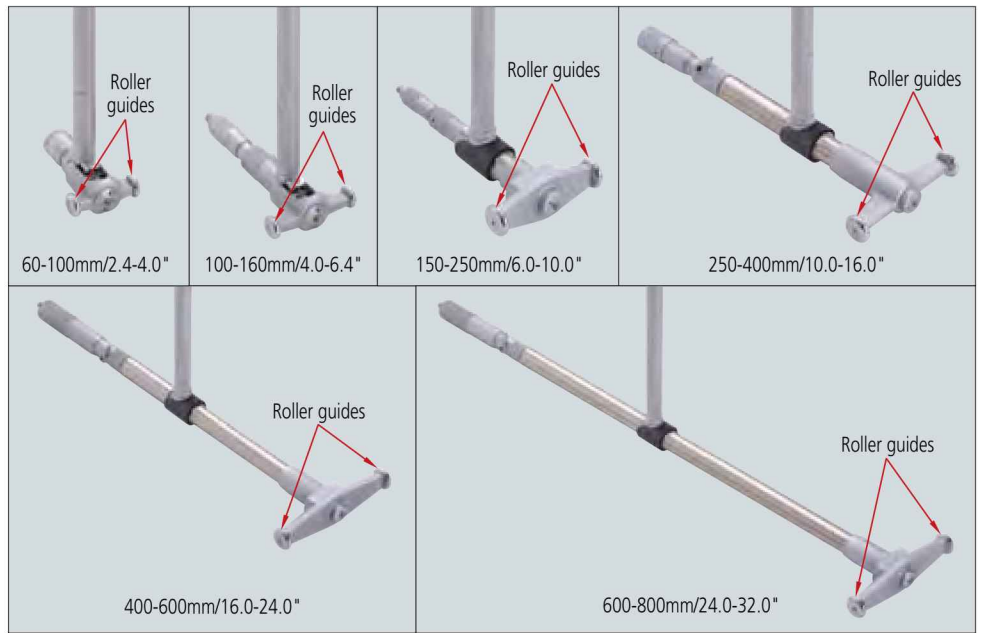
Metric													
Order No.	Range	Stroke of contact point	Measuring force	Guide force	Content of set						Probing depth		
					Bore gage	Dial indicator	Dial protection cover	Micrometer head	Sub-Anvil	Spanner			
511-803	60-100mm	1.6mm	5N or less	10N or less	511-803	Not supplied	Not supplied	1 pc.	2 pcs.	3 pcs.	150mm		
511-804	100-160mm				511-804				3 pcs.				
511-805	150-250mm				511-805				4 pcs.				
511-806	250-400mm		6N or less	15N or less	511-806				3 pcs.			2 pcs.	250mm
511-807	400-600mm				511-807				2 pcs.				
511-808	600-800mm				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				511-805				4 pcs.				
511-826	250-400mm		6N or less	15N or less	511-806				3 pcs.			2 pcs.	250mm
511-827	400-600mm				511-807				2 pcs.				
511-828	600-800mm				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				511-805				4 pcs.				
511-816	250-400mm		6N or less	15N or less	511-806				3 pcs.			2 pcs.	250mm
511-817	400-600mm				511-807				2 pcs.				
511-818	600-800mm				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	Spanner			
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"				511-835				4 pcs.				
511-836	10.0-16.0"		6N or less	15N or less	511-836				3 pcs.			2 pcs.	10"
511-837	16.0-24.0"				511-837				2 pcs.				
511-838	24.0-32.0"				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"				511-835				4 pcs.				
511-856	10.0-16.0"		6N or less	15N or less	511-836				3 pcs.			2 pcs.	6"
511-857	16.0-24.0"				511-837				2 pcs.				
511-858	24.0-32.0"				511-838				2 pcs.				
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"				511-835				4 pcs.				
511-846	10.0-16.0"		6N or less	15N or less	511-836				3 pcs.			2 pcs.	6"
511-847	16.0-24.0"				511-837				2 pcs.				
511-848	24.0-32.0"				511-838				2 pcs.				

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.)

Contact Points



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

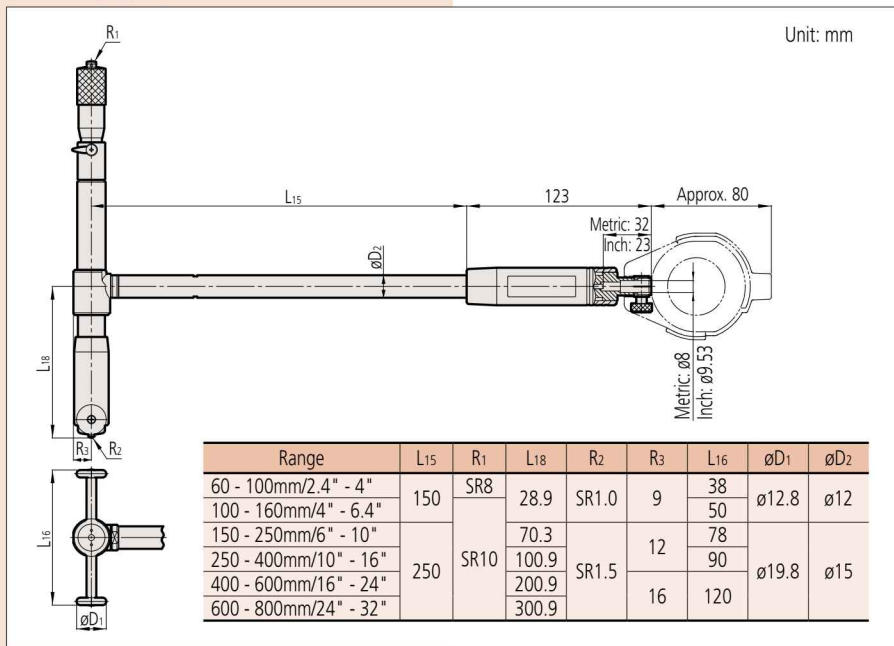
Recommended dial indicators (see Chapter F)

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

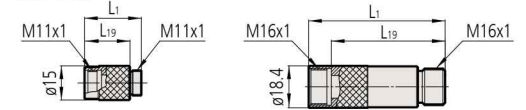
Recommended digimatic indicators (see Chapter F)

Metric models: **543-310B** (ID-C112GXB: 0.001mm)
Inch models: **543-312B** (ID-C112GEXB: 0.001mm/.00005")
* Indicators equipped with rubber bellows, such as water-proof types, cannot be used.

DIMENSIONS



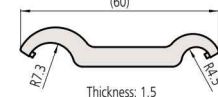
Sub-anvil



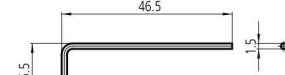
Notes: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

Spanner

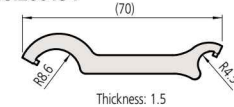
No.301336



No.202863



No.200154



STANDARD ACCESSORIES

Metric		Micrometer head		Sub-Anvil				Spanner
Bore gage (Main body)	Parts No.	Stroke	Screw size	Marked No.	Parts No.	L1	L19	Parts No.
511-803	21DZA267	10mm	M11x1	10mm	208892	15mm	10mm	301336 (2 pcs.)
				20mm	208894	25mm	20mm	202863 (1 pcs.)
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	
511-806	953118	25mm	M16x1	25mm	208926	35mm	25mm	200154 (2 pcs.)
				50mm	208928 (2 pcs.)	60mm	50mm	
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		Micrometer head		Sub-Anvil				Spanner
Bore gage (Main body)	Parts No.	Stroke	Screw size	Marked No.	Parts No.	L1	L19	Parts No.
511-833	21DZA272	.4"	M11x1	.4"	208893	.6"	.4"	301336 (2 pcs.)
				.8"	208895	1.0"	.8"	202863 (1 pcs.)
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"	208893	.6"	.4"	301336 (2 pcs.)
				.8"	208895 (2 pcs.)	1.0"	.8"	
				2"	21DAA493	2.2"	2"	
511-836	21DZA275	1.0"	M16x1	1"	208927	1.4"	1"	200154 (2 pcs.)
				2"	208929 (2 pcs.)	2.4"	2"	
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

- Capable of ID (inside diameter) measurement close to the bottom of a hole.
- Carbide contact point ensuring high durability and wear resistance.
- Grip is large and hollow to reduce effect of body heat on high-accuracy measurements.
- Alternative indicators may be used in place of those recommended*.

* Some indicators and protection covers cannot be used with these bore gages. Contact a Mitutoyo sales office if considering the use of dial or digimatic indicators other than the recommended models.

- 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.)

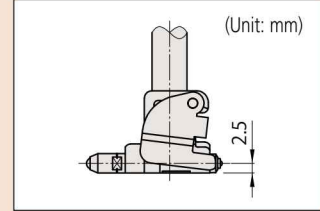


511-416



511-417

The dial indicator and protection cover are optional.



Technical Data

Accuracy: Metric models 4μm
Inch models .00016"
Repeatability: Metric models 1μm
Inch models .00004"
Adjacent error: Metric models 1μm
Inch models .00004"

Optional Accessories

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

Recommended dial indicators (see Chapter F)

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

Recommended digimatic indicators (see Chapter F)

Metric models: 543-310B (0.001mm)
Inch models: 543-312B (0.001mm/.00005")

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

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
511-415	15-35mm	1.2mm	4N or less	6N or less	511-415	Not supplied	Not supplied	11 pcs.	1 pc.	150mm
511-416	35-60mm				511-416					
511-417	50-150mm				511-417					
511-425	15-35mm	1.2mm	4N or less	6N or less	511-415	2046SB (Graduation: 0.01mm)	21DZA000	6 pcs.	1 pc.	150mm
511-426	35-60mm				511-416					
511-427	50-150mm				511-417					
511-435	15-35mm	1.2mm	4N or less	6N or less	511-415	2109SB-10 (Graduation: 0.001mm)	21DZA000	11 pcs.	1 pc.	150mm
511-436	35-60mm				511-416					
511-437	50-150mm				511-417					

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
511-418	.6-1.4"	.047"	4N or less	6N or less	511-418	Not supplied	Not supplied	11 pcs.	1 pc.	6"
511-419	1.4-2.4"				511-419					
511-420	2.0-6.0"				511-420					
511-428	.6-1.4"	.047"	4N or less	6N or less	511-418	2922SB (Graduation: .0005")	21DZA000	11 pcs.	1 pc.	6"
511-429	1.4-2.4"				511-419					
511-430	2.0-6.0"				511-420					
511-438	.6-1.4"	.047"	4N or less	6N or less	511-418	2923SB-10 (Graduation: .0001")	21DZA000	11 pcs.	1 pc.	6"
511-439	1.4-2.4"				511-419					
511-440	2.0-6.0"				511-420					

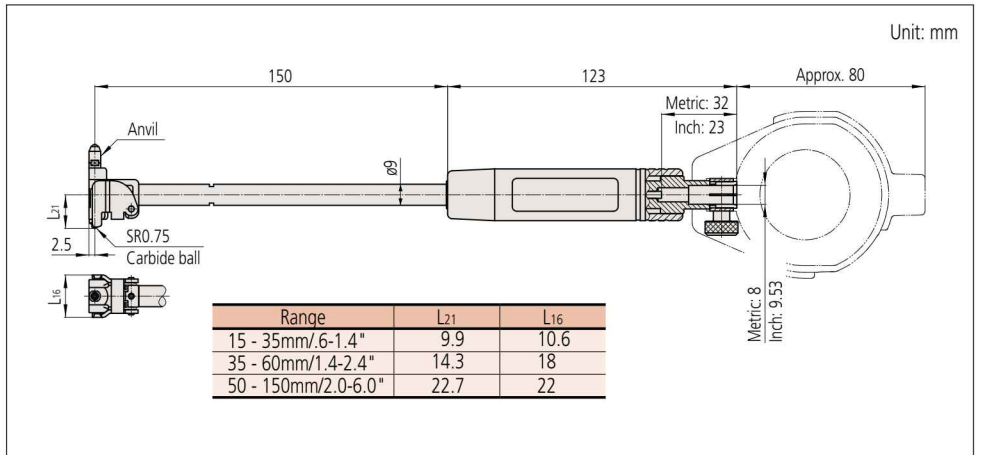
Notes: 1) A 10mm (.4") sub-anvil is supplied with 511-415/425/435/418/428/438 and a 50mm (2") sub-anvil is supplied with 511-417/427/437/420/430/440.

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

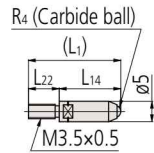
Contact Points



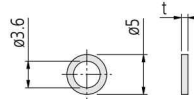
DIMENSIONS



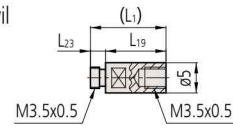
Anvil



Interchangeable washer

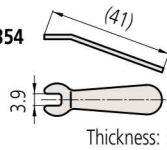


Sub-anvil

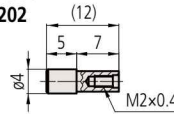


Notes: It is not permissible to use a sub-anvil other than as supplied as a standard accessory, or widen a measuring range by using multiple sub-anvils. (The measurement accuracy in such cases is not guaranteed.)

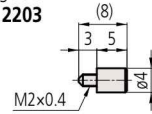
Spanner
No.204354



Washer holder
No.212202



Locking screw
No.212203



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil							Interchangeable washer		Sub-Anvil		
	Marked No.	Order No.	Indication of measuring size	L ₁	L ₂₂	R ₄	L ₁₄	Order No.	t	Order No.	L ₂₃	L ₁₉
511-415 511-418 () Used 10mm/.4" Sub-Anvil	1	21DZA376A	15mm(25mm)/.59"(1.98")	4.5mm/.18"	2.5 mm/.1"	SR1 mm/SR.04"	2mm/.08"	212127	0.5mm/.02"	21DAA563	2.5mm/.1"	10mm/.4"
	2	21DZA376B	16mm(26mm)/.63"(1.02")	5.5mm/.22"			3mm/.12"					
	3	21DZA376C	17mm(27mm)/.67"(1.06")	6.5mm/.26"			4mm/.16"					
	4	21DZA376D	18mm(28mm)/.71"(1.10")	7.5mm/.30"			5mm/.20"					
	5	21DZA376E	19mm(29mm)/.75"(1.14")	8.5mm/.33"			6mm/.24"					
	6	21DZA376F	20mm(30mm)/.79"(1.18")	9.5mm/.37"			7mm/.28"					
	7	21DZA376G	21mm(31mm)/.83"(1.22")	10.5mm/.41"			8mm/.31"					
	8	21DZA376H	22mm(32mm)/.87"(1.26")	11.5mm/.45"			9mm/.35"					
	9	21DZA376J	23mm(33mm)/.91"(1.30")	12.5mm/.49"			10mm/.39"					
	10	21DZA376L	24mm(34mm)/.94"(1.34")	13.5mm/.53"			11mm/.43"					
	11	21DZA376M	25mm(35mm)/.98"(1.38")	14.5mm/.57"			12mm/.47"					
511-416 511-419	1	21DZA404A	35mm/1.38"	17.5mm/.69"	7.5 mm/.3"	SR1.5 mm/SR.06"	10mm/.39"	212127	0.5mm/.02"			
	2	21DZA404B	40mm/1.57"	22.5mm/.89"			15mm/.59"					
	3	21DZA404C	45mm/1.77"	27.5mm/1.08"			20mm/.79"					
	4	21DZA404D	50mm/1.97"	32.5mm/1.28"			25mm/.98"					
	5	21DZA404E	55mm/2.17"	37.5mm/1.48"			30mm/1.18"					
	6	21DZA404F	60mm/2.36"	42.5mm/1.67"			35mm/1.38"					
511-417 511-420 () Used 50mm/2" Sub-Anvil	1	21DZA404A	50mm(100mm)/1.97"(3.94")	17.5mm/.69"	7.5 mm/.3"	SR1.5 mm/SR.06"	10mm/.39"	212127	0.5mm/.02"	21DAA596	7.5mm/.3"	50mm/2"
	2	21DZA404B	55mm(105mm)/2.17"(4.13")	22.5mm/.89"			15mm/.59"					
	3	21DZA404C	60mm(110mm)/2.36"(4.33")	27.5mm/1.08"			20mm/.79"					
	4	21DZA404D	65mm(115mm)/2.56"(4.53")	32.5mm/1.28"			25mm/.98"					
	5	21DZA404E	70mm(120mm)/2.76"(4.72")	37.5mm/1.48"			30mm/1.18"					
	6	21DZA404F	75mm(125mm)/2.95"(4.92")	42.5mm/1.67"			35mm/1.38"					
	7	21DZA404G	80mm(130mm)/3.15"(5.12")	47.5mm/1.87"			40mm/1.57"					
	8	21DZA404H	85mm(135mm)/3.35"(5.31")	52.5mm/2.07"			45mm/1.77"					
	9	21DZA404J	90mm(140mm)/3.54"(5.51")	57.5mm/2.26"			50mm/1.97"					
	10	21DZA404L	95mm(145mm)/3.74"(5.71")	62.5mm/2.46"			55mm/2.17"					
	11	21DZA404M	100mm(150mm)/3.94"(5.91")	67.5mm/2.66"			60mm/2.36"					

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.
- ABS (ABSOLUTE) type bore gages are not subject to overspeed error.
- 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-46 and C-47.)



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	.00005"/ 0.001mm	12 pcs.	4 pcs.	2 pcs.	6"
511-522	4.0-6.5"					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™ (Refer to page X for details.)

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: SR44 (2 pc), **938882**, for initial operational checks (standard accessory)
- 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

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

Optional Accessories

- 21DZA089**: Extension rod 250 mm (10")
- 21DZA081**: Extension rod 500 mm (20")
- Up to four extension rods can be jointed, and the maximum length 2m is allowed.
- Refer to page A-21 for details
- Connecting cables for Input Tool/ Digimatic Mini-Processor, etc.
- 1m: **905338**
- 2m: **905409**
- USB Input Tool Direct (2m): 06ADV380F**
- Connecting cables for **U-WAVE-T**
- For standard (160mm): **02AZD790F**
- For foot switch: **02AZE140F**
- : Setting ring (See page C-47.)
- Digimatic Mini-Processor DP-1VR: **264-504**

Example of connection

When connecting four pieces of 500mm extension rods

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

Usage example



Rectangular gauge blocks

* Available only for 511-501/521

516-118-10

516-118-60 with calibration certificate

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

* Equivalent to JIS B 7506 Grade 0

Square gauge blocks

* Available only for 511-501/521

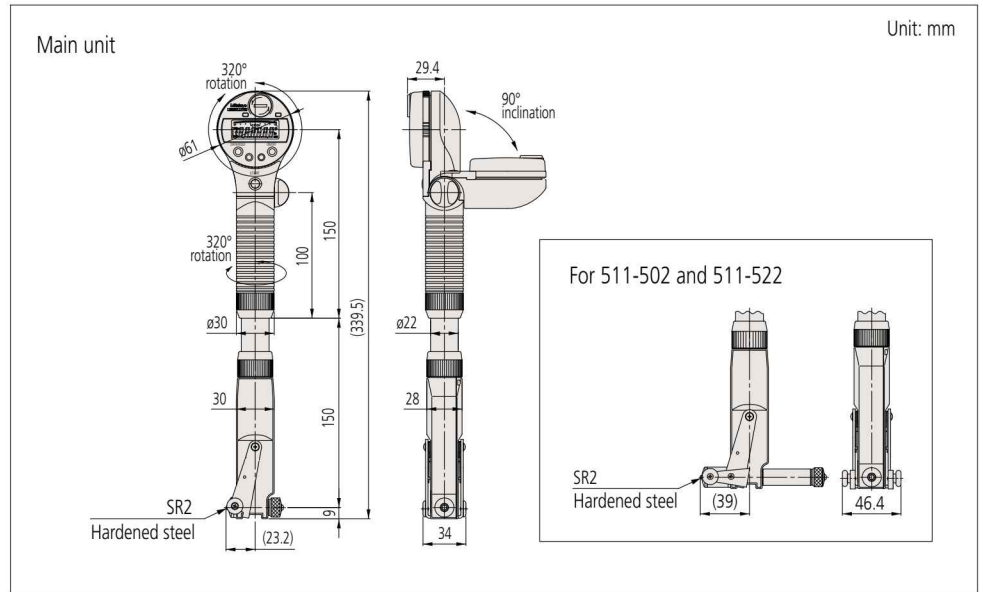
516-119-10

516-119-60 with calibration certificate

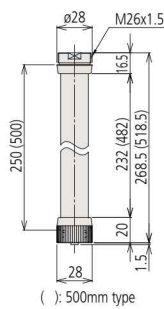
Description	Order No.	Qty	
Nominal length (mm)	1	614611-021	1
	2	614612-021	1
	3	614613-021	1
	5	614615-021	1
	10	614671-021	1
	20	614672-021	1
	30	614673-021	1
40	614674-021	1	
Flat jaw	619072	1 pair (2 pcs)	
Tie rod 3"	619062	1	
Tie rod 2 1/4"	619063	1	
Tie rod 1 1/2"	619064	1	
Flat head screw 1 1/4"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

* Equivalent to JIS B 7506 Grade 0

DIMENSIONS

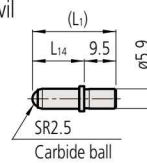


Extension rod

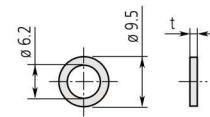


() : 500mm type

Anvil



Interchangeable washer



STANDARD ACCESSORIES

Bore gage (Main body)	Anvil					Interchangeable washer	
	Marked No.	Parts No.	Indication of measuring size	L1	L14	Parts No.	t
511-501 511-521	1	21DZA232A	45mm/1.8"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"
	2	21DZA232B	50mm/2.0"	20mm/.79"	10.5mm/.42"		
	3	21DZA232C	55mm/2.2"	25mm/.98"	15.5mm/.61"		
	4	21DZA232D	60mm/2.4"	30mm/1.18"	20.5mm/.81"		
	5	21DZA232E	65mm/2.6"	35mm/1.38"	25.5mm/1.00"		
	6	21DZA232F	70mm/2.8"	40mm/1.57"	30.5mm/1.20"		
	7	21DZA232G	75mm/3.0"	45mm/1.77"	35.5mm/1.40"		
	8	21DZA232H	80mm/3.2"	50mm/1.97"	40.5mm/1.59"		
	9	21DZA232J	85mm/3.4"	55mm/2.17"	45.5mm/1.79"		
	10	21DZA232L	90mm/3.6"	60mm/2.36"	50.5mm/1.99"		
	11	21DZA232M	95mm/3.8"	65mm/2.56"	55.5mm/2.19"		
	12	21DZA232N	100mm/4.0"	70mm/2.76"	60.5mm/2.38"		
511-502 511-522	1	21DZA232A	100mm/4.0"	15mm/.59"	5.5mm/.22"	205457 205458 205459 205460	0.5mm/.02" 1.0mm/.04" 2.0mm/.08" 3.0mm/.12"
	2	21DZA232B	105mm/4.2"	20mm/.79"	10.5mm/.42"		
	3	21DZA232C	110mm/4.4"	25mm/.98"	15.5mm/.61"		
	4	21DZA232D	115mm/4.6"	30mm/1.18"	20.5mm/.81"		
	5	21DZA232E	120mm/4.8"	35mm/1.38"	25.5mm/1.00"		
	6	21DZA232F	125mm/5.0"	40mm/1.57"	30.5mm/1.20"		
	7	21DZA232G	130mm/5.2"	45mm/1.77"	35.5mm/1.40"		
	8	21DZA232H	135mm/5.4"	50mm/1.97"	40.5mm/1.59"		
	9	21DZA232J	140mm/5.6"	55mm/2.17"	45.5mm/1.79"		
	10	21DZA232L	145mm/5.8"	60mm/2.36"	50.5mm/1.99"		
	11	21DZA232M	150mm/6.0"	65mm/2.56"	55.5mm/2.19"		
	12	21DZA232N	155mm/6.2"	70mm/2.76"	60.5mm/2.38"		
	13	21DZA232P	160mm/6.4"	75mm/2.95"	65.5mm/2.58"		

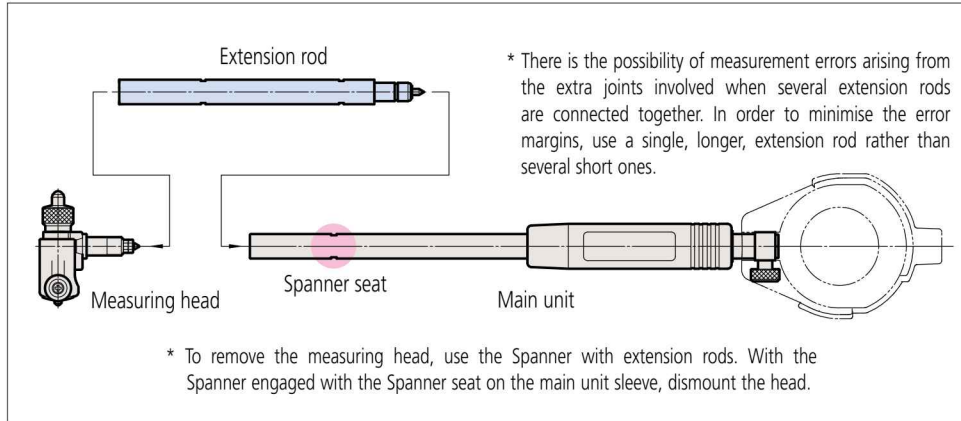
Bore Gages

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.
- Can not be connected to the products with special sizes or special specifications.
- 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.



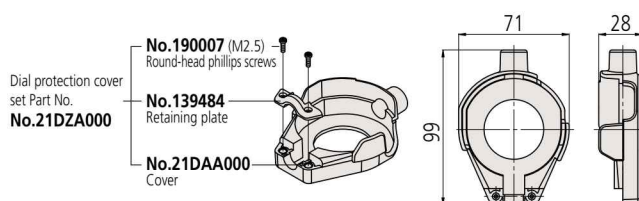
SPECIFICATIONS

Applicable model Order No.	Extension rod length					Extension rod diameter	Spanner part No.
	125m	250m	500m	750m	1000m		
511-701/511-731	953549	953550	953551	—	—	ø9mm	102148
511-415/511-418							
511-416/511-419							
511-417/511-420							
511-702/511-732	953552	953553	953554	953555	953556	ø12mm	212556
511-703/511-733							
511-704/511-734							
511-803/511-833							
511-804/511-834	953557	952361	953558	953559	953560	ø15mm	212556
511-705/511-735							
511-706/511-736							
511-805/511-835							
511-806/511-836							
511-807/511-837							
511-808/511-838							

*Spanner is supplied as standard.

Protection cover

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



Usage example



Technical Data

Flatness of parallel jaw
0.5µm (Parallelism 1µm)

Standard accessories

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

Bore Gage Checker SERIES 515

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



Standard configuration: Stand
Attachment A, B, C 1pc. for 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.

Steel Setting Rings



177-146



177-300

CERA Setting Rings

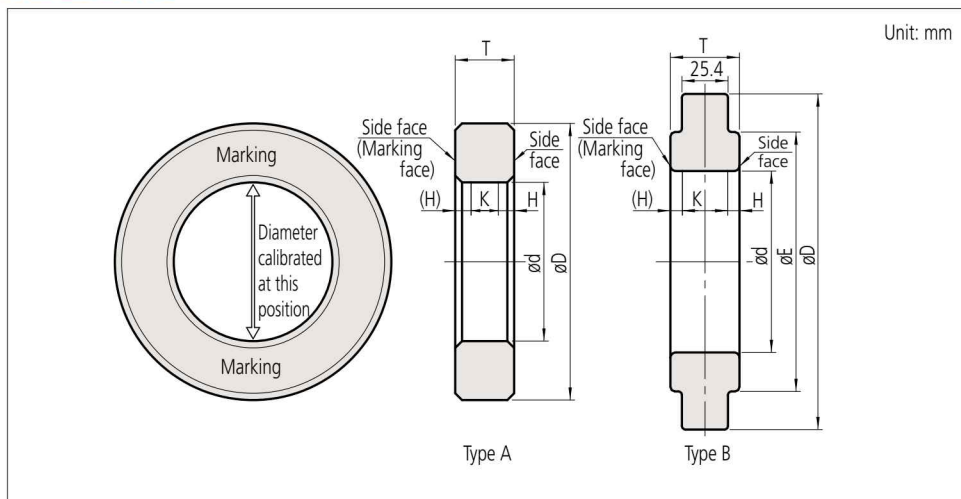


177-429



177-432

DIMENSIONS



Suffix

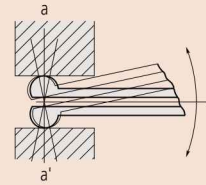
- 177-***-12:** With Inspection Certificate (provides a record of the calibrated diameter)
- 177-***-62:** With Inspection Certificate (provides a record of the calibrated diameter) and Calibration Certificate
- 177-***-82:** With Inspection Certificate (provides a record of the calibrated diameter), Calibration Certificate, and Traceability System Chart

Notes:

- The Inspection Certificate is not a substitute for a calibration certificate as it is undated.
- A more detailed inspection certificate describing roundness and cylindricity is available on request.

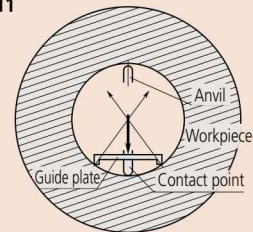
How to read the indicated value

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.

SPECIFICATIONS

Steel Setting Rings

Order No.	Nominal size ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	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

Order No.	Nominal size ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	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	$\pm .0004$ "	$\pm .00006$ "	.00004"	1.7	3.6
177-206	.16"	25	—	7	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	1.7	3.6
177-207	.24"	25	—	7	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	1.7	3.6
177-281	.275"	25	—	7	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	1.7	3.6
177-179	.35"	32	—	10	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	2.0	6.0
177-283	.425"	32	—	10	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	2.0	6.0
177-180	.5"	32	—	10	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	2.0	6.0
177-181	.6"	38	—	10	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	2.0	6.0
177-182	.65"	45	—	10	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	2.0	6.0
177-183	.7"	45	—	10	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	2.0	6.0
177-287	.8"	45	—	10	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	2.0	6.0
177-184	1"	53	—	15	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	3.2	8.6
177-289	1.2"	71	—	15	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	3.2	8.6
177-185	1.4"	71	—	15	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	3.2	8.6
177-291	1.6"	71	—	15	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	3.2	8.6
177-186	1.8"	85	—	15	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	3.2	8.6

CERA Setting Rings

Order No.	Nominal size ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	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. (Dimension measuring position is the center of the height T.)

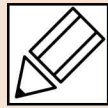
*2 Cylindricity is defined as per JIS B 0621 Definitions and designations of geometrical deviations, Section 4.4 "Cylindricity." Cylindricity is measured using three cross-sections between the top and bottom face of a ring, namely, close to the face near each sides and the center.

Order No.	Nominal size ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	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	3.2	8.6
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		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	38.1 (25.4)	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 ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	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	$\pm .0008$ "	$\pm .00006$ "	.00004"	3.7	12.6
177-293	2.4"	112	—	20	A	$\pm .0008$ "	$\pm .00006$ "	.00004"	3.7	12.6
177-315	2.5"	112	—	20	A	$\pm .0008$ "	$\pm .00006$ "	.00006"	3.7	12.6
177-188	2.8"	112	—	20	A	$\pm .0008$ "	$\pm .00006$ "	.00006"	3.7	12.6
177-317	3"	125	—	25	A	$\pm .0008$ "	$\pm .00006$ "	.00006"	4.2	16.6
177-295	3.2"	125	—	25	A	$\pm .0008$ "	$\pm .00006$ "	.00006"	4.2	16.6
177-319	3.5"	140	—	25	A	$\pm .0008$ "	$\pm .00006$ "	.00006"	4.2	16.6
177-189	3.6"	140	—	25	A	$\pm .0008$ "	$\pm .00006$ "	.00006"	4.2	16.6
177-297	4"	160	—	25	A	$\pm .0008$ "	$\pm .00006$ "	.00008"	4.2	16.6
177-299	5"	210	168	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00008"	5.3	27.5
177-301	6"	235	187	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00008"	5.3	27.5
177-303	7"	260	215	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00010"	5.3	27.5
177-305	8"	311	244	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00010"	5.3	27.5
177-307	9"	337	264	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00010"	5.3	27.5
177-309	10"	362	290	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00012"	5.3	27.5
177-311	11"	413	321	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00012"	5.3	27.5
177-313	12"	438	340	38.1	B	$\pm .0008$ "	$\pm .00010$ "	.00012"	5.3	27.5

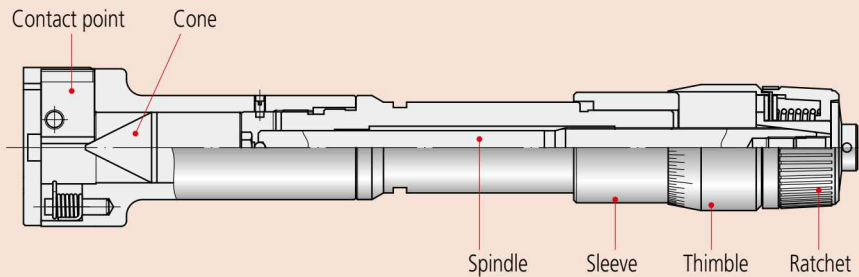
Order No.	Nominal size ϕD	Dimensions (mm)			Type	Accuracy				
		ϕD	ϕE	T		Tolerance between the nominal size and the actual diameter (inch)	Uncertainty of marked diameter value (inch) ^{*1}	Roundness/Cylindricity (inch) ^{*2}	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)
177-518	.16"	25	—	7	A	$\pm .0004$ "	$\pm .00006$ "	.00004"	1.7	3.6
177-520	.24"	25	—	7	A	$\pm .0004$ "	$\pm .00006$ "	.0000		

Quick Guide to Precision Measuring Instruments



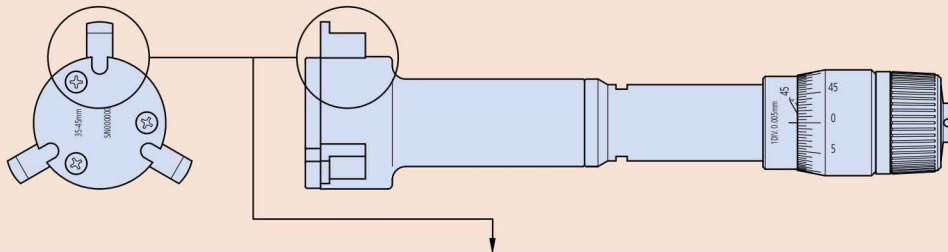
Internal Micrometers

Nomenclature



Custom-ordered Products (Holtest / Borematic)

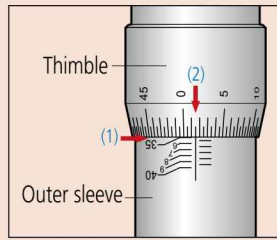
Mitutoyo can custom-build an internal micrometer best suited to your special application. Please feel free to contact Mitutoyo about the possibilities - even if only one custom-manufactured piece is required. Please note that, depending on circumstances, such a micrometer will usually need to be used 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		<p>Tip radius R that can measure the minimum diameter (different for each size)</p>	<ul style="list-style-type: none"> ● 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 $W = \text{less than } 2\text{mm}$: $l = \text{less than } 2\text{mm}$ For $W = 2\text{mm or more}$: $l = 2\text{mm}$ as the standard value which can be modified according to circumstances. ● The number of splines or serrations is limited to a multiple of 3. ● Details of the workpiece profile should be provided at the time of placing a custom-order. ● If your application needs a measuring range different from that of the standard internal micrometer an additional initial cost for the master ring gage will be required.
Round groove		<p>Tip radius R that can measure the minimum diameter (different for each size)</p>	
Spline		<p>Tip radius R that can measure the minimum diameter (different for each size)</p>	
Serration		<p>Tip radius R that can measure the minimum diameter (different for each size)</p>	
Threaded hole		<p>Tip radius R that can measure the minimum diameter (different for each size)</p>	

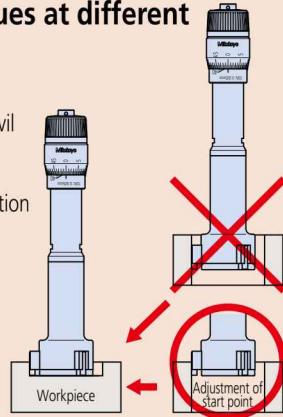
How to Read the Scale

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 Tubular Inside Micrometers

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

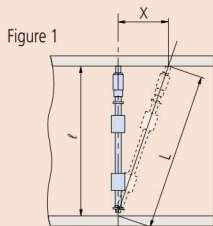


Figure 1
 l : Inside diameter to be measured
 L : Length measured with axial offset X
 X : Offset in axial direction
 Δl : Error in measurement
 $\Delta l: L-l = \sqrt{l^2 + X^2} - l$

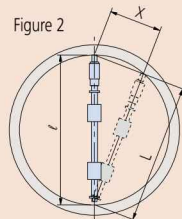


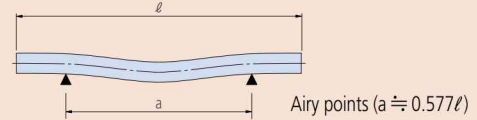
Figure 2
 l : Inside diameter to be measured
 L : Length measured with radial offset X
 X : Offset in radial direction
 Δl : Error in measurement
 $\Delta l: L-l = \sqrt{l^2 - X^2} - l$

If the Tubular 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.

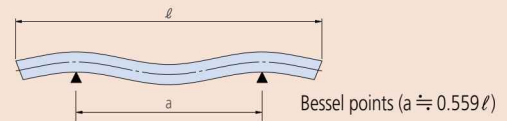


Airy and Bessel Points

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.



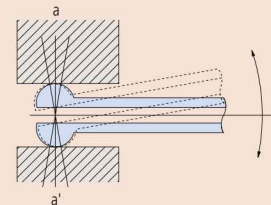
The ends of a bar (or micrometer) can be made exactly horizontal by spacing the two supports symmetrically as shown above. These points are known as the 'Airy Points' and are commonly used to ensure that the ends of a length bar are parallel to one another, so that the length is well defined.



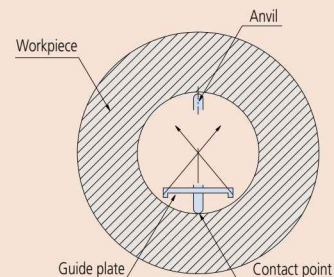
The change in length of a bar (or micrometer) due to bending can be minimized by spacing the two supports symmetrically as shown above. These points are known as the 'Bessel Points' and may be useful when using a long inside micrometer.

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).

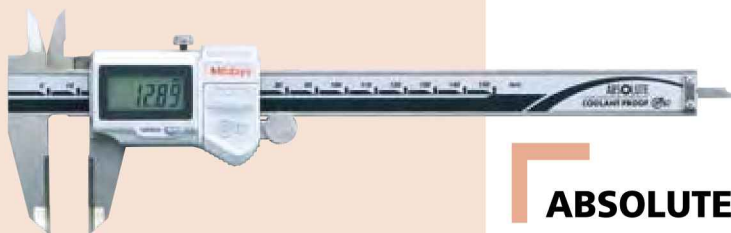


New Products



SuperCaliper

Refer to pages D-3–D-4 for details.



ABSOLUTE Coolant Proof Caliper

Refer to pages D-5–D-6 for details.



ABSOLUTE Digimatic Caliper

Refer to pages D-7–D-8 for details.



ABSOLUTE Digimatic Offset Caliper

Refer to page D-27 for details.



Digimatic Height Gage

Refer to pages D-43–D-44 for details.



Digimatic Caliper·Caliper

Digimatic Caliper·Caliper



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Digimatic Height Gage·Height Gage

Digimatic Height Gage·Height Gage



Height Gage

Height Gage



Depth Gage

Depth Gage



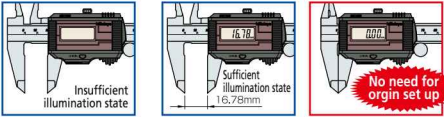
Calipers

An industry standard in measuring tools

SuperCaliper

SERIES 500 — No battery or origin reset needed for IP67 digital caliper

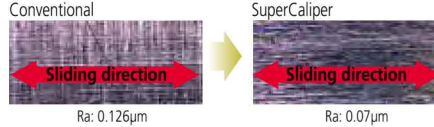
- Top-of-the-line digital caliper. Solar type caliper with no battery and IP67 protection assures waterproof reliability.



- With no annoying origin restoration necessary, a measurement can be started any time and there is no restriction on operating speed.
- The impact resistance of the display unit has been increased for improved usability in workshop conditions.

- Waterproof function makes this SuperCaliper suitable for use in an environment containing large amounts of cutting fluid or coolant. Operability is equivalent to the mechanical type caliper.
- This SuperCaliper uses components that do not contain harmful substances and is compatible with RoHS Directives.
- Slider operation is smooth and comfortable.

High quality guide surface finish for smooth slider movement

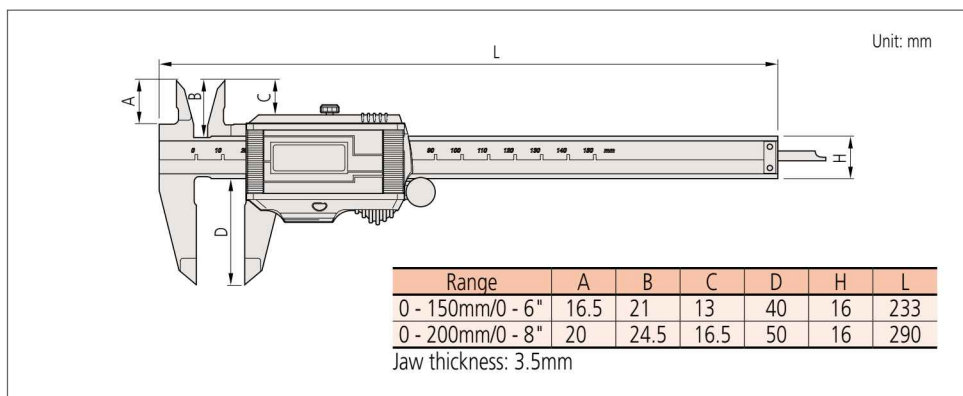


500-774

SPECIFICATIONS

Metric				Inch/metric			
Order No.	Range	Remarks	Mass	Order No.	Range	Remarks	Mass
500-776	0 - 150mm	with data output	180g	500-786	0 - 6"	with data output	180g
500-777	0 - 200mm		210g	500-787	0 - 8"		210g
500-774	0 - 150mm	w/o data output	180g	500-784	0 - 6"	w/o data output	180g
500-775	0 - 200mm		210g	500-785	0 - 8"		210g

DIMENSIONS



ABSOLUTE™ (Refer to page X for details.)

IP67 (Refer to page X for details.)



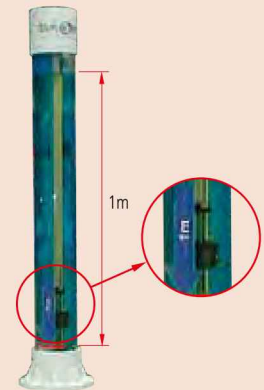
(Refer to page X for details.)



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

IP67 protection level

- Level 6:** Dust-proof. No ingress of dust allowed.
- Level 7:** Protected against water penetration. Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed to a depth of 1 meter in water under standardized conditions of pressure and time (30 min.).



Demonstration device

Technical Data

- Resolution: 0.01mm or .0005"/0.01mm
- Accuracy: ±0.02mm (excluding quantizing error)
- Repeatability: 0.01mm
- Quantizing error: ±1 count
- Dust/Water protection level: IP67*
- Power supply: Solar cell**
- Display: LCD
- Scale type: ABSOLUTE electromagnetic induction linear encoder
- Max. response speed: Unlimited
- * This model is not waterproof type. Therefore, rustproofing shall be applied after use.
- ** Can be used continuously above 60lux ambient illumination.



Functions

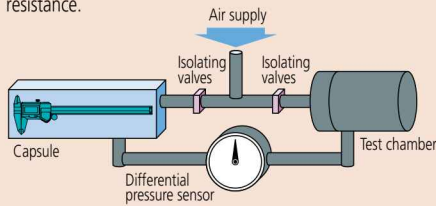
Origin-set: Absolute origin position can be changed.
 Alarm: Error message is displayed and measurement functions become inoperative if:

- Tool is turned on when both illumination and charging voltage are insufficient.
- Main unit is extremely polluted and miscalculation occurs in the display unit.



Air leak test equipment for water resistance inspection

Generally, an air leak test is adopted for evaluating water resistance.



Procedure: Place the measuring tool inside the capsule and seal it. Then fill the capsule and the test chamber with air at the required pressure and close the isolating valves. If there is no leak in the measuring tool, the differential pressure sensor will read zero, because the amount of air inside the test chamber is unchanging. However, if there is a leak in the measuring tool, the differential pressure sensor will show a non-zero reading due to a decrease in pressure inside the test chamber as air leaks into the tool. By detecting this differential pressure, GO/NG judgment for the severity of the leak is performed. This air leak test is performed for all ABS coolant proof calipers and coolant proof micrometers.



Air leak test equipment for ABS coolant proof caliper

Optional accessories

(Dedicated for the models equipped with a digimatic output function (Code No. 500-776, 500-777, 500-786 and 500-787))
 For details, refer to page D-39.

- **Connecting cables for IT/DP/MUX***
 - 05CZA624: SPC cable with data button (1m)
 - 05CZA625: SPC cable with data button (2m)
- **USB Input Tool Direct**
 - 06ADV380A: SPC cable for USB-ITN-A (2m)
- **Connecting cables for U-WAVE-T**
 - 02AZD790A: SPC cable for U-WAVE with data button (160mm)
 - 02AZE140A: SPC cable for foot switch



* Cannot be used for other than water resistant type Digital calipers with external output function.



About the charge function (SuperCaliper)

The minimum illumination required in the uncharged state is 60lux.

As shown in the table 'JIS Z 9110 Artificial Illumination Intensity Standard', this SuperCaliper can be used with confidence in a normal work environment.

The charge function allows the operator to use the SuperCaliper without interrupting work even if the ambient illumination is temporarily insufficient.

- In the fully charged state this SuperCaliper can operate for approximately one hour in an environment of 50lux illumination (less than the minimum necessary illumination intensity).
- The time necessary for full charge varies according to the charging conditions. If the SuperCaliper is left unused in an illumination of 500 lux (usual for manufacturing environments), it takes approximately one hour to reach full charge.

Illumination (lx)	Site (possible operations)
1500	
1000	Design room, drafting room (Fine visual work)
750	
500	Conference room, control room (Usual manufacturing environment) (Normal visual work)
300	
200	Machine room, electric room, lecture hall (Rough visual work)
150	
100	Corridor, passage, stairs (Very rough visual work)
75	
50	Emergency staircase, warehouse (Loading, unloading work)
30	
20	

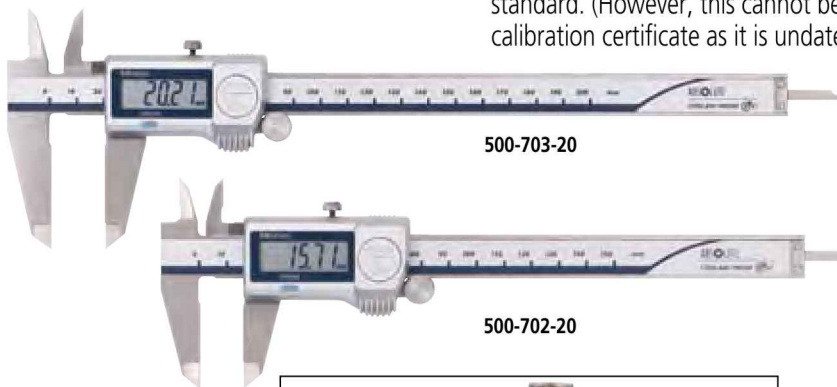
Excerpts from JIS Z 9110 Artificial illumination Intensity Standard

Calipers

An industry standard in measuring tools

ABSOLUTE Coolant Proof Caliper SERIES 500 — with Dust/Water Protection Conforming to IP67 Level

- ABS Coolant Proof Caliper with Dust/Water Protection conforming to IP67 Level. Can be used in workshop conditions exposed to coolant, water, dust or oil. 100% air-leak test ensures every caliper conforms to IP67.
- Font height is 9mm (increased by 22%) and visibility is improved (except for 0 - 300mm/ 0 - 12" models).
- Battery cap does not require a screw driver for battery replacement (except for 0 - 300mm / 0 - 12" models).
- Extended battery life of 5 years due to low current integrated circuit (except for 0 - 300mm/0 - 12" models).
- Easy to use — advanced ergonomic design uses only 1 button.
- Incorporates Mitutoyo's ABSOLUTE measurement system. No need to reset the origin.
- The automatic power-on/off function shuts down the LCD display after 20 minutes inactivity, but the ABS scale origin is unaffected. Power is restored to the display when the slider is moved.
- Stepped features can be measured.
- Can be integrated into statistical process control and measurement systems.
- An inspection certificate is supplied as standard. (However, this cannot be used as a calibration certificate as it is undated.)



500-703-20

500-702-20

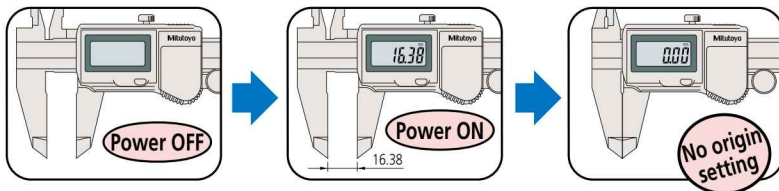


Actual size

Remarkably easy to read display



A built-in ABS (absolute) scale means that these calipers are ready to use immediately after power-on without origin resetting – just like using a vernier caliper.



Optional accessories

For details, refer to page D-39.



Connecting cables for IT/DP/MUX*

- 05CZA624: SPC cable with data button (1m)
- 05CZA625: SPC cable with data button (2m)



USB Input Tool Direct

- 06ADV380A: SPC cable for USB-ITN-A (2m)

Connecting cables for U-WAVE-T

- 02AZD790A: SPC cable for U-WAVE with data button (160mm)
- 02AZE140A: SPC cable for footswitch

* Cannot be used for other than water resistant type Digital calipers with external output function

ABSOLUTE™ (Refer to page X for details.)



(Refer to page X for details.)



(Refer to page X for details.)

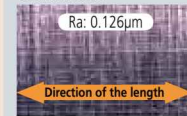


An inspection certificate is supplied as standard. Refer to page X for details.

Smooth slider movement makes for comfortable operation.

High quality guide surface finish for smooth slider movement

Conventional



Coolant proof caliper



Technical Data

Resolution: 0.01mm or .0005"/0.01mm

Repeatability: 0.01mm or .0005"/0.01mm

Quantizing error: Not including ±1 count

Dust/Water protection level: IP67 (IEC60529)*

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 5 years under normal use (1 year: 0 - 300mm/0 - 12" models)

* Although these models are IP67 rated, care should be taken to dry tool after use.

Functions

Origin-set: Absolute origin position can be changed.

Data output: Measurement data output connector allows integration into statistical process control and measurement systems.

Automatic power on/off: LCD display will turn off after 20 minutes inactivity, but the ABS scale unit origin is stored. Power is restored when the slider is moved.

Alarm: Error message is displayed if error in calculation is found and measurement is stopped. Measurement will not be continued while error is displayed. Also, if the battery voltage becomes low, "B" appears to alert the user before measurement is no longer possible.

IP67 protection level

IP67

First characteristic number	Protection from solid objects (people or things)		Second characteristic number	Protection from liquids (water, etc.)	
	Brief description	Description		Brief description	Description
6	Dust-proof.	No ingress of dust allowed.	7	Protected against water penetration.	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time.

For details of the test conditions used in evaluating each degree of protection, please refer to the original standard.

SPECIFICATIONS

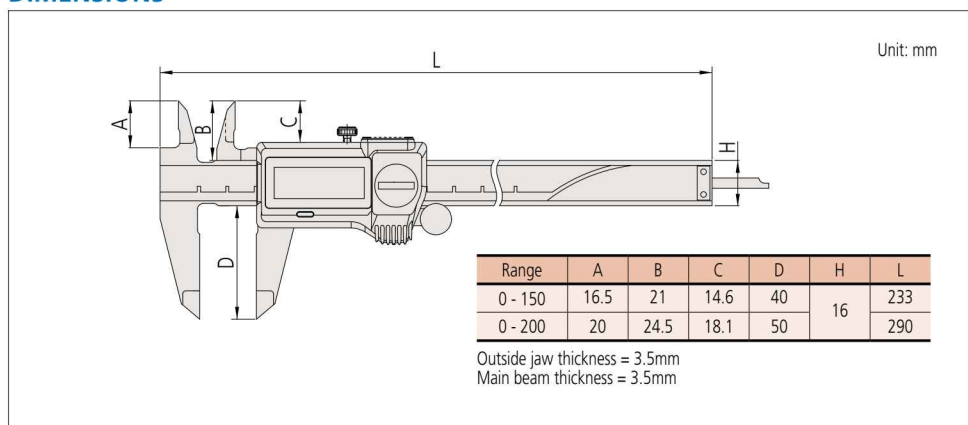
Metric								
Order No.	Range	Accuracy*	Mass	Measurement data output port	Thumb roller	Remarks		
500-702-20	0 - 150mm	±0.02mm	168g	—	—			
500-703-20	0 - 200mm		198g					
500-712-20	0 - 150mm		168g					
500-713-20	0 - 200mm		198g					
500-719-20	0 - 150mm		168g			✓	✓	Depth bar ø1.9mm
500-721-20	0 - 150mm		168g					Carbide-tipped jaws for outside measurement
500-722-20	0 - 200mm		198g					Carbide-tipped jaws for outside and inside measurement
500-723-20	0 - 150mm		168g					
500-724-20	0 - 200mm		198g					
500-714-10	0-300mm		±0.03mm			350g	✓	✓
500-718-11		345g		—				
500-704-10		350g		✓				
500-708-11		345g		—				

* Not including quantizing error of ±1 count in LSD

Inch/Metric									
Order No.	Range	Accuracy*	Mass	Measurement data output port	Thumb roller	Remarks			
500-731-20	0 - 6"	±.001"/ ±0.02mm	168g	—	—	Carbide-tipped jaws for outside measurement			
500-732-20	0 - 8"		198g						
500-733-20	0 - 6"		168g						
500-734-20	0 - 8"		198g						
500-735-20	0 - 6"		168g			✓	✓	Carbide-tipped jaws for outside measurement	
500-736-20	0 - 8"		198g					Carbide-tipped jaws for outside and inside measurement	
500-737-20	0 - 6"		168g						
500-738-20	0 - 8"		198g						
500-752-20	0 - 6"		168g			—	—		
500-753-20	0 - 8"		198g						
500-762-20	0 - 6"		168g			✓	—		
500-763-20	0 - 8"		198g						
500-768-20	0 - 6"		168g			✓	—	Depth bar ø1.9mm	
500-769-20	0 - 6"		168g					Depth bar ø1.9mm	
500-764-10	0-12"		".0015"/ ±0.03mm"			350g	✓	✓	
500-754-10						350g			—

* Not including quantizing error of ±1 count in LSD

DIMENSIONS



Calipers

An industry standard in measuring tools

ABSOLUTE Digimatic Caliper 500 Series — with exclusive ABSOLUTE Encoder Technology

- ABSOLUTE electromagnetic induction linear encoder system is introduced (except for 0 - 300mm/0 - 12" models).
- New ergonomic design with finger rest.
- The ZERO/ABS button allows the display to be Zero-Set at any slider position along the scale for comparison measurements. This button will also allow return to the absolute (ABS) mode and display of the true position from the origin (usually jaws closed point).
- Large and clear LCD readout.
- Smooth slider movement makes for comfortable operation.
- 18,000 hours battery life.
- Allows step measurement.
- Carbide-tipped jaw calipers are optimal for rough finished parts, castings, grinding stones, etc.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.

ABSOLUTE™ (Refer to page X for details.)



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

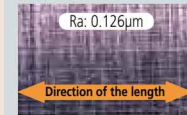
Technical Data

Accuracy: $\pm 0.02\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.03\text{mm}$ ($\leq 300\text{mm}$) (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Repeatability: 0.01mm
 Display: LCD
 Scale type*: ABSOLUTE electromagnetic induction linear encoder
 *ABSOLUTE electrostatic capacity static linear encoder for 0 - 300mm/0 - 12" models.
 Max. response speed: Unlimited
 Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
 Battery life: Approx. 5 years under normal use (18,000 hours for continuous use)

Smooth slider movement makes for comfortable operation.

High quality guide surface finish for smooth slider movement

Conventional ex. No.500-151



ABSOLUTE Digimatic Caliper ex. No.500-151-30



500-151-30

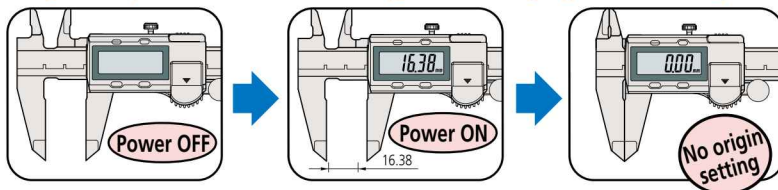


500-182-30



Remarkably easy to read display

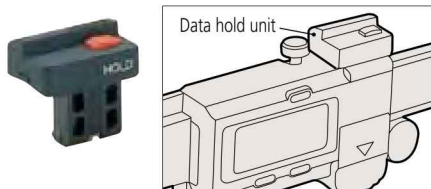
A built-in ABS (absolute) scale means that these calipers are ready to use immediately after power-on without origin resetting – just like using a vernier caliper.



Optional accessories

Dedicated for the models equipped with a digimatic output function. For details, refer to page D-39.

959143: Data hold unit



Connecting cables for IT/DP/MUX

- 959149: SPC cable with data button (1m)
- 959150: SPC cable with data button (2m)



USB Input Tool Direct

- 06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

- 02AZD790C: SPC cable for U-WAVE with data button (160mm)
- 02AZE140C: SPC cable for footswitch

Functions

Absolute measurement: After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The Absolute origin position can be changed by the ORIGIN button.

Incremental measurement: Display can be set to zero at any arbitrary position for comparative measurements

Low-voltage alert: If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible. A battery change advisory alert precedes this alert.

Data output: By using the connecting cable (option), measurement data can be output.

Data hold: By using the data hold unit (option), the displayed value can be held. This cannot be used with the data output function.

SPECIFICATIONS

Metric						
Order No.	Range	Accuracy**	Mass	Depth bar	Fine adjustment	Remarks
500-150-30	0 - 100mm	±0.02mm	137	ø1.9mm rod	with thumb roller	—
500-180-30*					—	—
500-151-30					with thumb roller	Carbide-tipped jaws for outside measurement
500-154-30	0 - 150mm	±0.02mm	162	Blade	with thumb roller	Carbide-tipped jaws for outside and inside measurement
500-155-30					—	—
500-158-30					—	—
500-181-30*	0 - 200mm	±0.02mm	192	Blade	with thumb roller	Carbide-tipped jaws for outside measurement
500-152-30					—	—
500-156-30					with thumb roller	Carbide-tipped jaws for outside and inside measurement
500-157-30					—	—
500-182-30*	0 - 300mm	±0.03mm	350	—	with thumb roller	—
500-153					with thumb roller	—

* Without SPC data output

* Not including quantizing error of ±1 count in LSD

Inch/Metric							
Order No.	Range	Accuracy**	Mass	Depth bar	Fine adjustment	Remarks	
500-170-30	0 - 4"	±0.001"/ ±0.02mm	137	.075" rod	with thumb roller	—	
500-195-30*						—	—
500-171-30						Blade	Carbide-tipped jaws for outside measurement
500-174-30	0 - 6"	±0.001"/ ±0.02mm	162	.075" rod	with thumb roller	Carbide-tipped jaws for outside and inside measurement	
500-175-30						—	—
500-178-30						Blade	Carbide-tipped jaws for outside measurement
500-196-30*	0 - 8"	±0.001"/ ±0.02mm	192	Blade	with thumb roller	Carbide-tipped jaws for outside and inside measurement	
500-159-30*						—	—
500-160-30*						Blade	Carbide-tipped jaws for outside measurement
500-172-30						—	—
500-176-30	0 - 8"	±0.001"/ ±0.02mm	192	Blade	with thumb roller	Carbide-tipped jaws for outside measurement	
500-177-30						—	—
500-197-30*						Blade	Carbide-tipped jaws for outside and inside measurement
500-163-30*	0 - 12"	±0.0015"/ ±0.03mm	350	—	—	Carbide-tipped jaws for outside measurement	
500-164-30*						—	—
500-173						Blade	Carbide-tipped jaws for outside and inside measurement
500-167	0 - 12"	±0.0015"/ ±0.03mm	350	—	—	Carbide-tipped jaws for outside measurement	
500-168						—	—
500-193*						Blade	Carbide-tipped jaws for outside and inside measurement
500-165*						—	—
500-166*	0 - 12"	±0.0015"/ ±0.03mm	350	—	—	Carbide-tipped jaws for outside measurement	
						Carbide-tipped jaws for outside and inside measurement	

* Without SPC data output

* Not including quantizing error of ±1 count in LSD

DIMENSIONS

Range	A	B	C	D	H	L
0-100mm	16.5	21	14.5	40	16	182
0-150mm	16.5	21	14.5	40	16	233
0-200mm	20	24.5	18	50	16	290
0-300mm	22	27.5	19.8	64	20	404

Jaw thickness: 3.5mm for 0-100mm/0-150mm/0-200mm models and 3.8mm for 0-300mm model

Calipers

An industry standard in measuring tools

ABSOLUTE™ (Refer to page X for details.)

Long ABSOLUTE Digimatic Caliper 500 Series — with Exclusive ABSOLUTE Encoder Technology

- Long Digital caliper incorporating an ABSOLUTE scale and available with a measuring range from 450mm to 1000mm.
- Allows step measurement
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.
- For the details of the Absolute scale and its function, refer to page D-8.



500-502-10

500-501-10

500-500-10

SPECIFICATIONS

Metric				
Order No.	Range	Depth bar	Fine adjustment	Remarks
500-500-10	0 - 450mm	—	—	—
500-501-10	0 - 600mm			
500-502-10	0 - 1000mm			

* without SPC data output

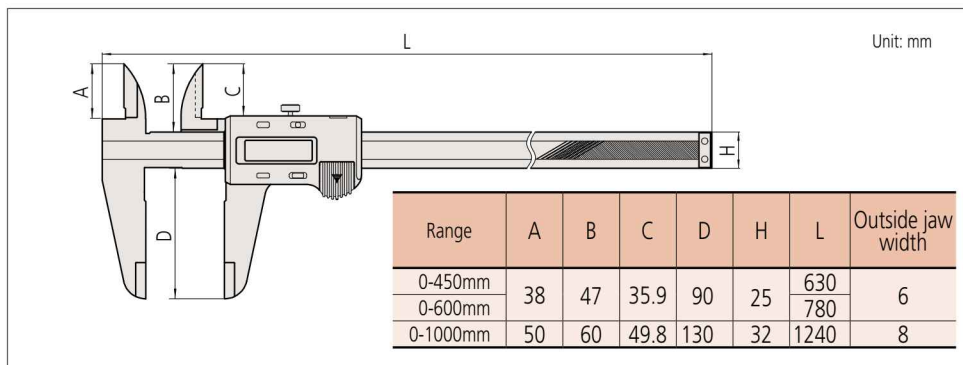
Inch/Metric				
Order No.	Range	Depth bar	Fine adjustment	Remarks
500-505-10	0 - 18"	—	—	—
500-506-10	0 - 24"			
500-507-10	0 - 40"			

* without SPC data output

Technical Data

Accuracy: $\pm 0.05\text{mm}$ ($\leq 600\text{mm}$), $\pm 0.07\text{mm}$ ($\leq 1000\text{mm}$)
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Repeatability: 0.01mm
Display: LCD
Scale type: ABSOLUTE electrostatic capacity linear encoder
Max. response speed: Unlimited
Battery: **SR44** (1 pc, **938882**,
for initial operational checks (standard accessory))
Battery life: Approx. 3.5 years under normal use
Max. response speed: Unlimited

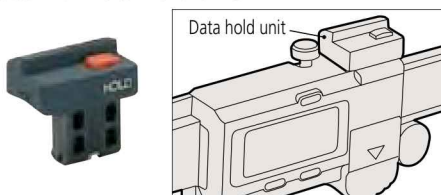
DIMENSIONS



Optional accessories

Dedicated for the models equipped with a digimatic output function. For details, refer to page D-39.

959143: Data hold unit



Connecting cables for IT/DP/MUX*

- 959149: SPC cable with data button (1m)
- 959150: SPC cable with data button (2m)



USB Input Tool Direct

- 06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

- 02AZD790C: SPC cable for U-WAVE with data button (160mm)
- 02AZE140C: SPC cable for footswitch



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

Technical Data

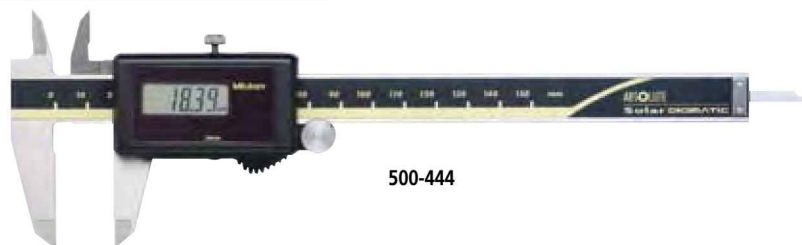
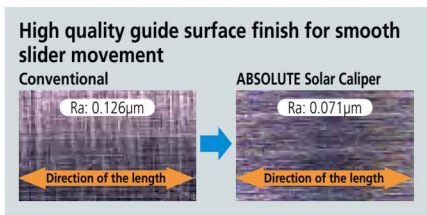
- Accuracy: ±0.02mm (excluding quantizing error)
- Resolution: 0.01mm or .0005"/0.01mm
- Repeatability: 0.01mm
- Display: LCD
- Scale type: ABSOLUTE electrostatic capacity linear encoder
- Power supply: Solar cell*
- Max. response speed: Unlimited
- Operational temperature: 0 to 40°C
- * Can be used continuously above 60lux ambient illumination

Functions

- Absolute measurement
- Scale contamination detection
- Data output (use together with optional connecting cable)
- Data hold (use optional hold unit. This cannot be used with the data output function)
- * For details of the function, refer to page D-8.

ABSOLUTE Solar Caliper SERIES 500 — No battery or origin reset needed

- Mitutoyo's Absolute Solar Digimatic Caliper retains its origin point indefinitely.
- At 60 Lux and above the ABSOLUTE solar caliper is ready to start measurement. No more repeated zero setting caused by a shortage of light.
- An ABSOLUTE scale is incorporated so that zero setting is not required at each power ON. No danger of overspeed errors.
- Slider operation is smooth and comfortable.
- Allows step measurement.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



500-444

SPECIFICATIONS

Metric			
Order No.	Range	Depth bar	Fine adjustment
500-443	0 - 100mm	ø1.9mm rod	with thumb roller
500-453*	0 - 100mm	ø1.9mm rod	
500-444	0 - 150mm	Blade	
500-454*	0 - 150mm		
500-445	0 - 200mm		
500-455*	0 - 200mm		

* without SPC data output

Inch/Metric			
Order No.	Range	Depth bar	Fine adjustment
500-463	0 - 4"	.075" rod	with thumb roller
500-473*	0 - 4"	.075" rod	
500-464	0 - 6"	Blade	
500-474*	0 - 6"		
500-465	0 - 8"		
500-475*	0 - 8"		

* without SPC data output

DIMENSIONS

Range	A	B	C	D	H	L
0-100mm	16.5	21	14.5	40	16	182
0-150mm						233
0-200mm						290

Jaw thickness: 3.5mm

Optional accessories

Dedicated for the models equipped with a digimatic output function. For details, refer to page D-39.

959143: Data hold unit



Connecting cables for IT/DP/MUX*

- 959149: SPC cable with data button (1m)
- 959150: SPC cable with data button (2m)



USB Input Tool Direct

- 06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

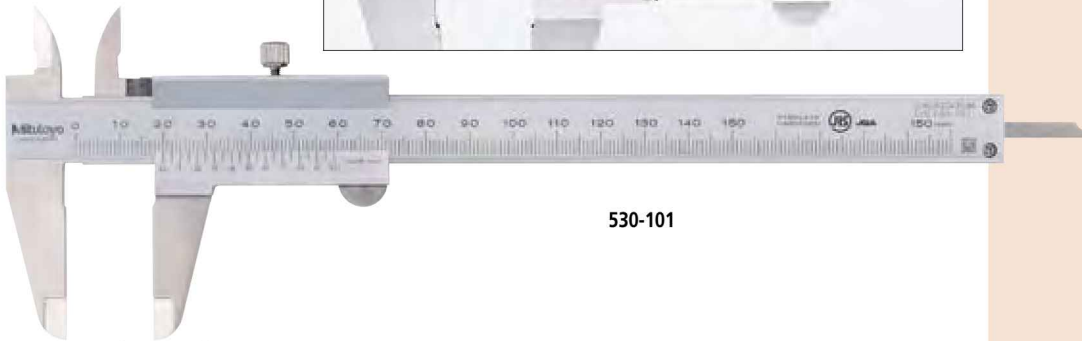
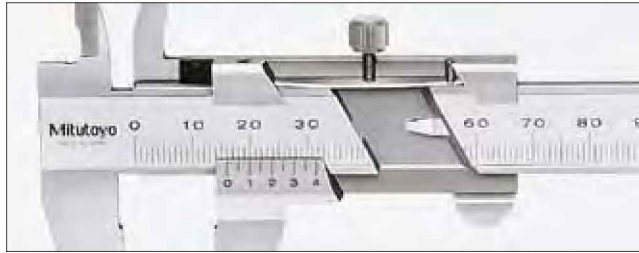
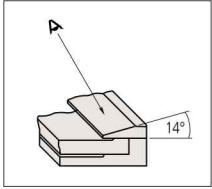
- 02AZD790C: SPC cable for U-WAVE with data button (160mm)
- 02AZE140C: SPC cable for footswitch

Calipers

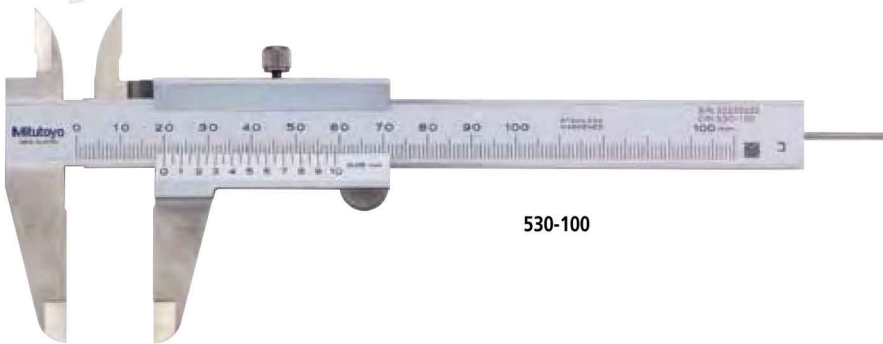
An industry standard in measuring tools

Vernier Caliper 530 Series — Standard model

- Plain and basic design.
- Stepped graduation face prevents dust ingress between the main scale and slider.
- The small vernier face angle (14°) provides easy reading.
- Can measure outside and inside dimensions, depth, and steps.
- Carbide-tipped jaw calipers are optimal for rough finished parts, castings, grinding stones, etc.
- Decimal and fractional graduated scales (metric/inch and inch models only).



530-101



530-100



530-102 (Round depth bar type)



530-320 (Carbide-tipped jaw type)

DIMENSIONS

Unit: mm

Range	Outside jaw thickness
0 - 100mm	3
0 - 150mm	
0 - 200mm	
0 - 300mm	3.8
0 - 600mm	6
0 - 1000mm	8

Range	A	B	D	E	F	H	L
0 - 100mm	17	21.5	40	53.5	30	16	182
0 - 150mm	17	21.5	40	53.5	30	16	229
0 - 200mm	20.5	25	50	53.5	30	16	288
0 - 300mm	22	27.5	64	66.5	36	20	404
0 - 600mm	38	47	90	89	50	25	780
0 - 1000mm	50	60	130	111	61	32	1240

* Code No.530-100 and No.530-102 incorporate a round depth bar (ø1.9mm).
The depth bar shown in the illustration above is a different type.

Technical Data

Accuracy: $\pm 0.05\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.08\text{mm}$ ($\leq 300\text{mm}$)
 $\pm 0.10\text{mm}$ ($\leq 600\text{mm}$), $\pm 0.15\text{mm}$ ($\leq 1000\text{mm}$)
 High accuracy type:
 $\pm 0.03\text{mm}$ ($\leq 200\text{mm}$), $\pm 0.04\text{mm}$ ($\leq 300\text{mm}$)
 Graduation: 0.05mm , 0.05mm ($1/128''$) or $.001''$ ($1/128''$)
 High accuracy type:
 0.02mm or 0.02mm ($.001''$)

SPECIFICATIONS

Metric				
Order No.	Range	Depth bar	Remarks	
530-100	0 - 100mm	ø1.9mm rod	—	
530-102			—	
530-101	0 - 150mm	Blade	—	
530-320			Carbide-tipped jaws for outside measurement	
530-335			Carbide-tipped jaws for outside and inside measurement	
530-122*			High accuracy model: $\pm 0.03\text{mm}$	
530-108			—	
530-321	0 - 200mm	Blade	Carbide-tipped jaws for outside measurement	
530-123*			High accuracy model: $\pm 0.03\text{mm}$	
530-109	0 - 300mm	Blade	—	
530-322			Carbide-tipped jaws for outside measurement	
530-124*			High accuracy model: $\pm 0.04\text{mm}$	
530-501	0 - 600mm	—	—	
530-502	0 - 1000mm	—	—	

* Graduation: 0.02mm

Metric/Inch with metric/inch double scale				
Order No.	Range	Depth bar	Inch graduation	Remarks
530-104	0 - 150mm	Blade	1/128"	—
530-316			1/128"	Clamping screw below the slider
530-312*			.001"	High accuracy model: $\pm 0.03\text{mm}$
530-114	0 - 200mm	Blade	1/128"	—
530-118*			.001"	High accuracy model: $\pm 0.03\text{mm}$
530-115	0 - 300mm	Blade	1/128"	—
530-119*			.001"	High accuracy model: $\pm 0.04\text{mm}$

* Graduation: 0.02mm

Inch with inch/inch double scale				
Order No.	Range	Depth bar	Inch graduation	Remarks
530-105	0 - 6"	Blade	1/128"	—
530-116	0 - 8"			

Measurement Applications

1. Outside measurement



2. Inside measurement



3. Step measurement



4. Depth measurement

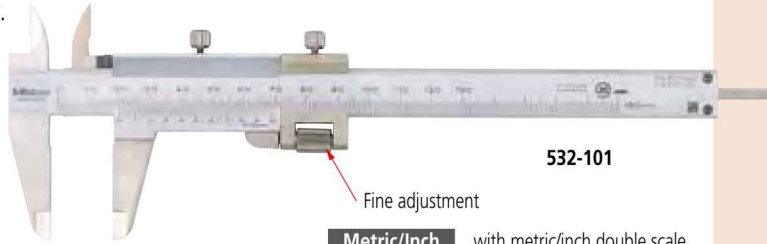


Calipers

An industry standard in measuring tools

Vernier Caliper 532 Series — with fine adjustment

- Fine-adjustment aids slider positioning.
- Allows step measurement.



532-101

Fine adjustment

Technical Data

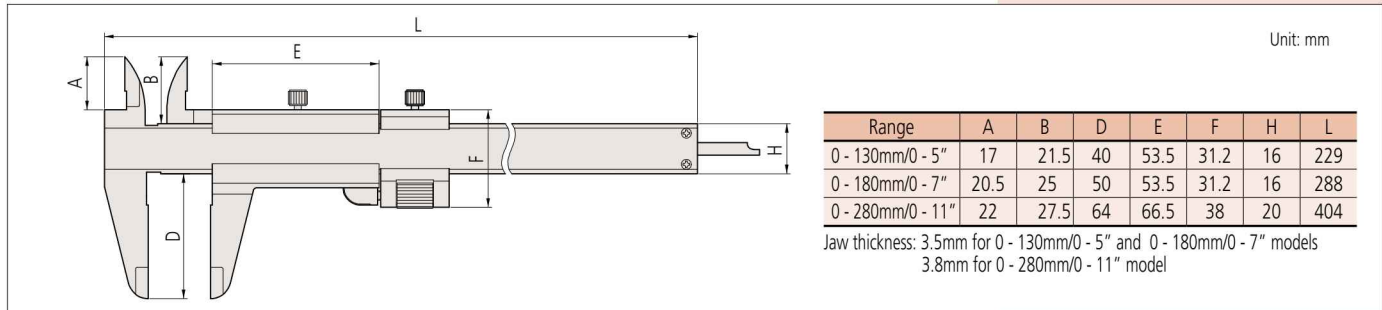
Accuracy: $\pm 0.03\text{mm}$ ($\leq 180\text{mm}$), $\pm 0.04\text{mm}$ ($\leq 280\text{mm}$)
Graduation: 0.02mm, 0.02mm (.001") or .001" (1/128")

SPECIFICATIONS

Metric				
Order No.	Range	Depth bar	Remarks	
532-101	0 - 130mm	Blade	with fine adjustment	
532-102	0 - 180mm			
532-103	0 - 280mm			

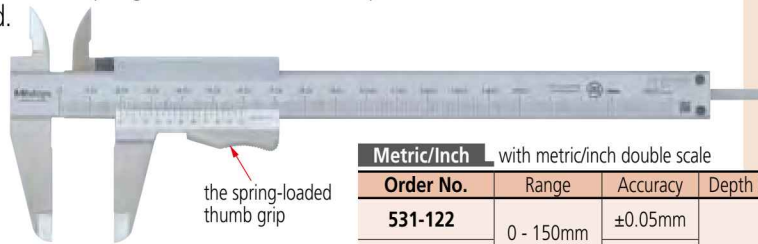
Metric/Inch with metric/inch double scale					
Order No.	Range	Depth bar	Inch graduation	Remarks	
532-119	0 - 130mm	Blade	.001"	with fine adjustment	
532-120	0 - 180mm				
532-121	0 - 280mm				

DIMENSIONS



Vernier Caliper 531 Series — with thumb clamp

- The slider moves only when the spring-loaded thumb grip is depressed.
- Allows step measurement.



531-101

the spring-loaded thumb grip

Technical Data

Accuracy: Refer to the list of specifications.
Graduation: 0.05mm, 0.05mm (1/128") or .001" (1/128")
High accuracy type:
0.02mm or 0.02mm (.001")

SPECIFICATIONS

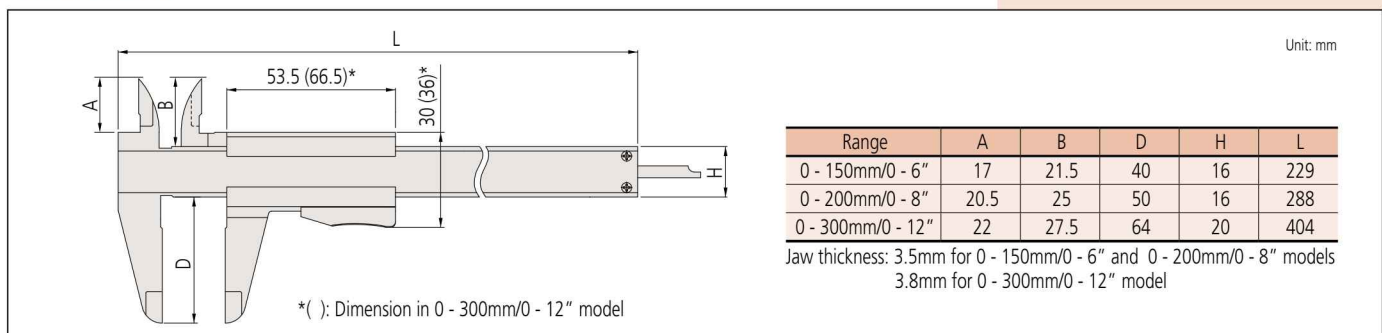
Metric				
Order No.	Range	Accuracy	Depth bar	Remarks
531-101	0 - 150mm	$\pm 0.05\text{mm}$	Blade	—
531-102	0 - 200mm			
531-103	0 - 300mm			

* Graduation: 0.02mm

Metric/Inch with metric/inch double scale					
Order No.	Range	Accuracy	Depth bar	Inch graduation	Remarks
531-122	0 - 150mm	$\pm 0.05\text{mm}$	Blade	1/128"	with inch/mm conversion label
531-128*		$\pm 0.03\text{mm}$.001"	High accuracy model
531-108	0 - 200mm	$\pm 0.05\text{mm}$		1/128"	—
531-129*		$\pm 0.03\text{mm}$.001"	High accuracy model
531-109	0 - 300mm	$\pm 0.08\text{mm}$		1/128"	—
531-112*		$\pm 0.04\text{mm}$.001"	High accuracy model

* Graduation: 0.02mm

DIMENSIONS



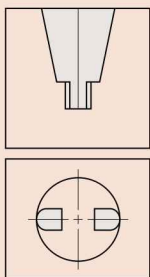
ABSOLUTE™ (Refer to page X for details.)

IP67

(Refer to page X for details.)

**TUV Rheinland
CERTIFIED**

(Refer to page X for details.)



Radiused jaws for accurate ID measurement

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)

Resolution: 0.01mm or .0005"/0.01mm

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)

Battery life: Approx. 3 years under normal use (1 year: 300mm models)

(3.5 years: over 300mm models)

Dust/Water protection level: IP67* (models up to 300mm)

*This model is not waterproof type.

Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-39.

959143: Data hold unit

Connecting cables for IT/DP/MUX

05CZA624: SPC cable with data button (1m)*

05CZA625: SPC cable with data button (2m)*



959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380A: SPC cable for USB-ITN-A (2m)*

06ADV380C: SPC cable for USB-ITN-C (2m)

Connecting cables for U-WAVE-T

02AZD790A: SPC cable for U-WAVE with data button (160mm)*

02AZE140A: SPC cable for footswitch*

02AZD790C: SPC cable for U-WAVE with data button (160mm)

02AZE140C: SPC cable for footswitch

* For IP67 models (up to 300mm)

ABSOLUTE Digimatic Caliper 550 Series — with Nib Style Jaws

- Offers a resolution of 0.01mm with corresponding accuracy.
- Incorporates an Absolute measurement system. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Code Nos. 550-301-10, 550-331-10, 550-311-10 and 550-341-10: IP67 (These models are not a waterproof type. Therefore a rustproofing shall be applied after use.)
- Allows integration into statistical process control and measurement systems for models

with measurement data output connector. Refer to page A-3.

- ID measurement value: displayed value + (the minimum inside measurement value mentioned below). OFFSET switch allows to input a compensation value so that the measurement value can be read directly (Code Nos. 550-301-10, 550-331-10, 550-311-10 and 550-341-10). Preset function allows to set a desired starting point (Code Nos. 550-331-10 and 550-341-10).



550-301-10

SPECIFICATIONS

Metric			
Order No.	Range*	Accuracy	Remarks
550-301-10	0 - 200mm (10.1 - 210mm)	±0.03mm	IP67
550-331-10	0 - 300mm (10.1 - 310mm)	±0.04mm	IP67, with offset/preset function for easy inside measurement
550-203-10	0 - 450mm (20.1 - 470mm)	±0.05mm	—
550-205-10	0 - 600mm (20.1 - 620mm)	±0.05mm	—
550-207-10	0 - 1000mm (20.1 - 1020mm)	±0.07mm	—

* () : Inside measurement

Note: Series 550 is not equipped with a depth bar.

Inch/Metric			
Order No.	Range*	Accuracy	Remarks
550-311-10	0 - 8" (.404" - 8.4")	±.0015"	IP67
550-341-10	0 - 12" (.404" - 12.4")	±.002"	IP67, with offset/preset function for easy inside measurement
550-223-10	0 - 18" (.504" - 18.5")		—
550-225-10	0 - 24" (.504" - 24.5")		—
550-227-10	0 - 40" (.504" - 40.2")		—

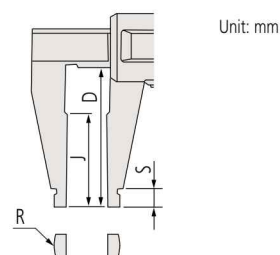
* () : Inside measurement

Note: Series 550 is not equipped with a depth bar.

DIMENSIONS

Range	D	J	S	R
0 - 200mm	60	40.5	8	5
0 - 300mm	75	50.5	12	5
0 - 450mm	100	65	18	10
0 - 600mm	100	65	18	10
0 - 1000mm	140	95	24	10

Jaw thickness: 3mm for 0 - 200mm model
3.8mm for 0 - 300mm model
6mm for 0 - 450mm and 0 - 600mm models
8mm for 0 - 1000mm model

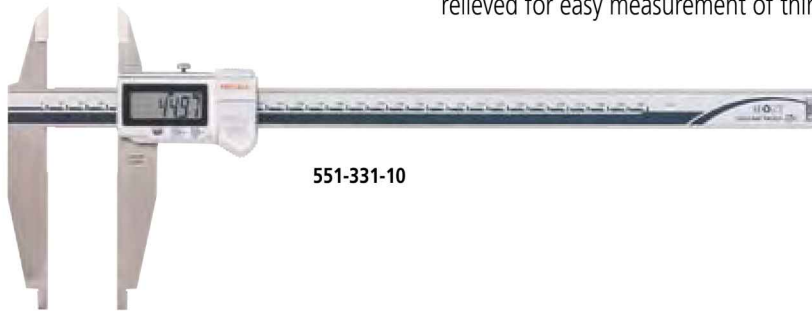


Calipers

An industry standard in measuring tools

ABSOLUTE Digimatic Caliper 551 Series - with Nib Style and Standard Jaws

- Offers a resolution of 0.01mm with corresponding accuracy.
- Incorporates an Absolute measurement system. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.
- ID measurement value: displayed value + (the minimum inside measurement value mentioned below). OFFSET switch allows to input a compensation value so that the measurement value can be read directly (Code No. 551-301-10, 551-331-10, 551-311-10 and 551-341-10). Preset function allows to set a desired starting point (Code No. 551-331-10 and 551-341-10).
- Tips of the outside measurement jaw are relieved for easy measurement of thin parts.



551-331-10

SPECIFICATIONS

Metric

Order No.	Range*	Accuracy	Remarks
551-301-10	0 - 200mm (10.1 - 210mm)	±0.03mm	IP67
551-331-10	0 - 300mm (10.1 - 310mm)	±0.04mm	IP67, with offset/preset function for easy inside measurement
551-204-10	0 - 500mm (20.1 - 520mm)	±0.06mm	—
551-206-10	0 - 750mm (20.1 - 770mm)	±0.06mm	
551-207-10	0 - 1000mm (20.1 - 1020mm)	±0.07mm	

* () : inside measurement

Note: Series 551 is not equipped with a depth bar.

Inch/Metric

Order No.	Range*	Accuracy	Remarks
551-311-10	0 - 8" (.404" - 8.4")	±.0015"	IP67
551-341-10	0 - 12" (.404" - 12.4")	±.002"	IP67, with offset/preset function for easy inside measurement
551-224-10	0 - 20" (.504" - 20.5")	±.0025"	—
551-226-10	0 - 30" (.504" - 30.5")	±.0025"	
551-227-10	0 - 40" (1.004" - 41")	±.003"	

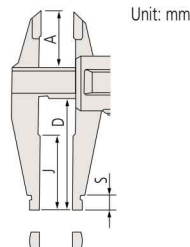
* () : inside measurement

Note: Series 551 is not equipped with a depth bar.

DIMENSIONS

Range	A	D	J	S
0 - 200mm	30	60	43	8
0 - 300mm	40.1	90	68	10
0 - 500mm	56	150	115	15
0 - 750mm	56	150	115	15
0 - 1000mm	56	150	115	20

Jaw thickness: 3mm for 0 - 200mm model
3.8mm for 0 - 300mm model
6mm for 0 - 500mm and 0 - 750mm models
8mm for 0 - 1000mm model



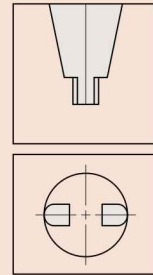
ABSOLUTE™ (Refer to page X for details.)



(Refer to page X for details.)



(Refer to page X for details.)



Radiused jaws for accurate ID measurement

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)

Resolution: 0.01mm or .0005"/0.01mm

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

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

for initial operational checks (standard accessory)

Battery life: Approx. 3 years under normal use

(1 year: 300mm models)

(3.5 years: over 300mm models)

Dust/Water protection level: IP67* (models up to 300mm)

*This model is not waterproof type.

Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-39.

959143: Data hold unit

Connecting cables for IT/DP/MUX

05CZA624: SPC cable with data button (1m)*

05CZA625: SPC cable with data button (2m)*



959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380A: SPC cable for USB-ITN-A (2m)*

06ADV380C: SPC cable for USB-ITN-C(2m)

Connecting cables for U-WAVE-T

02AZD790A: SPC cable for U-WAVE with data button

(160mm)*

02AZE140A: SPC cable for footswitch*

02AZD790C: SPC cable for U-WAVE with data button

(160mm)

02AZE140C: SPC cable for footswitch

* For IP67 models (up to 300mm)



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

Dial Caliper Series 505

- Newly designed dial movement for ultra-smooth sliding and high shock protection.
- Easy-to-read yellow dial.
- Large finger-rest aids ease-of-use.
- Jaw tips are relieved for easy measurement of thin parts.
- Allows step measurement.



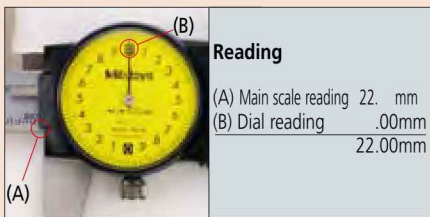
505-730



505-731



505-745



Reading
(A) Main scale reading 22. mm
(B) Dial reading .00mm
22.00mm

SPECIFICATIONS

Metric				
Order No.	Range	Accuracy	Graduation	Remarks
505-730	0 - 150mm	±0.03mm	0.02mm, 2mm/rev	Carbide-tipped jaws for outside measurement
505-734				
505-735				Carbide-tipped jaws for outside and inside measurement
505-732*	0 - 200mm	±0.02mm	0.01mm, 1mm/rev	—
505-731				
505-733*				
505-745	0 - 300mm	±0.04mm	0.02mm, 2mm/rev	

* Silver cover type

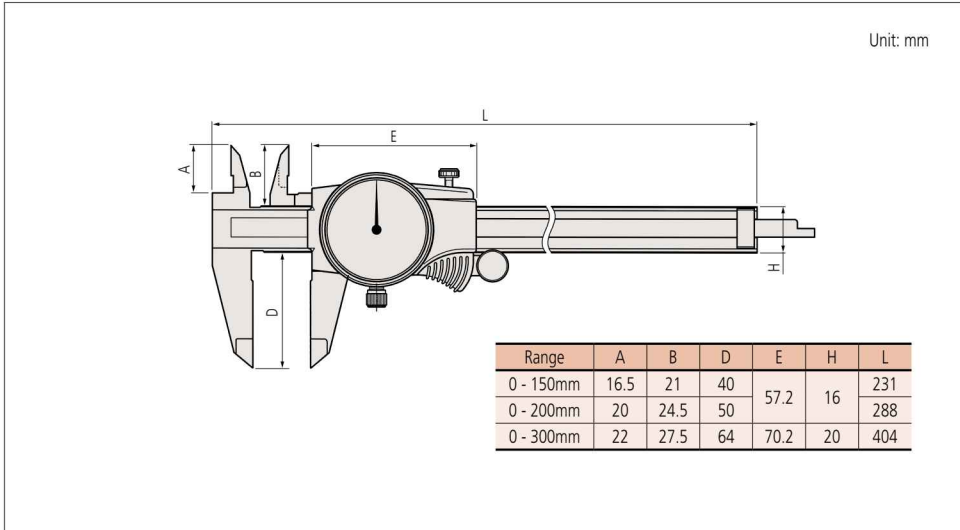
Inch				
Order No.	Range	Accuracy	Graduation	Remarks
505-740J / 505-742J*	0 - 6"	±.001"	.001", .1"/rev	Carbide-tipped jaws for outside measurement
505-736*		±.001"		
505-738*		±.001"		Carbide-tipped jaws for outside and inside measurement
505-744		±.001"		.001", .2"/rev
505-741J / 505-743J*	0 - 8"	±.002"	.001", .1"/rev	—
505-737*		±.002"		Carbide-tipped jaws for outside measurement
505-739*		±.002"		Carbide-tipped jaws for outside and inside measurement
505-749	0 - 12"	±.002"	.001", .2"/rev	—
505-746*		±.002"	.001", .1"/rev	
505-750		±.002"	.001", .2"/rev	Carbide-tipped jaws for outside measurement
505-747*		±.002"	.001", .1"/rev	Carbide-tipped jaws for outside and inside measurement
505-748*		±.002"		Carbide-tipped jaws for outside and inside measurement

* Silver cover type

Calipers

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DIMENSIONS



D

ABSOLUTE™ (Refer to page X for details.)

IP66 (Refer to page X for details.)

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ABSOLUTE Coolant Proof Carbon Fiber Caliper SERIES 552 — with Standard jaws

- IP66 Absolute Digital Caliper (Refer to page D-8 for Absolute function.)
- Lightweight Digimatic Calipers that employ CFRP (Carbon Fiber Reinforced Plastics) in the beam and jaws.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



552-303-10

Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)

Resolution: 0.01mm or .0005"/0.01mm

Material of jaws: Stainless Steel Hardened

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)

Battery life: Approx. 5,000 hours in continuous use

Dust/Water protection level: IP66 (IEC60529)*

Standard accessory: Jaw clamps (2 pcs.), 05GZA033

* This model is not waterproof type. Please wipe away the wet after use.

Functions

Zero-setting

Data hold

Offsetting

Presetting

Data output

Low-power and low-voltage alert

Counting value composition error

Automatic power on/off, inch/mm reading

(inch/mm models)

SPECIFICATIONS

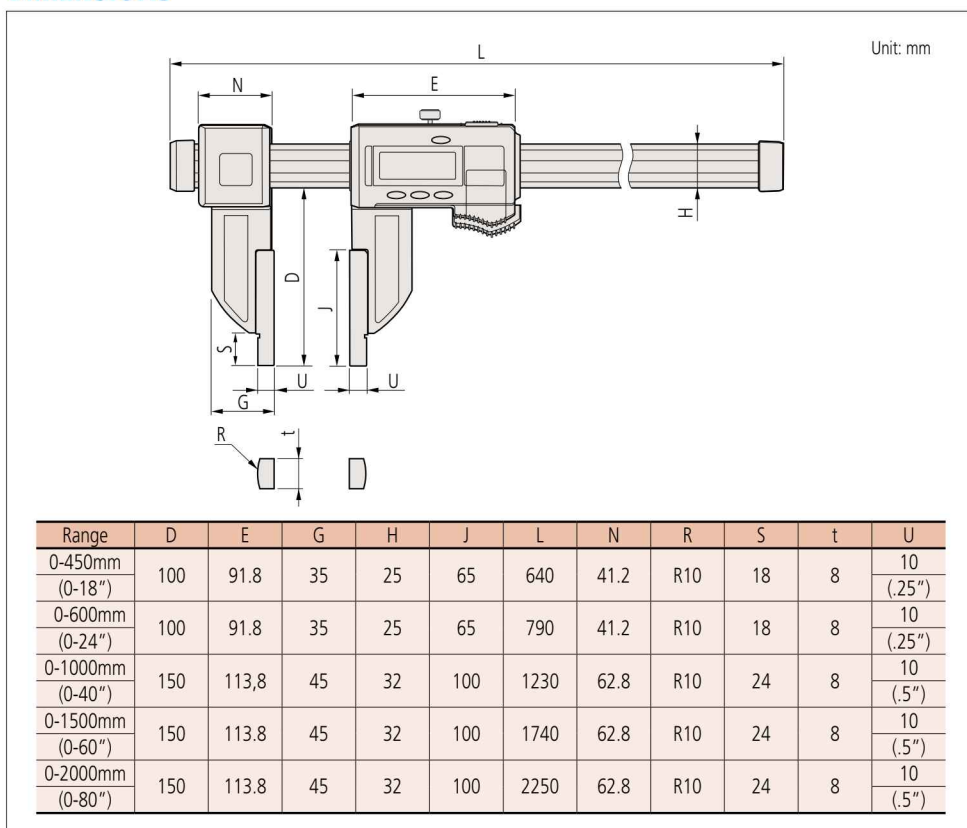
Metric			
Order No.	Range*	Accuracy	
552-302-10	0 - 450mm (20.1 - 470mm)	±0.04mm	
552-303-10	0 - 600mm (20.1 - 620mm)	±0.04mm	
552-304-10	0 - 1000mm (20.1 - 1020mm)	±0.05mm	
552-305-10	0 - 1500mm (20.1 - 1520mm)	±0.09mm	
552-306-10	0 - 2000mm (20.1 - 2020mm)	±0.12mm	

* () : Dimension in inside measurement

Inch/Metric			
Order No.	Range*	Accuracy	
552-312-10	0 - 18" (.504 - 18.5")	±.002"	
552-313-10	0 - 24" (.504 - 24.5")	±.002"	
552-314-10	0 - 40" (1.004 - 40.5")	±.002"	
552-315-10	0 - 60" (1.004 - 60.5")	±.004"	
552-316-10	0 - 80" (1.004 - 80.5")	±.005"	

* () : Dimension in inside measurement

DIMENSIONS



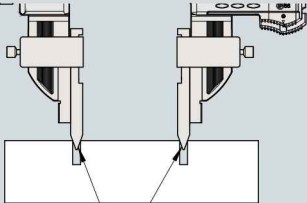

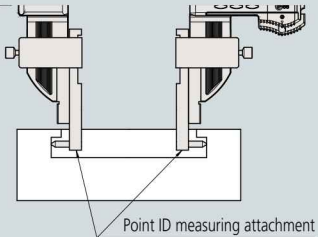

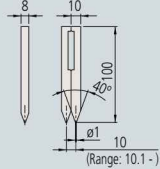

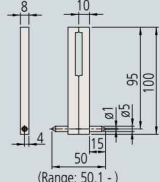

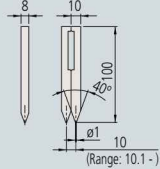

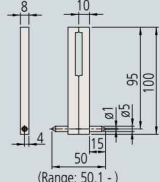

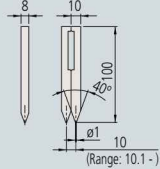

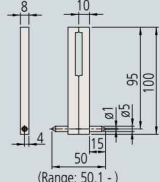
Calipers

An industry standard in measuring tools

Optional accessories

Metric		
	No. 552-302-10, 552-155-10, 552-303-10 and 552-156-10.	No. 552-304-10 and 552-305-10
Clamp box (1 pair)	No.914053	No.914054
Distance measurement jaw (1 pair)	No.914055	
Point ID measuring attachment	No.914057	

Inch/Metric		
	No. 552-312-10, 552-165-10, 552-313-10 and 552-166-10	No. 552-314-10, 552-315-10, 552-316-10
Clamp box (1 pair)	No.914053	No.914054
Distance measurement jaw (1 pair)	No.914056	
Point ID measuring attachment	No.914058	

 <p>Distant measurement jaw</p>	<p>Clamp box</p> 				
 <p>Point ID measuring attachment</p>	<table border="1"> <tbody> <tr> <td data-bbox="560 1037 847 1249"> <p>Distance measurement jaw</p> <p>Accuracy: $\pm 0.03\text{mm}$</p>  </td> <td data-bbox="847 1037 1040 1249">  </td> </tr> <tr> <td data-bbox="560 1249 847 1460"> <p>Point ID measuring attachment</p> <p>Accuracy: $\pm 0.02\text{mm}$</p>  </td> <td data-bbox="847 1249 1040 1460">  </td> </tr> </tbody> </table>	<p>Distance measurement jaw</p> <p>Accuracy: $\pm 0.03\text{mm}$</p> 		<p>Point ID measuring attachment</p> <p>Accuracy: $\pm 0.02\text{mm}$</p> 	
<p>Distance measurement jaw</p> <p>Accuracy: $\pm 0.03\text{mm}$</p> 					
<p>Point ID measuring attachment</p> <p>Accuracy: $\pm 0.02\text{mm}$</p> 					

Optional accessories

For details, refer to page D-39.

Connecting cables for **IT/DP/MUX**

05CZA624: SPC cable with data button (1m)

05CZA625: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

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

02AZD790A: SPC cable for U-WAVE with data button (160mm)

02AZE140A: SPC cable for footswitch

ABSOLUTE™ (Refer to page X for details.)

IP66 (Refer to page X for details.)

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Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)

Resolution: 0.01mm or .0005"/0.01mm

Material of jaws: Stainless Steel Hardened

Display: LCD

Scale type: ABSOLUTE electromagnetic induction linear encoder

Max. response speed: Unlimited

Battery: **SR44** (1 pc, **938882**, for initial operational checks (standard accessory))

Battery life: Approx. 5,000 hours in continuous use

Dust/Water protection level: IP66 (IEC 60529)*

Standard accessory: Jaw clamps (2 pcs.), 05GZA033

*This model is not waterproof type. Please wipe away the wet after use.

Functions

Zero-setting

Data hold

Offsetting

Presetting

Data output

Low-power and low-voltage alert

Counting value composition error

Automatic power on/off, inch/mm reading

(inch/mm models)

Optional accessories

For details, refer to page D-39.

Connecting cables for **IT/DP/MUX**

05CZA624: SPC cable with data button (1m)

05CZA625: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

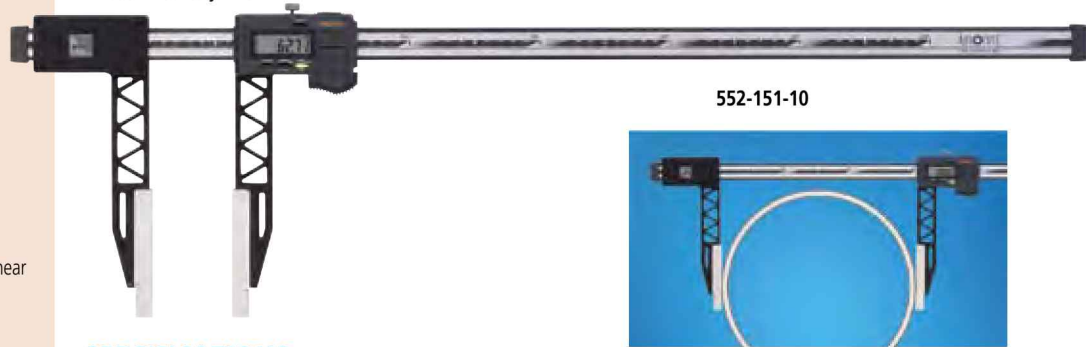
Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for U-WAVE with data button (160mm)

02AZE140A: SPC cable for footswitch

ABSOLUTE Coolant Proof Carbon Fiber Caliper SERIES 552 - with Long Jaws

- IP66 Absolute Digital Caliper (Refer to page D-8 for a description of Absolute measurement.)
- Lightweight Digimatic Calipers that employ CFRP (Carbon Fiber Reinforced Plastics) in the beam and jaws.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



SPECIFICATIONS

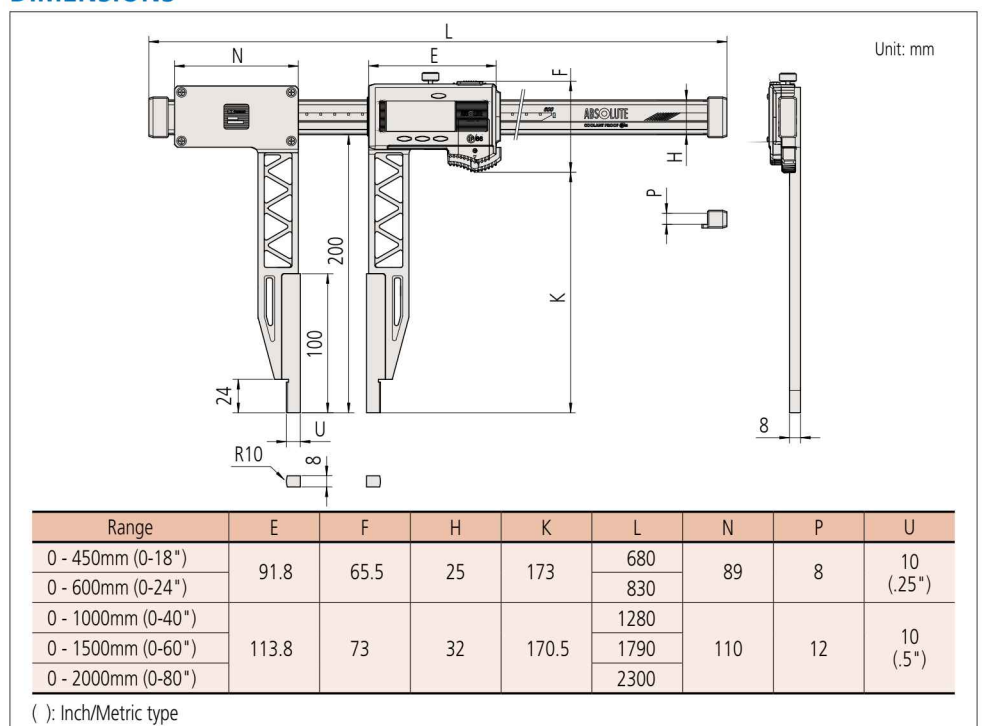
Metric		
Order No.	Range*	Accuracy
552-150-10	0 - 450mm (20.1 - 470mm)	±0.06mm
552-151-10	0 - 600mm (20.1 - 620mm)	
552-152-10	0 - 1000mm (20.1 - 1020mm)	±0.07mm
552-153-10	0 - 1500mm (20.1 - 1520mm)	±0.11mm
552-154-10	0 - 2000mm (20.1 - 2020mm)	±0.14mm

* () : Dimension in inside measurement

Inch/Metric		
Order No.	Range*	Accuracy
552-160-10	0 - 18" (.504 - 18.5")	±.0025"
552-161-10	0 - 24" (.504 - 24.5")	
552-162-10	0 - 40" (1.004 - 40.5")	±.003"
552-163-10	0 - 60" (1.004 - 60.5")	±.0045"
552-164-10	0 - 80" (1.004 - 80.5")	±.0055"

* () : Dimension in inside measurement

DIMENSIONS



Calipers

An industry standard in measuring tools

ABSOLUTE Coolant Proof Carbon Fiber Caliper SERIES 552 - with Ceramic Jaws

- IP66 Absolute Digital Caliper (Refer to page D-8 for a description of Absolute measurement.)
- Lightweight Digimatic Calipers that employ CFRP (Carbon Fiber Reinforced Plastics) in the beam and jaws.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.
- The zirconia-ceramic jaws make this caliper suitable for measuring moderately magnetic workpieces. However, since steel is used in the main unit, it may not be suitable for measuring strongly magnetic workpieces.



552-156-10

SPECIFICATIONS

Metric

Order No.	Range*	Accuracy
552-155-10	0 - 450mm (20.1 - 470mm)	±0.04mm
552-156-10	0 - 600mm (20.1 - 620mm)	

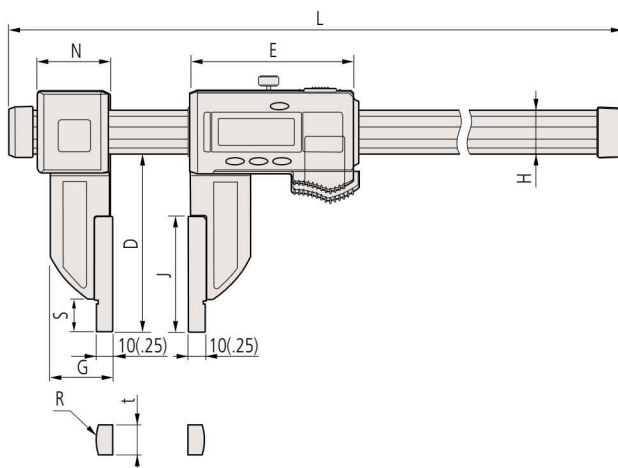
* (): Dimension in inside measurement

Inch/Metric

Order No.	Range*	Accuracy
552-165-10	0 - 18" (.504 - 18.5")	±.002"
552-166-10	0 - 24" (.504 - 24.5")	

* (): Dimension in inside measurement

DIMENSIONS



Unit: mm

Range	D	E	G	H	J	L	N	R	S	t
0-450mm (0-18")	100	91.8	35	25	65	640	41.2	R10	18	8
0-600mm (0-24")	100	91.8	35	25	65	790	41.2	R10	18	8

(): Inch/Metric type

ABSOLUTE™ (Refer to page X for details.)



(Refer to page X for details.)



(Refer to page X for details.)

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Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Material of jaws: Ceramic
Display: LCD
Scale type: ABSOLUTE electromagnetic induction linear encoder
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 5,000 hours in continuous use
Dust/Water protection level: IP66 (IEC 60529)*
Standard accessory: Jaw clamps (2 pcs.), 05GZA033
*This model is not waterproof type. Please wipe away the wet after use.

Functions

Zero-setting
Data hold
Offsetting
Presetting
Data output
Low-power and low-voltage alert
Counting value composition error
Automatic power on/off, inch/mm reading
(inch/mm models)

Optional accessories

For details, refer to page D-39.
Connecting cables for **IT/DP/MUX**
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for U-WAVE with data button
(160mm)
02AZE140A: SPC cable for footswitch

ABSOLUTE™ (Refer to page X for details.)

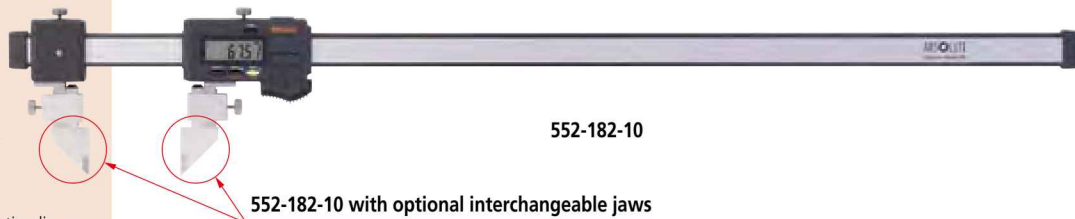
IP66 (Refer to page X for details.)



(Refer to page X for details.)

ABSOLUTE Coolant Proof Carbon Fiber Caliper SERIES 552 - with Interchangeable Jaws

- IP66 Absolute Digital Caliper (Refer to page D-8 for a description of Absolute measurement.)
- The range of applications can be expanded by using interchangeable jaws (optional).
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.
- Provided with preset function for setting a desired starting point, which allows direct readout of offset measurement.



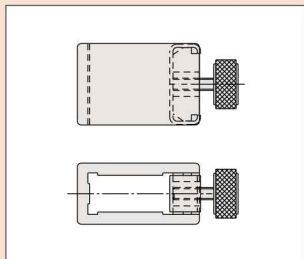
Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error)
 Resolution: 0.01mm or .0005"/0.01mm
 Display: LCD
 Scale type: ABSOLUTE electromagnetic induction linear encoder
 Max. response speed: Unlimited
 Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
 Battery life: Approx. 5,000 hours in continuous use
 Dust/Water protection level: IP66 (IEC 60529)*
 Standard accessory: Jaw clamps (2 pcs.), 05GZA033
 * Although these models are IP66 rated, care should be taken to dry tool after use.

Functions

Zero-setting
 Data hold
 Offsetting
 Presetting
 Data output
 Low-power and low-voltage alert
 Counting value composition error
 Automatic power on/off, inch/mm reading (inch/mm models)

Standard accessories (2 pcs)



Jaw clamps: No.05GZA033

Optional accessories

For details, refer to page D-39.
 Connecting cables for **IT/DP/MUX**
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)



USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)
 Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for U-WAVE with data button (160mm)
02AZE140A: SPC cable for footswitch

SPECIFICATIONS

Metric		
Order No.	Range	Accuracy
552-181-10	0 - 450mm	±0.04mm
552-182-10	0 - 600mm	
552-183-10	0 - 1000mm	±0.05mm
552-184-10	0 - 1500mm	±0.09mm
552-185-10	0 - 2000mm	±0.12mm

Inch/Metric		
Order No.	Range	Accuracy
552-191-10	0 - 18"	±.002"
552-192-10	0 - 24"	
552-193-10	0 - 40"	±.004"
552-194-10	0 - 60"	
552-195-10	0 - 80"	±.005"

Calipers

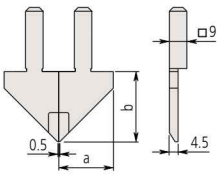
An industry standard in measuring tools

Optional accessories

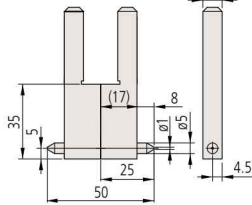
Interchangeable jaws

SPECIFICATIONS

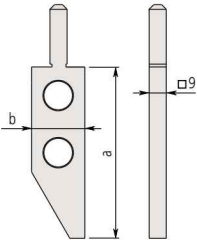
Standard type



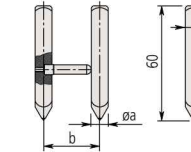
Inside point type



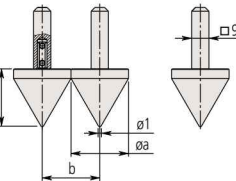
Surface Plate Type



Scriber Type

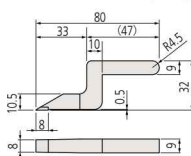


Centerline Type



Unit: mm

Scriber for height gages



Standard Type

Order No.	Components	a	b
07CZA056	Right (07CAA044), Left (07CAA045)	28mm (1.1")	30mm (1.2")

* 1 set

Inside Point Type

Order No.	Components	a	b
07CZA058	07CZA041 x 2pcs.	25mm	50mm
07CZA059	07CZA048 x 2pcs.	1"	2"

Scriber Type

Order No.	Components	a	b
07CZA055	Right (07CZA042), Left (07CZA043)	8mm	30mm
07CZA061	Right (07CZA042), Left (07CZA049)	0.31"	1.2"

Surface Plate Type

Order No.	a	b
07CZA044	90mm (3.5")	28mm (1.1")

Centerline Type

Order No.	Components	a	b
07CZA057	07CZA039 x 2pcs.	30mm	30mm
07CZA060	07CZA047 x 2pcs.	1.2"	1.2"

Note: Entering the appropriate offset value enables the display to indicate the correct measurement value inscribed on the jaws, which should be installed so that this inscription is visible from the display side of the caliper.

Scriber for height gages

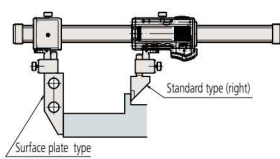
Order No.
07GZA000

Type	Applicable calipers	Range	Accuracy when attached to the caliper
Standard type	552-181-10 (552-191-10)	0 - 450mm (0-18")	±0.06mm (±0.025")
	552-182-10 (552-192-10)	0 - 600mm (0-24")	±0.07mm (±0.030")
	552-183-10 (552-193-10)	0 - 1000mm (0-40")	±0.07mm (±0.030")
	552-184-10 (552-194-10)	0 - 1500mm (0-60")	±0.11mm (±0.045")
	552-185-10 (552-195-10)	0 - 2000mm (0-80")	±0.14mm (±0.055")
Inside point type	552-181-10 (552-191-10)	Inside: 50.1-500mm (2.004-20") Outside: 0 - 450mm (0-18")	±0.09mm (±0.035")
	552-182-10 (552-192-10)	Inside: 50.1-650mm (2.004-26") Outside: 0 - 600mm (0-24")	±0.10mm (±0.040")
	552-183-10 (552-193-10)	Inside: 50.1-1050mm (2.004-42") Outside: 0 - 1000mm (0-40")	±0.10mm (±0.040")
	552-184-10 (552-194-10)	Inside: 50.1-1550mm (2.004-62") Outside: 0 - 1500mm (0-60")	±0.14mm (±0.055")
	552-185-10 (552-195-10)	Inside: 50.1-2050mm (2.004-82") Outside: 0 - 2000mm (0-80")	±0.17mm (±0.070")
Centerline type	552-181-10 (552-191-10)	30.1 - 480mm (1.204-19.2")	±0.08mm (±0.030")
	552-182-10 (552-192-10)	30.1 - 630mm (1.204-25.2")	±0.08mm (±0.030")
	552-183-10 (552-193-10)	30.1 - 1030mm (1.204-41.2")	±0.09mm (±0.035")
	552-184-10 (552-194-10)	30.1 - 1530mm (1.204-61.2")	±0.13mm (±0.055")
	552-185-10 (552-195-10)	30.1 - 2030mm (1.204-81.2")	±0.16mm (±0.065")
Scriber type	552-181-10 (552-191-10)	30 - 480mm (1.2-19.2")	±0.10mm (±0.040")
	552-182-10 (552-192-10)	30 - 630mm (1.2-25.2")	±0.11mm (±0.045")
	552-183-10 (552-193-10)	30 - 1030mm (1.2-41.2")	±0.11mm (±0.045")
	552-184-10 (552-194-10)	30 - 1530mm (1.2-61.2")	±0.15mm (±0.060")
	552-185-10 (552-195-10)	30 - 2030mm (1.2-81.2")	±0.18mm (±0.070")
Surface plate type + Scriber type for height gages	552-181-10 (552-191-10)	0 - 450mm (0-17.7")	±0.10mm (±0.040")
	552-182-10 (552-192-10)	0 - 600mm (0-23.7")	±0.11mm (±0.045")
	552-183-10 (552-193-10)	0 - 1000mm (0-39.4")	±0.11mm (±0.045")
	552-184-10 (552-194-10)	0 - 1500mm (0-59.4")	±0.15mm (±0.060")
	552-185-10 (552-195-10)	0 - 2000mm (0-79.6")	±0.18mm (±0.070")
Surface plate type + Inside point type	552-181-10 (552-191-10)	Inside: 25.1 - 475mm (1.004-19") Outside: 0 - 450mm (1-18")	±0.12mm (±0.050")
	552-182-10 (552-192-10)	Inside: 25.1 - 625mm (1.004-25") Outside: 0 - 600mm (1-24")	±0.13mm (±0.055")
	552-183-10 (552-193-10)	Inside: 25.1 - 1025mm (1.004-41") Outside: 0 - 1000mm (1-40")	±0.13mm (±0.055")
	552-184-10 (552-194-10)	Inside: 25.1 - 1525mm (1.004-62") Outside: 0 - 1500mm (1-60")	±0.17mm (±0.070")
	552-185-10 (552-195-10)	Inside: 25.1 - 2025mm (1.004-81") Outside: 0 - 2000mm (1-80")	±0.20mm (±0.080")
Surface plate type + Centerline type	552-181-10 (552-191-10)	15 - 465mm (0.6-18.6")	±0.11mm (±0.045")
	552-182-10 (552-192-10)	15 - 615mm (0.6-24.6")	±0.12mm (±0.050")
	552-183-10 (552-193-10)	15 - 1015mm (0.6-40.6")	±0.12mm (±0.050")
	552-184-10 (552-194-10)	15 - 1515mm (0.6-60.6")	±0.16mm (±0.065")
	552-185-10 (552-195-10)	15 - 2015mm (0.6-80.6")	±0.19mm (±0.075")

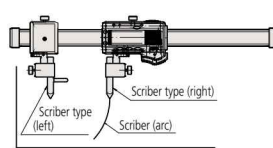
(): Inch/Metric models

Application examples

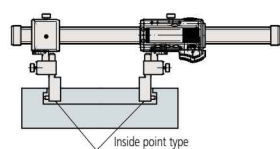
Surface plate type + Standard type



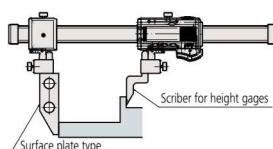
Scriber type



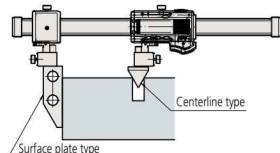
Inside point type



Surface plate type + Scriber for height gages



Surface plate type + Centerline type

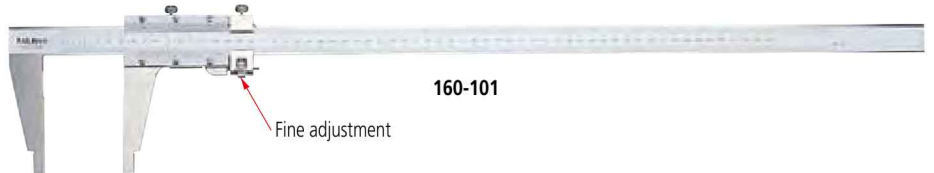


Vernier Caliper SERIES 160 — with Nib Style Jaws and Fine Adjustment

- Inside and outside measurements can be read directly from the upper and lower vernier scales.
- The jaws have radiused measuring faces for accurate inside diameter (ID) measurement.
- With fine adjustment (except for 160-130/131/132/133/134).

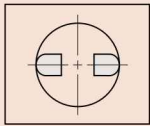
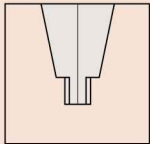


160-131



160-101

Fine adjustment



Radiused jaws for accurate ID measurement

SPECIFICATIONS

Metric with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-130	0 (20.1) - 450mm	±0.10mm	0.05mm	without fine adjustment
160-131	0 (20.1) - 600mm			
160-132	0 (20.1) - 1000mm			
160-133	0 (20.1) - 1500mm			
160-134	0 (20.1) - 2000mm			

* (): Minimum dimension in ID measurement

Metric with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-127	0 (10.1) - 300mm	±0.04mm	0.02mm	with fine adjustment
160-128	0 (20.1) - 450mm	±0.05mm		
160-101	0 (20.1) - 600mm	±0.05mm		
160-104	0 (20.1) - 1000mm	±0.07mm		
160-110	0 (20.1) - 1500mm	±0.1mm		
160-113	0 (20.1) - 2000mm	±0.12mm		

* (): Minimum dimension in ID measurement

Metric/Inch with metric/inch double scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-150	0 (10.1) - 300mm	±0.04mm	0.02mm/.001"	+10mm/.394" to reading in inside measurement
160-151	0 (20.1) - 450mm	±0.05mm		+20mm/.787" to reading in inside measurement
160-153	0 (20.1) - 600mm	±0.05mm		
160-155	0 (20.1) - 1000mm	±0.07mm		
160-157	0 (20.1) - 1500mm	±0.1mm		
160-159	0 (20.1) - 2000mm	±0.12mm		

* (): Minimum dimension in ID measurement

Inch with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-124	0 (.304") - 12"	±.0015"	.001"	—
160-116	0 (.504") - 18"	±.002"		
160-102	0 (.504") - 24"			
160-105	0 (1.004") - 40"	±.003"		
160-111	0 (1.004") - 60"	±.004"		
160-114	0 (1.004") - 80"	±.005"		

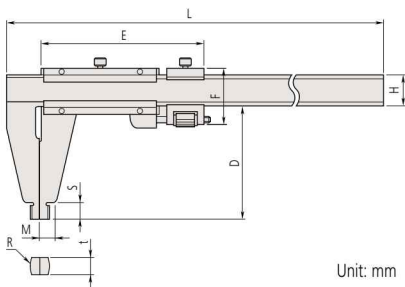
* (): Minimum dimension in ID measurement

Inch/Metric with inch/metric double scale

Order No.	Range*	Accuracy	Graduations	Remarks
160-125	0 (.304") - 12"	±.0015"	.001"/0.02mm	+3"/7.62mm to reading in inside measurement
160-119	0 (.504") - 18"	±.002"		+1"/25.4mm to reading in inside measurement
160-103	0 (.504") - 24"	±.002"		
160-106	0 (1.004") - 40"	±.003"		
160-112	0 (1.004") - 60"	±.004"		
160-115	0 (1.004") - 80"	±.005"		

* (): Minimum dimension in ID measurement

DIMENSIONS



Unit: mm

Range	D	E	F	H	L	M	R	S	t
0-300mm/0-12"	75	103	38	20	445	10	R 5	12	3.8
0-450mm*	100	89	—	25	630	14.8	R10	18	6
0-450mm/0-18"	100	112	51	—	—	—	R10	18	6
0-600mm*	100	89	—	25	780	14.8	R10	18	6
0-600mm/0-24"	100	112	51	—	—	—	R10	18	6
0-1000mm*	140	111	—	32	1240	17	R10	24	8
0-1000mm/0-40"	140	150	62.5	—	—	—	R10	24	8
0-1500mm*	180	129	—	32	1800	19	R10	30	8
0-1500mm/0-60"	180	170	62.5	—	—	—	R10	30	8
0-2000mm*	180	129	—	40	2300	23	R10	30	12
0-2000mm/0-80"	180	180	78	—	—	—	R10	30	12

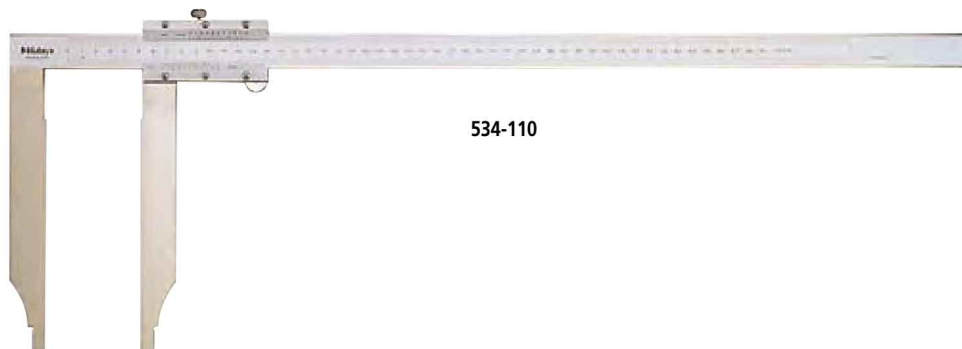
*: without fine adjustment

Calipers

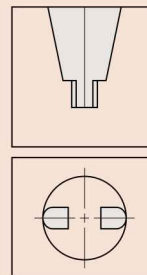
An industry standard in measuring tools

Long Jaw Vernier Caliper SERIES 534

- Long jaws for measuring hard-to-reach workpiece features.
- Inside and outside measurements can be read directly from the upper and lower vernier scales.



534-110



Round jaws for accurate ID measurement

SPECIFICATIONS

Metric _____ with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduation	Remarks
534-109	0 (10.1) - 300mm	±0.07mm	0.05mm	without fine adjustment
534-110	0 (20.1) - 500mm	±0.13mm		

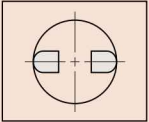
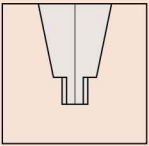
* (): Minimum dimension in inside measurement

Metric/Inch _____ with metric/inch double scale

Order No.	Range*	Accuracy	Graduation	Remarks
534-101	0 (10.1) - 300mm	±0.07mm	0.05mm/ 1/128"	+10mm/.394" to reading in inside measurement without fine adjustment
534-105		±0.04mm	0.02mm/.001"	
534-102	0 (20.1) - 500mm	±0.13mm	0.05mm/ 1/128"	+20mm/.787" to reading in inside measurement without fine adjustment
534-106		±0.06mm	0.02mm/.001"	
534-103	0 (20.1) - 750mm	±0.16mm	0.05mm/ 1/128"	
534-107		±0.08mm	0.02mm/.001"	
534-104	0 (20.1) - 1000mm	±0.20mm	0.05mm/ 1/128"	
534-108		±0.10mm	0.02mm/.001"	

* (): Minimum dimension in inside measurement

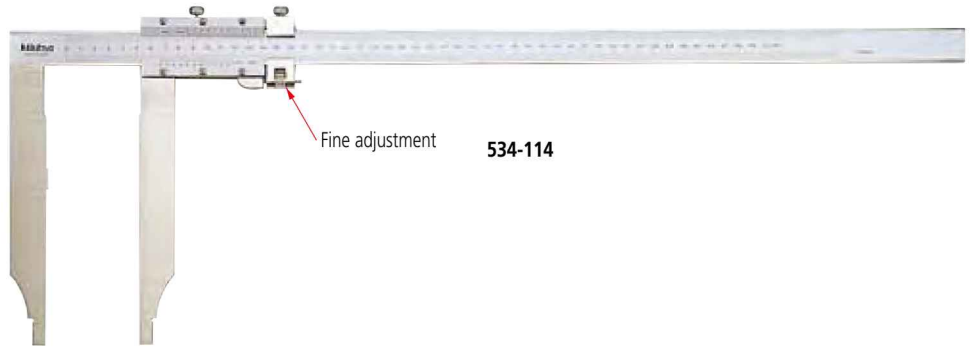
Long Jaw Vernier Caliper SERIES 534



Radiused jaws for accurate ID measurement

- Long jaws for measuring hard-to-reach workpiece features.

- Inside and outside measurements can be read directly from the upper and lower vernier scales.



SPECIFICATIONS

Metric _____ with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduation	Remarks
534-113	0 (10.1) - 300mm	±0.04mm	0.02mm	with fine adjustment
534-114	0 (20.1) - 500mm	±0.06mm		
534-115	0 (20.1) - 750mm	±0.08mm		
534-116	0 (20.1) - 1000mm	±0.10mm		

* (): Minimum dimension in inside measurement

Inch _____ with inside measurement vernier scale

Order No.	Range*	Accuracy	Graduation	Remarks
534-117	0 (.304") - 12"	±.002"	.001"	with fine adjustment
534-118	0 (.804") - 20"	±.003"		
534-119	0 (.804") - 30"	±.004"		
534-120	0 (.804") - 40"			

* (): Minimum dimension in inside measurement

DIMENSIONS

Unit: mm

Range	D	E	F	H	L	M	R	S	t
0-300mm*	90	76.5	—	20	445	7	R5	12	3.8
0-300mm/0-12"		103	38				R5		3.8
0-500mm*	112	89	—	25	682	12	R10	18.5	6
0-500mm/0-20"		—	—				R10		6
0-750mm*	150	—	—	32	995	12	R10	18.5	6
0-750mm/0-30"		62.5	—				R10		8
0-1000mm*	150	—	—	32	1230	12	R10	18.5	8
0-1000mm/0-40"		62.5	—				R10		8

* Without fine adjustment

Calipers

An industry standard in measuring tools

Offset Caliper

SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- The beam-mounted jaw can be adjusted to facilitate measurement of stepped sections and hard-to-get-at workpiece features.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



SPECIFICATIONS

Metric	Digital model	
Order No.	Range	Accuracy
573-601	0 - 150mm	±0.02mm
573-611*	0 - 150mm	±0.02mm
573-602	0 - 200mm	±0.02mm
573-612*	0 - 200mm	±0.02mm
573-604	0 - 300mm	±0.03mm
573-614*	0 - 300mm	±0.03mm

* Without thumb roller

Metric	Analog model	
Order No.	Range	Accuracy
536-101	0 - 150mm	±0.05mm
536-102	0 - 200mm	±0.05mm
536-103	0 - 300mm	±0.08mm

Inch/Metric	Digital model	
Order No.	Range	Accuracy
573-701	0 - 6"	±.001"
573-702	0 - 8"	±.001"
573-704	0 - 12"	±.0015"

DIMENSIONS

Unit: mm

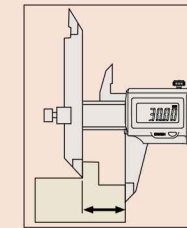
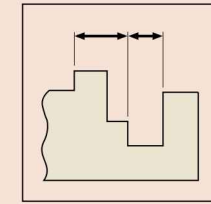
Order No.	Model	Range	D	G	J	N	W
573-601	Digital model	0 - 150mm	40	10	30	10	95
573-602		0 - 200mm	50	10	38.5	10	95
573-604		0 - 300mm	64	15	51	15	135
536-101	Analog model	0 - 150mm	40	10	30	10	95
536-102		0 - 200mm	50	10	38.5	10	95
536-103		0 - 300mm	64	15	51	15	135



(Refer to page X for details.)



(Refer to page X for details.)



Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)
 Resolution*: 0.01mm or .0005"/0.01mm
 Graduation**: 0.05mm
 Display*: LCD
 Scale type*: ABSOLUTE electromagnetic induction linear encoder
 Max. response speed*: Unlimited
 Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
 Battery life*: Approx. 3 years under normal use (1 year: 300mm model)
 Dust/Water protection level*: IP67 (IEC 60529)***
 * Digital models ** Analog models
 *** This model is not waterproof type. Therefore, rustproofing shall be applied after use.

Optional accessories for Digital Model

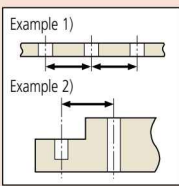
For details, refer to page D-39.
959143: Data hold unit
 Connecting cables for IT/DP/MUX
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
 Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for **U-WAVE** with data button (160mm)
02AZE140A: SPC cable for footswitch



(Refer to page X for details.)



(Refer to page X for details.)

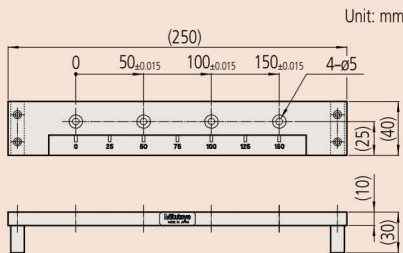


Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc, **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
(1 year: 310mm model)
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories for Digital Models

For details, refer to page D-39.
959143: Data hold unit
Connecting cables for IT/DP/MUX
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140A: SPC cable for footswitch
05FAJ735: Centerline caliper inspection gage



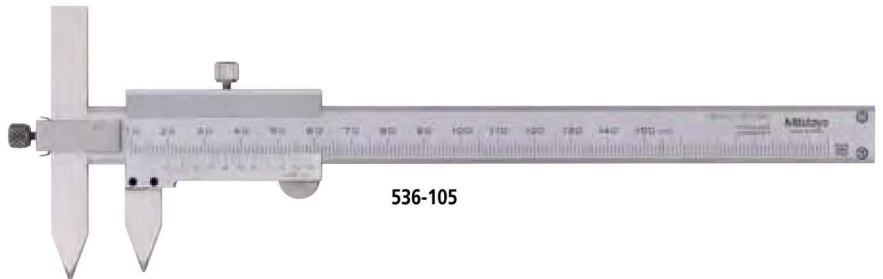
Offset Centerline Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- Specially designed for hole Center-to-Center measurements on the same, or offset, planes.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Direct reading of pitch measurements is available due to the offset-value setting function.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



573-605

ABSOLUTE™



536-105

SPECIFICATIONS

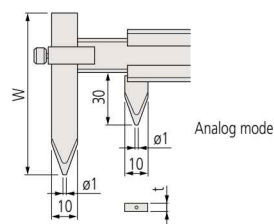
Metric	Digital model	
Order No.	Range	Accuracy
573-605	10.1 - 160mm	±0.03mm
573-615*	10.1 - 160mm	±0.03mm
573-606	10.1 - 210mm	±0.03mm
573-616*	10.1 - 210mm	±0.03mm
573-608	10.1 - 310mm	±0.04mm
573-618*	10.1 - 310mm	±0.04mm

* Without thumb roller

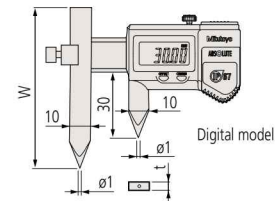
Metric	Analog model	
Order No.	Range	Accuracy
536-105	10.1 - 150mm	±0.05mm
536-106	10.1 - 200mm	±0.05mm
536-107	10.1 - 300mm	±0.08mm

Inch/Metric	Digital model	
Order No.	Range	Accuracy
573-705	.404 - 6.4"	±.0015"
573-706	.404 - 8.4"	±.0015"
573-708	.404 - 12.4"	±.0015"

DIMENSIONS



Range	W	t
10 - 150mm	75	3
10 - 200mm	75	3
10 - 300mm	100	3.8



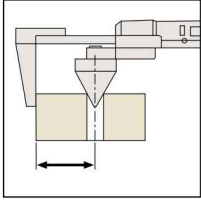
Range	W	t
10 - 160mm/4 - 6.4"	75	3.5
10 - 210mm/4 - 8.4"	75	3.5
10 - 310mm/4 - 12.4"	100	3.8

Calipers

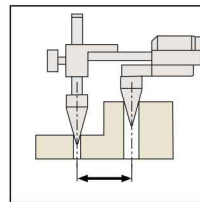
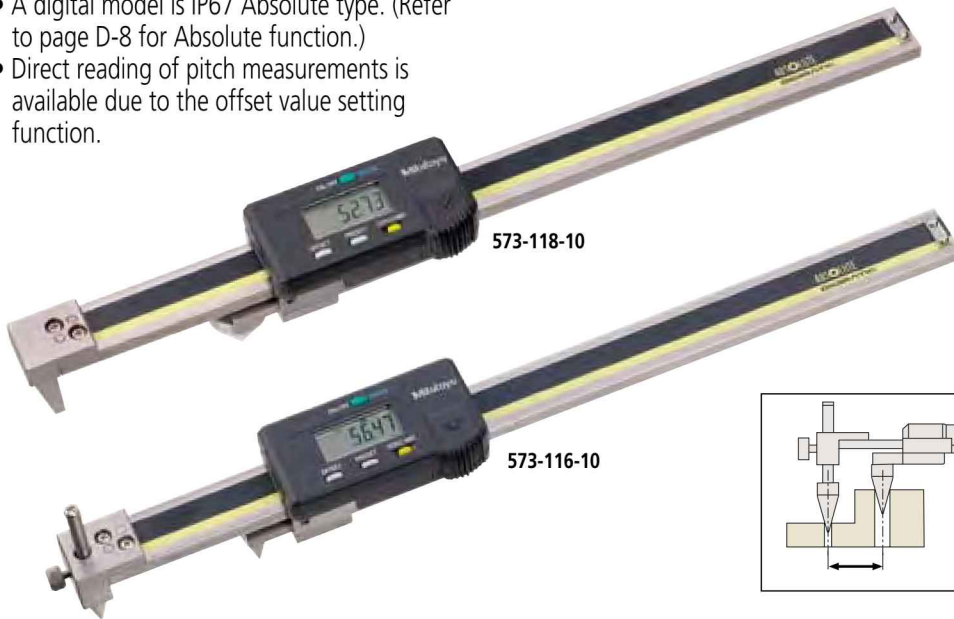
An industry standard in measuring tools

ABSOLUTE Back-Jaw Centerline Caliper SERIES 573 - Center-to-Center & Edge-to-Center Types

- Specially designed to measure hole Center-to-Center and Edge-to-Center distances.
- Provided with jaws on the back of the slider, measurements can be read easily from above.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.
- Dedicated calibration inspection tools are available.



- A digital model is IP67 Absolute type. (Refer to page D-8 for Absolute function.)
- Direct reading of pitch measurements is available due to the offset value setting function.

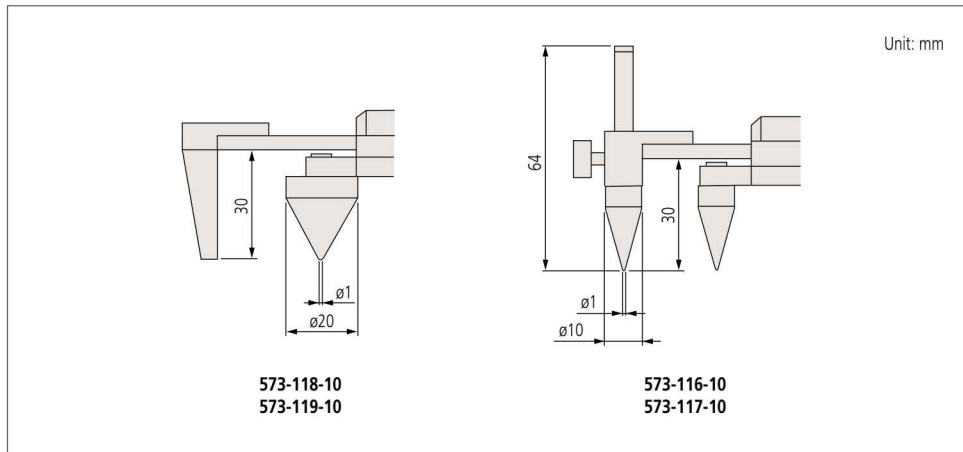


SPECIFICATIONS

Metric	Edge-to-center distance type	
Order No.	Range	Accuracy
573-118-10	10.1 - 200mm	±0.10mm
573-119-10	10.1 - 300mm	±0.15mm

Metric	Center-to-center distance type	
Order No.	Range	Accuracy
573-116-10	10.1 - 200mm	±0.10mm
573-117-10	10.1 - 300mm	±0.15mm

DIMENSIONS



ABSOLUTE™ (Refer to page X for details.)

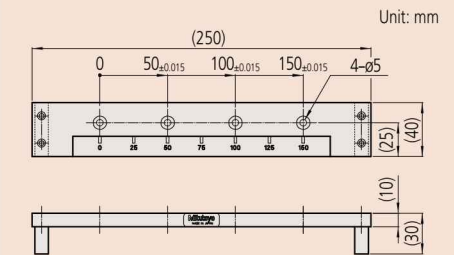


Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Scale type: ABSOLUTE electrostatic capacity linear encoder
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 3.5 years under normal use

Optional accessories

For details, refer to page D-39.
959143: Data hold unit
Connecting cables for IT/DP/MUX
959149: SPC cable with data button (1m)
959150: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380C: SPC cable for **USB-ITN-C** (2m)
Connecting cables for **U-WAVE-T**
02AZD790C: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140C: SPC cable for footswitch
05FAJ735: Centerline caliper inspection gage





(Refer to page X for details.)



(Refer to page X for details.)



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)

Resolution*: 0.01mm or .0005"/0.01mm

Graduation**: 0.05mm

Display*: LCD

Scale type*: ABSOLUTE electromagnetic induction linear encoder

Max. response speed*: Unlimited

Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)

Battery life*: Approx. 3 years under normal use

Dust/Water protection level*: IP67 (IEC 60529)***

* Digital models ** Analog models

*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories for Digital Models

For details, refer to page D-39.

Connecting cables for IT/DP/MUX

05CZA624: SPC cable with data button (1m)

05CZA625: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

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

02AZD790A: SPC cable for **U-WAVE** with data button (160mm)

02AZE140A: SPC cable for footswitch

Point Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- Narrow-tip jaws fit into very small grooves and tracks, making many previously difficult outside measurements far easier to obtain.
- Allows step measurement.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- SPC output models allow integration into statistical process control and measurement systems. Refer to page A-3.



SPECIFICATIONS

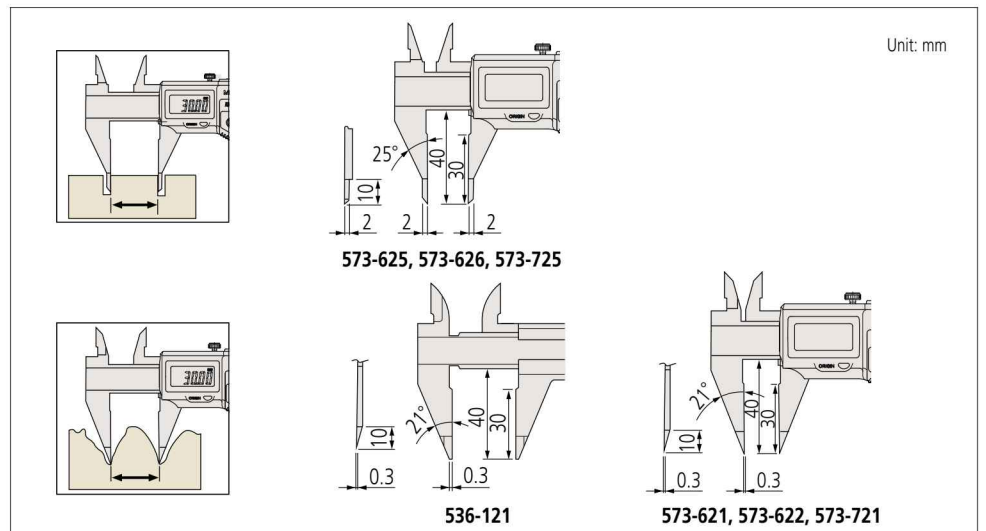
Metric	Digital model	
Order No.	Range	Accuracy
573-621	0 - 150mm	±0.02mm
573-625	0 - 150mm	±0.02mm
573-622*	0 - 150mm	±0.02mm
573-626*	0 - 150mm	±0.02mm

* without thumb roller

Inch/Metric	Digital model	
Order No.	Range	Accuracy
573-721	0 - 6"	±.001"
573-725	0 - 6"	±.001"

Metric		
Order No.	Range	Accuracy
536-121	0 - 150mm	±0.05mm

DIMENSIONS



Calipers

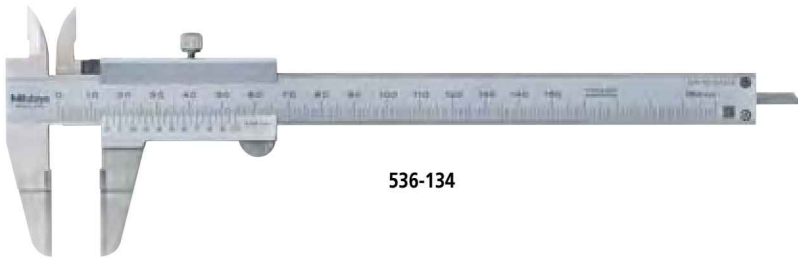
An industry standard in measuring tools

Blade Type Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- The thin blade-type jaws fit into very small grooves and make previously difficult outside measurements far easier to obtain.
- The outside measuring faces are carbide tipped.
- Allows step measurement.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



573-634
ABSOLUTE™



536-134

SPECIFICATIONS

Metric	Order No.	Range	Accuracy
Digital model	573-634	0 - 150mm	±0.02mm
	573-635*	0 - 150mm	±0.02mm

* without thumb roller

Metric	Order No.	Range	Accuracy
	536-134	0 - 150mm	±0.05mm
	536-135	0 - 200mm	±0.05mm
	536-136	0 - 300mm	±0.08mm

Inch/Metric	Order No.	Range	Accuracy
Digital model	573-734	0 - 6"	±.001"

DIMENSIONS

Unit: mm

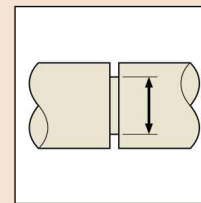
Range	D	d	e	t
0 - 150mm	40	20	0.75	3
0 - 200mm	50	25	0.75	3
0 - 300mm	64	30	1	3.8



(Refer to page X for details.)



(Refer to page X for details.)



Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error for digital models)
 Resolution*: 0.01mm or .0005"/0.01mm
 Graduation**: 0.05mm
 Display*: LCD
 Scale type*: ABSOLUTE electromagnetic induction linear encoder
 Max. response speed*: Unlimited
 Battery: **SR44** (1 pc), **938882**, for initial operational checks (standard accessory)
 Battery life*: Approx. 3 years under normal use
 Dust/Water protection level*: IP67 (IEC 60529)***
 * Digital models ** Analog models
 *** This model is not waterproof type.
 Therefore, rustproofing shall be applied after use.

Optional accessories for Digital Models

For details, refer to page D-39.
 Connecting cables for IT/DP/MUX
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
 Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for **U-WAVE** with data button (160mm)
02AZE140A: SPC cable for footswitch



(Refer to page X for details.)



(Refer to page X for details.)



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)

Resolution*: 0.01mm or .00005"/0.01mm

Graduation**: 0.05mm

Display*: LCD

Scale type*: ABSOLUTE electromagnetic induction linear encoder

Max. response speed*: Unlimited

Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)

Battery life*: Approx. 3 years under normal use

Dust/Water protection level*: IP67 (IEC 60529)***

* Digital models ** Analog models

*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-39.

Connecting cables for IT/DP/MUX

05CZA624: SPC cable with data button (1m)

05CZA625: SPC cable with data button (2m)

USB Input Tool Direct

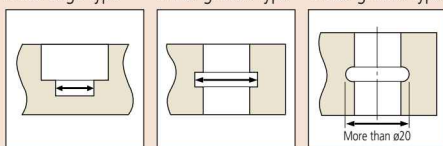
06ADV380A: SPC cable for **USB-ITN-A** (2m)

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

02AZD790A: SPC cable for **U-WAVE** with data button (160mm)

02AZE140A: SPC cable for footswitch

Knife-edge type Inside groove type Inside groove type



ABSOLUTE Inside Caliper SERIES 573, 536 — Knife-edge/Inside Groove/Point Jaw Type

- Specially designed for inside measurements in hard-to-reach places.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.

Knife-edge type



Inside groove type



Point jaw type



SPECIFICATIONS

Metric	Digital model			
Order No.	Range	Accuracy	Remarks	
573-642	10 - 200mm	±0.05mm	Knife-edge type, Measurable min. hole diameter: ø10mm	
573-643*	10 - 200mm	±0.05mm	Knife-edge type, Measurable min. hole diameter: ø10mm	
573-645**	10.1 - 160mm	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10.1mm	
573-647*	10.1 - 160mm	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10.1mm	
573-646**	20.1 - 170mm	±0.03mm	Point jaw type, Measurable min. hole diameter: ø20.1mm	
573-648*	20.1 - 170mm	±0.03mm	Point jaw type, Measurable min. hole diameter: ø20.1mm	

* without thumb roller
** Incorporated with the offsetting function, which indicates the actual measurement value.

Metric				
Order No.	Range	Accuracy	Remarks	
536-142	10 - 200mm	±0.12mm	Knife-edge type, Measurable min. hole diameter: ø10.1mm	
536-145	10.1 - 150mm	±0.05mm	Inside groove type, Measurable min. hole diameter: ø10.1mm	
536-146	20.1 - 150mm	±0.05mm	Point jaw type, Measurable min. hole diameter: ø20.1mm	
536-147	30.1 - 300mm	±0.08mm	Point jaw type, Measurable min. hole diameter: ø30.1mm	
536-148	70.1 - 450mm	±0.10mm	Point jaw type, Measurable min. hole diameter: ø70.1mm	
536-149	70.1 - 600mm	±0.12mm	Point jaw type, Measurable min. hole diameter: ø70.1mm	

Inch/Metric	Digital model			
Order No.	Range	Accuracy	Remarks	
573-742	.4 - 6"	±.002"	Knife-edge type, Measurable min. hole diameter: ø.4"	
573-745**	.404 - 6"	±.002"	Inside groove type, Measurable min. hole diameter: ø.404"	
573-746**	.804 - 6"	±.0015"	Point jaw type, Measurable min. hole diameter: ø.804"	

** Incorporated with the offsetting function, which indicates the actual measurement value.

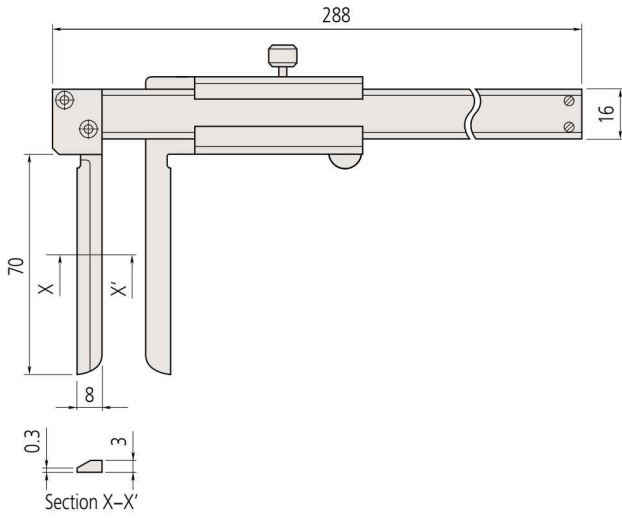
Calipers

An industry standard in measuring tools

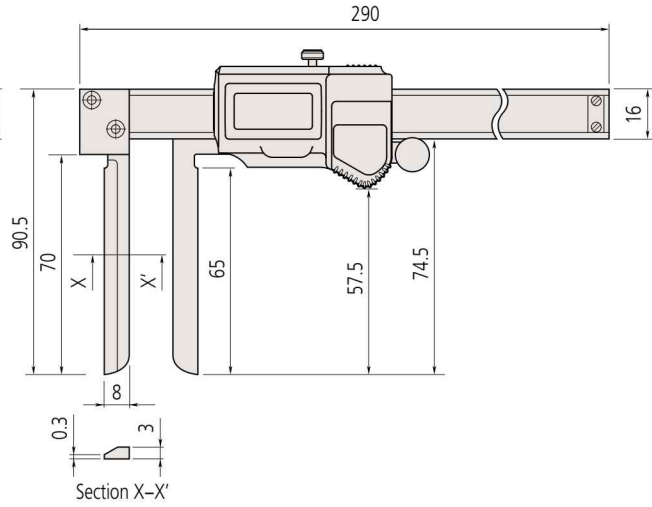
DIMENSIONS

Unit: mm

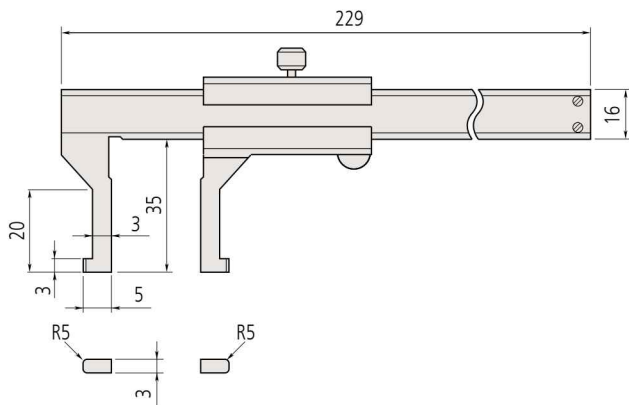
Knife-edge type: 536-142



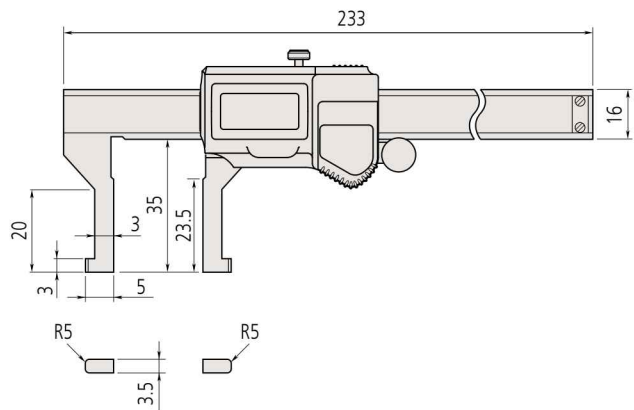
Knife-edge type: 573-642, 643, 742



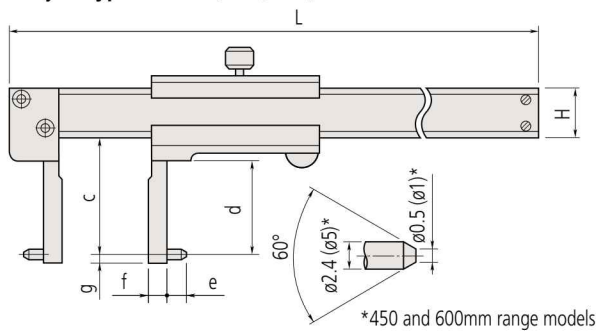
Inside groove type: 536-145



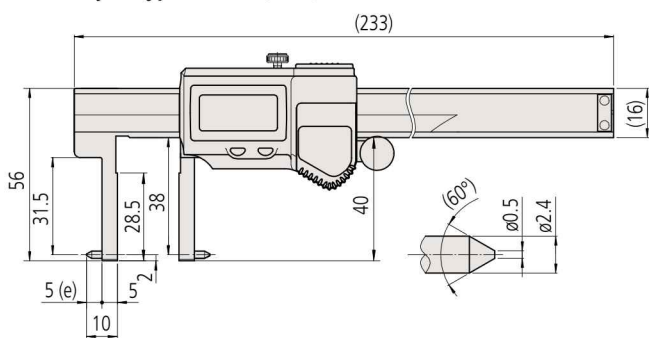
Inside groove type: 573-645, 647, 745



Point jaw type: 536-146, 147, 148, 149



Point jaw type: 573-646, 648, 746



*450 and 600mm range models

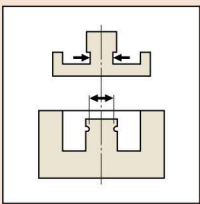
Range	c	d	e	f	g	H	L
150mm	38	31	5	5	2	16	229
300mm	98	89	5	10	2	20	403
450mm	145	136	10	25	5	25	610
600mm	145	136	10	25	5	25	750



(Refer to page X for details.)



(Refer to page X for details.)



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)
Resolution*: 0.01mm or .0005"/0.01mm
Graduation**: 0.05mm
Display*: LCD
Scale type*: ABSOLUTE electromagnetic induction linear encoder
Max. response speed*: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life*: Approx. 3 years under normal use
Dust/Water protection level*: IP67 (IEC 60529)***
* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-39.
Connecting cables for IT/DP/MUX
05CZA624: SPC cable with data button (1m)
05CZA625: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380A: SPC cable for **USB-ITN-A** (2m)
Connecting cables for **U-WAVE-T**
02AZD790A: SPC cable for **U-WAVE** with data button
(160mm)
02AZE140A: SPC cable for footswitch

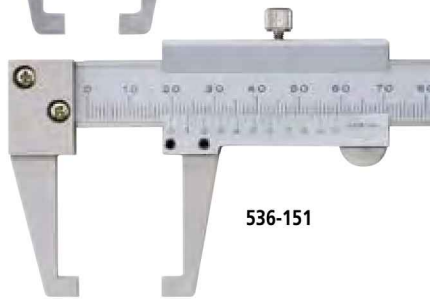
Neck Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- Can measure wall thickness inside bores and recesses.
- Digital models are an IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.

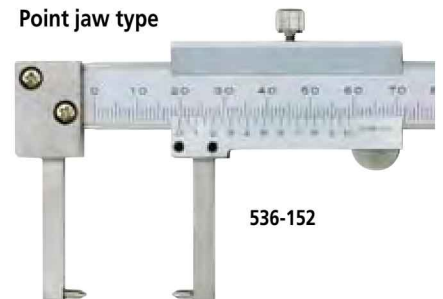


573-651

ABSOLUTE™



536-151



536-152

SPECIFICATIONS

Metric	Digital model	
Order No.	Range	Accuracy
573-651	0 - 150mm	±0.03mm
573-652*	0 - 150mm	±0.03mm
573-653**	0 - 150mm	±0.03mm
573-654***	0 - 150mm	±0.03mm

* Point type
** Without thumb roller

Metric	Digital model	
Order No.	Range	Accuracy
536-151	0 - 150mm	±0.05mm
536-152*	0 - 150mm	±0.05mm

* Point type

Inch/Metric	Digital model	
Order No.	Range	Accuracy
573-751	0 - 6"	±.0015"
573-752*	0 - 6"	±.0015"

* Point type

DIMENSIONS

Unit: mm

Jaw thickness: 3mm for **536-151** and **536-152**
3.5mm for **573-651, 653, 751** and **573-652, 654, 672**

Calipers

An industry standard in measuring tools

Tube Thickness Caliper SERIES 573, 536 — ABSOLUTE Digimatic and vernier type

- The beam-mounted jaw is a round bar that facilitates measurements of tube wall thickness.
- Digital models are IP67 Absolute type. No need to reset the origin after switching on. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



573-661

ABSOLUTE™



536-161

SPECIFICATIONS

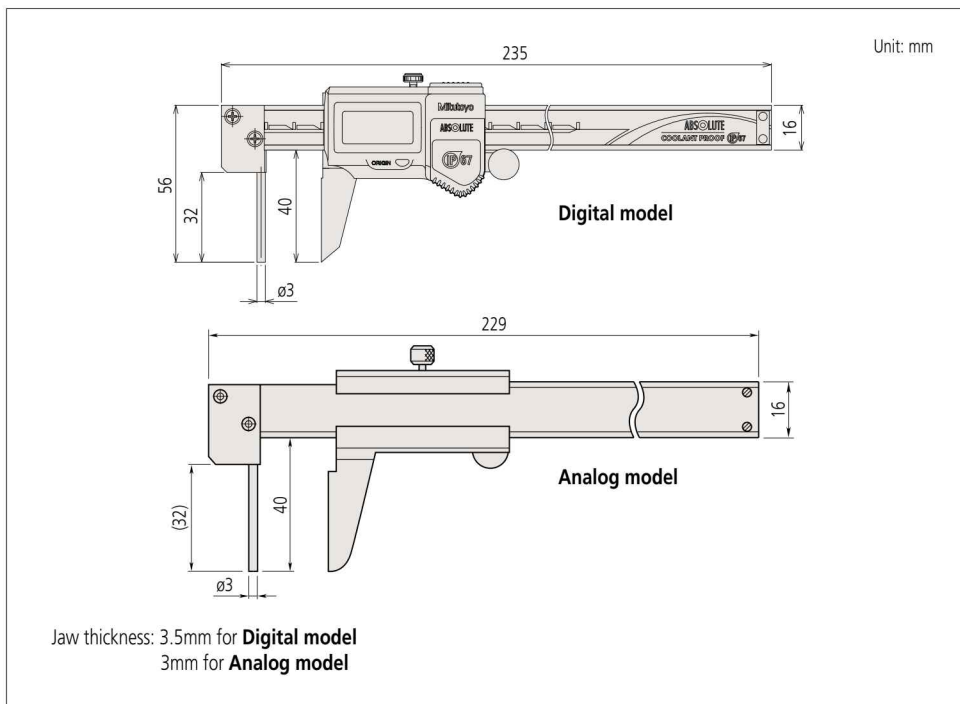
Metric	Digital model	
Order No.	Range	Accuracy
573-661	0 - 150mm	±0.05mm
573-662*	0 - 150mm	±0.05mm

* without thumb roller

Metric	Analog model	
Order No.	Range	Accuracy
536-161	0 - 150mm	±0.05mm

Inch/Metric	Digital model	
Order No.	Range	Accuracy
573-761	0 - 6"	±.002"

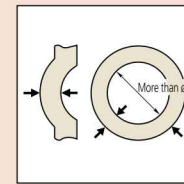
DIMENSIONS



(Refer to page X for details.)



(Refer to page X for details.)



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error for digital models)

Resolution*: 0.01mm or .0005"/0.01mm

Graduation**: 0.05mm

Display*: LCD

Scale type*: ABSOLUTE electromagnetic induction linear encoder

Max. response speed*: Unlimited

Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)

Battery life*: Approx. 3 years under normal use

Dust/Water protection level*: IP67 (IEC 60529)***

* Digital models ** Analog models
*** This model is not waterproof type.
Therefore, rustproofing shall be applied after use.

Optional accessories

For details, refer to page D-39.

Connecting cables for IT/DP/MUX

05CZA624: SPC cable with data button (1m)

05CZA625: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380A: SPC cable for **USB-ITN-A** (2m)

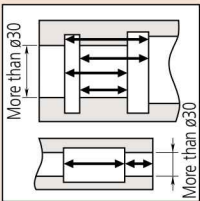
Connecting cables for **U-WAVE-T**

02AZD790A: SPC cable for **U-WAVE** with data button (160mm)

02AZE140A: SPC cable for footswitch

Technical Data

Accuracy: $\pm 0.03\text{mm}$
 Graduation: 0.02mm



Hook Type Vernier Caliper SERIES 536

- Can measure width of grooves and lands inside bores and recesses.



SPECIFICATIONS

Metric			
Order No.	Range*	Accuracy	Remarks
536-171	0 - 200mm (10.1 - 200mm)	$\pm 0.03\text{mm}$	—
536-172	0 - 200mm (2.1 - 200mm)	$\pm 0.03\text{mm}$	with fine adjustment

* () : Dimension in inside measurement

DIMENSIONS

Unit: mm									
Range	D	F	L	N	P	S	t	W	
536-171*1	12	—	320	—	5	4	3.5	28	
536-172*2	—	28.5	—	20	1	—	—	—	

*1: Inside measuring face is R5.
 *2: Inside measuring face is flat.

Swivel Vernier Caliper SERIES 536 — Moving Jaw type

- The moving jaw can be rotated to measure sectioned shafts.
- Allows step measurement.



SPECIFICATIONS

Metric			
Order No.	Range	Accuracy	Remarks
536-212	0 - 200mm	$\pm 0.05\text{mm}$	with depth bar

* with depth bar

DIMENSIONS

Unit: mm									
20.5	25	53.5	288	16	30	42	50		

Jaw thickness: 3mm

Technical Data

Accuracy: $\pm 0.05\text{mm}$
 Graduation: 0.05mm



Calipers

An industry standard in measuring tools

Absolute Low Force Caliper SERIES 573

- ABSOLUTE electromagnetic induction linear encoder system is introduced.
- Due to the low measuring force, these calipers are ideal for measuring elastic workpieces such as plastic parts and rubber parts that standard calipers cannot measure accurately.
- Allows fine feeding easily by using thumb roller.
- Displacement of main scale jaw is 0.3mm.
- Measuring force: 0.49N to 0.98N (0.5gf to 1.0gf)
- Absolute type. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.



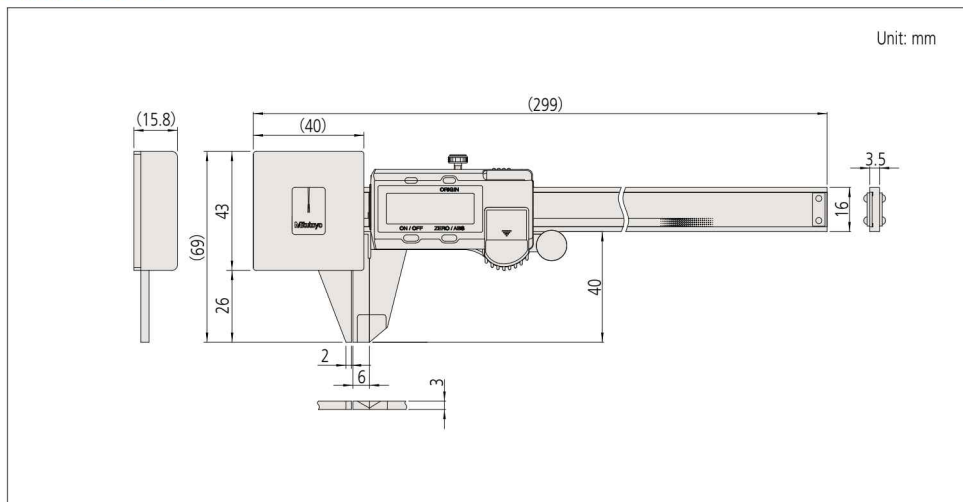
573-191-30

SPECIFICATIONS

Metric			Inch/Metric		
Order No.	Range	Accuracy*	Order No.	Range	Accuracy*
573-191-30	0 - 180mm	±0.05mm	573-291-20	0 - 7"	±.002"

* Excluding quantizing error.
Note) Dedicated for outside measurement (depth bar is not fitted).

DIMENSIONS



ABSOLUTE™ (Refer to page X for details.)



Technical Explanation

Measurement procedure



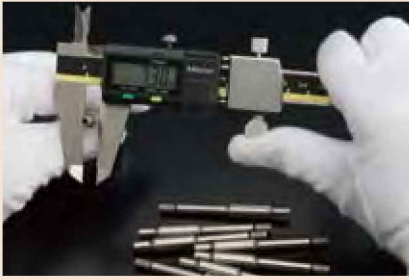
A consistently low measuring force can be guaranteed by only taking measurements when the pointer is between the two fiducial lines.

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Scale type*: ABSOLUTE electromagnetic inductive linear encoder
Jaw retraction: 0.3mm
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 3.5 years under normal use

Optional accessories

For details, refer to page D-39.
959143: Data hold unit
Connecting cables for IT/DP/MUX
959149: SPC cable with data button (1m)
959150: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380C: SPC cable for **USB-ITN-C** (2m)
Connecting cables for **U-WAVE-T**
02AZD790C: SPC cable for **U-WAVE** with data button (160mm)
02AZE140C: SPC cable for footswitch



Technical Data

Accuracy: Refer to the list of specifications.
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Repeatability: 0.01mm
Display: LCD
Scale type: ABSOLUTE electromagnetic inductive linear encoder
Jaw retraction: 2mm
Max. response speed: Unlimited
Battery: **SR44** (1 pc), **938882**,
for initial operational checks (standard accessory)
Battery life: Approx. 3.5 years under normal use

Optional accessories

For details, refer to page D-39.

959143: Data hold unit

Connecting cables for **IT/DP/MUX**

959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380C: SPC cable for **USB-ITN-C** (2m)

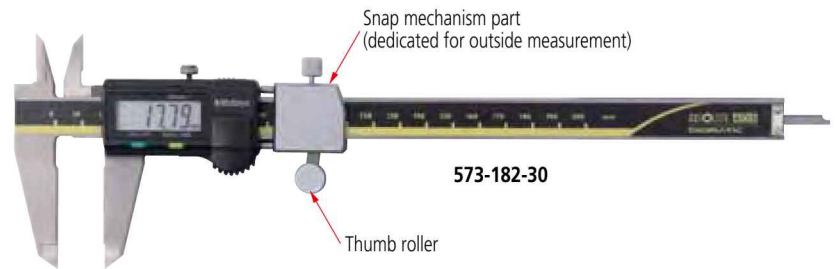
Connecting cables for **U-WAVE-T**

02AZD790C: SPC cable for **U-WAVE** with data button (160mm)

02AZE140C: SPC cable for footswitch

Absolute Snap Caliper SERIES 573

- ABSOLUTE electromagnetic induction linear encoder system is introduced.
- Snap mechanism allows continuous and easy measurement without moving the slider by using the lever.
- The ABSOLUTE Digimatic snap caliper features a spring-loaded mechanism to allow quick and efficient GO/NO-GO inspection for mass production parts.
- Allows step measurement
- Displacement of snap part is 2 mm.
- Measuring force: 7N to 14N
- Absolute type. (Refer to page D-8 for a description of Absolute measurement.)
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.

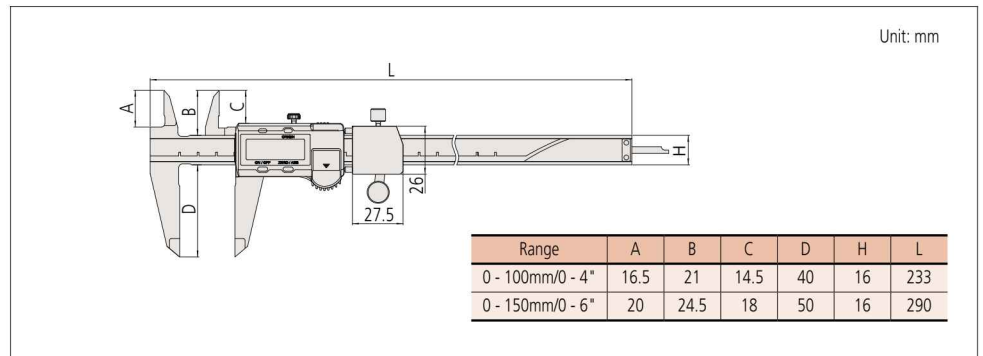


SPECIFICATIONS

Metric			Inch/Metric		
Order No.	Range	Accuracy*	Order No.	Range	Accuracy*
573-181-30	0 - 100mm	±0.02mm	573-281-20	0 - 4"	±.001"
573-182-30	0 - 150mm	±0.02mm	573-282-20	0 - 6"	±.001"

* Excluding quantizing error.
Note) Dedicated for outside measurement (depth bar is not fitted).

DIMENSIONS



Introduction for Measurement data recording tools for Calipers and Height Gages (optional)

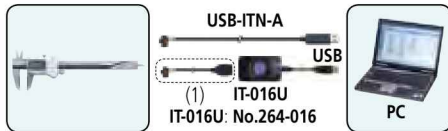
For Coolant Proof Calipers (Connector type A)

■ Dedicated connecting cables (optional)

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

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

USB-ITN-A (2m): No.06ADV380A



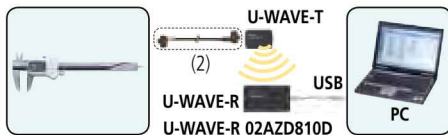
Dedicated cable for models with SPC data output

- (1) 1m: **No.05CZA624**
- 2m: **No.05CZA625**

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

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

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



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790A**
- For footswitch: **No.02AZE140A**

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



Dedicated cable for models with SPC data output

- (1) 1m: **No.05CZA624**
- 2m: **No.05CZA625**

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)

... **IT-007R** (refer to page A-6), **MUX-10F** (refer to page A-14)



Dedicated cable for models with SPC data output

- (1) 1m: **No.05CZA624**
- 2m: **No.05CZA625**

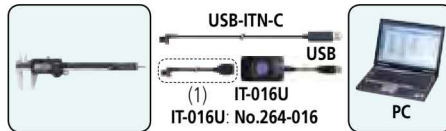
For Digimatic Calipers other than coolant proof type (Connector type C)

■ Dedicated connecting cables (optional)

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

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

USB-ITN-C (2m): No.06ADV380C



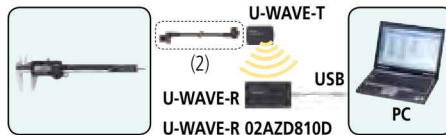
Dedicated cable for models with SPC data output

- (1) 1m: **No.959149**
- 2m: **No.959150**

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

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

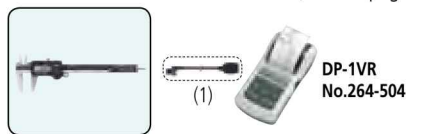
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

- (2) For standard 160mm: **No.02AZD790C**
- For footswitch: **No.02AZE140C**

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

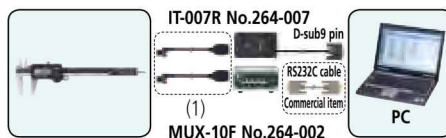


Dedicated cable for models with SPC data output

- (1) 1m: **No.959149**
- 2m: **No.959150**

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)

... **IT-007R** (refer to page A-6), **MUX-10F** (refer to page A-14)



Dedicated cable for models with SPC data output

- (1) 1m: **No.959149**
- 2m: **No.959150**

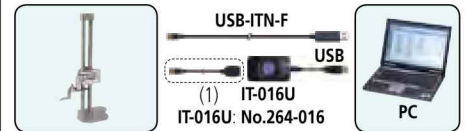
For Digimatic Height Gages (Connector type F)

■ Dedicated connecting cables (optional)

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

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

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



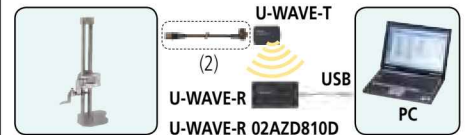
Dedicated cable for models with SPC data output

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

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

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

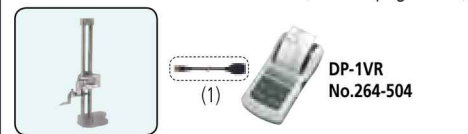
U-WAVE-T (buzzer): No.02AZD880D



Dedicated cable for models with SPC data output

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

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

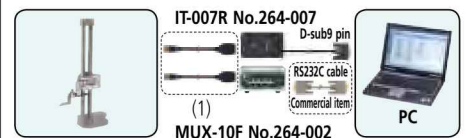


Dedicated cable for models with SPC data output

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

- Connecting to PC, PLC, etc. by RS-232C communication (only for wired system)

... **IT-007R** (refer to page A-6), **MUX-10F** (refer to page A-14)



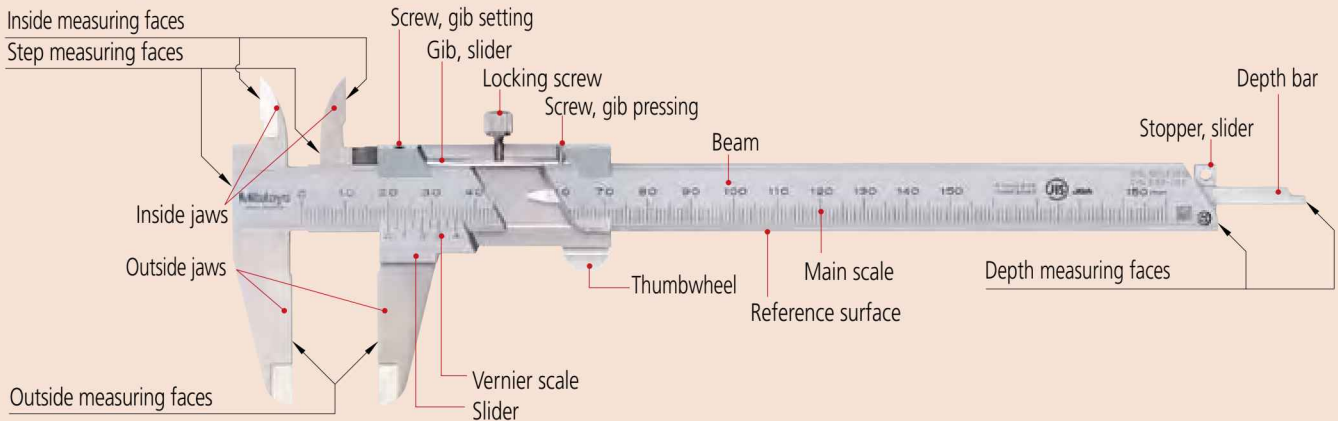
Dedicated cable for models with SPC data output

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

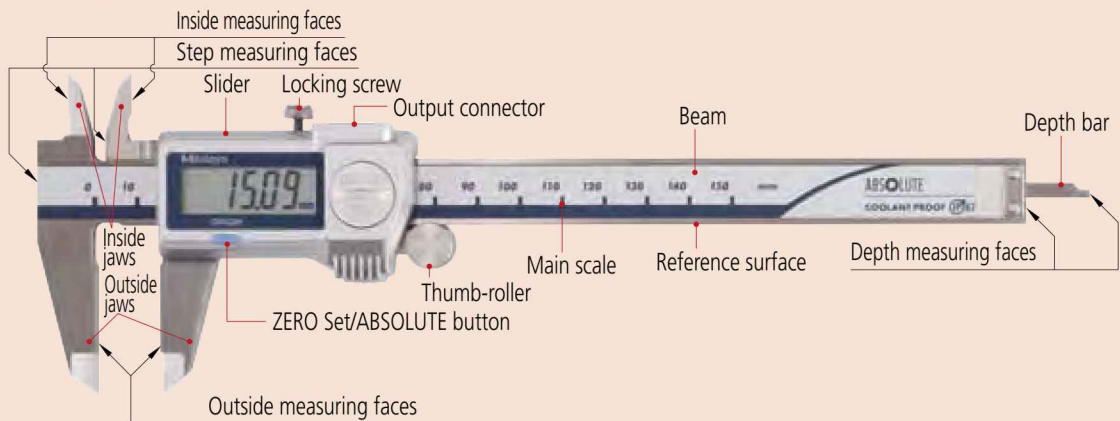
Quick Guide to Precision Measuring Instruments Calipers

■ Nomenclature

Vernier Caliper

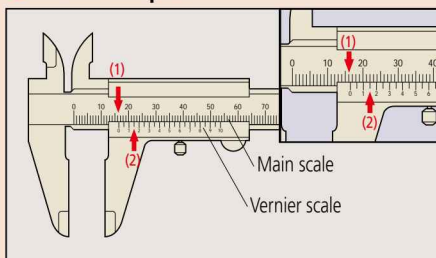


Absolute Digimatic Caliper



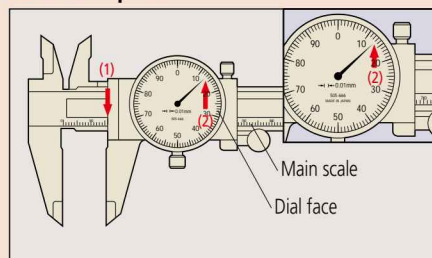
■ How to Read the Scale

● Vernier Calipers



Graduation	0.05mm
(1) Main scale	16 mm
(2) Vernier	0.15 mm
Reading	16.15 mm

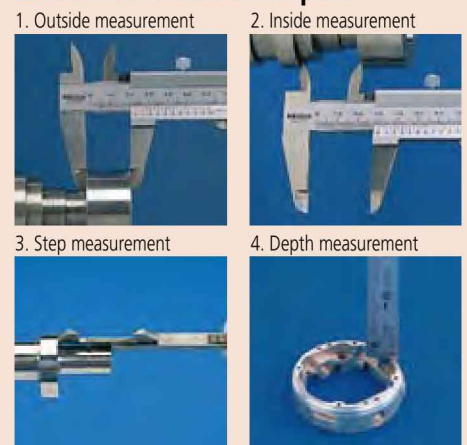
● Dial Calipers



Graduation	0.01mm
(1) Main scale	16 mm
(2) Dial face	0.13 mm
Reading	16.13 mm

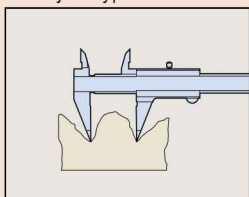
Note) Above left, 0.15 mm (2) is read at the position where a main scale graduation line corresponds with a vernier graduation line.

■ Measurement examples



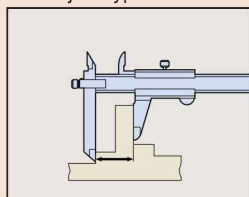
■ Special Purpose Caliper Applications

Point jaw type



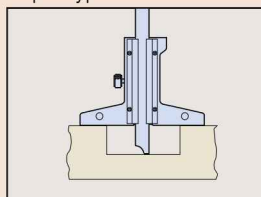
For uneven surface measurement

Offset jaw type



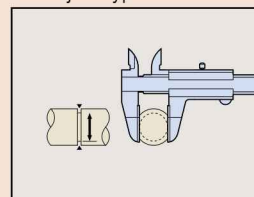
For stepped feature measurement

Depth type



For depth measurement

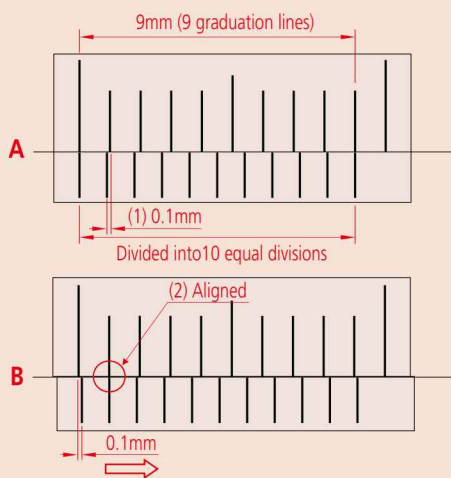
Blade jaw type



For diameter of narrow groove measurement

Vernier scale

This is a short auxiliary scale that enables accurate interpolation between the divisions of a longer scale without using mechanical magnification. The principle of operation is that each vernier scale division is slightly smaller than a main scale division, so that successive vernier graduations successively coincide with main scale graduations as one is moved relative to the other. Specifically, n divisions on a vernier scale are the same length as $n-1$ divisions on the main scale it works with, and n defines the division (or interpolation) ratio. Although n may be any number, in practice it is typically 10, 20, 25, etc., so that the division is a useful decimal fraction. The example below is for $n = 10$. The main scale is graduated in mm, and so the vernier scale is 9mm (10 divisions) long, the same as 9mm (9 divisions) on the main scale. This produces a difference in length of 0.1mm (1) as shown in figure A (the 1st vernier graduation is aligned with the first main scale graduation). If the vernier scale is slid 0.1mm to the right as shown in figure B, the 2nd graduation line on the vernier scale moves into alignment with the 2nd line on the main scale (2), and so enables easy reading of the 0.1mm displacement.



Some early calipers divided 19 divisions on the main scale by 20 vernier divisions to provide 0.05mm resolution. However, the closely spaced lines proved difficult to read and so, since the 1970s, a long vernier scale that uses 39 main scale divisions to spread the lines is generally used instead, as shown below.

19mm Vernier scale



Scale reading 1.45mm

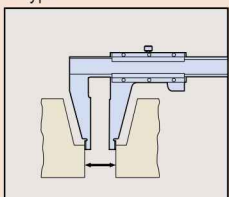
39mm vernier scale (long vernier scale)



Scale reading 30.35mm

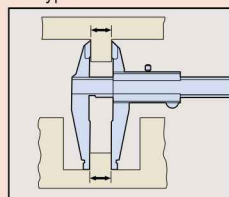
Calipers were made that gave an even finer resolution of 0.02mm. These required a 49-division vernier scale dividing 50 main scale divisions. However, they were difficult to read and are now hard to find since Digital calipers with an easily read display and resolution of 0.01mm appeared.

C-type



Standard outside measurement
Inside measurement of a stepped hole
Measurement of a stepped part

CN-type

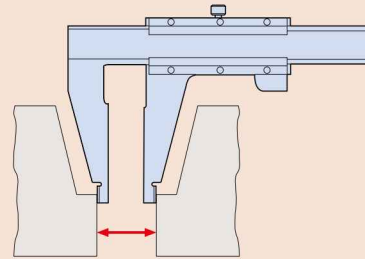


Standard outside measurement
Measurement of a stepped hole
Measurement of a stepped part

About Long Calipers

Steel rules are commonly used to roughly measure large workpieces but if a little more accuracy is needed then a long caliper is suitable for the job. A long caliper is very convenient for its user friendliness but does require some care in use. In the first place it is important to realize there is no relationship between resolution and accuracy. For details, refer to the values in our catalog. Resolution is constant whereas the accuracy obtainable varies dramatically according to how the caliper is used.

The measuring method with this instrument is a concern since distortion of the main beam causes a large amount of the measurement error, so accuracy will vary greatly depending on the method used for supporting the caliper at the time. Also, be careful not to use too much measuring force when using the outside measuring faces as they are furthest away from the main beam so errors will be at a maximum here. This precaution is also necessary when using the tips of the outside measuring faces of a long-jaw caliper.



Small hole measurement with an M-type caliper

A structural error d occurs when you measure the internal diameter of a small hole.

$\varnothing D$: True internal diameter

$\varnothing d$: Measured diameter

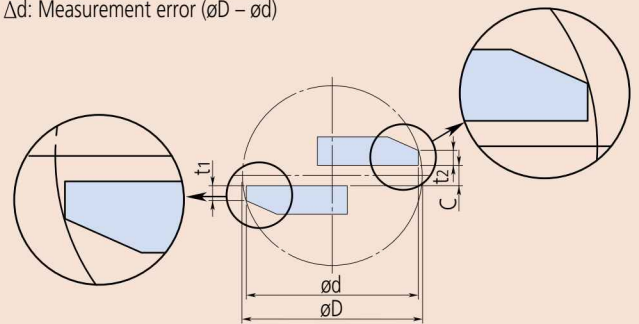
t_1, t_2 : Thickness of the inside jaw

C : Distance between the inside jaws

Δd : Measurement error ($\varnothing D - \varnothing d$)

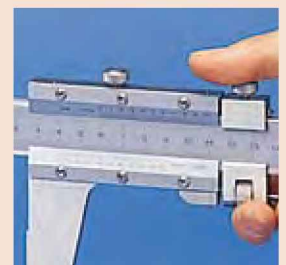
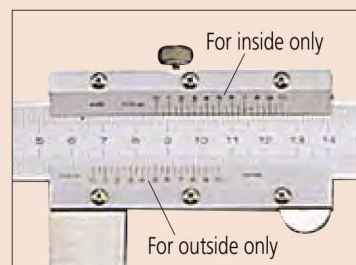
True internal diameter ($\varnothing D$: 5mm) Unit: mm

t_1+t_2+C	0.3	0.5	0.7
Δd	0.009	0.026	0.047



Inside Measurement with a CM-type Caliper

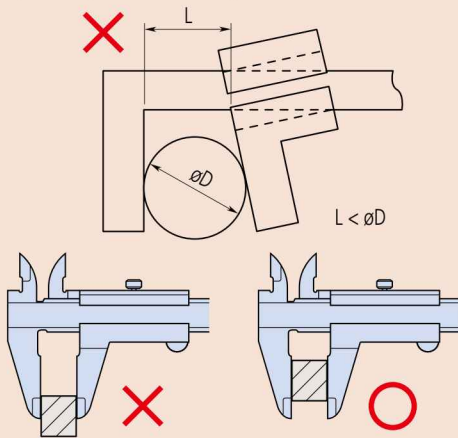
Because the inside measuring faces of a CM-type caliper are at the tips of the jaws the measuring face parallelism is heavily affected by measuring force, and this becomes a large factor in the measurement accuracy attainable. In contrast to an M-type caliper, a CM-type caliper cannot measure a very small hole diameter because it is limited to the size of the stepped jaws, although normally this is no inconvenience as it would be unusual to have to measure a very small hole with this type of caliper. Of course, the radius of curvature on the inside measuring faces is always small enough to allow correct hole diameter measurements right down to the lowest limit (jaw closure). Mitutoyo CM-type calipers are provided with an extra scale on the slider for inside measurements so they can be read directly without the need for calculation, just as for an outside measurement. This useful feature eliminates the possibility of error that occurs when having to add the inside-jaw-thickness correction on a single-scale caliper.



General notes on use of caliper

1. Potential causes of error

A variety of factors can cause errors when measuring with a caliper. Major factors include parallax effects, excessive measuring force due to the fact that a caliper does not conform to Abbe's Principle, differential thermal expansion due to a temperature difference between the caliper and workpiece, and the effect of the thickness of the knife-edge jaws and the clearance between these jaws during measurement of the diameter of a small hole. Although there are also other error factors such as graduation accuracy, reference edge straightness, main scale flatness on the main blade, and squareness of the jaws, these factors are included within the instrumental error tolerances. Therefore, these factors do not cause problems as long as the caliper satisfies the instrumental error tolerances. Handling notes have been added to the JIS so that consumers can appreciate the error factors caused by the structure of the caliper before use. These notes relate to the measuring force and stipulate that "as the caliper does not have a constant-force device, you must measure a workpiece with an appropriate even measuring force. Take extra care when you measure it with the root or tip of the jaw because a large error could occur in such cases."



2. Inside measurement

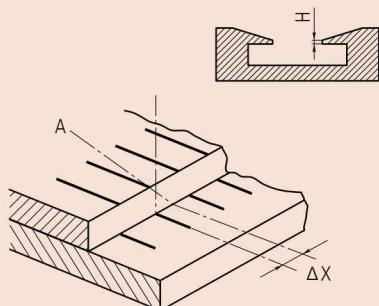
Insert the inside jaw as deeply as possible before measurement.
Read the maximum indicated value during inside measurement.
Read the minimum indicated value during groove width measurement.

3. Depth measurement

Read the minimum indicated value during depth measurement.

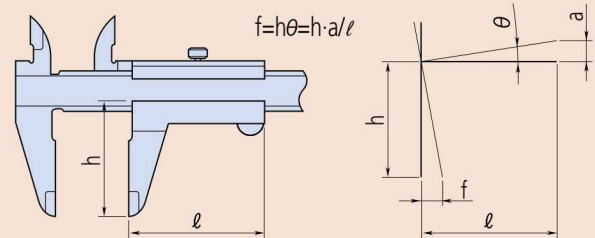
4. Parallax error when reading the scales

Look straight at the vernier graduation line when checking the alignment of vernier graduation lines to the main scale graduation lines.
If you look at a vernier graduation line from an oblique direction (A), the apparent alignment position is distorted by ΔX as shown in the figure below due to a parallax effect caused by the step height (H) between the planes of the vernier graduations and the main scale graduations, resulting in a reading error of the measured value. To avoid this error, the JIS stipulates that the step height should be no more than 0.3 mm.



5. Moving Jaw Tilt Error

If the moving jaw becomes tilted out of parallel with the fixed jaw, either through excessive force being used on the slider or lack of straightness in the reference edge of the beam, a measurement error will occur as shown in the figure. This error may be substantial due to the fact that a caliper does not conform to Abbe's Principle.



Example: Assume that the error slope of the jaws due to tilt of the slider is 0.01mm in 50mm and the outside measuring jaws are 40mm deep, then the error (at the jaw tip) is calculated as $(40/50) \times 0.01\text{mm} = 0.008\text{mm}$.
If the guide face is worn then an error may be present even using the correct measuring force.

6. Relationship between measurement and temperature

The main scale of a caliper is engraved (or mounted on) stainless steel, and although the linear thermal expansion coefficient is equal to that of the most common workpiece material, steel, i.e. $(10.2 \pm 1) \times 10^{-6} / \text{K}$, note that other workpiece materials, the room temperature and the workpiece temperature may affect measurement accuracy.

7. Handling

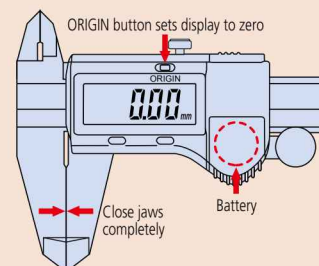
Caliper jaws are sharp, and therefore the instrument must be handled with care to avoid personal injury.
Avoid damaging the scale of a digital caliper and do not engrave an identification number or other information on it with an electric marker pen.
Avoid damaging a caliper by subjecting it to impact with hard objects or by dropping it on a bench or the floor.

8. Maintenance of beam sliding surfaces and measuring faces

Wipe away dust and dirt from the sliding surfaces and measuring faces with a dry soft cloth before using the caliper.

9. Checking and setting the origin before use

Clean the measuring surfaces by gripping a sheet of clean paper between the outside jaws and then slowly pulling it out. Close the jaws and ensure that the vernier scale (or display) reads zero before using the caliper. When using a Digimatic caliper, reset the origin (ORIGIN button) after replacing the battery.



10. Handling after use

After using the caliper, completely wipe off any water and oil. Then, lightly apply anti-corrosion oil and let it dry before storage.
Wipe off water from a waterproof caliper as well because it may also rust.

11. Notes on storage

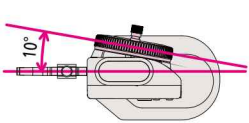
Avoid direct sunlight, high temperatures, low temperatures, and high humidity during storage.
If a digital caliper will not be used for more than three months, remove the battery before storage.
Do not leave the jaws of a caliper completely closed during storage.

Height Gage

A standard measuring tool of industry

Digimatic Height Gage SERIES 192 — Multi-function Type with SPC Data Output

- Double-column structure ensures high measuring accuracy.
- Ergonomic base fits comfortably in the hand.
- Bidirectional touch-trigger probe is available as an optional accessory.
- Character height of the LCD display has been increased (10mm to 11mm) and a high-contrast LCD display unit adopted, so that the readability is improved.
- Inclined handle improves slider ergonomics.
- Allows integration into statistical process control and measurement systems. Refer to page A-3.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 3,500 hours in continuous use.
- Carbide-tipped long scriber (No. **905200** with overall length of 150mm) is provided as a standard accessory. (Standard accessory: scriber clamp No. **05GZA033**)
- For precision Black Granite Surface Plates, refer to page E-51.



192-663-10

SPECIFICATIONS

Metric							
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-663-10	0 - 300mm	0.01mm (0.005mm)	±0.02mm	0.01mm	500mm/s	510mm	5.7kg
192-664-10	0 - 600mm		±0.04mm			802mm	8.3kg
192-665-10	0 - 1000mm		±0.06mm			1228mm	15.7kg

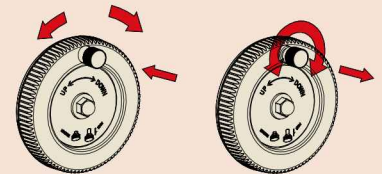
* Excluding quantizing error

Inch/Metric							
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-670-10	0 - 12"	.0005"/0.01mm (.0002"/0.005mm)	±.001"	0.01mm	500mm/s	510mm	5.7kg
192-671-10	0 - 18"		±.0015"			649mm	7.5kg
192-672-10	0 - 24"		±.0015"			802mm	8.3kg
192-673-10	0 - 40"		±.0025"			1228mm	15.7kg

* Excluding quantizing error

Functions

- Origin-setting (ABS measurement mode): Any arbitrary value can be stored as the origin point.
- Zero-setting (INC measurement mode): Displayed value can be set to zero at any arbitrary position of the slider.
- Origin restoration: Previously set origin is restored when switching back to ABS mode.
- Presetting (ABS INC measurement mode): Displayed value can be set to any arbitrary value, including negative values.
- Measuring direction: Measuring direction can be switched at the press of a button.
- Data hold: Display value can be held. Reverts to ABS or INC mode when cancelled.
- Alarm: Error message is displayed when overflow or overspeed of displayed value arises and measurement is stopped.
- Data output: Allows integration into statistical process control and measurement systems. (Refer to page A-3.)
- Fine and coarse height adjustment through knob and wheel combination.
- Slider height adjustment wheel allows fine and coarse height adjustment.



- Coarse adjustment: Push the small fine-adjustment knob in to disengage gearing and then turn the large wheel.
- Fine adjustment: Pull the fine-adjustment knob out to engage gearing and then turn this knob, which then slowly turns the wheel.

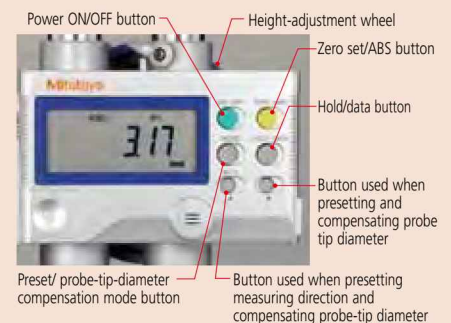
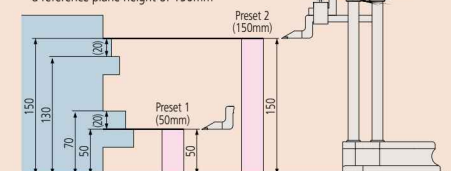
Low-voltage alert: When battery voltage becomes low, a warning appears in the display.

Probe-tip diameter compensation: An adjustment is applied to the raw measurement data to compensate for the effect of the size of the spherical contact point used by the bidirectional touch-trigger probe.

Presetting (2 positions)

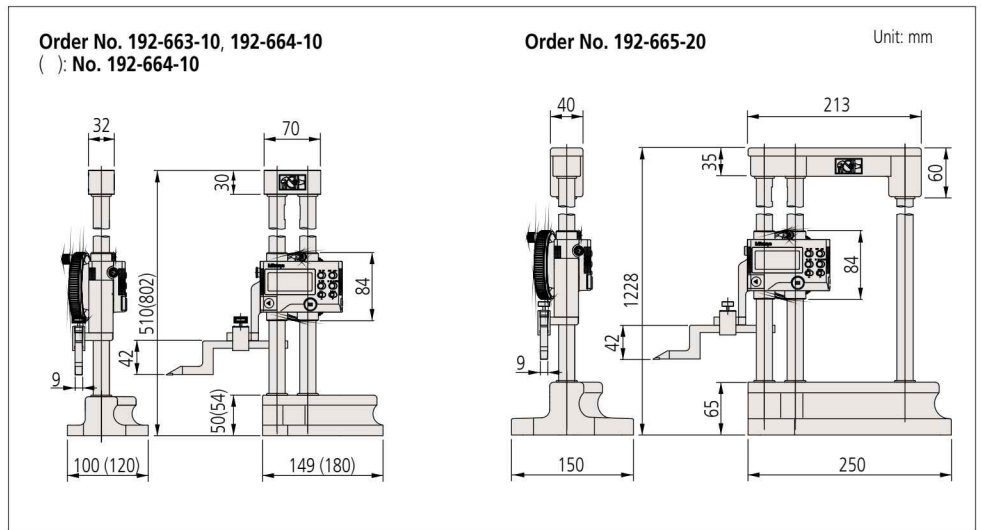
With two preset functions, two reference heights can be used relative to a surface plate.

- **Example of preset 1**
To measure a height of 70mm, with a reference plane height of 50mm
- **Example of preset 2**
To measure a height of 130mm, with a reference plane height of 150mm



* Probe-tip-diameter compensation mode is a function provided for Order No. 192-663-10/192-664-10/192-665-10/192-670-10/192-671-10/192-672-10/192-673-10.

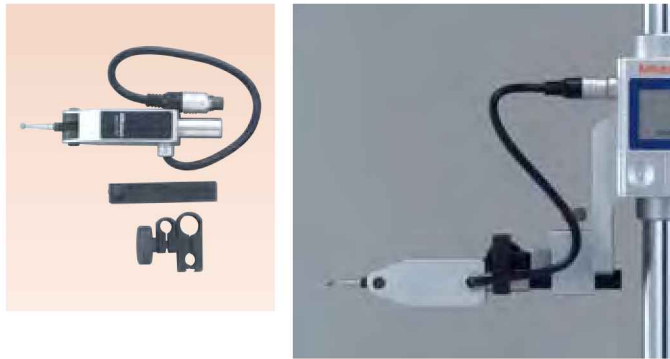
DIMENSIONS



Optional Accessory

Bidirectional touch-trigger probe

Improves accuracy in step, internal thickness, and outside width measurement by minimizing reproducibility error.



SPECIFICATIONS

Metric							
Order No.	Measuring direction	Relay contact type	Probe overtravel	Probe size	Repeatability	Measuring force	Standard accessories
192-007	Bidirectional	Normally Open	1.5mm	ø3mm	σ : 2 μ m	0.4N	Holder arm, Clamp

Inch							
Order No.	Measuring direction	Relay contact type	Probe overtravel	Probe size	Repeatability	Measuring force	Standard accessories
192-008	Bidirectional	Normally Open	1.5mm	ø3mm	σ : 2 μ m	0.4N	Holder arm, Clamp

For details of the connecting cable, refer to page D-39.

Connecting cables for IT/DP/MUX

905338: SPC cable (1m)

905409: SPC cable (2m)



USB Input Tool Direct

06ADV380F: SPC cable for USB-ITN-F (2m)

Connecting cables for U-WAVE-T

02AZD790F: SPC cable for U-WAVE (160mm)

02AZE140F: SPC cable for footswitch

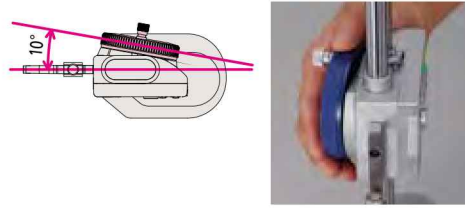
Height Gage

A standard measuring tool of industry

Digimatic Height Gage SERIES 192 — Standard Type with SPC Data Output

- Easy-to-use standard type.
- Double-column structure ensures high measuring accuracy.
- Ergonomic base fits comfortably in the hand.
- Character height of the LCD display has been increased (10mm to 11mm) and a high-contrast LCD display unit adopted, so that readability is improved.
- Allows integration into statistical process control and measurement systems. Refer to page A-3.

- Inclined handle improves slider ergonomics.



- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 3,500 hours in continuous use.
- Carbide-tipped long scriber No. 07GZA000 is provided as a standard accessory. (Standard accessory: scriber clamp No. 05GZA033)
- For precision Black Granite Surface Plates, refer to page E-51.



192-613-10

SPECIFICATIONS

Metric							
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-613-10	0 - 300mm	0.01mm (0.005mm)	±0.02mm	0.01mm	500mm/s	475mm	4.7kg
192-614-10	0 - 600mm		±0.05mm			802mm	8.3kg
192-615-10	0 - 1000mm		±0.07mm			1228mm	15.7kg

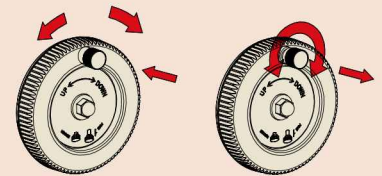
* Excluding the quantizing error of ±1 count.

Inch/Metric							
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Height	Mass
192-630-10	0 - 12"	.0005"/0.01mm (.0002"/0.005mm)	±.001"	0.01mm	500mm/s	475mm	4.7kg
192-631-10	0 - 18"		±.002"			649mm	7.5kg
192-632-10	0 - 24"		±.002"			802mm	8.3kg
192-633-10	0 - 40"		±.003"			1228mm	15.7kg

* Excluding the quantizing error of ±1 count.

Functions

- Origin-setting (ABS measurement mode): Any arbitrary value can be stored as the origin point.
- Zero-setting (INC measurement mode): Displayed value can be set to zero at any arbitrary position of the slider.
- Origin restoration: Previously set origin is restored when switching back to ABS mode.
- Presetting (ABS INC measurement mode): Displayed value can be set to any arbitrary value, including negative values.
- Measuring direction: Measuring direction can be switched at the press of a button.
- Data hold: Display value can be held. Reverts to ABS or INC mode when cancelled.
- Alarm: Error message is displayed when overflow or overspeed of displayed value arises and measurement is stopped.
- Data output: Allows integration into statistical process control and measurement systems. (Refer to page A-3.)
- Fine and coarse height adjustment through knob and wheel combination. Slider height adjustment wheel allows fine and coarse height adjustment.



Coarse adjustment

Fine adjustment

Push the small fine-adjustment knob in to disengage gearing and then turn the large wheel.

Pull the fine-adjustment knob out to engage gearing and then turn this knob, which then slowly turns the wheel.

Low-voltage alert:

When battery voltage becomes low, a warning appears in the display.

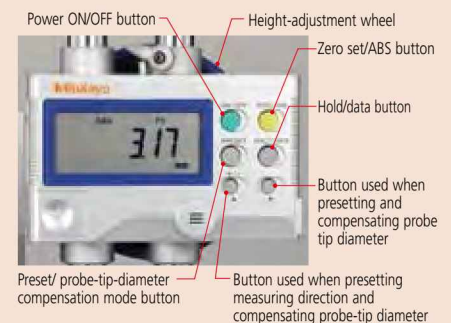
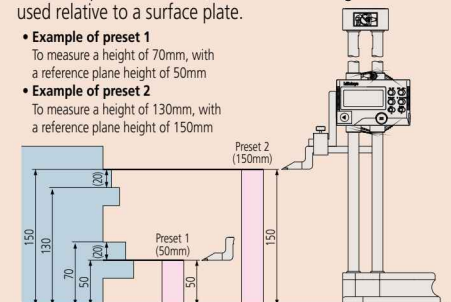
Probe-tip diameter compensation:

An adjustment is applied to the raw measurement data to compensate for the effect of the size of the spherical contact point used by the bidirectional touch-trigger probe.

Presetting (2 positions)

With two preset functions, two reference heights can be used relative to a surface plate.

- **Example of preset 1**
To measure a height of 70mm, with a reference plane height of 50mm
- **Example of preset 2**
To measure a height of 130mm, with a reference plane height of 150mm

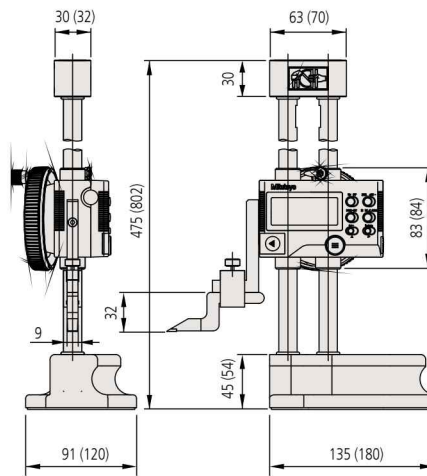


* Probe-tip-diameter compensation mode is a function provided for Order No. 192-663-10/192-664-10/192-665-10/192-670-10/192-671-10/192-672-10/192-673-10.

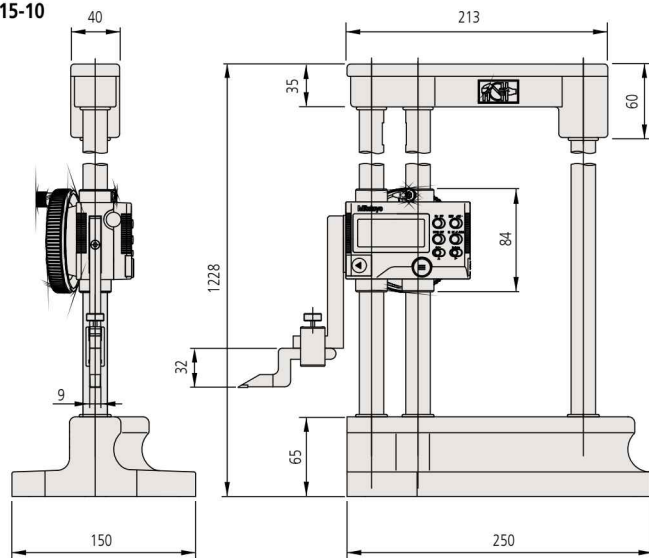
DIMENSIONS

Order No. 192-613-10, 192-614-10
 (): No. 192-614-10

Unit: mm



Order No. 192-615-10



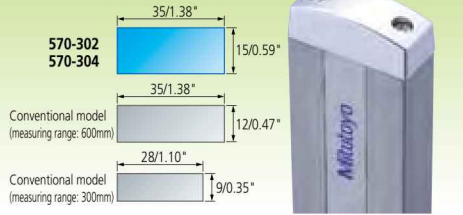
Height Gage

A standard measuring tool of industry

ABSOLUTE Digimatic Height Gage SERIES 570 — with ABSOLUTE Linear Encoder

- Allows smooth elevation by the slider adjustment wheel, which is the same as the well-established double-column structure height gage.
- Large slider-clamp lever ensures positive and accurate clamping action.
- High durability and high accuracy are ensured by an improved column design (35x15mm).
- Due to the built-in ABSOLUTE scale function, origin setting is not required each time power is turned ON.
- Allows integration into statistical process control and measurement systems. Refer to page A-3.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 20,000 hours under normal use.
- For precision Black Granite Surface Plates, refer to page E-51.

Dimensions of column cross section



- Character height of the LCD display is 10mm.
- Ergonomic and stylish base fits comfortably in the hand.



SPECIFICATIONS

Metric						
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Mass
570-302	0 - 300mm	0.01mm	±0.03mm	0.01mm	Unlimited	4.6kg
570-304	0 - 600mm		±0.05mm			6.4kg

* Excluding quantizing error

Inch/Metric						
Order No.	Range	Resolution	Accuracy*	Repeatability	Max. response speed	Mass
570-312	0 - 12"	.0005"/0.01mm	±.0015"	0.01mm	Unlimited	4.6kg
570-313	0 - 18"		±.002"			5.9kg
570-314	0 - 24"		±.002"			6.4kg

* Excluding quantizing error

ABSOLUTE™

(Refer to page X for details.)

Functions

Origin-setting:

Any convenient reference surface, such as a surface plate, etc., can be stored as the absolute origin point.

Absolute measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. Absolute origin position can be changed by ORIGIN button.

Incremental measurement: Allows origin setting at any arbitrary position. In this case, the origin point is not stored after turning off the power.

Data hold

Display value can be held.

Data output:

Allows integration into statistical process control and measurement systems. (Refer to page A-3.)

Low-voltage alert:

Low-voltage alert: If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible so that the battery can be changed in good time.

Standard accessories

For 570-302, 304

No.07GZA000 Scriber

No.05GZA033 Scriber clamp

For 570-312 and 570-313, 570-314

No.900258 Scriber

No.901385 Scriber clamp



Optional accessories

For details, refer to page D-39.

Connecting cables for IT/DP/MUX

905338: SPC cable with data button (1m)

905409: SPC cable with data button (2m)

USB Input Tool Direct

06ADV380F: SPC cable for USB-ITN-F (2m)

Connecting cables for U-WAVE-T

02AZD790F: SPC cable for U-WAVE with data button (160mm)

02AZE140F: SPC cable for footswitch



Slider height adjustment wheel



Large clamp lever

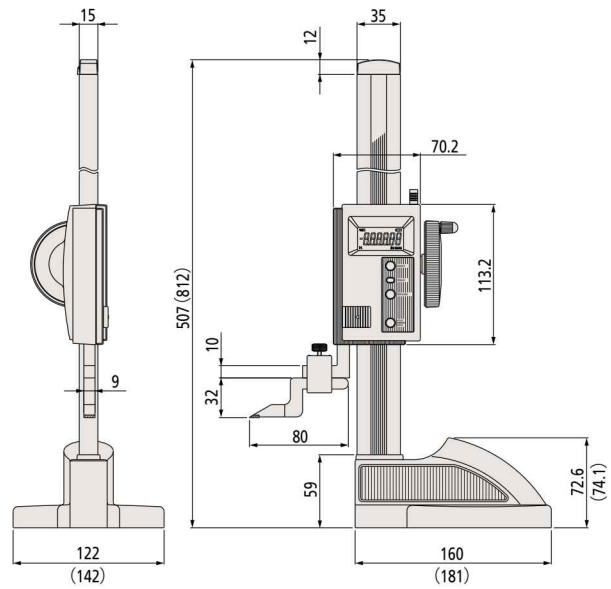


Base that fits the hand comfortably

DIMENSIONS

() : No. 570-304

Unit: mm



Height Gage

A standard measuring tool of industry

ABSOLUTE Digimatic Height Gage SERIES 570 — with ABSOLUTE Linear Encoder

- ABS and INC measurement modes allow efficient operation.
- Rigid structure makes instrument suitable for use in severe work environments.
- The +/- measurement function widens the application range.
- Allows integration into statistical process control and measurement systems. Refer to page A-3.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 5,000 hours under normal use.
- Carbide-tipped scriber (No. **900173** for Nos. **570-227** and **244**, and No. **905200** for Nos. **570-230** and **248**) is provided as a standard accessory. (Standard accessory: scriber clamp No. **901338** for Nos. **570-227** and **244**, and No. **05GZA033** for Nos. **570-230** and **248**)
- When a dial indicator or test indicator is used with **570-227**, the dedicated holding bar (**953639**, overall length 50mm) is recommended for use. However, instrumental error may be larger because the measurement point is further from the beam.
- For precision Black Granite Surface Plates, refer to page E-51.



570-227

SPECIFICATIONS

Metric

Order No.	Range	Resolution	Fine feed	Accuracy*	Repeatability	Height	Mass
570-227	0 - 200mm	0.01mm	4mm	±0.03mm	0.01mm	355mm	1.4kg
570-230	0 - 1000mm		6mm	±0.07mm		1260mm	16.8kg

* Excluding quantizing error

Inch/Metric

Order No.	Range	Resolution	Fine feed	Accuracy*	Repeatability	Height	Mass
570-244	0 - 8"	.0005" / 0.01mm	.16"	±.002"	0.01mm	355mm	1.4kg
570-248	0 - 40"		.24"	±.003"		1260mm	16.8kg

* Excluding quantizing error

ABSOLUTE™

(Refer to page X for details.)

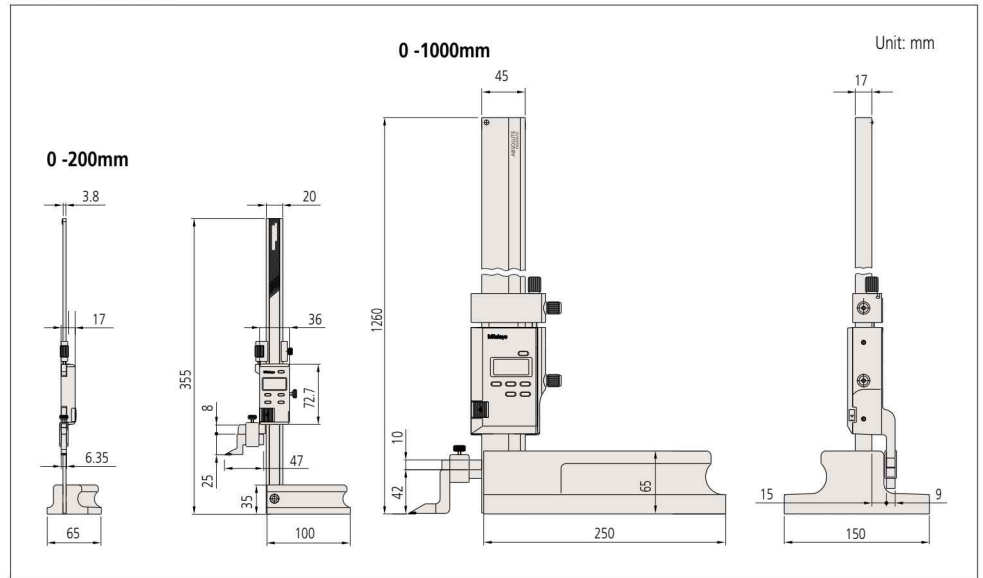
Functions

Zero-setting
 +/- directional measurement
 Data hold
 Data output
 Presetting
 inch/mm reading (inch/mm models)
 Preset value memory
 Origin restoration
 Low battery voltage alert
 Counting value composition error alert

Optional accessories

For details, refer to page D-39.
 Connecting cables for IT/DP/MUX
905338: SPC cable with data button (1m)
905409: SPC cable with data button (2m)
 USB Input Tool Direct
06ADV380F: SPC cable for **USB-ITN-F** (2m)
 Connecting cables for **U-WAVE-T**
02AZD790F: SPC cable for **U-WAVE** with data button (160mm)
02AZE140F: SPC cable for footswitch

DIMENSIONS



D

Height Gage

A standard measuring tool of industry

Vernier Height Gage

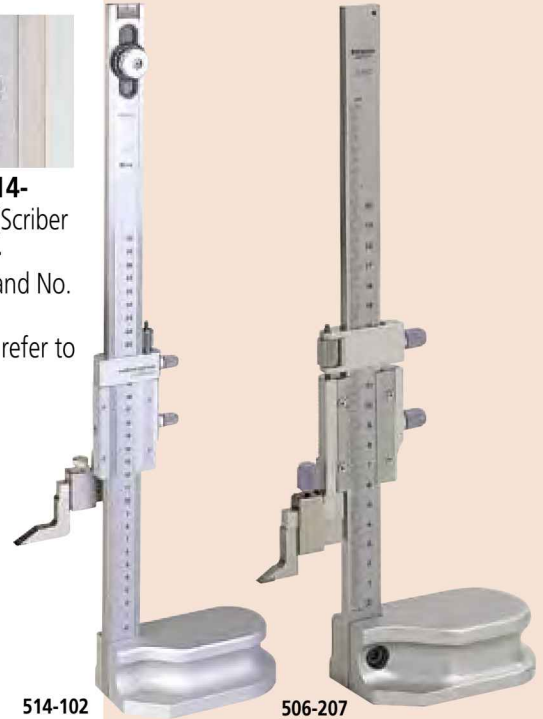
SERIES 514, 506 — Standard Height Gage with Adjustable Main Scale

- Fits comfortably in the hand and moves easily on the surface plate.
- The main scale slides and clamps within the column for quick and convenient zero-setting.
- Large locking knobs are used both for the slider and fine adjustment clamps to make clamping easy and secure.
- Operability of slider has been improved.
- Large main-scale engraving for fatigue-free



working.

- Carbide-tipped scriber (No. **07GZA000** for Nos. **514-102/104/106/103/105/107**, No. **905200** for Nos. **514-108** and **109**, and No. **900390** for No. **514-170**) is provided as a standard accessory. (Scriber clamp No. **05GZA033** for Code No. **514-102/104/106/108/103/105/107/109**, and No. **905008** for No. **514-170**)
- For precision Black Granite Surface Plates, refer to page E-51.



SPECIFICATIONS

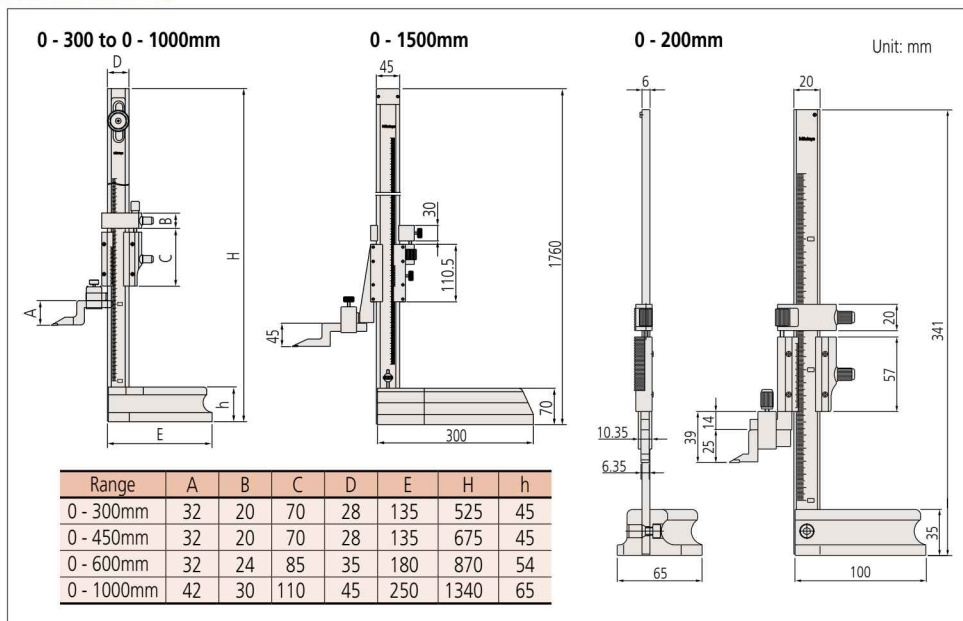
Metric

Order No.	Range	Graduation	Accuracy	Scale adjustment	Fine feed	Height	Mass	Remarks
506-207	0 - 200mm	0.02mm	±0.03mm	—	4mm	341mm	1.4Kg	—
514-102	0 - 300mm		±0.04mm	15mm		525mm	3.1Kg	—
514-104	0 - 450mm		±0.05mm		675mm	3.4Kg	—	
514-106	0 - 600mm		±0.07mm	7mm	870mm	7.4Kg	—	
514-108	0 - 1000mm	0.05mm	±0.07mm	25mm	6mm	1340mm	20Kg	—
514-170	0 - 1500mm		±0.18mm		20mm	1760mm	26Kg	with magnifier

Inch/Metric

Order No.	Range	Graduation	Accuracy	Scale adjustment	Fine feed	Height	Mass	Remarks
506-208	0 - 8"	.001"/0.02mm	±.001"	—	.16"	341mm	1.4Kg	—
514-103	0 - 12"		±.002"	.6"		525mm	3.1Kg	—
514-105	0 - 18"		±.002"		.6"	675mm	3.4Kg	—
514-107	0 - 24"		±.003"	1"	.27"	870mm	7.4Kg	—
514-109	0 - 40"	—	±.003"	—	.24"	1340mm	20.0 Kg	—

DIMENSIONS



Optional accessories

- 07GZA000:** Scriber
 - 953638:** Holding bar for test indicator (length: 50mm)
 - 900209:** Holding bar for test indicator (length: 100mm)
 - 953639:** Holding bar for test indicator (length: 2")
 - 900306:** Holding bar for test indicator (length: 4")
 - 900321:** Swivel clamp used with holding bar (metric)
 - 900322:** Swivel clamp used with holding bar (inch)
 - 902053:** Clamp (with dovetail groove, $\phi 6$ and $\phi 8$ holes)
- Note: A test indicator can be mounted on a height gage using a holding bar and clamp.

Dial Height Gage SERIES 192 — With digital counter

- Easy and error-free reading with both up and down digital counters as well as a dial.

- Fits comfortably in the hand and moves easily on the surface plate.



- Can be zero-set at any arbitrary position.
- Provided with a large adjustment wheel for easy height adjustment.
- Clamp can be operated easily and securely.

- Carbide tipped scriber (**No. 07GZA000**) is attached as standard. (Standard accessory: Scriber clamp **No.05GZA033**)
- For precision Black Granite Surface Plates, refer to page E-51.

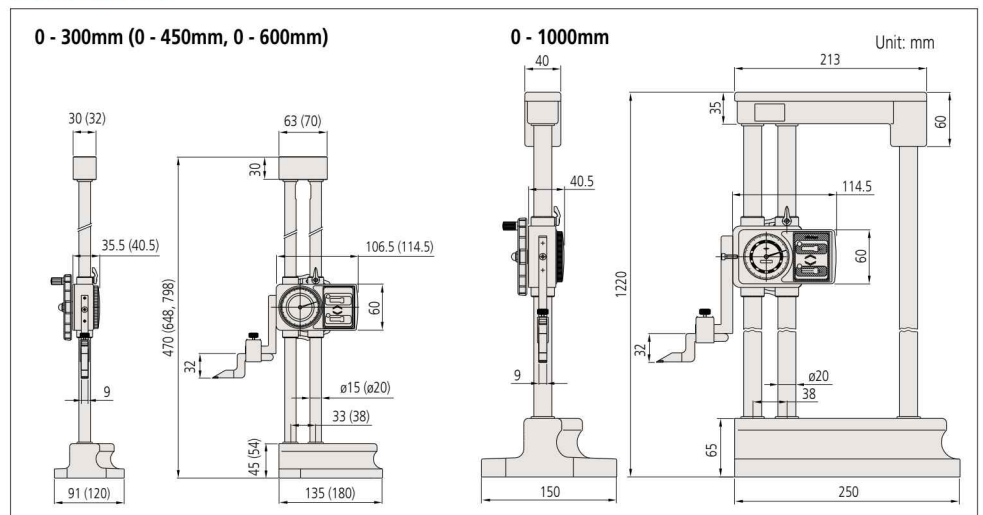


192-130

SPECIFICATIONS

Metric					
Order No.	Range	Accuracy	Graduation	Height	Mass
192-130	0 - 300mm	$\pm 0.03\text{mm}$	0.01mm	470mm	4.2kg
192-131	0 - 450mm	$\pm 0.05\text{mm}$		648mm	9.2kg
192-132	0 - 600mm	$\pm 0.05\text{mm}$		798mm	9.8kg
192-133	0 - 1000mm	$\pm 0.07\text{mm}$		1220mm	17.0kg
Inch					
Order No.	Range	Accuracy	Graduation	Height	Mass
192-150	0 - 12"	$\pm 0.0015"$.001"	470mm	4.2kg
192-151	0 - 18"	$\pm 0.002"$		648mm	9.2kg
192-152	0 - 24"	$\pm 0.002"$		798mm	9.8kg
192-153	0 - 40"	$\pm 0.003"$		1220mm	17.0kg

DIMENSIONS



Height Gage

A standard measuring tool of industry

CERA Caliper Checker SERIES 515

- Enables efficient setting and inspection of calipers and height gages.



515-555

SPECIFICATIONS

Metric

Order No.	Range	Block pitch accuracy*		Parallelism of blocks*		Mass
		20 - 300mm	350 - 600mm	20 - 300mm	350 - 600mm	
515-555	0 - 300mm	±5.0µm	—	2.0µm	—	4kg
515-556-2	0 - 600mm		±7.0µm		4.0µm	

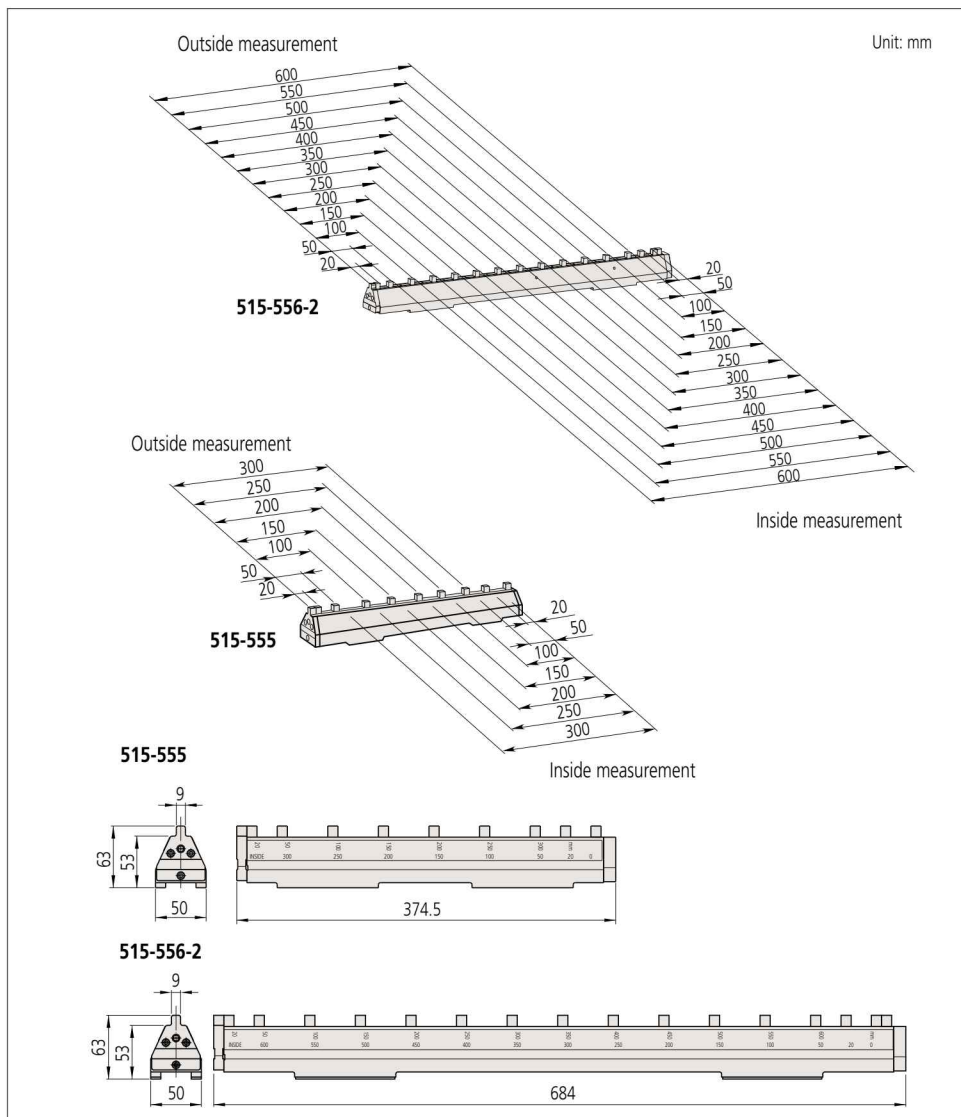
* The block accuracy and the parallelism of blocks are based on the following:
 Outside caliper and height gage: lower end reference plane
 Inside caliper: inside reference plane

Inch

Order No.	Range	Block pitch accuracy*		Parallelism of blocks*		Mass
		1 - 12"	1 - 12"	1 - 12"	1 - 12"	
515-565	0 - 12"	±.0002"		.00008"		4kg

* The block accuracy and the parallelism of blocks are based on the following:
 Outside caliper and height gage: lower end reference plane
 Inside caliper: inside reference plane

DIMENSIONS



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

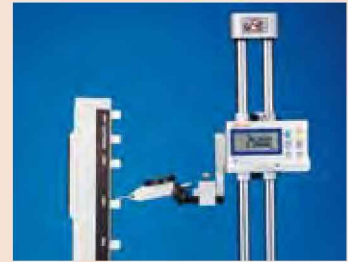
Applications



Checking accuracy of caliper (outside measurement)



Checking accuracy of caliper (inside measurement)



Checking accuracy of height gage

Optional accessories

- 602162: Wooden case for 300mm, 12inch model
- 602164: Wooden case for 600mm model

Alternative solution using a Square Gauge Block Accessories Set

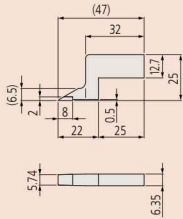
If such an accessories set is available, then an instrument equivalent to the CERA Calibration Checker may be assembled, as shown below, if additional elements are obtained (particularly plain jaws, 619072). For details, refer to pages E-25/26. Note that such an assembly will not have the corrosion resistance of the CERA Calibration Checker and, therefore, more care will be required in use and storage.



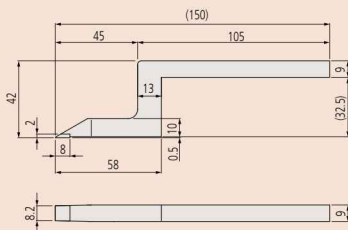
Scriber DIMENSIONS

900173

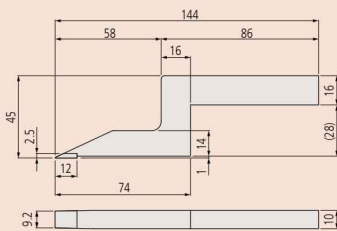
Unit: mm



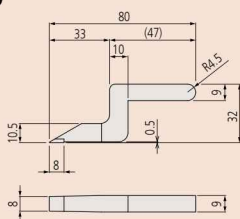
905200



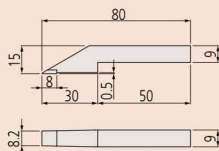
900390



07GZA000



900168



Height Gage Optional accessories for height gages

SPECIFICATIONS

Metric	
Order No.	Applicable Height Gages
07GZA000	192 Series Digimatic Height Gages (192-613-10, 192-614-10, 192-615-10)
	570 Series Digimatic Height Gages (570-302, 570-304)
	192 Series Dial Height Gages (192-130, 192-131, 192-132, 192-133)
	514 Series Vernier Height Gages (514-102, 514-104, 514-106, 514-103, 514-105, 514-107)
905200	574 Series Heightmatic (574-112-1, 574-111-1, 574-110-1)
	192 Series Digimatic Height Gages (192-663-10, 192-664-10, 192-665-10)
	570 Series Digimatic Height Gages (570-230)
900390	514 Series Vernier Height Gages (514-108, 514-109)
	514 Series Vernier Height Gage (514-170)

Inch	
Order No.	Applicable Height Gages
900173	570 Series Digimatic Height Gages (570-227, 570-244)
	506 Series Vernier Height Gages (506-207, 506-208)
900258	192 Series Digimatic Height Gages (192-630-10, 192-631-10, 192-632-10, 192-633-10)
	570 Series Digimatic Height Gages (570-312, 570-313, 570-314)
	574 Series Heightmatic (574-212-1, 574-211-1, 574-210-1)
905201	192 Series Digimatic Height Gages (192-670-10, 192-671-10, 192-672-10, 192-673-10)
	570 Series Digimatic Height Gages (570-248)

Contact Sensor



No. 900872

- The contact sensor eliminates errors caused by non-contact of the slider with a workpiece while making measurements. When the scriber of a height gage touches a conductive workpiece, an indicator lights up to indicate that a measurement can be taken, which results in consistent results.
- Magnet is incorporated.
- Battery (PR44, 2 pcs required) is not included.
- For precision Black Granite Surface Plates, refer to page E-51.

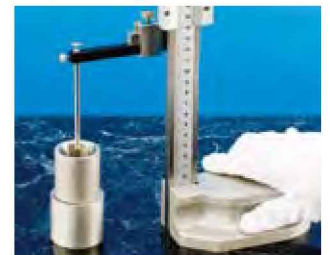
Center Probe



No. 951144

- Allows quick measurement of center-to-center distance between holes.
- Measurable hole diameters: 1 - 38mm
- Mounting position dimension: 99 mm

Depth Gage Attachment



No. 900764

- Attaches to a height gage for measuring groove and hole depth.
- Minimum hole diameter: 5.5mm
- Maximum distance from the bottom of the holding bar to the contact point: 80mm (metric type), 2.95" (inch type)
- Dial indicator contact points are usable. (Refer to pages F-51.)
- Mounting position dimension: 99 mm
- Holding bar length: 100mm

Height Gage

A standard measuring tool of industry

Linear Height SERIES 518 — High Performance 2D Measurement System

- Excellent accuracy of $(1.1+0.6L/600)\mu\text{m}$ with $0.1\mu\text{m}/0.4\mu\text{m}$ resolution/repeatability.
- High-accuracy Height Gage incorporating a wide range of measurement functions.
- To achieve best-in-class accuracy, a high-accuracy reflective-type linear encoder and high-accuracy guide are used.
- Measurement can be implemented by icon-based commands that also support easy one-key operation.
- Perpendicularity (frontal) of $5\mu\text{m}$ and straightness of $4\mu\text{m}$ are guaranteed.
- The TFT LCD provides excellent visibility and operability.
- Pneumatic full/semi-floating system allows adjustment of air-cushion height.
- Basic statistical functions are provided and, additionally, RS-232C data output provides the option of evaluating measurement data externally with SPC software on a PC.
- For precision Black Granite Surface Plates, refer to page E-51.
- Backup/Restore of data and measurement part programs can be implemented using USB storage devices (FAT16/32 format compatible).



518-351A-21



With power grip
518-352A-21

SPECIFICATIONS

Inch/Metric	Model without power grip	Remarks
	Order No.	
	518-351A-21	Model for North America, English manual
	518-351A-22	Model for South America, Spanish manual
	518-351D-21	Model for EU, English manual
	518-351E-21	Model for the UK, English manual
	518-351DC	Model for China, Chinese manual
	518-351K	Model for Korea, Korean manual

Inch/Metric	Model with power grip	Remarks
	Order No.	
	518-352A-21	Model for North America, English manual
	518-352A-22	Model for South America, Spanish manual
	518-352D-21	Model for EU, English manual
	518-352E-21	Model for the UK, English manual
	518-352DC	Model for China, Chinese manual
	518-352K	Model for Korea, Korean manual

* Power grip pre-installed models



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

Technical Data

- Measuring range: 0 - 977mm
 Slider stroke: 600mm
 Resolution: 0.0001 / 0.001 / 0.01 / 0.1mm or (switchable) .000001" / .00001" / .0001" / .001"
 Accuracy at 20°C*1: $(1.1+0.6L/600)\mu\text{m}$
 L = Measuring length (mm)
- Repeatability (2 σ)*1: Plane: 0.4 μm , Bore: 0.9 μm
 Perpendicularity*2: 5 μm (after compensation)
 Straightness*2: 4 μm (mechanical straightness)
 Drive method: Manual / motor (5 - 40mm/s, 7 steps)
 Measuring force: 1N
 Balancing method: Counter balance
 Floating method: Full / semi-floating with built-in air compressor
- Display: 5.7-inch color TFT LCD
 Language for display: Japanese, English, German, French, Italian, Spanish, Dutch, Portuguese, Swedish, Czech, Hungarian, Slovene, Polish, Traditional Chinese, Korean, and Simplified Chinese
- No. of stored programs: 50 (max.)
 No. of stored data: 60,000 (max.)
 Power supply: AC adapter / battery (Ni-MH)
 Battery operation time: Approx. 5 hours
 (air floating & slider elevation: 25% duty cycle)
- *1 Guaranteed when using the standard eccentric $\phi 5$ probe
 *2 Guaranteed when using the Lever Head (MLH-521) or Mu-checker (M-511)

Screenshot examples

Measurement screen

Statistical processing result

Histogram processing result

Squareness measurement result: Graphical display

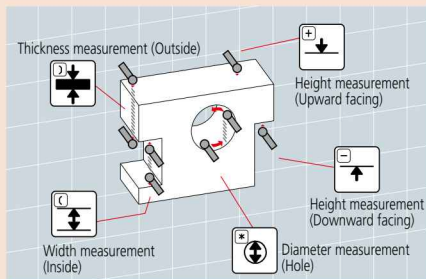
To use this function, a Digimatic indicator or a lever head plus a digital Mu-checker are required.

Squareness measurement result: Numeric display

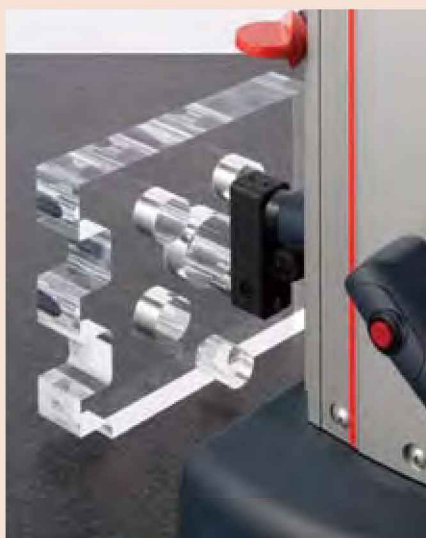
Standard accessories

- 12AAF634 5-stepped probe
 - 12AAA715 Ball-diameter corrected block
- *When the correction is performed by using the taper type contact point, the ball-diameter corrected block No. 12AAA787 (for taper type contact point) is required.
- 12AAF674 Auxiliary weight (2pcs.)

Example of measurements

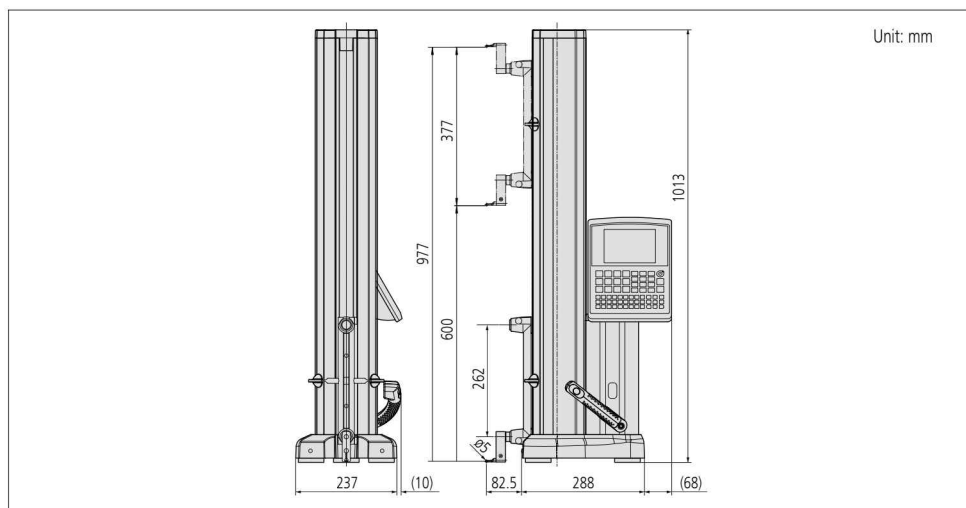


The power grip makes it easy to approach the workpiece.



The sample workpiece shown in the above photo is an optional accessory (12AAA879).

DIMENSIONS



Optional accessories

● For Linear Height and QM-Height ● For Linear Height only



- (1) 12AAC072: Depth probe
- (2) 12AAC073: $\varnothing 20\text{mm}$ taper probe
- (3) 12AAA792: Dial indicator ($\varnothing 8\text{mm}$ stem) holder
- (4) 12AAA793: Probe extension holder ($85\text{mm}/3.3''$)
 - 12AAB136: $\varnothing 10\text{mm}$ cylindrical probe
- (6) 932361: Mu-checker lever head holder*
 - *Additional auxiliary weights are required (total 4 pcs).
 - 12AAF666: $\varnothing 1\text{mm}$ ball probe (coaxial type)
 - 12AAF667: $\varnothing 2\text{mm}$ ruby ball probe (coaxial type)
- (8) 957261: $\varnothing 2\text{mm}$ ball probe (coaxial type)
- (9) 957262: $\varnothing 3\text{mm}$ ball probe (coaxial type)
- (10) 957263: $\varnothing 4\text{mm}$ ball probe (coaxial type)
- (11) 12AAB552: $\varnothing 10\text{mm}$ ball probe, $L = 55\text{mm}$ (coaxial type)
- 12AAF668: $\varnothing 10\text{mm}$ ball probe, $L = 82\text{mm}$ (coaxial type)
- 12AAF669: $\varnothing 10\text{mm}$ ball probe, $L = 120\text{mm}$ (coaxial type)
- 12AAF670: $\varnothing 5\text{mm}$ disk probe
- 12AAF671: $\varnothing 10\text{mm}$ disk probe
- (12) 957264: $\varnothing 14\text{mm}$ disk probe
- (13) 957265: $\varnothing 20\text{mm}$ disk probe
- 12AAF672: $\varnothing 1\text{mm}$ ball offset probe
- (14) 12AAA788: $\varnothing 4\text{mm}$ ball offset probe
- $\varnothing 5\text{mm}$ ball offset probe 05HAA394
- (15) 12AAA789: $\varnothing 6\text{mm}$ ball offset probe
- (16) 226116: Test indicator ($\varnothing 6\text{mm}$ stem) adapter
- Sample workpiece 12AAA879
- (17) 226117: M2 CMM stylus adapter*¹
- (18) 226118: M3 CMM stylus adapter*¹
- CMM ball and disk hard probes are available.
 - $\varnothing 2$ 932377A, $\varnothing 3$ 932378A
 - $\varnothing 5$ 932379A, $\varnothing 6$ 932380A
 - $\varnothing 10$ 532328
 - Disc probe
 - $\varnothing 20$ 532345, $\varnothing 30$ 930803
 - 12AAF712: Battery pack

Various peripheral devices

- 12AAN048*² Receipt printer (for Japan)
- 12AAN049*² Receipt printer (for North America)
- 12AAN050*² Receipt printer (for EU; excluded U.K.)
- 12AAN051*² Receipt printer (for U.K.)
- 12AAN052: Receipt paper (10-roll set)
- 12AAA804: Cable for page printer (2m)
- 12AAA807: RS-232C cable (2m/80")
- 12AAG920: RS-232C cable (3m/118")
- Digimatic cable No.936937 (1m)
- No.965014 (2m)

*1 For enabling CMM styli to be used.

*2 Attachment for fixing the connecting cable is provided as standard.

Height Gage

A standard measuring tool of industry

QM-Height SERIES 518 — High Precision ABSOLUTE Digital Height Gage

- Best-in-class accuracy $\pm(2.4+2.1L/600)\mu\text{m}$
- Newly developed high accuracy and high resolution ABSOLUTE linear encoder for position detection. Once origin is set, origin setting is not required each time you turn the power ON (except in the case of a large environmental temperature change).



518-236

- GO/±NG judgment is performed by setting upper and lower tolerances. If a judgment result is out of tolerance, the display backlighting changes from green to red, so tolerance judgment can be made at a glance.



- Frequent-use measurement such as inside/outside diameter and pitch calculation can be implemented by icon-based commands that also support easy one-key operation.
- Possible to measure inside/outside diameters via a unique method (detect the circle apex and process by tracing measurement*).
* Tracing measurement stroke is approx. 1mm upwards and downwards from the measurement start point.
- Built-in air-suspension feature mechanism using an internal pump enables smooth movement over a surface plate. (Lower-cost version without air suspension also available.)
- With SPC and RS-232C output.
- Continuous battery life of 300 hours*⁵ using four alkaline batteries. (Also works with four NiMH AA/HR6 rechargeable batteries.)

SPECIFICATIONS

Metric				
Code No.	518-230	518-232	518-234	518-236
Measuring range (stroke)	0 - 465mm (350mm)	0 - 715mm (600mm)	0 - 465mm (350mm)	0 - 715mm (600mm)
Resolution (selectable)	0.001mm/0.005mm	0.001mm/0.005mm	0.001mm/0.005mm	0.001mm/0.005mm
Accuracy at Measurement* ¹	$\pm(2.4+2.1L/600)\mu\text{m}$			
20°C Repeatability* ¹	$2\sigma\leq 1.8\mu\text{m}$			
Perpendicularity* ² (20°C)	7 μm	12 μm	7 μm	12 μm
Guiding method	Roller bearing			
Drive method	Manual (wheel)			
Measurement principle	Electromagnetic induction absolute encoder			
Measuring force	1.5 \pm 0.5N			
Data output ports	Digimatic / USB* ³			
Air-suspension feature	Not included	Not included	Included (for positioning only)* ⁴	Included (for positioning only)* ⁴
Power supply	Alkaline AA/LR6 batteries x 4 (standard accessories) / AC adapter (optional accessory) / Supports NiMH (HR6) rechargeable batteries x 4			
Battery life guidelines* ⁵	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination
	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day
Mass	25kg	29kg	25kg	29kg
Size (mm)	Stroke 350mm type: 280(W)x273(D)x784(H)mm Stroke 600mm type: 280(W)x273(D)x1016(H)mm			
Operating temperature range (recommended)	0 - 40°C (10 - 30°C)			
Operating temperature range	20 - 80%RH (Must be free from condensation)			
Storage temperature range	-10°C - 50°C			
Storage humidity range	5 - 90% RH (Must be free from condensation)			

*1 The indication accuracy and repeatability represent the values obtained from the height measurement of a flat surface using the standard holder with $\phi 5$ ball contact point. In the case of diameter, minimum (maximum) value, circle pitch or difference measurement, measuring errors may be larger than the accuracy ratings listed in the table due to variations in measuring force during a scanning measurement, which differs from height measurement.

*2 Indicates the value obtained from the measurement of a straight surface placed perpendicular to the the base reference surface using the Lever Head (MLH-321) and Mu-checker (M-411).

*3 Requires special communication driver and software. Consult your local Mitutoyo Sales Office for details. These can be downloaded from the Mitutoyo web site. <http://www.mitutoyo.co.jp/eng/>

*4 When using a model with the air-suspension feature, it is advisable to use a JIS 1 class, or higher, surface plate. Using on surfaces with scratches or unevenness may prevent the system operating to the specified performance.

*5 Battery life depends on the operating conditions. In particular, it is more economical to use the optional AC adapter to power the instrument if the application requires prolonged use of the air-suspension feature.

ABSOLUTE™

(Refer to page X for details.)



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

Standard accessories

- 05HZA148 5-stepped probe
- 12AAA715 Ball-diameter corrected block
- Auxiliary grip

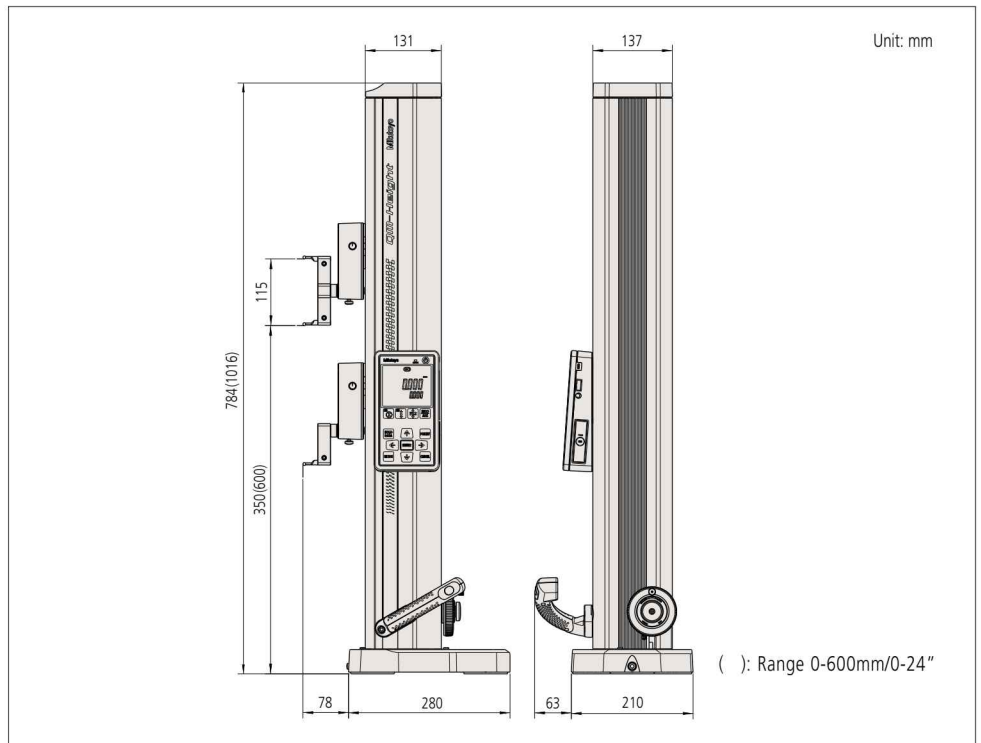
Optional accessories

- 12AAC072: Depth probe
- 12AAA792: Dial indicator ($\phi 8$ mm stem) holder
- 12AAA793: Probe extension holder (85mm/3.3")
- 12AAF667: $\phi 2$ mm ruby ball probe (coaxial type)
- 957261: $\phi 2$ mm ball probe (coaxial type)
- 957262: $\phi 3$ mm ball probe (coaxial type)
- 957263: $\phi 4$ mm ball probe (coaxial type)
- 957264: $\phi 14$ mm disk probe
- 957265: $\phi 20$ mm disk probe
- 12AAA788: $\phi 4$ mm ball offset probe
- 12AAA789: $\phi 6$ mm ball offset probe
- 226116: Test indicator ($\phi 6$ mm stem) adapter
- Sample workpiece 12AAA879
- Scriber 05HZA173
- Digimatic connecting cable
- 936937 (1m)
- 965014 (2m)
- AC Adapter 06AEG180JA/D/E/K/DC
- 05HZA143: 9x9 adapter (clamp 901385 is required)
- 05GA033: Clamp (for 9x9 adapter)
- 05HZA144: 6.35x12.7 adapter (clamp assy. 901385 is required)
- 901385: Clamp assy. (for 6.35x12.7 adapter)
- 02AZE990: U-WAVE mounting plate

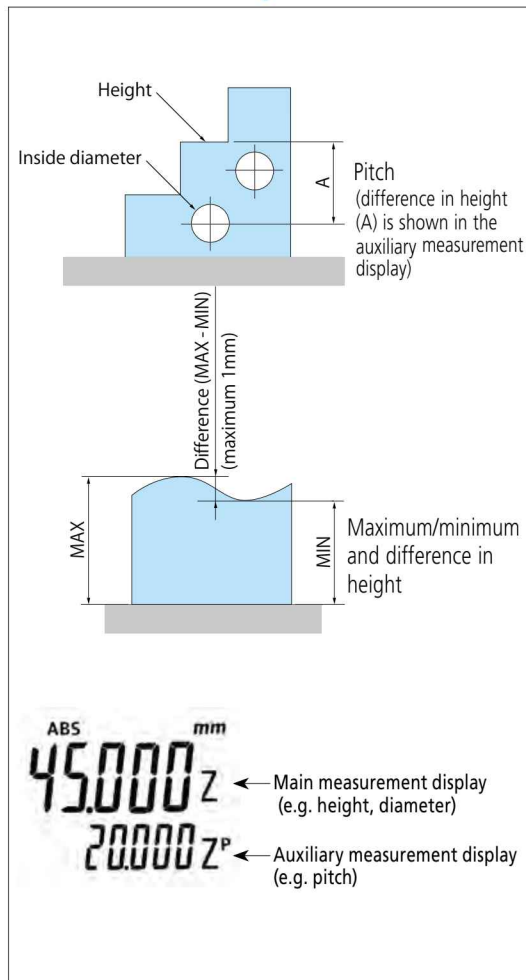
Inch/Metric

Code No.	518-231	518-233	518-235	518-237
Measuring range	0-465mm (0 - 350mm/0-14")	0-715mm (0 - 600mm/0-24")	0-465mm (0 - 350mm/0-14")	0-715mm (0 - 600mm/0-24")
Resolution (selectable)	0.001mm/0.005mm/0.0005"/0.001"/0.0002"	0.001mm/0.005mm/0.0005"/0.001"/0.0002"	0.001mm/0.005mm/0.0005"/0.001"/0.0002"	0.001mm/0.005mm/0.0005"/0.001"/0.0002"
Accuracy at Measurement* ¹	$\pm(2.4+2.1L/600)\mu\text{m}$			
20°C Repeatability* ¹	$2\sigma\leq 1.8\mu\text{m}$			
Perpendicularity* ² (20°C)	7 μm	12 μm	7 μm	12 μm
Guiding method	Roller bearing			
Drive method	Manual (wheel)			
Measurement principle	Electromagnetic induction absolute encoder			
Measuring force	1.5 \pm 0.5N			
Data output ports	Digimatic / USB* ³			
Air-suspension feature	Not included	Not included	Included (for positioning only)* ⁴	Included (for positioning only)* ⁴
Power supply	Alkaline AA/LR6 batteries x 4 (standard accessories) / AC adapter (optional accessory) / Supports NiMH (HR6) rechargeable batteries x 4			
Battery life guidelines* ⁵	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination	Approx. 300 hours (continuous use) LED: Other than full-time illumination
	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 100 hours (continuous use) LED: Full-time illumination	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day	Approx. 3.3 days when the air-suspension feature is used for 0.5 hours/day
Mass	25kg	29kg	25kg	29kg
Size (mm)	Stroke 350mm type: 280(W)x273(D)x784(H)mm Stroke 600mm type: 280(W)x273(D)x1016(H)mm			
Operating temperature range (recommended)	0 - 40°C (10 - 30°C)			
Operating temperature range	20 - 80%RH (Must be free from condensation)			
Storage temperature range	-10°C - 50°C			
Storage humidity range	5 - 90% RH (Must be free from condensation)			

DIMENSIONS



Measurement example



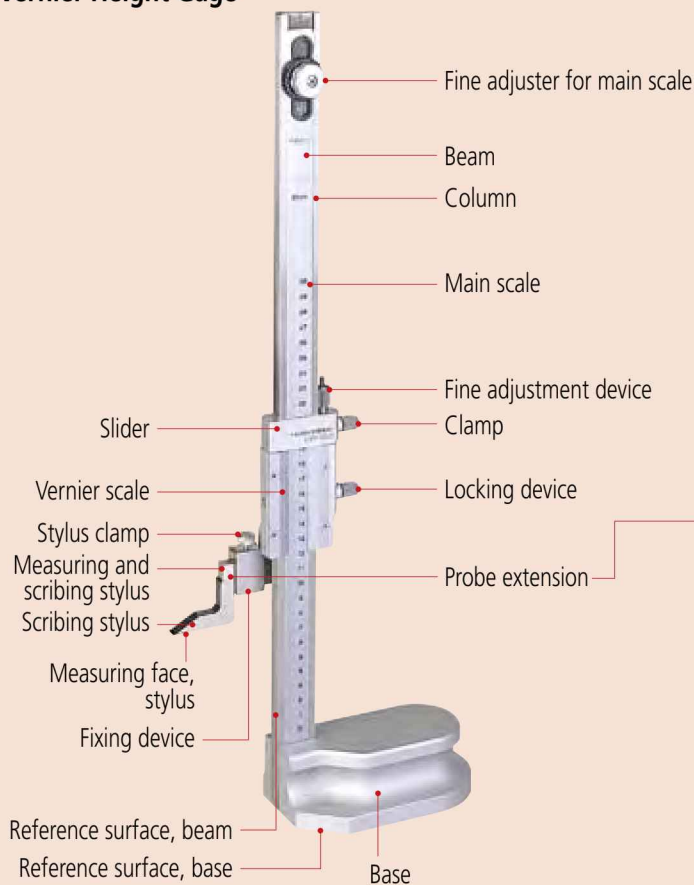
Quick Guide to Precision Measuring Instruments



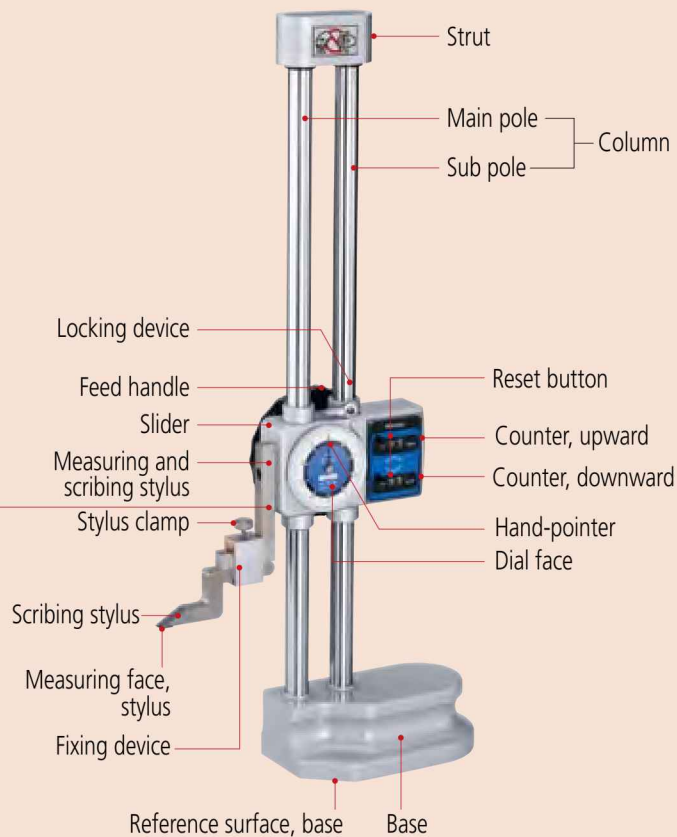
Height Gages

Nomenclature

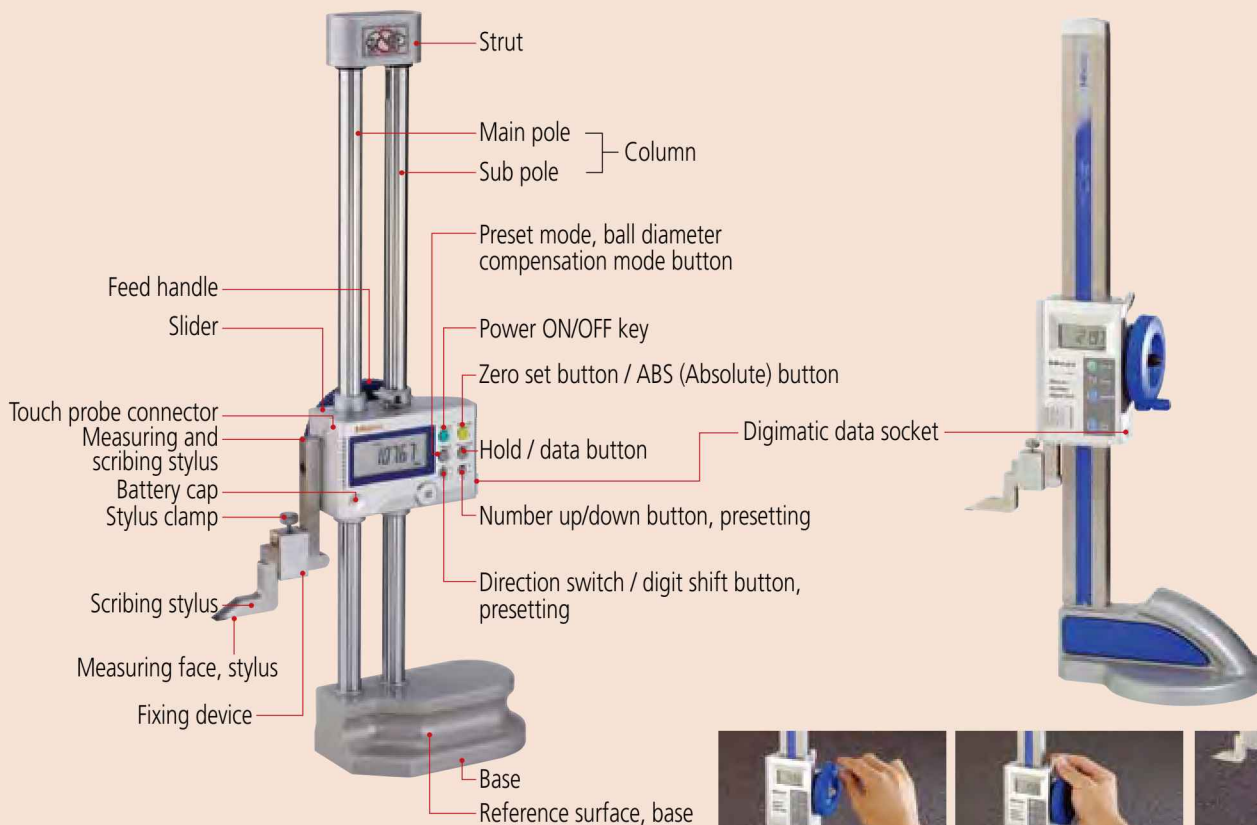
Vernier Height Gage



Mechanical Digit Height Gage



Digimatic Height Gages



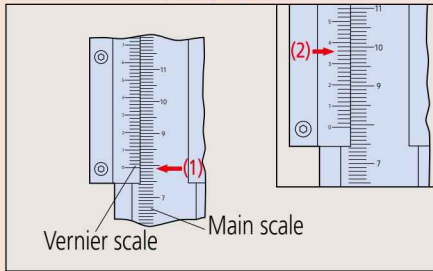
Slider handwheel

Slider clamping lever

Ergonomic base

How to read

Vernier Height gage



Graduation 0.02mm

(1) Main scale 79 mm

(2) Vernier 0.36 mm

Reading 79.36 mm

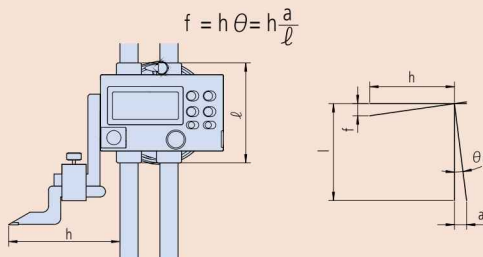
General notes on use of Height Gages

1. Potential causes of error

Like the caliper, the error factors involved include parallax effects, error caused by excessive measuring force due to the fact that a height gage does not conform to Abbe's Principle, and differential thermal expansion due to a temperature difference between the height gage and workpiece. There are also other error factors caused by the structure of the height gage. In particular, the error factors related to a warped reference edge and scriber installation described below should be studied before use.

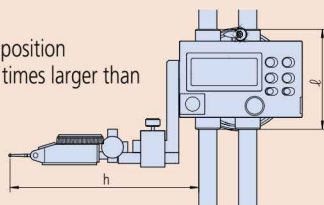
2. Reference edge (column) warping and scriber installation

Like the caliper, and as shown in the following figure, measurement errors result when using the height gage if the reference column, which guides the slider, becomes warped. This error can be represented by the same calculation formula for errors caused by nonconformance to Abbe's Principle.



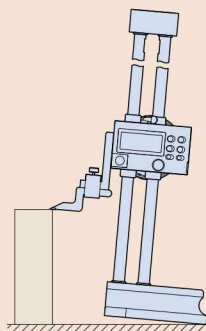
Installing the scriber (or a lever-type dial indicator) requires careful consideration because it affects the size of any error due to a warped reference column by increasing dimension h in the above formula. In other words, if an optional long scriber or lever-type dial indicator is used, the measurement error becomes larger.

Example: Effect of measuring point position
When h is 150 mm, the error is 1.5 times larger than when h is 100 mm.



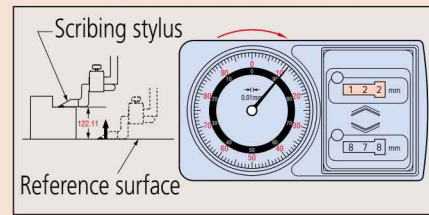
3. Lifting of the base from the reference surface

When setting the scriber height from a gauge block stack, or from a workpiece feature, the base may lift from the surface plate if excessive downwards force is used on the slider, and this results in measurement error. For accurate setting, move the slider slowly downwards while moving the scriber tip to and fro over the gauge block surface (or feature). The correct setting is when the scriber is just felt to lightly touch as it moves over the edge of the surface. It is also necessary to make sure that the surface plate and height gage base reference surface are free of dust or burrs before use.



Mechanical Digit Height gage

Measuring upwards from a reference surface

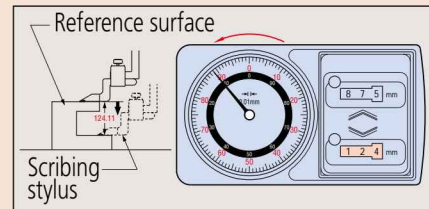


Counter 122 mm

Dial 0.11 mm

Reading 122.11 mm

Measuring downwards from a reference surface



Counter 124 mm

Dial 0.11 mm

Reading 124.11 mm

4. Error due to inclination of the main scale (column)

According to JIS standards, the perpendicularity of the column reference edge to the base reference surface should be better than:

$$\left(0.01 + \frac{L}{1000}\right) \text{ mm} \quad L \text{ indicates the measuring length (unit: mm)}$$

This is not a very onerous specification. For example, the perpendicularity limit allowable is 0.61 mm when L is 600 mm. This is because this error factor has a small influence and does not change the inclination of the slider, unlike a warped column.

5. Relationship between accuracy and temperature

Height gages are made of several materials. Note that some combinations of workpiece material, room temperature, and workpiece temperature may affect measuring accuracy if this effect is not allowed for by performing a correction calculation.

6. The tip of a height gage scriber is very sharp and must be handled carefully if personal injury is to be avoided.

7. Do not damage a digital height gage scale by engraving an identification number or other information on it with an electric marker pen.

8. Carefully handle a height gage so as not to drop it or bump it against anything.

Notes on using the height gage

- Keep the column, which guides the slider, clean. If dust or dirt accumulates on it, sliding becomes difficult, leading to errors in setting and measuring.
- When scribing, securely lock the slider in position using the clamping arrangements provided. It is advisable to confirm the setting after clamping because the act of clamping on some height gages can alter the setting slightly. If this is so, allowance must be made when setting to allow for this effect.
- Parallelism between the scriber measuring face and the base reference surface should be 0.01 mm or better. Remove any dust or burrs on the mounting surface when installing the scriber or lever-type dial indicator before measurement. Keep the scriber and other parts securely fixed in place during measurement.
- If the main scale of the height gage can be moved, move it as required to set the zero point, and securely tighten the fixing nuts.
- Errors due to parallax error are not negligible. When reading a value, always look straight at the graduations.
- Handling after use: Completely wipe away any water and oil. Lightly apply a thin coating of anti-corrosion oil and let dry before storage.
- Notes on storage:
 - Avoid direct sunlight, high temperatures, low temperatures, and high humidity during storage.
 - If a digital height gage will not be used for more than three months, remove the battery before storage.
 - If a protective cover is provided, use the cover during storage to prevent dust from adhering to the column.

Depth Gage

A standard measuring tool of industry

Depth Micrometer SERIES 329, 129 — Interchangeable Rod Type

- This type uses interchangeable rods to enable wide-range measurement.
- **Order Nos. 329-250-30, 329-251-30, 329-350-30, and 329-351-30** allow integration into statistical process control and measurement systems.
- Measuring rod diameter: $\varnothing 4\text{mm}$
- Measuring rod lock.
- Ratchet stop provides constant measuring force.

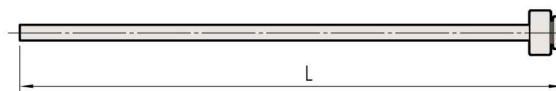


SPECIFICATIONS

Metric					Inch/Metric				
Order No.	Range	Resolution	Base	No. of rods	Order No.	Range	Resolution	Base	No. of rods
Digimatic (LCD)					Digimatic (LCD)				
329-250-30	0 - 150mm	0.001mm	101.6 x 16mm	6	329-350-30	0 - 6"	.00005"/0.001mm	4" x .63"	6
329-251-30	0 - 300mm			12	329-351-30	0 - 12"			.0001"/0.001mm
Metric					Inch				
Order No.	Range	Graduation	Base	No. of rods	Order No.	Range	Graduation	Base	No. of rods
Analog					Analog				
129-154	0 - 25mm	.01mm	63.5 x 16mm	1	129-129	0 - 2"	.001"	4" x .63"	2
129-155			101.6 x 16mm		2.5" x .63"	3			
129-109	0 - 50mm	.01mm	63.5 x 16mm	2	129-126	0 - 3"	.001"	4" x .63"	3
129-113			101.6 x 16mm		2.5" x .63"			4	
129-110	0 - 75mm	.01mm	63.5 x 16mm	3	129-127	0 - 4"	.001"	4" x .63"	4
129-114			101.6 x 16mm		2.5" x .63"			6	
129-111	0 - 100mm	.01mm	63.5 x 16mm	4	129-128	0 - 6"	.001"	4" x .63"	6
129-115			101.6 x 16mm		2.5" x .63"			12	
129-112	0 - 150mm	.01mm	63.5 x 16mm	6	129-129	0 - 12"	.001"	4" x .63"	12
129-116			101.6 x 16mm		2.5" x .63"			12	
129-152	0 - 300mm	.01mm	63.5 x 16mm	12	129-130	0 - 12"	.001"	4" x .63"	12
129-153			101.6 x 16mm		2.5" x .63"			12	

* For the function of Digimatic models 329-250-30, 329-251-30, 329-350-30, and 329-351-30, refer to page D-62. These models are not waterproof.

Interchangeable rod (Optional Accessories) (Check and adjust the origin point before measurement)



Range	0 - 25mm	25 - 50mm	50 - 75mm	75 - 100mm	100 - 125mm	125 - 150mm	150 - 175mm	175 - 200mm	200 - 225mm	225 - 250mm	250 - 275mm	275 - 300mm	
Analog models	Order No.	983501	983503	983505	983507	983509	983511	983525	983527	983529	983531	983533	983535
	L	104mm	129mm	154mm	179mm	204mm	229mm	254mm	279mm	304mm	329mm	354mm	379mm
Digimatic models	Order No.	983505	983507	983509	983511	983525	983527	983529	983531	983533	983535	981781	981782
	L	154mm	179mm	204mm	229mm	254mm	279mm	304mm	329mm	354mm	379mm	404mm	429mm
Range	0 - 1"	1 - 2"	2 - 3"	3 - 4"	4 - 5"	5 - 6"	6 - 7"	7 - 8"	8 - 9"	9 - 10"	10 - 11"	11 - 12"	
Analog models	Order No.	983502	983504	983506	983508	983510	983512	983526	983528	983530	983532	983534	983536
	L	104.3mm	129.7mm	155.1mm	180.5mm	205.9mm	231.3mm	256.7mm	282.1mm	307.5mm	332.9mm	358.3mm	383.7mm
Digimatic models	Order No.	983506	983508	983510	983512	983526	983528	983530	983532	983534	983536	981783	981784
	L	155.1mm	180.5mm	205.9mm	231.3mm	256.7mm	282.1mm	307.5mm	332.9mm	358.3mm	383.7mm	409.1mm	434.5mm

Technical Data

Accuracy:
 $\pm 3\mu\text{m}/\pm 0.00015"$ for micrometer head
 (Excluding quantizing error)
 Flatness of reference face:
 $1.3\mu\text{m}$ (.00005") for 63.5mm (2.5") length base,
 $2\mu\text{m}$ (.00008") for 101.6mm (4") length base
 Flatness of measuring rod face: $0.3\mu\text{m}$
 Parallelism between reference face and measuring rod face:
 $(4+R/50)\mu\text{m}$, R = Max. measuring length (mm)
 Fraction rounded up
 $\pm(2+R/75)\mu\text{m}$ for interchangeable rod,
 R = Max. range (mm)
 Fraction rounded up
 Battery: **SR44** (1 pc), **938882**,
 for initial operational checks (standard accessory)
 Battery life*: Approx. 2.4 years under normal use
 * Digital models
 Scale type: Electromagnetic induction absolute encoder



Optional accessories for 329-250-30, 329-251-30, 329-350-30, and 329-351-30.

For details, refer to page A-21.
 Connection cable for 329-250-30, 329-251-30, 329-350-30, and 329-351-30
05CZA662: SPC cable with data button (1m)
05CZA663: SPC cable with data button (2m)
USB Input Tool Direct
06ADV380B: SPC cable for **USB-ITN-B** (2m)
 Connection cables for U-WAVE-T
02AZD790B: SPC cable for **U-WAVE** with data button (160mm)
02AZE140B: SPC cable for footswitch

Functions of 329-250-30, 329-251-30, 329-350-30, and 329-351-30

ORIGIN set: Resets the ABS (absolute) origin at the current position.
(ABS measurement system)

ZERO set: The display is set to zero at the current position for incremental (comparative) mode measurements. Absolute system measurement mode can easily be restored when required.

Preset: Enters a specified value into the display at the current position.

Hold: The displayed value is temporarily held at the current value so that the instrument can be moved before the display is read. Useful for making measurements in difficult-to-access.

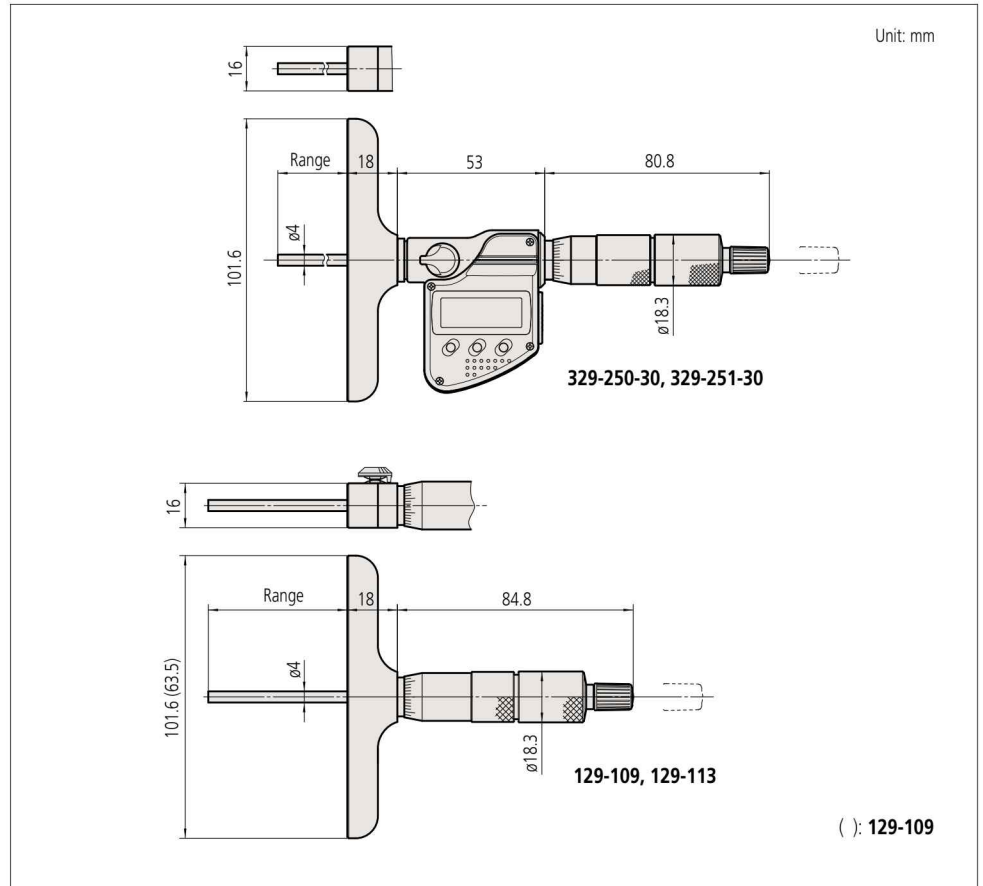
Measurement data output: Equipped with a Digimatic data output port to incorporate instrument into an SPC or networked measurement system.

Auto-power ON/OFF: If the instrument is not used for approximately 20 minutes, the display turns off while keeping the current origin of the ABS measurement system. The display is restored when the spindle is rotated.

Error alarm: If overflow of the display or a calculation error occurs, the measurement function stops and a message is displayed. Measurement will not be continued so as to avoid an erroneous display value. Warning light indicates low battery.

Function lock: PRESET (origin set) and ZERO (zero set) buttons can be locked in order to prevent them being changed unintentionally.

DIMENSIONS



D

Depth Gage

A standard measuring tool of industry

Depth Micrometer SERIES 128

- Measuring rod diameter: $\varnothing 4\text{mm}$
- Measuring rod lock is attached.
- *Measuring rod is attached on the rear side of the micrometer.
- Carbide-tipped measuring rod model is available.
- Ratchet stop provides constant measuring force.



SPECIFICATIONS

Metric			
Order No.	Range	Graduation	Base
128-101	0 - 25mm	0.01mm	63.5 x 16mm
128-103*1			
128-102			101.6 x 16mm
128-104*1			

Inch			
Order No.	Range	Graduation	Base
128-105	0 - 1"	.001"	2.5" x .63"
128-106			4" x .63"

*1 with carbide-tipped measuring rod

Depth Micro Checker SERIES 515

- The Depth Micro Checker is designed to check and help set the range-end points of a depth micrometer.

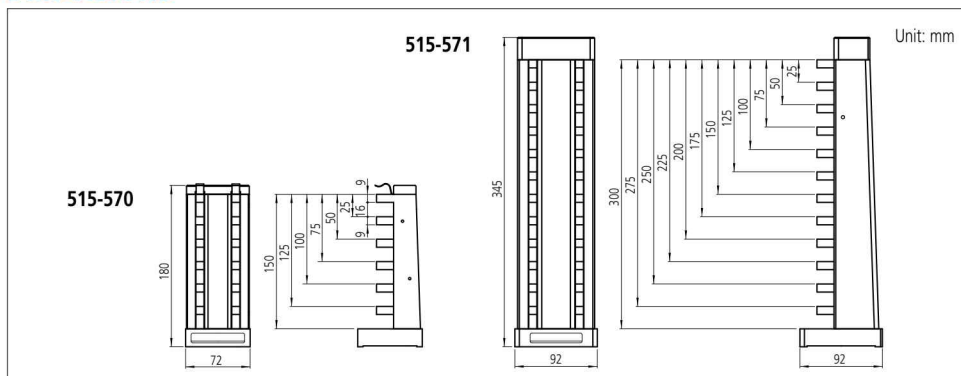


SPECIFICATIONS

Metric			
Order No.	Range	Block pitch accuracy	Anvil block accuracy
515-570	0 - 150mm	$\pm(1+L/150)\mu\text{m}$, L = Length to check (mm)	$\pm 0.5\mu\text{m}$
515-571	0 - 300mm		

Inch			
Order No.	Range	Block pitch accuracy	Anvil block accuracy
515-575	0 - 6"	$\pm(40+L/0.15)\mu\text{inch}$, L = Length to check (inch)	40 μinch

DIMENSIONS

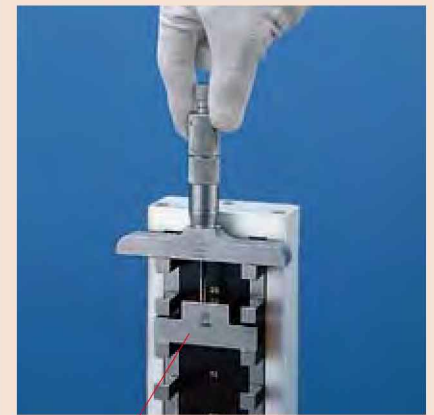


Technical Data

Accuracy: $\pm 3\mu\text{m}$ ($\pm .00015"$)
 Flatness of reference face:
 1.3 μm (.00005") for 63.5mm (2.5") length base,
 2 μm (.00008") for 101.6mm (4") length base
 Flatness of measuring spindle face: 0.3 μm



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



A 25mm anvil block provides the reference surface for the depth micrometer rod

ABSOLUTE Digimatic Depth Gauge SERIES 571

- Coolant proof models achieve IP67 protection level.
- Enables stable depth measurement with a resolution of 0.01mm.
- ABSOLUTE Digital Caliper (Refer to page D-8 for ABSOLUTE function.)
- Sliding operation of models with the measuring ranges 150mm (6"), 200mm (8") and 300mm (12") is smooth and comfortable.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Optional longer extension bases are available. (Except for models with measuring ranges of 600, 750, 1000mm)

Optional accessories for IP67 coolant proof models

For details, refer to page D-39.

Connecting cables

05CZA624: SPC cable with data button (1m)

05CZA625: SPC cable with data button (2m)

USB Input Tool Direct

06ADCV380A: SPC cable for USB-ITN-B (2m)

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

02AZD790A: SPC cable for U-WAVE with data button (160mm)

02AZE140A: SPC cable for footswitch

Optional accessories for other than IP67 coolant proof models

For details, refer to page D-39.

959143: Data hold unit

Connecting cables for **IT/DP/MUX**

959149: SPC cable with data button (1m)

959150: SPC cable with data button (2m)

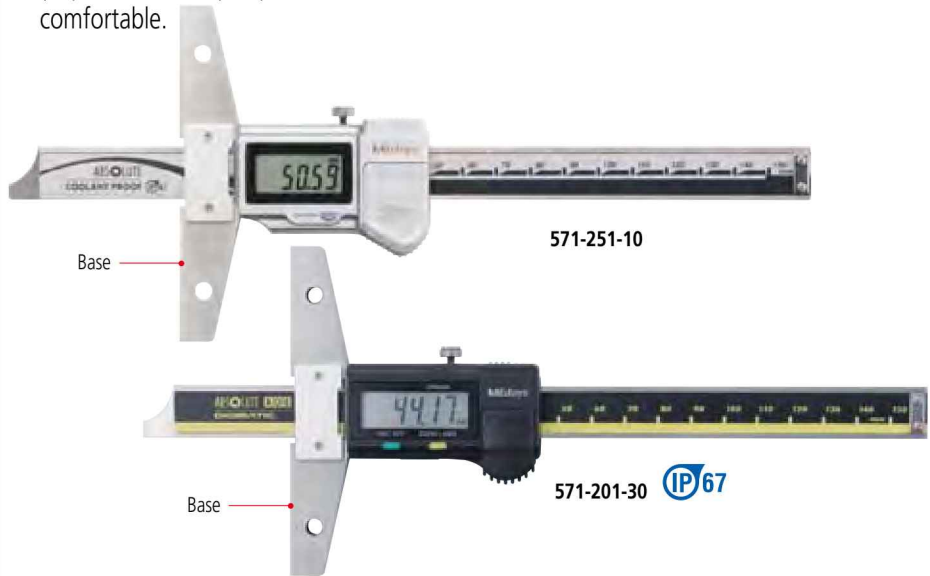
USB Input Tool Direct

06ADV380C: SPC cable for USB-ITN-C (2m)

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

02AZD790C: SPC cable for U-WAVE with data button (160mm)

02AZE140C: SPC cable for footswitch



SPECIFICATIONS

Metric						
Order No.	Range	Resolution	Accuracy*	Repeatability	Base (W x T)	Battery life
571-201-30	0 - 150mm	0.01mm	±0.02mm	0.01mm	100 x 6mm	5years
571-202-30	0 - 200mm		±0.03mm			3.5years
571-203-20	0 - 300mm		±0.02mm			3years
571-251-10**	0 - 150mm		±0.02mm		1years	
571-252-10**	0 - 200mm		±0.03mm			
571-253-10**	0 - 300mm			100 x 6.3mm		
571-204-10	0 - 450mm	0.01mm	±0.05mm	0.01mm	250 x 10mm	3years
571-205-10	0 - 600mm		±0.06mm			
571-206-10	0 - 750mm		±0.07mm			
571-207-10	0 - 1000mm					

* Excluding quantizing error
** IP67 Coolant Proof model

Inch/Metric					
Order No.	Range	Accuracy*	Repeatability	Base (W x T)	Battery life
571-211-30	0 - 6"	±.001"/±0.02mm	0.005"/ 0.01mm	3.93" x .23"	5years
571-212-30	0 - 8"	±.001"/±0.02mm			3.5years
571-213-10	0 - 12"	±.0015"/±0.03mm			3years
571-261-10**	0 - 6"	±.001"/±0.02mm			1years
571-262-10**	0 - 8"	±.001"/±0.02mm			
571-263-10**	0 - 12"	±.0015"/±0.03mm			
571-214-10	0 - 18"	±.002"/±0.05mm	9.8" x .39"		3years
571-215-10	0 - 24"	±.002"/±0.05mm			
571-216-10	0 - 30"	±.0025"/±0.06mm			
571-217-10	0 - 40"	±.0025"/±0.07mm			

* Excluding quantizing error
** IP67 Coolant Proof model

DIMENSIONS

**571-201-30, 571-202-30, 571-203-20,
571-251-10, 571-252-10**
(): No. 571-251-10, 571-252-10

571-253-10

**571-204-10, 571-205-10,
571-206-10, 571-207-10**

Unit: mm

Range	L	Base thickness
0 - 150mm	237	6
0 - 200mm	287	6
0 - 300mm	403 (404)	6 (6.3)
0 - 450mm	635	10
0 - 600mm	785	10
0 - 750mm	935	10
0 - 1000mm	1200	10

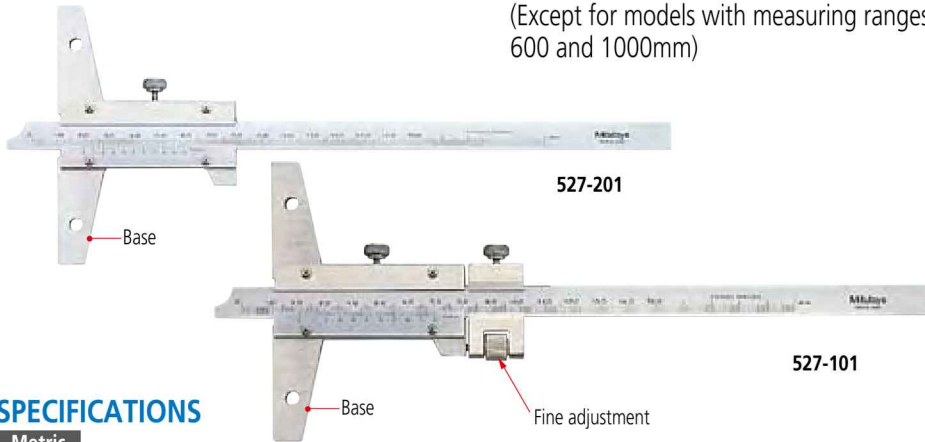
(): Coolant Proof models

Depth Gage

A standard measuring tool of industry

Vernier Depth Gage SERIES 527

- Standard gage for depth measurement.
- Optional longer extension bases are available. (Except for models with measuring ranges of 600 and 1000mm)



SPECIFICATIONS

Metric

Order No.	Range	Vernier reading	Accuracy	Base (W x T)	Remarks
527-201	0 - 150mm	0.05mm	±0.05mm	100 x 6.5mm	—
527-202	0 - 200mm		±0.08mm		—
527-203	0 - 300mm		±0.10mm		—
527-204	0 - 600mm	0.05mm	±0.10mm	250 x 10mm	—
527-205	0 - 1000mm		±0.15mm		—

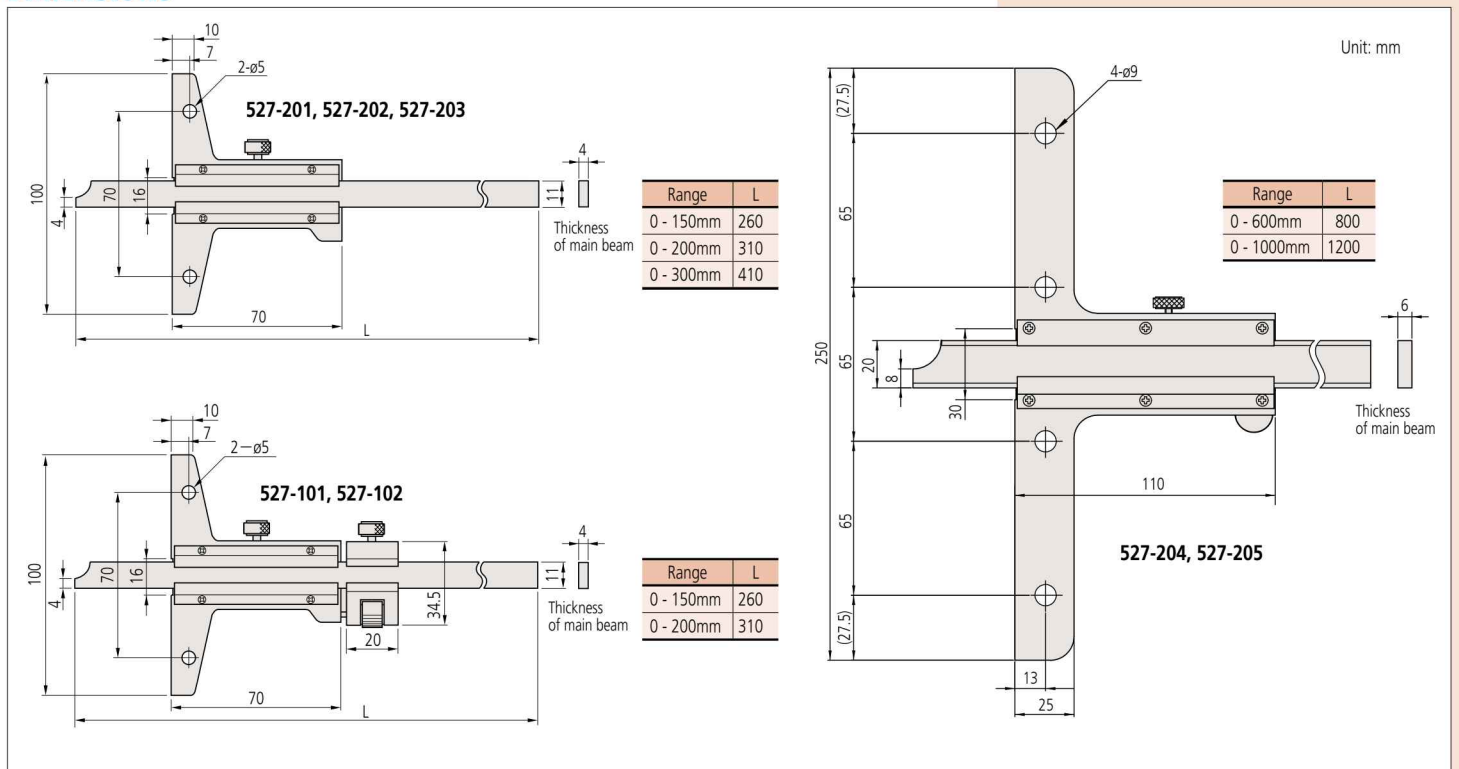
Metric

Order No.	Range	Vernier reading	Accuracy	Base (W x T)	Remarks
527-101	0 - 150mm	0.02mm	±0.03mm	100 x 6.5mm	with fine adjustment
527-102	0 - 200mm				

Inch

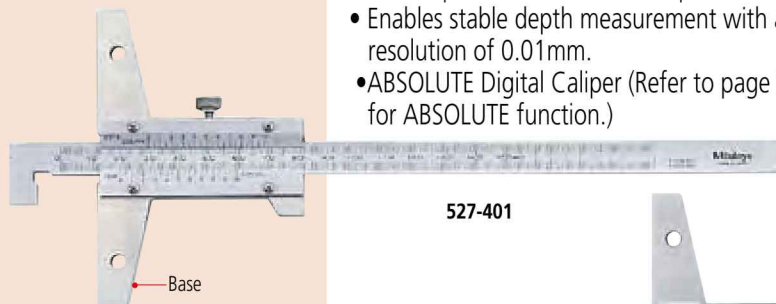
Order No.	Range	Vernier reading	Accuracy	Base (W x T)	Remarks
527-111	0 - 6"	.001"	±.001"	3.93" x .25"	with fine adjustment
527-112	0 - 8"		±.0015"		
527-113	0 - 12"		±.002"	9.8" x .39"	
527-114	0 - 24"		±.002"		
527-115	0 - 40"		±.003"		

DIMENSIONS



Depth Gage SERIES 527, 571 — Hook End Type

- The end of the main beam is hook-shaped to allow depth and thickness measurements of a projected portion or lip in a hole, in addition to standard depth measurement.
- Coolant proof models achieve IP67 protection level.
- Enables stable depth measurement with a resolution of 0.01mm.
- ABSOLUTE Digital Caliper (Refer to page D-8 for ABSOLUTE function.)
- Digital models display the compensation value by pressing the OFF switch to allow direct reading.
- Slider operation of the digital models is smooth and comfortable.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.
- Battery: **SR44** (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life: Approx. 3 years under normal use (for digital models)
- Optional longer extension bases are available.

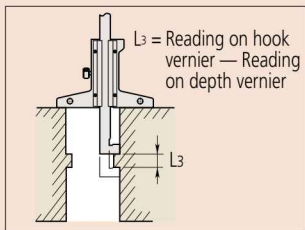
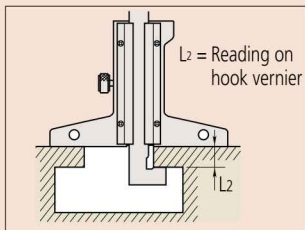
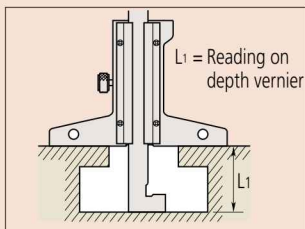


527-401



571-254-10 **IP67**

Applications



Optional accessories for digital models

For details, refer to page A-21.

Connection cables for coolant proof models

05CZA624: SPC cable with data button (1m)

05CZA625: SPC cable with data button (2m)

USB Input Tool Direct

06ADCV380A: SPC cable for **USB-ITN-B** (2m)

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

02AZD790A: SPC cable for **U-WAVE** with data button (160mm)

02AZE140A: SPC cable for footswitch

SPECIFICATIONS

Metric				
Order No.	Range: L1 (L2 and L3)	Resolution	Accuracy*	Base (WxT)
Digimatic (LCD)				
571-254-10**	10 - 160mm (0 - 150mm)	0.01mm	±0.03mm	100x6mm
571-255-10**	10 - 210mm (0 - 200mm)			
Analog				
527-401	10 - 150mm (0 - 150mm)	0.05mm	±0.05mm	100x6.5mm
527-402	10 - 200mm (0 - 200mm)		±0.08mm	
527-403	10 - 300mm (0 - 300mm)			

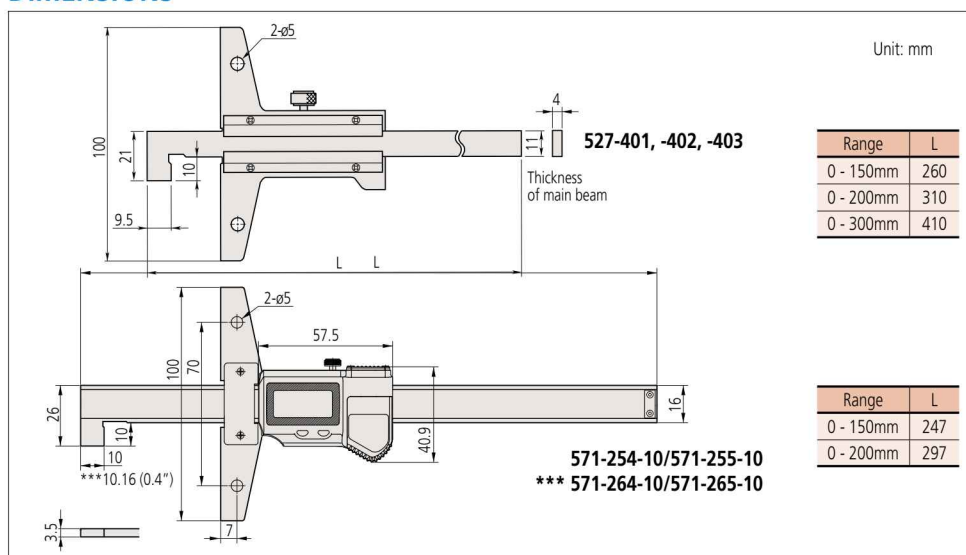
* Excluding quantizing error ** IP67 Coolant Proof model

Inch/Metric				
Order No.	Range: L1 (L2 and L3)	Resolution	Accuracy*	Base (WxT)
Digimatic (LCD)				
571-264-10	.4" - 6.4" (0 - 6")	.0005" / 0.01mm	±0.0015" / ±0.03mm	100x6mm
571-265-10	.4" - 8.4" (0 - 8")			

* Excluding quantizing error

Metric				
Order No.	Range: L1 (L2 and L3)	Vernier reading	Accuracy	Base (WxT)
Analog				
527-411	10 - 150mm (0 - 150mm)	0.02mm	±0.03mm	100x6.5mm
527-412	10 - 200mm (0 - 200mm)		±0.04mm	
527-413	10 - 300mm (0 - 300mm)			

DIMENSIONS



Depth Gage

A standard measuring tool of industry

Extension Bases

Optional accessory for Depth Gage

- Attaches to the base (reference face) plate of a depth gage to extend its span.
- Refer to the illustrations at left for attachment details.
- Extension base is three times the length of the base for models of less than 300mm range.
- These extension bases cannot be attached to 0-600mm, 0-1000mm, 0-24" and 0-40" range models.

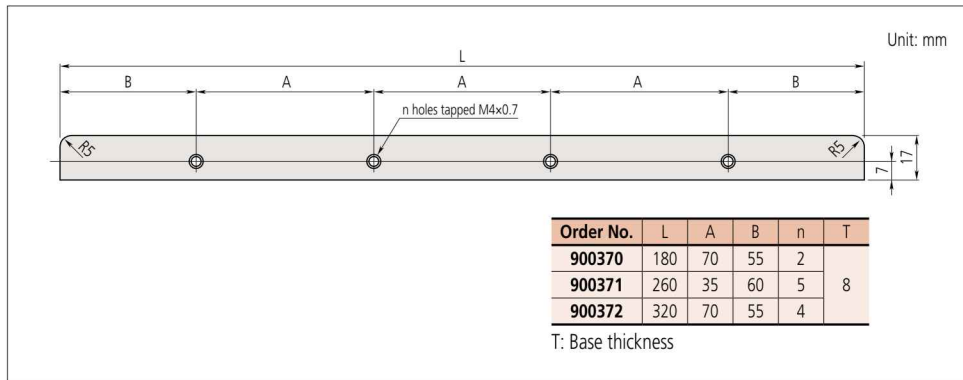


900372

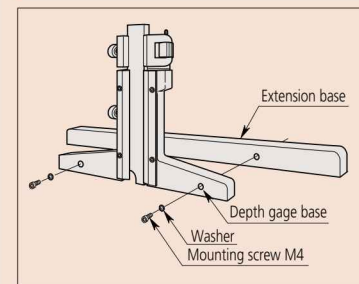
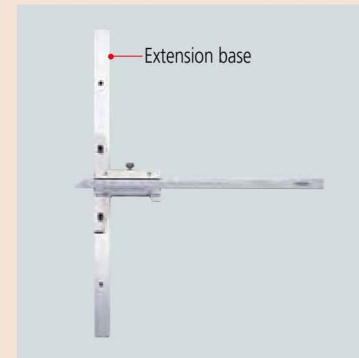
SPECIFICATIONS

Metric			Inch		
Order No.	Size L	n	Order No.	Size L	n
900370	180mm	2	900367	7"	2
900371	260mm	5	900368	10"	5
900372	320mm	4	900369	12"	4

DIMENSIONS



Example of attaching the extension base



Depth Gage Attachment Optional Accessory for Calipers

- Attaching this depth gage attachment to the depth measurement face of the caliper makes depth measurement accurate and secure.

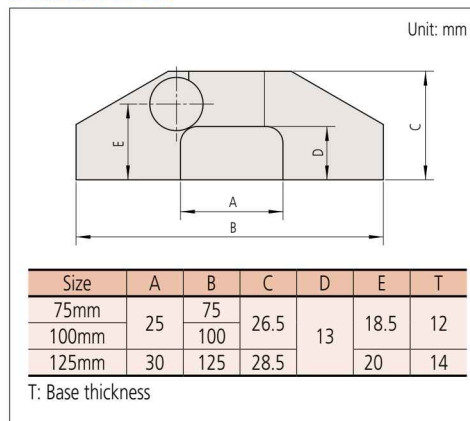


050084-10

SPECIFICATIONS

Order No.	Size	Applicable measuring range of caliper
050083-10	75mm	100mm, 150mm, 200mm, 4", 6" and 8"
050084-10	100mm	100mm, 150mm, 200mm, 4", 6" and 8"
050085-10	125mm	300mm and 12"

DIMENSIONS



Example of attaching the extension base



Dial Depth Gage SERIES 7

Note:

*1

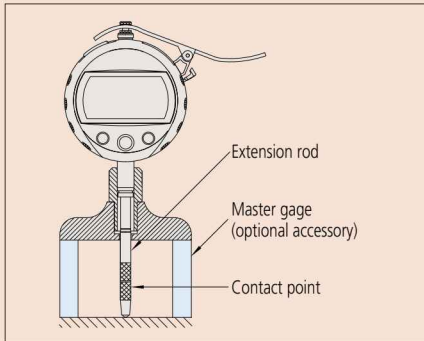
Caution should be exercised when exchanging a contact point of a Depth Gage (Dial/Digimatic Indicator)

- If a different size contact point is mounted, displacement of the contact point from the base contact surface will be changed and as a result, measurement range may not be maintained.
- A contact point cannot be mounted to a Depth Gage, if its diameter is too large for the hole diameter of the base.
- Parallelism adjustment with the bottom face of the base is required when mounting a flat contact point such as the flat/needle or carbide-tipped contact point.

*2

Caution should be exercised when using an extension rod

- If the total length of the extension rod exceeds 110mm (4.5") use the instrument in a vertical position (contact point downward).
- Use a master gage (such as Gauge blocks) to perform zero-setting when the extension rod is mounted. (Master gage is an optional accessory.)



*3

Indicators

- Indicators for a Depth Gage is used for the Depth Gage. When the indicator is exchanged and extension rod is connected longer, the contact-point may incline significantly.
- Code No.543-400B / 543-402B for Depth Gage has a measuring force less than 1.5N.

- Optimal for hole, narrow groove and step measurement.



7211



7214



7222

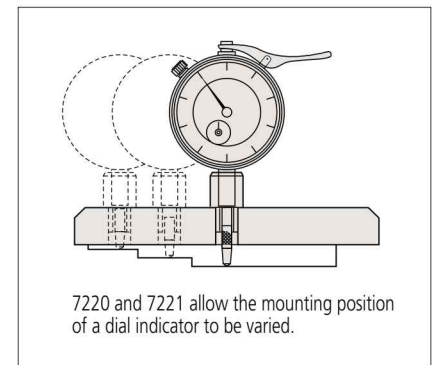


7224



7231

Example of use



7220 and 7221 allow the mounting position of a dial indicator to be varied.

Metric

Order No.	Range	Graduation	Accuracy	Stroke	Measuring force	Base			Mounting position of a dial indicator	Contact point*1	Extension rod*2	Indicator*3 (dial indicator)	
						W	T	Flatness					
7210	0 - 10mm	0.01mm	±15µm	10mm	1.4N	40mm	16mm	5µm	1	Provided with a needle point (No.137413)	—	2902SB for Depth Gage	
7211	63.5mm					Provided with a carbide-tipped ball point (No.21JAA224)							
7212	101.6mm					Provided with a carbide-tipped ball point (No.21JAA225)							
7213	63.5mm					±30µm				30mm			2.5N
7214	101.6mm												
7220	0 - 200mm		±15µm	10mm	1.4N	150mm	18mm		3	1	Provided with a needle point (No.137413)	5 pcs. (10, 20, 30, 30, 100mm)	2902SB for Depth Gage
7221	100mm												
7222	150mm												
7223	ø16mm												
7224	0 - 10mm		ø25mm	5mm	1.4N	63.5mm	16mm		1	1	Provided with a carbide-tipped ball point (No.21JAA224: 17mm) (No.21JAA226: 22mm)	—	1162T for Depth Gage (Back plunger type)
		ø40mm											
7231	0 - 200mm									5 pcs. (10, 20, 30, 30, 100mm)			

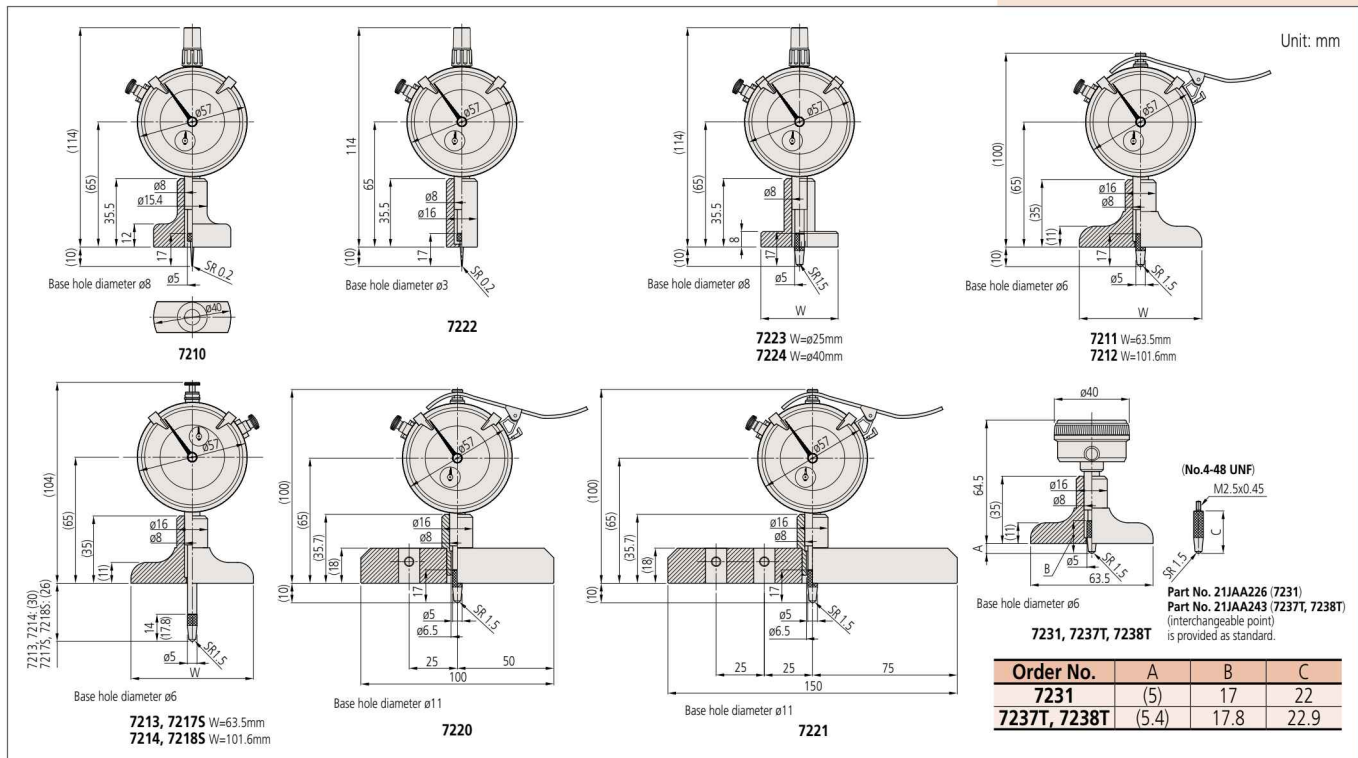
Inch

Order No.	Range	Graduation	Accuracy	Stroke	Measuring force	Base			Mounting position of a dial indicator	Contact point*1	Extension rod*2	Indicator*3 (dial indicator)
						W	T	Flatness				
7217S	0 - 8"	.001"	±.002"	1"	2.5N	63.5mm	16mm	.0002"	1	Carbide ball point (No.21JZA242)	3 pcs. (1", 2", 4")	2904SB for Depth Gage
7218S						101.6mm				Provided with a carbide-tipped ball point (No.21JZA242: 17.8mm) (No.21JZA243: 22.9mm)		
7237T				.2"	1.4N	63.5mm				4 pcs. (.5", 1", 2", 4")	1168T for Depth Gage (Back plunger type)	
7238T												101.6mm

Depth Gage

A standard measuring tool of industry

DIMENSIONS



ABSOLUTE Digimatic Depth Gage SERIES 547

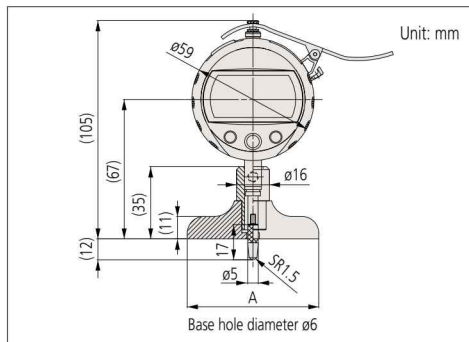
- Easy-to-read dial effectively prevents misreading.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. Refer to page A-3.

ABSOLUTE™

(Refer to page X for details.)



DIMENSIONS



SPECIFICATIONS

Metric											
Order No.	Range	Graduation	Stroke	Accuracy*4	Measuring force	Base			Contact point*1	Extension rod*2	Indicator*3
						W	T	flatness			
547-211	0 - 200mm	0.01mm	12.7mm	$\pm 20\mu\text{m}$	1.5N	63.5mm	16mm	5 μm	Provided with a carbide-tipped ball point (No.21JAA224)	5 pcs. (10, 20, 30, 30, 100mm)	543-400B*3
547-212						101.6mm					
547-251		0.001mm		63.5mm							
547-252				101.6mm		2 μm					
Inch/Metric											
Order No.	Range	Graduation	Stroke	Accuracy*4	Measuring force	Base			Contact point*1	Extension rod*2	Indicator*3
						W	T	flatness			
547-2175	0 - 8"	.0005"/0.01mm	.5"	$\pm .001$ "	1.5N	2.5"	.63"	.0002"	Provided with a carbide-tipped ball point (No.21JZA242)	4 pcs. (.5", 1", 2", 4")	543-402B*3
547-2185						4"					
547-2575		.00005"/0.001mm		2.5"							
547-2585				4"		.00008"					

*1 to *3: Refer to page D-68.

*4: Excluding quantizing error.

New Products



Ultra Low Expansion Ceramic Gauge Blocks (ZERO CERA Block)

Refer to page E-6 for details.

Gauge Block Comparator GBCD-100A

Refer to page E-31 for details.

Digital Height Master

Refer to page E-35 for details.

High Precision Square

Refer to page E-42 for details.

Gauge Blocks

Gauge Block



Height Master & Reference Gages

Height Master



Granite Surface Plates



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Gauge Blocks

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Gauge Blocks

Length Standards Brought to You by Mitutoyo

Features and Accuracies

Features of Mitutoyo Gauge Blocks

Mitutoyo offers 3 types of gauge block for use as length standards: rectangular steel, rectangular ceramic (CERA Blocks) and square steel gauge blocks. In addition, rectangular and square protection blocks (1mm and 2mm for each) are available in tungsten carbide. Mitutoyo gauge blocks are recognized to be of the highest quality both here in Japan and abroad, and are available in various grades to meet every need in respect of working conditions, environment and application.

Accuracy

As a world-leading precision measuring equipment manufacturer, Mitutoyo is certified by the Japanese government as an accredited calibration laboratory, which means that the accuracy of its gauge blocks is guaranteed through traceability to the Metrology Management Center of the National Institute of Advanced Industrial Science and Technology (AIST).

Wringing

Lapping measuring surfaces is one of Mitutoyo's specialties. Our advanced technique, developed over more than half a century, enables us to achieve the optimum flatness and surface finish needed for gauge blocks and thus maximize the wringing force.

Abrasion Resistance and Dimensional Stability of Steel Blocks

High-carbon high-chrome steel is employed to satisfy a variety of the material characteristics required for gauge blocks. Our advanced heat treatment technology for steel blocks, which involves repeated temperature cycling, simultaneously achieves excellent abrasion resistance and minimizes any change in length over time.

CERA Blocks

CERA blocks are made of a ceramic material with a superior surface finish, created by Mitutoyo's ultra-precision machining techniques, that provides a premium quality block with significant advantages:

1. Corrosion Resistant

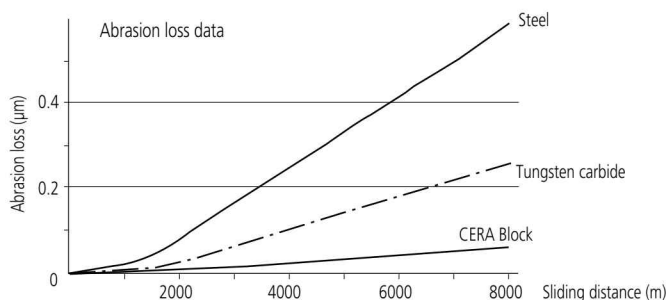
Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.

2. No Burrs Caused by Accidental Mishandling

Since the CERA Block is very hard, it will not scratch easily and is highly resistant to burrs. If a burr is formed, it can easily be removed with a ceramic deburring stone (Ceraston).

3. Abrasion Resistant

CERA Blocks have 10 times the abrasion resistance of steel gauge blocks.



4. Dimensionally Stable

CERA Blocks are free from dimensional change over time.

5. Clearly Marked Sizes

Black characters, indicating the nominal length, are inscribed by laser and are clearly visible against the white surface of the block.

6. Non-magnetic Nature Prevents Steel Swarf Contamination

7. High Wringing Force

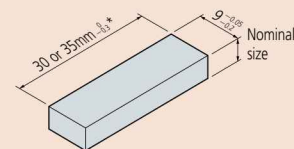
Superior flatness and surface finish provides maximum wringing force.



Classification of Gauge Blocks by Shape

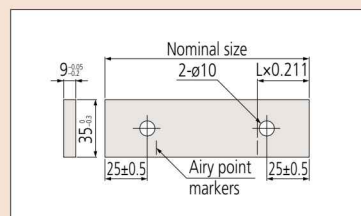
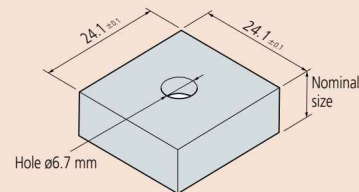
Mitutoyo broadly divides gauge blocks into two categories according to the block shape.

Rectangular gauge blocks



* Depends on the nominal size.
More than 10mm
10mm or less

Square gauge blocks



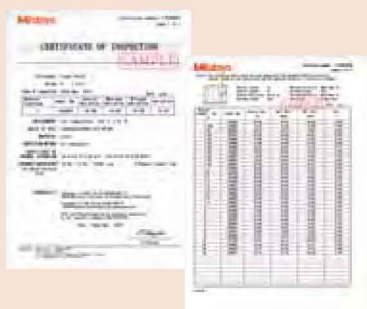
Coupling holes in long rectangular gauge blocks

Selecting Gauge Blocks

- Select gauge blocks in accordance with the combination range required.
If a large length is required, add a long block set.
- Select gauge blocks in accordance with the minimum length step required. Add wear block sets if necessary.
- If a set containing a large number of gauge blocks is selected, the number of combination gauge blocks required for a length is reduced and the number of combinations is increased. The accuracy will be retained and damage will be reduced.
- The specific gauge block set for micrometer inspection and caliper inspection is available (refer to page E-11 for details).
- If using only one length repeatedly, it is a good idea to purchase discrete gauge blocks (refer to page E-13, E-14, E-15, E-16, and E24 for details).
- The 2mm-based gauge blocks, which take the base of the minimum length step as 2mm, are easy to handle and will not warp, as compared to the 1mm-based gauge blocks.

Mitutoyo Gauge Blocks and Inspection Certificates

A Certificate of Inspection is furnished with all Mitutoyo gauge blocks with a serial number on the box (in the case of sets) and an identification number on each block. The deviation of each block from nominal length, at the time of inspection, is stated. For this inspection, each gauge block is measured relative to the upper level master using a gauge block comparator. Grade K gauge blocks are measured by a primary measurement method using an interferometer.



Grade and Application

The following table can be used to select the gauge block grade according to usage (specified by DIN861, BS4311, and JIS B 7506).

	Applications	Grade
Workshop use	• Mounting tools and cutters	2
	• Manufacturing gages • Calibrating instruments	1 or 2
Inspection use	• Inspecting mechanical parts, tools, etc.	1 or 2
	• Checking the accuracy of gages • Calibrating instruments	0 or 1
Calibration use	• Checking the accuracy of gauge blocks for workshop • Checking the accuracy of gauge blocks for inspection • Checking the accuracy of instruments	K or 0
Reference use	• Checking the accuracy of gauge blocks for calibration • For academic research	K

Constructing a Gauge Block Stack

The following points should be noted when constructing a gauge block stack:

1. Use as few gauge blocks as possible to obtain the required length by selecting thick blocks wherever possible.
2. Select the block for the least significant digit first, then work back through the more significant digits until the required length is attained.
3. There are multiple combinations for the integer part of a length. To prevent wear as much as possible, do not always use the same gauge blocks.

Example: Required length = 45.6785mm

• For a 1mm-based gauge block set (112 pcs.)

$$\begin{array}{r}
 1.0005 \\
 1.008 \\
 1.17 \\
 17.5 \\
 +) 25 \\
 \hline
 45.6785\text{mm}
 \end{array}$$

• For a 2mm-based gauge block set (112 pcs.)

$$\begin{array}{r}
 2.0005 \\
 2.008 \\
 2.17 \\
 14.5 \\
 +) 25 \\
 \hline
 45.6785\text{mm}
 \end{array}$$

* Regarding the method for wringing, refer to "Quick Guide to Precision Measuring Instruments" on page E-33.



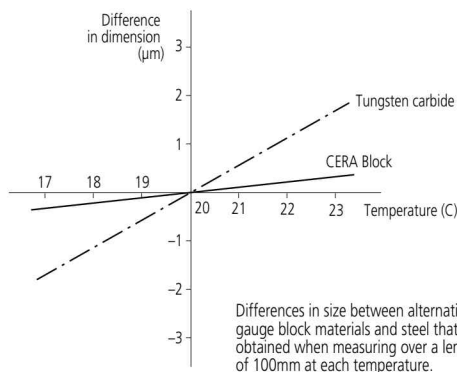
8. Superior Material Characteristics of CERA Block

Property	Material	CERA Block (ZrO ₂)	Steel (Fe)	Tungsten Carbide (WC-Co)
Hardness (HV)		1350	800	1650
Coefficient of thermal expansion (10 ⁻⁶ /K)		9.3±0.5	10.8±0.5	5.5±1.0
Flexural strength by 3-point bending (MPa)		1270	1960	1960
Fracture toughness K _{1c} (MPa•m ^{1/2})		7	120	12
Young's modulus x10 ⁴ (MPa)		20.6	20.6	61.8
Poisson's ratio		0.3	0.3	0.2
Specific gravity (Kg/dm ³)		6.0	7.8	14.8
Thermal conductivity (W/m•k)		2.9	54.4	79.5

* Ceramics have the advantage of a slow response to temperature changes due to the low thermal conductivity. However, caution is required when using CERA blocks in the environment of severe temperature change.

9. Closest Expansion Coefficient to Steel

The thermal expansion coefficient of a CERA Block is quite similar to that of a steel gauge block.



10. Highly Resistant to Dropping and Impact Damage

The CERA Block material is one of the toughest ceramics. It is extremely difficult to crack a CERA block in normal use.

Features of Square Gauge Blocks



1. Gauge blocks in a stack can be clamped together

After wringing square gauge blocks, a tie rod can be inserted through the center hole to clamp the blocks together for extra security.



2. A height reference standard can easily be made

A precision height reference standard can be made easily and inexpensively using accessories such as the plain jaw and block base.



3. A dedicated inspection jig can easily be made

A dedicated inspection jig for periodic inspection of instruments can be made easily and inexpensively.



4. A wide measuring surface with cross-sectional dimensions of 24.1 x 24.1mm is available.

A square gauge block retains stable orientation both longitudinally and laterally. A wide range of applications is covered, including cutting tool positioning, angle measurement with a sine bar, taper measurement with a roller, and inspection of depth micrometers.

Long and Ultra-Thin Gauge Blocks

Mitutoyo offers extra-thin gauge blocks from 0.10 mm to 0.99 mm (increments of 0.01 mm) as well as long gauge blocks up to 1,000 mm as standard products.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

ACCURACY SPECIFICATIONS: JIS B 7506-2004 (JAPAN)

(at 20°C)

Nominal length (mm)		Grade K		Grade 0	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
from 0.5	up to 10	±0.20µm	0.05µm	±0.12µm	0.10µm
over 10	up to 25	±0.30µm	0.05µm	±0.14µm	0.10µm
over 25	up to 50	±0.40µm	0.06µm	±0.20µm	0.10µm
over 50	up to 75	±0.50µm	0.06µm	±0.25µm	0.12µm
over 75	up to 100	±0.60µm	0.07µm	±0.30µm	0.12µm
over 100	up to 150	±0.80µm	0.08µm	±0.40µm	0.14µm
over 150	up to 200	±1.00µm	0.09µm	±0.50µm	0.16µm
over 200	up to 250	±1.20µm	0.10µm	±0.60µm	0.16µm
over 250	up to 300	±1.40µm	0.10µm	±0.70µm	0.18µm
over 300	up to 400	±1.80µm	0.12µm	±0.90µm	0.20µm
over 400	up to 500	±2.20µm	0.14µm	±1.10µm	0.25µm
over 500	up to 600	±2.60µm	0.16µm	±1.30µm	0.25µm
over 600	up to 700	±3.00µm	0.18µm	±1.50µm	0.30µm
over 700	up to 800	±3.40µm	0.20µm	±1.70µm	0.30µm
over 800	up to 900	±3.80µm	0.20µm	±1.90µm	0.35µm
over 900	up to 1000	±4.20µm	0.25µm	±2.00µm	0.40µm

Nominal length (mm)		Grade 1		Grade 2	
		Limit deviation of length at any point	Tolerance for the variation in length	Limit deviation of length at any point	Tolerance for the variation in length
from 0.5	up to 10	±0.20µm	0.16µm	±0.45µm	0.30µm
over 10	up to 25	±0.30µm	0.16µm	±0.60µm	0.30µm
over 25	up to 50	±0.40µm	0.18µm	±0.80µm	0.30µm
over 50	up to 75	±0.50µm	0.18µm	±1.00µm	0.35µm
over 75	up to 100	±0.60µm	0.20µm	±1.20µm	0.35µm
over 100	up to 150	±0.80µm	0.20µm	±1.60µm	0.40µm
over 150	up to 200	±1.00µm	0.25µm	±2.00µm	0.40µm
over 200	up to 250	±1.20µm	0.25µm	±2.40µm	0.45µm
over 250	up to 300	±1.40µm	0.25µm	±2.80µm	0.50µm
over 300	up to 400	±1.80µm	0.30µm	±3.60µm	0.50µm
over 400	up to 500	±2.20µm	0.35µm	±4.40µm	0.60µm
over 500	up to 600	±2.60µm	0.40µm	±5.00µm	0.70µm
over 600	up to 700	±3.00µm	0.45µm	±6.00µm	0.70µm
over 700	up to 800	±3.40µm	0.50µm	±6.50µm	0.80µm
over 800	up to 900	±3.80µm	0.50µm	±7.50µm	0.90µm
over 900	up to 1000	±4.20µm	0.60µm	±8.00µm	1.00µm

ACCURACY SPECIFICATIONS: BS 4311: Part 1: 1993 (UK)

(at 20°C)

Nominal length (inch)		Grade K			Grade 0		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 0.4	±5µin	2µin	2µin	±5µin	4µin	4µin
over 0.4	up to 1	±6µin	2µin	2µin	±6µin	4µin	4µin
over 1	up to 2	±8µin	3µin	2µin	±8µin	4µin	4µin
over 2	up to 3	±10µin	3µin	2µin	±10µin	5µin	4µin
over 3	up to 4	±12µin	3µin	2µin	±12µin	5µin	4µin

Nominal length (inch)		Grade 1			Grade 2		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 0.4	±10µin	6µin	6µin	±20µin	12µin	10µin
over 0.4	up to 1	±12µin	6µin	6µin	±25µin	12µin	10µin
over 1	up to 2	±15µin	7µin	6µin	±30µin	12µin	10µin
over 2	up to 3	±20µin	7µin	6µin	±40µin	14µin	10µin
over 3	up to 4	±25µin	8µin	6µin	±50µin	14µin	10µin

ACCURACY SPECIFICATIONS: BS 4311: Part 1: 1993 (UK)

(at 20°C)

Nominal length (mm)		Grade K			Grade 0		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 10	±0.12µm	0.05µm	0.05µm	±0.12µm	0.10µm	0.10µm
over 10	up to 25	±0.15µm	0.05µm	0.05µm	±0.15µm	0.10µm	0.10µm
over 25	up to 50	±0.20µm	0.06µm	0.05µm	±0.20µm	0.10µm	0.10µm
over 50	up to 75	±0.25µm	0.06µm	0.05µm	±0.25µm	0.12µm	0.10µm
over 75	up to 100	±0.30µm	0.07µm	0.05µm	±0.30µm	0.12µm	0.10µm

Nominal length (mm)		Grade 1			Grade 2		
		Tolerance on deviation of measured central length	Parallelism	Flatness	Tolerance on deviation of measured central length	Parallelism	Flatness
over 0	up to 10	±0.25µm	0.16µm	0.15µm	±0.50µm	0.30µm	0.25µm
over 10	up to 25	±0.30µm	0.16µm	0.15µm	±0.60µm	0.30µm	0.25µm
over 25	up to 50	±0.40µm	0.18µm	0.15µm	±0.80µm	0.30µm	0.25µm
over 50	up to 75	±0.50µm	0.18µm	0.15µm	±1.00µm	0.35µm	0.25µm
over 75	up to 100	±0.60µm	0.20µm	0.15µm	±1.20µm	0.35µm	0.25µm

ACCURACY SPECIFICATIONS: ASME B89.1.9-2002 (USA)

(at 20°C)

Nominal length (inch)		Grade K		Grade 00		Grade 0		Grade 1		Grade 2	
		Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length
	up to .05	±12µin	2µin	±4µin	2µin	±6µin	4µin	±12µin	6µin	±24µin	12µin
over .05	up to .4	±10µin	2µin	±3µin	2µin	±5µin	4µin	±8µin	6µin	±18µin	12µin
over .45	up to 1	±12µin	2µin	±3µin	2µin	±6µin	4µin	±12µin	6µin	±24µin	12µin
over 1	up to 2	±16µin	2µin	±4µin	2µin	±8µin	4µin	±16µin	6µin	±32µin	12µin
over 2	up to 3	±20µin	2µin	±5µin	3µin	±10µin	4µin	±20µin	6µin	±40µin	14µin
over 3	up to 4	±24µin	3µin	±6µin	3µin	±12µin	5µin	±24µin	8µin	±48µin	14µin
over 4	up to 5	±32µin	3µin	±8µin	3µin	±16µin	5µin	±32µin	8µin	±64µin	16µin
over 5	up to 6	±32µin	3µin	±8µin	3µin	±16µin	5µin	±32µin	8µin	±64µin	16µin
over 6	up to 7	±40µin	4µin	±10µin	4µin	±20µin	6µin	±40µin	10µin	±80µin	16µin
over 7	up to 8	±40µin	4µin	±10µin	4µin	±20µin	6µin	±40µin	10µin	±80µin	16µin
over 8	up to 10	±48µin	4µin	±12µin	4µin	±24µin	6µin	±48µin	10µin	±104µin	18µin
over 10	up to 12	±56µin	4µin	±14µin	4µin	±28µin	7µin	±56µin	10µin	±112µin	20µin
over 12	up to 16	±72µin	5µin	±18µin	5µin	±36µin	8µin	±72µin	12µin	±144µin	20µin
over 16	up to 20	±88µin	6µin	±20µin	6µin	±44µin	10µin	±88µin	14µin	±176µin	24µin
over 20	up to 24	±104µin	6µin	±25µin	6µin	±52µin	10µin	±104µin	16µin	±200µin	28µin
over 24	up to 28	±120µin	7µin	±30µin	7µin	±60µin	12µin	±120µin	18µin	±240µin	28µin
over 28	up to 32	±136µin	8µin	±34µin	8µin	±68µin	12µin	±136µin	20µin	±260µin	32µin
over 32	up to 36	±152µin	8µin	±38µin	8µin	±76µin	14µin	±152µin	20µin	±300µin	36µin
over 36	up to 40	±160µin	10µin	±40µin	10µin	±80µin	16µin	±168µin	24µin	±320µin	40µin

Nominal length (mm)		Grade K		Grade 00		Grade 0		Grade 1		Grade 2	
		Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length	Limit deviations of length at any point	Tolerance for the variation in length
	up to 0.5	±0.30µm	0.05µm	±0.10µm	0.05µm	±0.14µm	0.10µm	±0.30µm	0.16µm	±0.60µm	0.30µm
over 0.5	up to 10	±0.20µm	0.05µm	±0.07µm	0.05µm	±0.12µm	0.10µm	±0.20µm	0.16µm	±0.45µm	0.30µm
over 10	up to 25	±0.30µm	0.05µm	±0.07µm	0.05µm	±0.14µm	0.10µm	±0.30µm	0.16µm	±0.60µm	0.30µm
over 25	up to 50	±0.40µm	0.06µm	±0.10µm	0.06µm	±0.20µm	0.10µm	±0.40µm	0.18µm	±0.80µm	0.30µm
over 50	up to 75	±0.50µm	0.06µm	±0.12µm	0.06µm	±0.25µm	0.12µm	±0.50µm	0.18µm	±1.00µm	0.35µm
over 75	up to 100	±0.60µm	0.07µm	±0.15µm	0.07µm	±0.30µm	0.12µm	±0.60µm	0.20µm	±1.20µm	0.35µm
over 100	up to 150	±0.80µm	0.08µm	±0.20µm	0.08µm	±0.40µm	0.14µm	±0.80µm	0.20µm	±1.60µm	0.40µm
over 150	up to 200	±1.00µm	0.09µm	±0.25µm	0.09µm	±0.50µm	0.16µm	±1.00µm	0.25µm	±2.00µm	0.40µm
over 200	up to 250	±1.20µm	0.10µm	±0.30µm	0.10µm	±0.60µm	0.16µm	±1.20µm	0.25µm	±2.40µm	0.45µm
over 250	up to 300	±1.40µm	0.10µm	±0.35µm	0.10µm	±0.70µm	0.18µm	±1.40µm	0.25µm	±2.80µm	0.50µm
over 300	up to 400	±1.80µm	0.12µm	±0.45µm	0.12µm	±0.90µm	0.20µm	±1.80µm	0.30µm	±3.60µm	0.50µm
over 400	up to 500	±2.20µm	0.14µm	±0.50µm	0.14µm	±1.10µm	0.25µm	±2.20µm	0.35µm	±4.40µm	0.60µm
over 500	up to 600	±2.60µm	0.16µm	±0.65µm	0.16µm	±1.30µm	0.25µm	±2.60µm	0.40µm	±5.00µm	0.70µm
over 600	up to 700	±3.00µm	0.18µm	±0.75µm	0.18µm	±1.50µm	0.30µm	±3.00µm	0.45µm	±6.00µm	0.70µm
over 700	up to 800	±3.40µm	0.20µm	±0.85µm	0.20µm	±1.70µm	0.30µm	±3.40µm	0.50µm	±6.50µm	0.80µm
over 800	up to 900	±3.80µm	0.20µm	±0.95µm	0.20µm	±1.90µm	0.35µm	±3.80µm	0.50µm	±7.50µm	0.90µm
over 900	up to 1000	±4.20µm	0.25µm	±1.00µm	0.25µm	±2.00µm	0.40µm	±4.20µm	0.60µm	±8.00µm	1.00µm



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

***Suffix Number (-■■■) for Selecting Standard Required**

ISO/DIN/JIS			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-01B	K	○	○

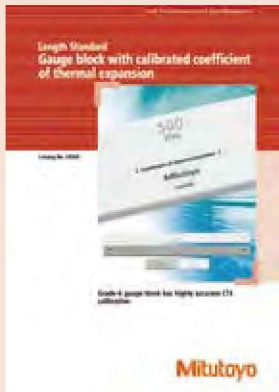
ASME			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-51B	K	○	○

BS			
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-11B	K	○	○

* Only for 100mm type



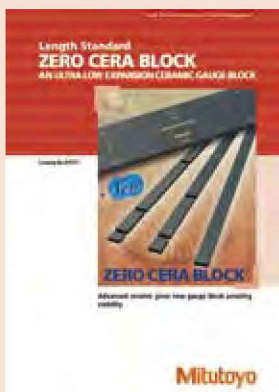
Inspection Certificate



For details, please refer to Leaflet No. E4334 "Gauge Block with calibrated coefficient of thermal expansion".



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



For details, please refer to Leaflet No. E4331 "ZERO CERA BLOCK"

Gauge Blocks with a Calibrated Coefficient of Thermal Expansion

- Mitutoyo offers top-quality gauge blocks (steel and ceramic), superior to K class blocks due to their advanced manufacturing technologies.
- Features an accurately calibrated thermal expansion coefficient measured with a proprietary double-faced interferometer (DFI).
- Each gauge block is calibrated for length on a highly accurate gauge block interferometer (GBI) system.
- Available as rectangular gauge blocks in the range 100 to 500mm.



SPECIFICATIONS

Metric Blocks with CTE			Inch Blocks with CTE		
Order No. (steel)*	Order No. (CERA)*	Length (mm)	Order No. (steel)*	Order No. (CERA)*	Length (inch)
611681	613681	100	611204	613204	4
611802	613802	125	611205	613205	5
611803	613803	150	611206	613206	6
611804	613804	175	611207	613207	7
611682	613682	200	611208	613208	8
611805	613805	250	611222	613222	10
611683	613683	300	611223	613223	12
611684	613684	400	611224	613224	16
611685	613685	500	611225	613225	20

Grade	K class in JIS/ASME/ISO
Uncertainty of thermal expansion coefficient	0.035 × 10 ⁻⁶ /K (k = 2)
Uncertainty of length measurement	30nm (k = 2), for 100mm block

* An inspection certificate and a JCSS calibration certificate are supplied as standard. A calibration report and a calibration certificate for the thermal expansion coefficient are also supplied as standard.

ZERO CERA Blocks

- Thermal expansion in the temperature range 20±1°C less than 1/500 that of steel (0±0.02×10⁻⁶/K(20°C))
- Almost no secular change both in dimension and coefficient of thermal expansion
- Complementary ultra-low thermal expansion and high specific rigidity (Young's modulus/specific gravity)



SPECIFICATIONS

Metric Blocks			Length (mm)
Order No.			
JIS/ISO/DIN	BS	ASME	
617673-016	617673-116	617673-516	30
617675-016	617675-116	617675-516	50
617681-016	617681-116	617681-516	100
617682-016	617682-116	617682-516	200
617683-016	617683-116	617683-516	300
617684-016	617684-116	617684-516	400
617685-016	617685-116	617685-516	500
617840-016	617840-116	617840-516	600
617841-016	617841-116	617841-516	700
617843-016	617843-116	617843-516	800
617844-016	617844-116	617844-516	900
617845-016	617845-116	617845-516	1000
516-771-60	516-771-61	516-771-66	Above set

Gauge Blocks

Length Standards Brought to You by Mitutoyo

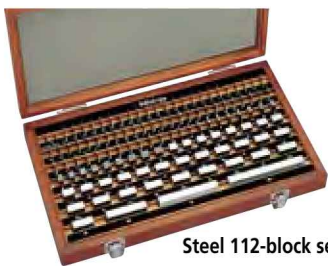


An inspection certificate is supplied as standard. Refer to page X for details.

Metric/Inch Rectangular Gauge Block Sets SERIES 516

- Mitutoyo provides a wide selection of boxed sets of gauge blocks to meet the various needs of industry. Selecting the best set, or sets, to acquire usually depends on the accuracy required by the target applications, the level of convenience desired (larger sets offer more combination possibilities) and the environmental conditions in which they will be used.

Steel 1mm Base Block Sets



Steel 112-block set



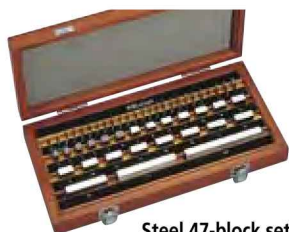
Steel 103-block set



Steel 76-block set



Steel 56-block set



Steel 47-block set



Steel 46-block set



Steel 34-block set



Steel 32-block set

Steel 0.001mm Step Block Sets



Steel 9-block set



Steel 9-block set



Steel 18-block set

Steel Long Block Sets



Steel 8-block set

Steel Wear Block Sets



Steel 2-block set

Steel Thin Block Sets



Steel 9-block set

Note: Details of the contents of any particular set are given on page E-9.



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

CERA 1mm Base Block Sets



CERA 112-block set



CERA 103-block set



CERA 76-block set



CERA 56-block set



CERA 47-block set



CERA 46-block set



CERA 34-block set



CERA 32-block set

CERA 0.001mm Step Block Sets



CERA 9-block set



CERA 9-block set

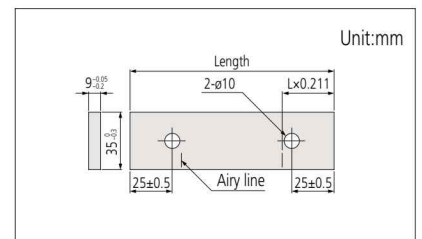


CERA 18-block set

CERA Long Block Sets



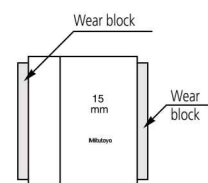
CERA 8-block set



CERA Wear Block Sets



CERA 2-block set



Note: Details of the contents of any particular set are given on page E-10.

Gauge Blocks

Length Standards Brought to You by Mitutoyo

SPECIFICATIONS

1mm Base Block Sets

* Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
122	—	—	—	—	—	1.0005	—	1
	516-596	—	K: -#0	—	—	1.001 - 1.009	0.001	9
	516-597	—	O: -#0	—	—	1.01 - 1.49	0.01	49
	516-598	—	1: -#0	—	—	1.6 - 1.9	0.1	4
	516-599	—	2: -#0	—	—	0.5 - 24.5	0.5	49
112	516-531	516-541	—	K: -#6	—	1.0005	—	1
	516-937	516-337	K: -#0	00: -#6	K: -#1	1.001 - 1.009	0.001	9
	516-938	516-338	O: -#0	0: -#6	O: -#1	1.01 - 1.49	0.01	49
	516-939	516-339	1: -#0	1: -#6	1: -#1	0.5 - 24.5	0.5	49
	516-940	516-340	2: -#0	2: -#6	2: -#1	25 - 100	25	4
103	516-533	516-542	—	K: -#6	—	1.0005	—	1
	516-941	516-341	K: -#0	00: -#6	K: -#1	1.001 - 1.49	0.01	49
	516-942	516-342	O: -#0	0: -#6	O: -#1	0.5 - 24.5	0.5	49
	516-943	516-343	1: -#0	1: -#6	1: -#1	25 - 100	25	4
	516-944	516-344	2: -#0	2: -#6	2: -#1	—	—	—
88	—	—	—	—	—	1.0005	—	1
	516-969	516-369	—	—	K: -#1	1.001 - 1.009	0.001	9
	516-970	516-370	O: -#0	—	O: -#1	1.01 - 1.49	0.01	49
	516-971	516-371	1: -#0	—	1: -#1	0.5 - 9.5	0.5	19
	516-972	516-372	2: -#0	—	2: -#1	10 - 100	10	10
87	516-535	515-543	—	K: -#6	—	1.001 - 1.009	0.001	9
	516-945	516-345	K: -#0	00: -#6	K: -#1	1.01 - 1.49	0.01	49
	516-946	516-346	O: -#0	0: -#6	O: -#1	0.5 - 9.5	0.5	19
	516-947	516-347	1: -#0	1: -#6	1: -#1	10 - 100	10	10
	516-948	516-348	2: -#0	2: -#6	2: -#1	—	—	—
76	—	—	—	—	—	1.005	—	1
	516-949	516-349	K: -#0	—	—	1.01 - 1.49	0.01	49
	516-950	516-350	O: -#0	—	—	0.5 - 9.5	0.5	19
	516-951	516-351	1: -#0	—	—	10 - 40	10	4
	516-952	516-352	2: -#0	—	—	50 - 100	25	3
56	516-536	516-544	—	K: -#6	—	0.5	—	1
	516-953	516-353	K: -#0	00: -#6	—	1.001 - 1.009	0.001	9
	516-954	516-354	O: -#0	0: -#6	—	1.01 - 1.09	0.01	9
	516-955	516-355	1: -#0	1: -#6	—	1.1 - 1.9	0.1	9
	516-956	516-356	2: -#0	2: -#6	—	1 - 24	1	24
47	516-537	516-545	—	K: -#6	—	1.005	—	1
	516-957	516-357	K: -#0	00: -#6	—	1.01 - 1.09	0.01	9
	516-958	516-358	O: -#0	0: -#6	—	1.1 - 1.9	0.1	9
	516-959	516-359	1: -#0	1: -#6	—	1 - 24	1	24
	516-960	516-360	2: -#0	2: -#6	—	25 - 100	25	4
47	—	—	—	—	—	1.005	—	1
	516-961	516-361	K: -#0	—	K: -#1	1.01 - 1.19	0.01	19
	516-962	516-362	O: -#0	—	O: -#1	1.2 - 1.9	0.1	8
	516-963	516-363	1: -#0	—	1: -#1	1 - 9	1	9
	516-964	516-364	2: -#0	—	2: -#1	10 - 100	10	10
46	—	—	—	—	—	1.001 - 1.009	0.001	9
	516-994	516-394	K: -#0	—	—	1.01 - 1.09	0.01	9
	516-995	516-395	O: -#0	—	—	1.1 - 1.9	0.1	9
	516-996	516-396	1: -#0	—	—	1 - 9	1	9
	516-997	516-397	2: -#0	—	—	10 - 100	10	10
34	—	—	—	—	—	1.0005	—	1
	516-128	516-178	K: -#0	—	K: -#1	1.001 - 1.009	0.001	9
	516-129	516-179	O: -#0	—	O: -#1	1.01 - 1.09	0.01	9
	516-130	516-180	1: -#0	—	1: -#1	1.1 - 1.9	0.1	9
	516-131	516-181	2: -#0	—	2: -#1	1 - 5	1	5
32	—	—	—	—	—	1.005	—	1
	516-965	516-365	K: -#0	—	K: -#1	1.01 - 1.09	0.01	9
	516-966	516-366	O: -#0	—	O: -#1	1.1 - 1.9	0.1	9
	516-967	516-367	1: -#0	—	1: -#1	1 - 9	1	9
	516-968	516-368	2: -#0	—	2: -#1	10 - 30	10	3
					60		1	

Thin Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
9	516-990	—	O: -#0	—	—	0.10 - 0.50	0.05	9
	516-991	—	1: -#0	—	—	—	—	—
	516-992	—	2: -#0	—	—	—	—	—



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

* Suffix Number (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS		
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets.

ASME		
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets. Suffix No. 6: Only for Grade K sets.

BS		
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	○	—
6	○	○

Suffix No. 1: Not available for Grade K sets. Suffix No. 6: Only for Grade K sets.

Inspection Certificate





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

SPECIFICATIONS

0.001mm Step Block Set

* Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
18	516-973	516-373	K: -#0	—	—	0.991 - 0.999	0.001	9
	516-974	516-374	O: -#0	—	—	1.001 - 1.009	0.001	9
	516-975	516-375	1: -#0	—	—			
	516-976	516-376	2: -#0	—	—			
9	516-981	516-381	K: -#0	—	K: -#1	1.001 - 1.009	0.001	9
	516-982	516-382	O: -#0	—	O: -#1			
	516-983	516-383	1: -#0	—	1: -#1			
	516-984	516-384	2: -#0	—	2: -#1			
9	516-985	516-385	K: -#0	—	—	0.991 - 0.999	0.001	9
	516-986	516-386	O: -#0	—	—			
	516-987	516-387	1: -#0	—	—			
	516-988	516-388	2: -#0	—	—			

Long Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
8	516-540	516-546	—	K: -#6	—	125 - 175	25	3
	516-701	516-731	K: -#0	00: -#6	—	200 - 250	50	2
	516-702	516-732	O: -#0	0: -#6	—	300 - 500	100	3
	516-703	516-733	1: -#0	1: -#6	—			
	516-704	516-734	2: -#0	2: -#6	—			

Wear Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
2	516-807	516-832	0: -#0	0: -#6	—	1		2
	516-806	516-833	1: -#0	1: -#6	—			
2	516-803	516-830	0: -#0	0: -#6	—	2		2
	516-802	516-831	1: -#0	1: -#6	—			

Inch Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
82	516-548	516-556	—	K: -#6	—	.10005		1
	516-905	516-305	—	00: -#6	—	.1001 - .1009	.0001	9
	516-906	516-306	—	0: -#6	0: -#1	.101 - .149	.001	49
	516-907	516-307	—	1: -#6	1: -#1	.05 - .95	.05	19
	516-908	516-308	—	2: -#6	2: -#1	1 - 4	1	4
81	516-549	516-557	—	K: -#6	—	.1001 - .1009	.0001	9
	516-901	516-301	—	00: -#6	—	.101 - .149	.001	49
	516-902	516-302	—	0: -#6	0: -#1	.05 - .95	.05	19
	516-903	516-303	—	1: -#6	1: -#1	1 - 4	1	4
	516-904	516-304	—	2: -#6	2: -#1			
49	—	—	—	—	—	.1001 - .1009	.0001	9
	516-910	—	—	—	0: -#1	.101 - .109	.001	9
	516-911	—	—	—	1: -#1	.01 - .19	.01	19
	516-912	—	—	—	2: -#1	.2 - .9	.1	8
35	516-550	516-558	—	K: -#6	—	.10005		1
	516-913	516-313	—	00: -#6	—	.1001 - .1009	.0001	9
	516-914	516-314	—	0: -#6	0: -#1	.101 - .109	.001	9
	516-915	516-315	—	1: -#6	1: -#1	.11 - .19	.01	9
	516-916	516-316	—	2: -#6	2: -#1	.1 - .3	.1	3
						.5, 1, 2, 4		4

Thin Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
28	516-551	—	—	K: -#6	—	.02005		1
	516-917	—	—	00: -#6	—	.0201 - .0209	.0001	9
	516-918	—	—	0: -#6	—	.021 - .029	.001	9
	516-919	—	—	1: -#6	—	.01 - .09	.01	9
	516-920	—	—	2: -#6	—			
10	516-926	—	—	0: -#6	0: -#1	.005 - .050	.005	10
	516-927	—	—	1: -#6	1: -#1			
	516-928	—	—	—	2: -#1			

Long Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
8	—	516-564	—	K: -#6	—	5 - 7	1	3
	—	516-741	—	00: -#6	—	8, 10, 12	2	3
	516-712	516-742	—	0: -#6	—	16, 20	4	2
	516-713	516-743	—	1: -#6	—			

Wear Block Sets

Blocks per set	Order No.		Standard / grade available and Suffix No.*			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size	Step	Qty.
2	516-809	516-836	—	0: -#6	—	.05		2
	516-808	516-837	—	1: -#6	—			
2	516-805	516-834	—	0: -#6	—	.1		2
	516-804	516-835	—	1: -#6	—			

Gauge Blocks

Length Standards Brought to You by Mitutoyo



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Micrometer Inspection Gauge Block Sets SERIES 516

- Dedicated gauge block sets for micrometer inspection.
Sets **516-106/7/8** and **516-322/3** are recommended for checking instrumental errors in micrometers due to the choice of block sizes ensuring that the instrument is checked through a full rotation of the spindle over the range 0-25 mm (or 0-1").
Sets **516-115/6/7**, **516-165/6** and **516-177** contain blocks in 25 mm (or 1") steps for aiding inspection of large micrometers in conjunction with one of the abovementioned sets.
Sets **516-580/1/2**, **516-390/1/2** are dedicated to the QuantuMike with its 2mm/rev spindle feed.

Steel



Steel 10-block set



Steel 10-block set



Steel 8-block set



Steel 10-block set

CERA



CERA 10-block set



CERA 10-block set



CERA 8-block set



CERA 10-block set

Micro Checker

Can clamp a stack of gauge blocks to be used for micrometer inspection.



516-607
(The gauge blocks are optional.)



Gauge Block Sets for Micrometer Inspection

A set consisting of a Micro Checker and gauge blocks for micrometer inspection.

(516-132/3/4/5/6/7)



SPECIFICATIONS

Metric	Micro Checker (holder only)
Order No.	516-607
Applicable gauge block set	516-106, 516-107, 516-108, 516-156, 516-157, 516-158
Applicable gauge block size (mm)	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25

Inch	Micro Checker (holder only)
Order No.	516-608
Applicable gauge block set	516-921, 516-922, 516-923, 516-321, 516-322, 516-323
Applicable gauge block size (inch)	.105, .210, .315, .420, .5, .605, .710, .815, .920, 1