

Mitutoyo

Catalog No. US-1002



Measuring Instruments Catalog

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02-214-0101

Ceraston

Accessory for Gauge Blocks

FEATURES

- Alumina-ceramic grinding stone for removing burrs from hard materials such as ceramics that ordinary grinding stones cannot handle.
- Can be used both for steel gauge blocks and CERA Blocks.



SPECIFICATIONS

Order No.	Dimensions (W x D x H)	Mass
601645	100 x 25 x 12mm	110g
601644	150 x 50 x 20mm	530g

Maintenance Kit for Gauge Block

SERIES 516

FEATURES

- Includes all necessary maintenance tools for daily care and storage of gauge blocks.
- Supplied in a fitted wooden case for portable use.



516-650

SPECIFICATIONS

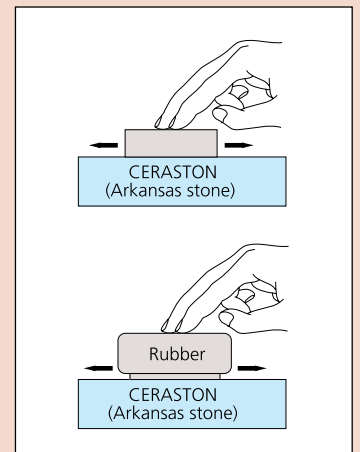
Order No.	Assortment of tools and accessories
516-650	Anti-corrosive oil (600001): Used for both steel and tungsten-carbide gauge blocks.
	Ceraston (601645): Used for removing burrs on the measuring surface
	Optical flat (600003): Used for checking whether burrs exist.
	Tweezers (600004): Used for handling thin gauge blocks.
	Blower brush (600005): Used for blowing out dust on the measuring surface.
	Cleaning paper (600006): Used for wiping off rust preventive oil and contamination.
	Artificial leather mat (600007): Used as a gauge block mat.
	Reagent bottle (600008): Bottle of wiping solution (100mL)
	Gloves

Mitutoyo



Removing burrs

- (1) Wipe any dust and oil films from the gauge block and the Ceraston (or Arkansas stone) using a solvent.
- (2) Place the gauge block on the Ceraston so that the measuring face that has burrs is on the abrasive surface of the stone. While applying light pressure, move the gauge block to and fro about ten times (Fig. 1). Use a block rubber for thin gauge blocks to apply even pressure (Fig. 2).
- (3) Check the measuring face for burrs with an optical flat. If the burrs have not been removed, repeat step (2). If burrs are too large, they may not be removed with a grinding stone. If so, discard the gauge block.



Note: The abrasive surface of a Ceraston must be made flat by lapping it from time to time. After lapping the Ceraston, the lapping powder must be completely removed from the surface to prevent the surface of the gauge block from being scratched. Mitutoyo does not handle the Arkansas stone.





Technical Data

Accuracy (at 20°C): $(0.5 + L/1000)\mu\text{m}$,
L = Measured length (mm)
Glass material: Low expansion glass
Thermal expansion coefficient: $8 \times 10^{-6}/\text{K}$
Graduation: 1mm
Graduation thickness: 4μm
Mass: 0.75kg (250mm), 1.8kg (500mm)

SPECIFICATIONS

Metric				
Range	Order No.	L	W	T
250mm	182-501-50	280mm	20mm	10mm
250mm	182-501-60	280mm	20mm	10mm
500mm	182-502-50	530mm	30mm	20mm
500mm	182-502-60*	530mm	30mm	20mm

*with English JCSS certificate.

Standard Scales

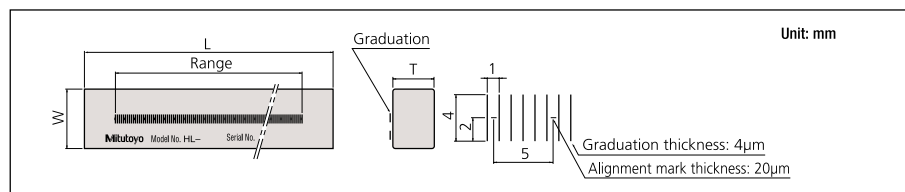
SERIES 182 — Made of Low Expansion Glass

FEATURES

- High precision glass scales manufactured under Mitutoyo's leading-edge Linear Scale production technology.
- High accuracy is guaranteed to be used as a standard for calibrating graduated scales.

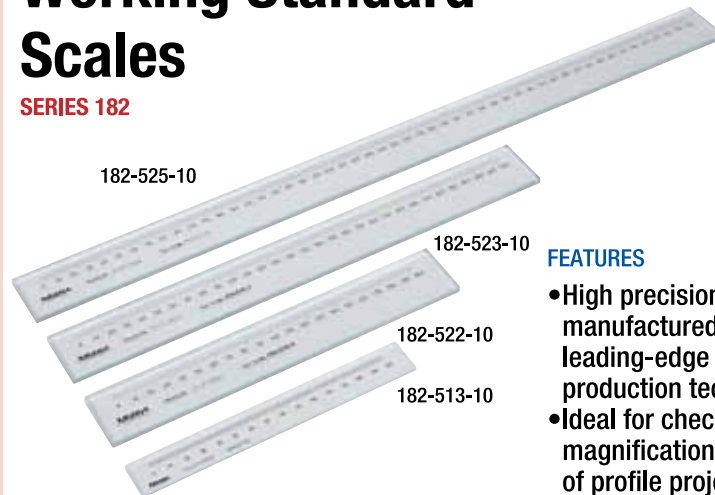


DIMENSION



Working Standard Scales

SERIES 182



FEATURES

- High precision glass scales manufactured under Mitutoyo's leading-edge Linear Scale production technology.
- Ideal for checking magnification accuracy of profile projectors and microscopes, and the table feeding accuracy of measuring equipment.

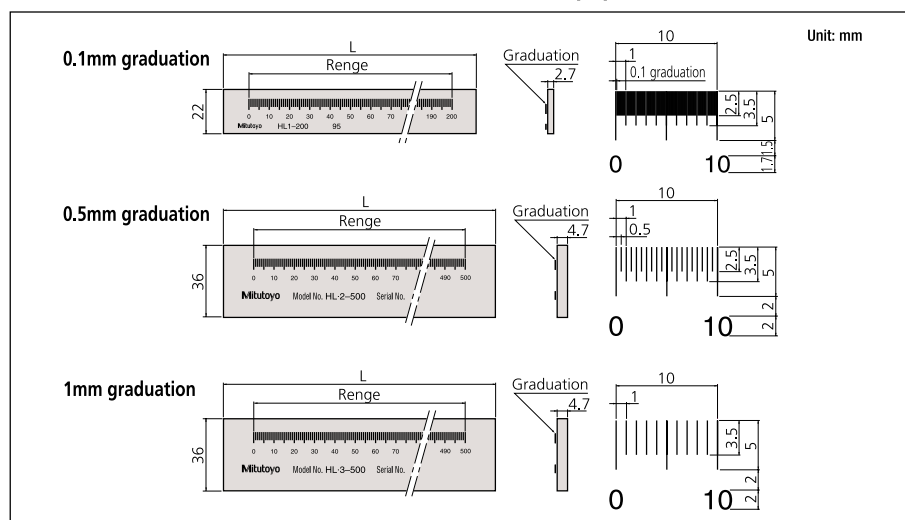
Technical Data

Accuracy (at 20°C): $(1.5 + 2L/1000)\mu\text{m}$,
L = Measured length (mm)
Glass material: Sodium glass
Thermal expansion coefficient: $8.5 \times 10^{-6}/\text{K}$
Graduation: 0.1mm (thickness: 20μm)
0.5mm (thickness: 50μm)
1mm (thickness: 100μm)
Mass: Refer to the list of specifications.

SPECIFICATIONS

Metric				
Range	Order No.	Graduation	L	Mass
50mm	182-511-10	0.1mm	75mm	0.23kg
100mm	182-512-10	0.1mm	125mm	0.24kg
150mm	182-513-10	0.1mm	175mm	0.35kg
200mm	182-514-10	0.1mm	225mm	0.36kg
100mm	182-521-10	0.5mm	130mm	0.27kg
200mm	182-522-10	0.5mm	230mm	0.32kg
300mm	182-523-10	0.5mm	330mm	0.57kg
400mm	182-524-10	0.5mm	430mm	0.71kg
500mm	182-525-10	0.5mm	530mm	0.86kg
250mm	182-531-10	1mm	280mm	0.55kg
500mm	182-532-10	1mm	530mm	0.86kg
750mm	182-533-10	1mm	780mm	1.22kg
1000mm	182-534-10	1mm	1030mm	1.54kg

DIMENSION



Precision Square

SERIES 916

FEATURES

- Three types of square are available.
- All edges are hardened and precision ground



916-213
Standard type



916-402
with stand



916-102
Beveled-edge type

SPECIFICATIONS

Size (HxW)	Order No.	Remarks
50 x 40mm	916-211	Standard type
75 x 50mm	916-212	Standard type
100 x 70mm	916-213	Standard type
150 x 100mm	916-214	Standard type
200 x 130mm	916-215	Standard type
230 x 165mm	916-216	Standard type
300 x 200mm	916-217	Standard type
400 x 250mm	916-218	Standard type
75 x 50mm	916-401	with stand
100 x 70mm	916-402	with stand
150 x 100mm	916-403	with stand
200 x 130mm	916-404	with stand
230 x 165mm	916-405	with stand
300 x 200mm	916-406	with stand
400 x 250mm	916-407	with stand
50 x 40mm	916-100	Standard type
75 x 50mm	916-101	Standard type
100 x 70mm	916-102	Standard type
150 x 100mm	916-103	Standard type
200 x 130mm	916-104	Standard type

Technical Data

SPECIFICATIONS

Order No.	Outside	Inside
916-211	6μm	12.5μm
916-212	6.5μm	15μm
916-213	7μm	15μm
916-214	8μm	17.5μm
916-215	9μm	20μm
916-216	10μm	22.5μm
916-217	11μm	25μm
916-218	13μm	30μm
916-401	6.5μm	14μm
916-402	7μm	15μm
916-403	8μm	17.5μm
916-404	9μm	20μm
916-405	10μm	22.5μm
916-406	11μm	25μm
916-407	13μm	30μm
916-100	2.5μm	6μm
916-101	3μm	6.5μm
916-102	3μm	7μm
916-103	3.5μm	8μm
916-104	4μm	9μm

Precision Dial Square

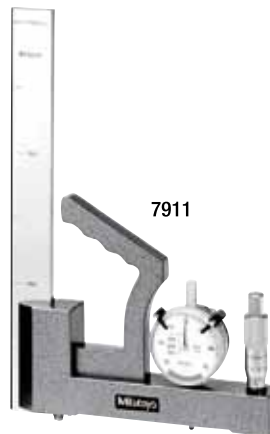
SERIES 7

FEATURES

- Regular type and beveled-edge type blades are interchanfable.
- Dial insicator shows squareness directly.

SPECIFICATIONS

Size	Order No.	Range	Squareness
300mm	7911	±0.17mm	±2.5μm/300mm
600mm	7912	±0.24mm	±5μm/600mm



Technical Data

Range	: ± 0.17mm (7911)
	: ± 0.24mm (7912)
Squareness	: ±2.5μm/300mm(7911)
	: ±5μm/600mm (7912)

Spring Dividers and Calipers

SERIES 950

FEATURES

- Spring Divider - Fully hardened and tempered joints, spring, washers and divider points.
- Outside Spring Caliper - Contact ends fully rounded to bive accurate dimensions.
- Inside Spring Caliper - Ends fully rounded to give accurate contact with a workpiece.



950-211
Spring Divider



950-231
Outside Spring Caliper



950-231
Inside Spring Caliper

SPECIFICATIONS

Range	Order No.		
	Spring Divider	Outside Spring Caliper	Inside Spring Caliper
4" (100mm)	950-211	950-221	950-231
6" (150mm)	950-212	950-222	950-232
8" (200mm)	950-213	950-223	950-233

Combination Square Set

SERIES 180

Technical Data

- Square head:** Used to set the rule at 90 degrees or 45 degrees to an edge of a workpiece.
- Center head:** Used to locate centers of round workpieces
- Protractor head:** Used to set the rule at a desired angle to an edge of a workpiece. Also used for measuring angles.

FEATURES

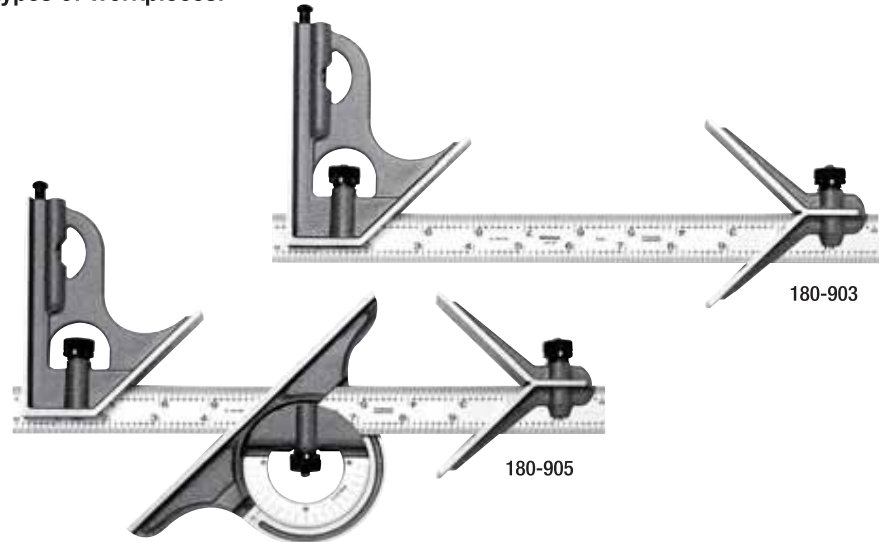
- Three measuring heads are attached to the stainless steel rule (blade), allowing versatile measurements on various types of workpieces.
- The measuring heads are hardened.
- Economy sets not including a protractor head are also available.

Blades (Individual)

Range	Order No.	Graduation
150mm	180-405	1mm, 0.5mm, 1mm, 0.5mm
300mm	180-505	1mm, 0.5mm, 1mm, 0.5mm
450mm	180-705	1mm, 0.5mm, 1mm, 0.5mm
600mm	180-605	1mm, 0.5mm, 1mm, 0.5mm
6"/150mm	180-403	1/32", 1/64", 1mm, 0.5mm
12"/300mm	180-503	1/32", 1/64", 1mm, 0.5mm
18"/450mm	180-703	1/32", 1/64", 1mm, 0.5mm
24"/600mm	180-603	1/32", 1/64", 1mm, 0.5mm

Measuring Heads (Individual)

Order No.	Description	Remarks
180-101	Square head	For 150mm (6") blades
180-102	Square head	For 300mm (12"), 450mm (18"), 600mm (24") blades
180-201	Center head	For 150mm (6") blades
180-202	Center head	For 300mm (12"), 450mm (18"), 600mm (24") blades
180-301	Protractor head	For 300mm (12"), 450mm (18"), 600mm (24") blades



SPECIFICATIONS

Metric Combination Square Sets			
Size	Order No.	B l a d e provided	
	Complete	Semi-complete	
150mm	—	180-919	180-405
300mm	180-910	180-920	180-505

Inch/Metric Combination Square Sets			
Size	Order No.	B l a d e provided	
	Complete	Semi-complete	
6"/150mm	—	180-915	180-403
12"/300mm	180-907	180-909	180-503

Thickness Gages

SERIES 184

FEATURES

- Metric thickness gages are straight leaves.
- Each leaf is marked with its thickness.
- Each leaf is detachable if necessary.



SPECIFICATIONS

Metric			
Range	Order No.	Composition of leaves	Remarks
0.05 - 1mm	184-313S	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	—
	184-303S	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	Long leaf
0.05 - 1mm	184-304S	20 leaves: 0.05 - 1mm by 0.05mm	Long leaf
0.05 - 1mm	184-305S	13 leaves: 0.05 - 0.3mm by 0.05mm, 0.4 - 1mm by 0.1mm	—
	184-301S	13 leaves: 0.05 - 0.3mm by 0.05mm, 0.4 - 1mm by 0.1mm	Long leaf
0.05 - 0.8mm	184-306S	10 leaves: 0.05 - 0.2mm by 0.05mm, 0.3 - 0.8mm by 0.1mm	—
	184-308S	10 leaves: 0.05 - 0.2mm by 0.05mm, 0.3 - 0.8mm by 0.1mm	Long leaf
0.03 - 0.5mm	184-307S	13 leaves: 0.03 - 0.1mm by 0.01mm, 0.2 - 0.5mm by 0.1mm, 0.15mm	—
	184-302S	13 leaves: 0.03 - 0.1mm by 0.01mm, 0.2 - 0.5mm by 0.1mm, 0.15mm	Long leaf

Precision Levels

SERIES 960

FEATURES

- High precision longitudinal and transverse vials make it possible to check or level surfaces.

SPECIFICATIONS

Order No.	Sensitivity	Dimensions (W x D x H)
960-606	0.02mm/m	200 x 44 x 38.2mm
960-706	0.02mm/m	200 x 44 x 200mm

Radius Gages

SERIES 186

FEATURES

- Radius size is stamped on each gage.
- Both concave and convex radius gages become a pair.
- With a locking clamp.

SPECIFICATIONS

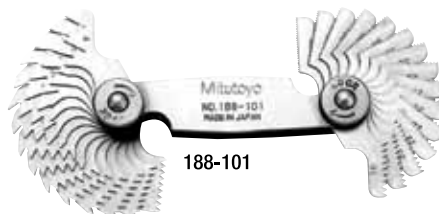
Metric			
Range	Order No.	Composition of leaves	Remarks
0.4 - 6mm	186-110	18 pairs: 0.4, 0.8, 1, 1.2, 1.5, 1.6mm, 1.75 - 3mm by 0.25mm, 3.5 - 6mm by 0.5mm	90° arc
0.5 - 13mm	186-902	26 pairs: 0.5 - 13mm by 0.5mm	90° arc
1 - 7mm	186-105	34 pairs: 1 - 3mm by 0.25mm 3.5 - 7mm by 0.5mm	180° arc
7.5 - 15mm	186-106	32 pairs: 7.5 - 15mm by 0.5mm	180° arc
15.5 - 25mm	186-107	30 pairs: 15.5 - 20mm by 0.5mm, 21 - 25mm by 1mm	180° arc

Pitch Gages

SERIES 188

FEATURES

- Thread pitch size is stamped on each gage.
- Metric, Unified, and Whitworth screw pitch gages.



SPECIFICATIONS

Metric Screw Pitch Gages

Range	Order No.	Composition of leaves
0.35 - 6mm	188-130	22 leaves: 0.35, 0.4, 0.45, 0.5, 0.6, 0.7, 0.75, 0.8, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6mm and 60° angle gage
0.4 - 7mm	188-122	21 leaves: 0.4, 0.5, 0.7, 0.75, 0.8, 0.9, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7mm
0.4 - 7mm	188-121	18 leaves: 0.4, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7mm

Unified Screw Pitch Gages

Range	Order No.	Composition of leaves
4 - 42 TPI	188-111	30 leaves: 4, 4 1/2, 5, 5 1/2, 6, 7, 8, 9, 10, 11, 11 1/2, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42 TPI

Note: Metric and Unified Pitch Gage Set (188-151) is available. It consists of 188-122 (Metric) and 188-111 (Unified).

Whitworth Screw Pitch Gages

Range	Order No.	Composition of leaves
4 - 42 TPI	188-101	30 leaves: 4, 4 1/2, 5, 5 1/2, 6, 7, 8, 9, 10, 11, 11 1/2, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42 TPI
4 - 60 TPI	188-102	28 leaves: 4, 4 1/2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 34, 36, 40, 48, 60 TPI

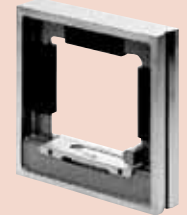
Mitutoyo

Technical Data

Accuracy of graduations: ± 0.7 (960-606), ± 0.3 (960-706)



960-606



960-706



186-105



186-110

Technical Data

Range: -360° to +360°
 Tolerance: $\pm 2''$ ($\pm 0.03^\circ$)
 Repeatability: 1'
 Resolution: 1' (0.01°)
 Battery: Lithium Battery
 Battery life: 2,000 hours

Function

Presetting

Digital Universal Protractor

SERIES 187**FEATURES**

- Data output function make it easy to see the statistical data.
- Can be attached to height gages. gage holder (950750, metric)
- Setting preset value.
- Removable blade.

SPECIFICATIONS

Blade length	Order No.	Remarks (standard accessory)
150mm	187-501	Height gage holder (950750)
300mm	187-502	Height gage holder (950750)



187-501

Universal Bevel Protractor

SERIES 187**FEATURES**

- High-precision angle gage for accurate angle measurement of machines, molds, and jigs.
- Can be attached to height gages.



187-901

SPECIFICATIONS

Metric		
Blade length	Order No.	Remarks
150, 300mm	187-901	w/60°, 45°, 30° edges
150mm	187-907	w/60°, 45° edges
300mm	187-908	w/60°, 45° edges

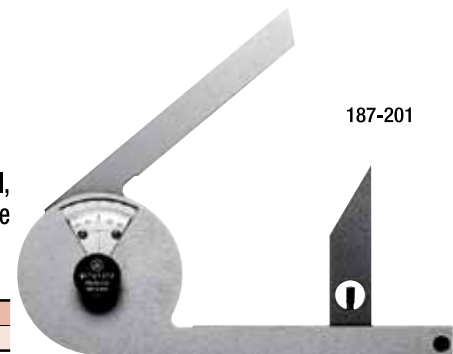
Bevel Protractor

SERIES 187**FEATURES**

- Consists of three sheets of stainless steel, the middle one of which is made for angle measurements.

SPECIFICATIONS

Blade length	Order No.	Remarks
135mm	187-201	w/60°, 30° edges



187-201

Technical Data

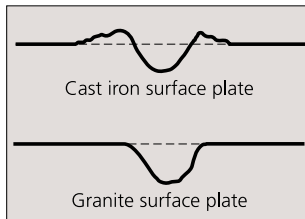
Graduation: 5 min. (0° - 90° - 0°)
 Blade edge angle: 30° and 60°

Black Granite Surface Plate

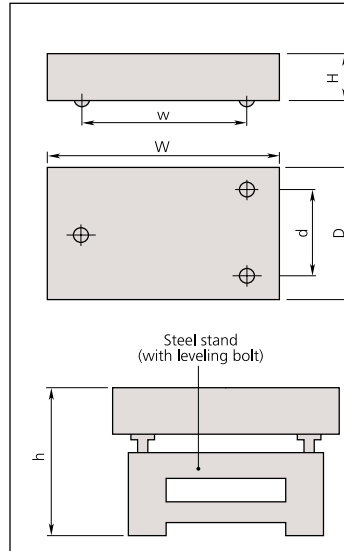
SERIES 517

FEATURES

- Natural granite seasoned for thousands of years is free from deterioration or dimensional change over time.
- Granite surface plate has many advantages over cast iron surface plates: Twice as hard as cast iron. Minimal changes in dimension due to temperature changes.
- Free from wringing, so there is no interruption of work.
- Free from burrs or protrusions because of the fine grain structure and insignificant stickiness; this ensures a high degree of flatness over a long service life and causes no damage to other parts or instruments.
- Trouble-free operation for use with magnetic materials.
- Long life and rust-free, resulting in low maintenance costs.
- Steel stands are optional.



DIMENSION



Unit: mm

W	D	H	w	d	Mass
300	300	100	240	240	27kg
450	300	100	390	240	40kg
600	450	100	500	370	80kg
600	600	130	500	500	140kg
750	500	130	630	420	146kg
1000	750	150	700	630	337kg
1000	1000	150	700	700	450kg
1500	1000	200	1100	700	900kg
2000	1000	250	1500	700	1500kg
2000	1500	300	1500	1100	2700kg
2000	2000	300	2000	1500	4200kg
3000	1500	400	1500	1100	5400kg
3000	2000	500	2000	1500	9000kg



1000 x 750mm



600 x 600mm

SPECIFICATIONS

Grade 0

Dimensions (W x D x H)	Order No.*	Flatness
300 x 300 x 100mm	517-301	0.003mm
450 x 300 x 100mm	517-311	0.003mm
600 x 450 x 100mm	517-314	0.004mm
600 x 600 x 130mm	517-303	0.005mm
750 x 500 x 130mm	517-305	0.005mm
1000 x 750 x 150mm	517-307	0.006mm
1000 x 1000 x 150mm	517-309	0.007mm
1500 x 1000 x 200mm	517-313	0.008mm
2000 x 1000 x 250mm	517-310	0.010mm
2000 x 1500 x 300mm	517-316	0.010mm
2000 x 2000 x 300mm	517-317	0.011mm
3000 x 1500 x 400mm	517-318	0.013mm
3000 x 2000 x 500mm	517-319	0.014mm

Grade 1

Dimensions (W x D x H)	Order No.*	Flatness
300 x 300 x 100mm	517-101	0.005mm
450 x 300 x 100mm	517-111	0.006mm
600 x 450 x 100mm	517-114	0.008mm
600 x 600 x 130mm	517-103	0.008mm
750 x 500 x 130mm	517-105	0.009mm
1000 x 750 x 150mm	517-107	0.012mm
1000 x 1000 x 150mm	517-109	0.013mm
1500 x 1000 x 200mm	517-113	0.016mm
2000 x 1000 x 250mm	517-110	0.019mm
2000 x 1500 x 300mm	517-116	0.020mm
2000 x 2000 x 300mm	517-117	0.022mm
3000 x 1500 x 400mm	517-118	0.025mm
3000 x 2000 x 500mm	517-119	0.027mm

*Suffix Number for Calibration Certificate

Suffix No.	Calibration certificate
-4	Not provided
K	Provided

SPECIFICATIONS:

Applicable surface plate size (W x D x H)	Order No.*	Adjustable height (h) range	Remarks
300 x 300 x 100mm	—	—	—
450 x 300 x 100mm	—	—	—
600 x 450 x 100mm	517-203-4 / 203R / 203CR	755 - 780mm	With levelling bolt
600 x 600 x 130mm	517-204-4 / 204R / 204CR	785 - 810mm	With levelling bolt
750 x 500 x 130mm	517-205-4 / 205R / 205CR	785 - 810mm	With levelling bolt
1000 x 750 x 150mm	517-206-4 / 206R / 206CR	755 - 780mm	With levelling bolt
1000 x 1000 x 150mm	517-207-4 / 207R / 207CR	735 - 775mm	With levelling bolt
1500 x 1000 x 200mm	517-208-4 / 208R / 208CR	735 - 775mm	With levelling bolt
2000 x 1000 x 250mm	517-209-4 / 209R / 209CR	735 - 775mm	With levelling bolt
2000 x 1500 x 300mm	517-210-4 / 210R / 210CR	735 - 775mm	With levelling bolt
2000 x 2000 x 300mm	06AAY174	700 - 706mm	—
3000 x 1500 x 400mm	06AAY175	700 - 706mm	—
3000 x 2000 x 500mm	06AAY176	700 - 706mm	—

*Suffix "-4": Normal type, Suffix "R": with safty frame, Suffix "CR": with casters

Stand

Bench Comparator

SERIES 162

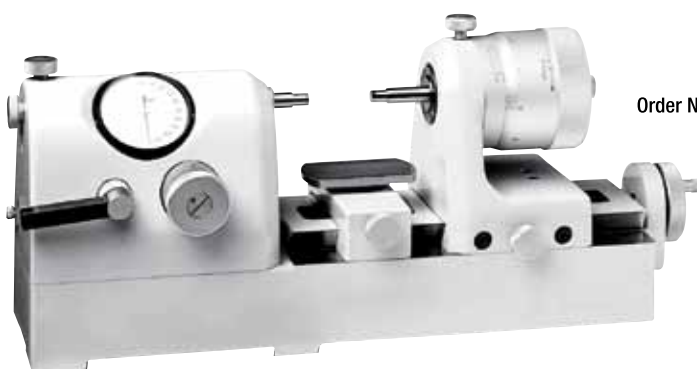
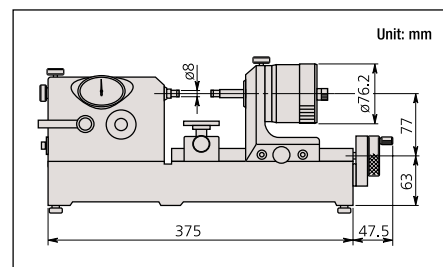
Technical Data

Micrometer head stroke: 25mm
 Graduation: 0.001mm
 Dial indicator range: ± 0.1 mm
 Maximum workpiece length: 100mm
 Mass: 15kg

FEATURES

- 25mm stroke micrometer head (Graduation: 0.001mm) is provided.
- Retractable anvil with dial indicator for high accuracy inspection of mass-produced parts.
- Anvil pressure is variable.
- Adjustable workpiece stage height.
- Dial Indicator is shockproof.
- $\phi 8$ mm probe of Mitutoyo Mu-Checker can be attached for higher precision measurement if required.

DIMENSION



Order No.: 162-101 (metric)

Bench Center

SERIES 967

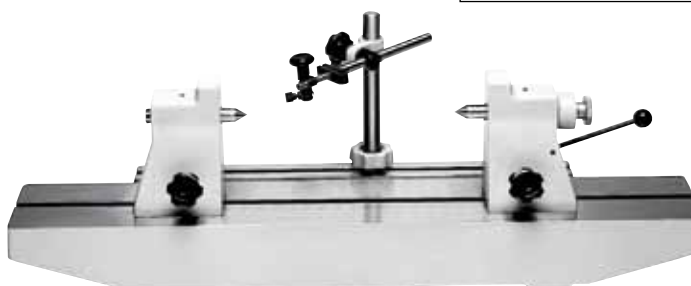
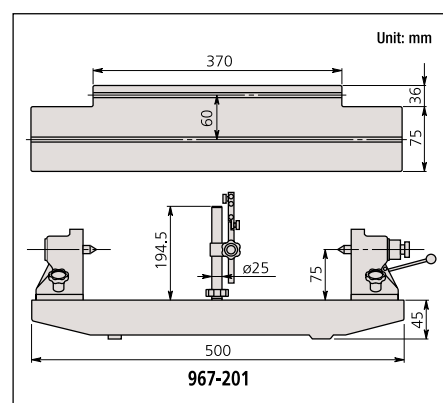
Technical Data

Maximum workpiece dia.: 300mm
 Maximum workpiece height: 150mm
 Mass: 13kg

FEATURES

- Used with a dial test indicator (optional), the Bench Center provides precision measurement of concentricity verification on cylindrical workpieces.
- With an indicator clamp. (Holding stem diameter: 8mm)

DIMENSION



Order No.: 967-201