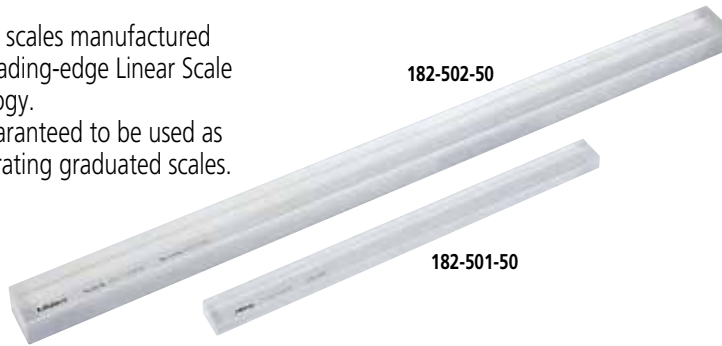


# Standard Scales

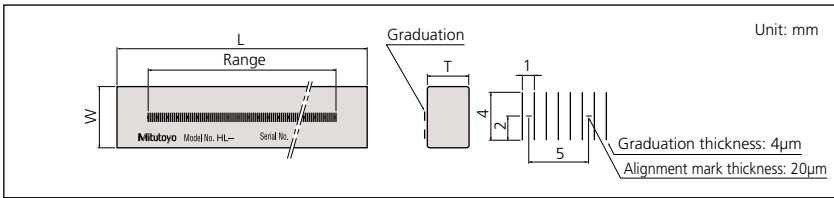
**SERIES 182 — Made of Low-Expansion Glass**

## 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.



## DIMENSIONS



## 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	<b>182-501-50</b>	280mm	20mm	10mm
250mm	<b>182-501-60*</b>	280mm	20mm	10mm
500mm	<b>182-502-50</b>	530mm	30mm	20mm
500mm	<b>182-502-60*</b>	530mm	30mm	20mm

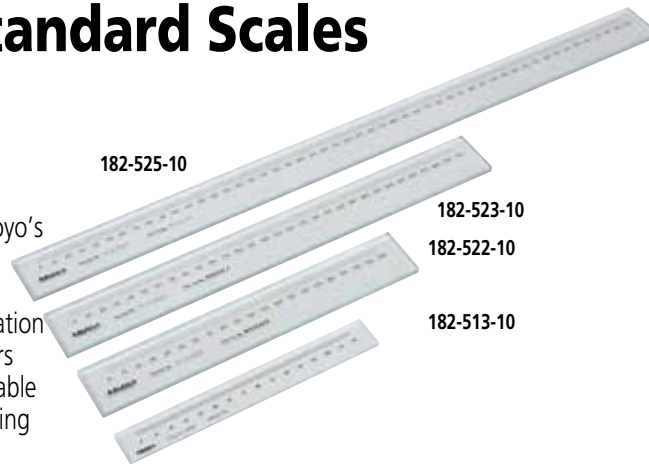
\*with English JCSS certificate.

# Working Standard Scales

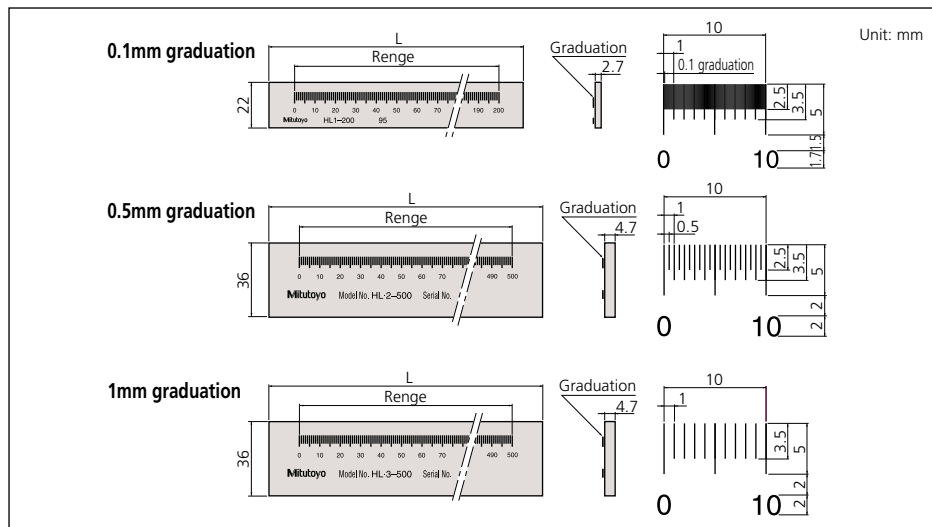
**SERIES 182**

## 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.



## DIMENSIONS



## 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)

## SPECIFICATIONS

### Metric

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

# High-Precision Square

## SERIES 311

### FEATURES

The High-Precision Square gage is used for inspecting the travel straightness and axial perpendicularity of moving elements on equipment, such as machine tools, CMMs, form measuring machines and semiconductor-related equipment.

- Four precision-lapped reference surfaces.
- Better than 1 $\mu$ m/300mm straightness and perpendicularity.



311-111



311-112



311-113

### SPECIFICATIONS

#### Metric

Order No.	Dimension (W x L x T)	Mass
311-111	90 x 110 x 25mm	1.5kg
311-112	160 x 210 x 25mm	5.0kg
311-113	260 x 310 x 30mm	14.0kg

\* 311-113 is supplied with a removable handle.

# 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 give accurate dimensions.
- Inside Spring Caliper — Ends fully rounded to give accurate contact with a workpiece.



Spring divider



Outside spring calipers



Inside spring calipers

### SPECIFICATIONS

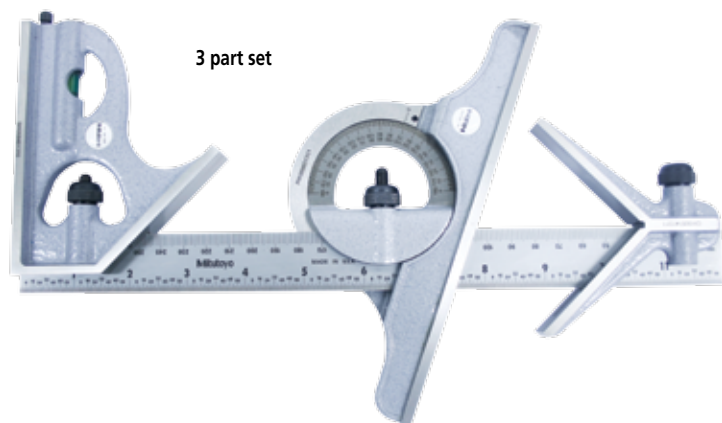
Range	Order No.		
	Spring divider	Outside spring calipers	Inside spring calipers
6" (150mm)	950-212	950-222	950-232
8" (200mm)	950-213	950-223	950-233

# Combination Square Set

## SERIES 180

### FEATURES

- Measuring heads are attached to the graduated steel rule (blade), allowing versatile measurements on various types of workpieces.
- The measuring heads come hardened or cast iron-not hardened.
- Economy sets without a protractor head are available.



### SPECIFICATIONS

**Head Only** \_\_\_\_\_ Hardened

Order No.	Description
<b>180-102B</b>	Square Head for 12"/300mm to 24"/600mm
<b>180-202B</b>	Center Head for 12"/300mm to 24"/600mm

**Head Only** \_\_\_\_\_ Cast iron-not hardened

Order No.	Description
<b>180-112B</b>	Square Head for 12"/300mm to 24"/600mm
<b>180-212B</b>	Center Head for 12"/300mm to 24"/600mm
<b>180-301B</b>	Protractor Head for 12"/300mm to 24"/600mm

**Inch/Metric** \_\_\_\_\_ Hardened Combination Square Sets

Set No.	Blade		Square Head	Center Head	Protractor Head	
	Size	Type				
<b>180-903B</b>	12"	4R	<b>180-501B</b>	<b>180-102B</b>	<b>180-202B</b>	-
<b>180-905B</b>	12"	4R	<b>180-501B</b>	<b>180-102B</b>	<b>180-202B</b>	<b>180-301B*</b>
<b>180-906B</b>	12"	16R	<b>180-502B</b>	<b>180-102B</b>	<b>180-202B</b>	<b>180-301B*</b>
<b>180-907B</b>	12"/300mm	E/M	<b>180-503B</b>	<b>180-102B</b>	<b>180-202B</b>	<b>180-301B*</b>
<b>180-910B</b>	300mm	Metric	<b>180-505B</b>	<b>180-102B</b>	<b>180-202B</b>	<b>180-301B*</b>

\*Cast iron-not hardened

**Inch/Metric** \_\_\_\_\_ Cast iron-not hardened Combination Square Sets

Set No.	Blade		Square Head	Center Head	Protractor Head	
	Size	Type				
<b>180-803B</b>	12"	4R	<b>180-501B</b>	<b>180-112B</b>	<b>180-212B</b>	-
<b>180-805B</b>	12"	4R	<b>180-501B</b>	<b>180-112B</b>	<b>180-212B</b>	<b>180-301B</b>

**Inch / Metric** \_\_\_\_\_ Blades only

Order No.	Length	Graduations	Accuracy (length)
<b>180-501B</b>	12"	8, 16, 32, 64ths (4R)	+0.005" / -0.0035" (+0.13mm / -0.09mm)
<b>180-502B</b>	12"	32, 64, 50, 100ths (16R)	
<b>180-503B</b>	12" x 300mm	32, 64ths, 1, 0.5mm	
<b>180-505B</b>	300mm	1, .5, 1, 0.5mm	+0.006" / -0.0035" (+0.15mm / -0.09mm)
<b>180-701B</b>	18"	8, 16, 32, 64ths (4R)	
<b>180-703B</b>	18" x 450mm	32, 64ths, 1, 0.5mm	
<b>180-601B</b>	24"	8, 16, 32, 64ths (4R)	+0.007" / -0.0035" (+0.18mm / -0.09mm)
<b>180-603B</b>	24" x 600mm	32, 64ths, 1, 0.5mm	

### 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.

# Steel Rules

## SERIES 182

### FEATURES

- Clear graduations on satin-chrome finish.
- Stainless tempered.



182-125

### SPECIFICATIONS

#### Wide Rigid Rules (thickness 3/64")

Order No.	Size	Graduations				Width	Accuracy (Length)
182-101	6"(4R)	1/8	1/16	1/32	1/64th	3/4"	+.004" / -.0035" (+0.1mm / -0.09mm)
182-102	6"(16R)	1/32	1/64	1/50	1/100th	3/4"	
182-103	6"(5R)	1/32	1/64	1/10	1/100th	3/4"	
182-104	6"(3R)	1/32	1/64	1/10	1/50th	3/4"	
182-105	6" x 150mm	1/32	1/64	1mm	0.5mm	3/4"	
182-106	6" x 150mm	1/50	1/100	1mm	0.5mm	3/4"	
182-107	6" x 150mm	1/10	1/100	1mm	0.5mm	3/4"	
182-108	6" x 150mm	1/10	1/50	1mm	0.5mm	3/4"	
182-111	150mm	1mm	0.5mm	1mm	0.5mm	19mm	
182-121	12"(4R)	1/8	1/16	1/32	1/64th	1"	
182-122	12"(16R)	1/32	1/64	1/50	1/100th	1"	
182-123	12"(5R)	1/32	1/64	1/10	1/100th	1"	
182-124	12"(3R)	1/32	1/64	1/10	1/50th	1"	
182-125	12" x 300mm	1/32	1/64	1mm	0.5mm	1"	
182-126	12" x 300mm	1/50	1/100	1mm	0.5mm	1"	
182-131	300mm	1mm	0.5mm	1mm	0.5mm	25mm	+.006" / -.035" (+0.15mm / -0.09mm)
182-241	18"(4R)	1/8	1/16	1/32	1/64	13/16"	
182-142	18"(16R)	1/32	1/64	1/50	1/100th	13/16"	
182-143	18"(5R)	1/32	1/64	1/10	1/100th	13/16"	
182-145	18" x 450mm	1/32	1/64	1mm	0.5mm	13/16"	
182-151	450mm	1mm	0.5mm	1mm	0.5mm	30mm	+.007" / -.0035" (+0.18mm / -0.09mm)
182-161	24"(4R)	1/8	1/16	1/32	1/64	13/16"	
182-162	24"(16R)	1/32	1/64	1/50	1/100th	13/16"	
182-163	24"(5R)	1/32	1/64	1/10	1/100th	13/16"	
182-165	24" x 600mm	1/32	1/64	1mm	0.5mm	13/16"	
182-171	600mm	1mm	0.5mm	1mm	0.5mm	30mm	

# Steel Rules

## SERIES 182

### FEATURES

- Clear graduations on satin-chrome finish.
- Stainless tempered.



182-265

### SPECIFICATIONS

#### Full-Flexible Rules (thickness 1/64")

182-223

Order No.	Size	Graduations				Width	Accuracy (Length)
182-201	6"(4R)	1/8	1/16	1/32	1/64th	1/2"	+.004" / -.0035" (+0.1mm / -0.09mm)
182-202	6"(16R)	1/32	1/64	1/50	1/100th	1/2"	
182-203	6"(5R)	1/32	1/64	1/10	1/100th	1/2"	
182-204	6"(3R)	1/32	1/64	1/10	1/50th	1/2"	
182-205	6" x 150mm	1/32	1/64	1mm	0.5mm	1/2"	
182-206	6" x 150mm	1/50	1/100	1mm	0.5mm	1/2"	
182-207	6" x 150mm	1/10	1/100	1mm	0.5mm	1/2"	
182-208	6" x 150mm	1/10	1/50	1mm	0.5mm	1/2"	
182-211	150mm	1mm	0.5mm	1mm	0.5mm	12mm	+.005" / -.0035" (+0.13mm / -0.09mm)
182-221	12"(4R)	1/8	1/16	1/32	1/64th	1/2"	
182-222	12"(16R)	1/32	1/64	1/50	1/100th	1/2"	
182-223	12"(5R)	1/32	1/64	1/10	1/100th	1/2"	
182-224	12"(3R)	1/32	1/64	1/10	1/50th	1/2"	
182-225	12" x 300mm	1/32	1/64	1mm	0.5mm	1/2"	
182-226	12" x 300mm	1/50	1/100	1mm	0.5mm	1/2"	
182-231	300mm	1mm	0.5mm	1mm	0.5mm	12mm	
182-141	18"(4R)	1/8	1/16	1/32	1/64	3/4"	+.006" / -.0035" (+0.15mm / -0.09mm)
182-242	18"(16R)	1/32	1/64	1/50	1/100th	3/4"	
182-243	18"(5R)	1/32	1/64	1/10	1/100th	3/4"	
182-245	18" x 450mm	1/32	1/64	1mm	0.5mm	3/4"	
182-251	450mm	1mm	0.5mm	1mm	0.5mm	18mm	
182-261	24"(4R)	1/8	1/16	1/32	1/64	3/4"	+.007" / -.0035" (+0.18mm / -0.09mm)
182-262	24"(16R)	1/32	1/64	1/50	1/100th	3/4"	
182-263	24"(5R)	1/32	1/64	1/10	1/100th	3/4"	
182-264	24"(3R)	1/32	1/64	1/10	1/50th	3/4"	
182-265	24" x 600mm	1/32	1/64	1mm	0.5mm	3/4"	
182-271	600mm	1mm	0.5mm	1mm	0.5mm	18mm	

# Semi-Flexible Rules

## SERIES 182

### FEATURES

- Engraved on frontside only

### SPECIFICATIONS



Order No.	Size	Graduations				Width	Accuracy (Length)
182-301	4" x 100mm	1/2mm	1mm	1/32	1/64	1/16th	5/8"
182-302	6" x 150mm	1/2mm	1mm	1/32	1/64	1/16th	5/8"
182-303	8" x 200mm	1/2mm	1mm	1/32	1/64	1/16th	5/8"
182-305	12" x 300mm	1/2mm	1mm	1/32	1/64	1/16th	5/8"
182-307	20" x 500mm	1/2mm	1mm	1/32	1/64	1/16th	5/8"
182-309	40" x 1000mm	1/2mm	1mm	1/32	1/64	1/16th	5/8"

# Thickness Gages

## SERIES 950, 184

### FEATURES

- Each leaf is marked with its thickness.
- Each leaf is detachable.



184-303S

### Technical Data

Accuracy of Leaves Thickness

#### Nominal Thickness

Metric

0.01mm to less than 0.06mm:	±0.003mm
0.06mm to less than 0.10mm:	±0.004mm
0.10mm to less than 0.35mm:	±0.005mm
0.35mm to less than 0.65mm:	±0.008mm
0.65mm to less than 3.0mm:	±0.01mm

Inch	
.0015 to less than .007":	±.0002"
.007 to less than .015":	±.0003"
.015 to less than .025":	±.0004"
.026 to less than .030":	±.00045"
.031 to less than .040":	±.0005"
.041 to less than .075":	±.00055"
.076 to less than .100":	±.0006"
.101 to less than .200":	±.00065"
.200" and over :	±.00075"

#### Tolerance

### SPECIFICATIONS

#### Inch

Range	Order No.	Type of Blade	Blade Length	Composition of leaves
.002" - .035" (26 leaves)	<b>950-251</b>	Straight 1/2" width	3"	.002 thru .018" by .001" step plus .022, .024, .025, .028, .030, .032, .035"
.0015" - .025" (26 leaves)	<b>950-252</b>	Tapered 1/4" width at tip	3"	.002 thru .025" by .001" step plus .0015, .0025"
.0015" - .200" (15 leaves)	<b>950-254</b>	Straight 1/2" width	3"	.0015, .002, .003, .004, .006, .008, .010, .012, .015, .020, .030, .040, .075, .100, .200"
.0015" - .200" (13 leaves)	<b>950-255</b>	Straight 1/2" width	4.5"	.0015, .002, .003, .004, .006, .008, .010, .020, .030, .040, .075, .100, .200"
.0015" - .015" (8 leaves)	<b>950-256</b>	Straight 1/2" width	6"	.0015, .002, .003, .004, .008, .010, .012, .015"

#### Metric

Range	Order No.	Type of Blade	Blade Length	Composition of leaves
0.05 - 1mm	<b>184-313S</b>	Straight 13mm width	100mm	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm
	<b>184-303S</b>		150mm	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm
0.05 - 1mm	<b>184-304S</b>	Straight 13mm width	150mm	20 leaves: 0.05 - 1mm by 0.05mm
	<b>184-305S</b>	Straight 13mm width	100mm	13 leaves: 0.05 - 0.3mm by 0.05mm, 0.4 - 1mm by 0.1mm
150mm			13 leaves: 0.05 - 0.3mm by 0.05mm, 0.4 - 1mm by 0.1mm	
0.05 - 0.8mm	<b>184-306S</b>	Straight 13mm width	100mm	10 leaves: 0.05 - 0.2mm by 0.05mm, 0.3 - 0.8mm by 0.1mm
	<b>184-308S</b>		150mm	10 leaves: 0.05 - 0.2mm by 0.05mm, 0.3 - 0.8mm by 0.1mm
0.03 - 0.5mm	<b>184-307S</b>	Straight 13mm width	100mm	13 leaves: 0.03 - 0.1mm by 0.01mm, 0.2 - 0.5mm by 0.1mm, 0.15mm
			150mm	13 leaves: 0.03 - 0.1mm by 0.01mm, 0.2 - 0.5mm by 0.1mm, 0.15mm

### Wooden Box Part No.

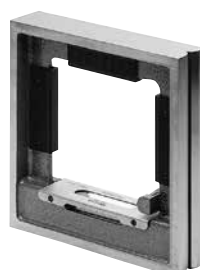
Part No.	Spare
073112	<b>960-703</b>
063413	<b>960-611</b>
	<b>960-611</b>
	<b>960-613</b>

## Precision Levels

### SERIES 960

### FEATURES

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



960-703



960-611

### SPECIFICATIONS

#### Metric

Order No.	Sensitivity	Accuracy	Dimensions (W x D x H)
<b>960-703</b>	0.02mm/m	±0.006mm	200 x 44 x 200mm

#### Inch

Order No.	Sensitivity	Accuracy	Dimensions		
			W	D	H
<b>960-611</b>	.0012"/12"	±.0006"	7.87"	1.73"	1.50"
<b>960-612</b>	.0006"/12"	±.0003"	7.87"	1.73"	1.50"
<b>960-613</b>	.00024"/12"	±.00017"	7.87"	1.73"	1.50"

# Digital Universal Protractor

## SERIES 187

### FEATURES

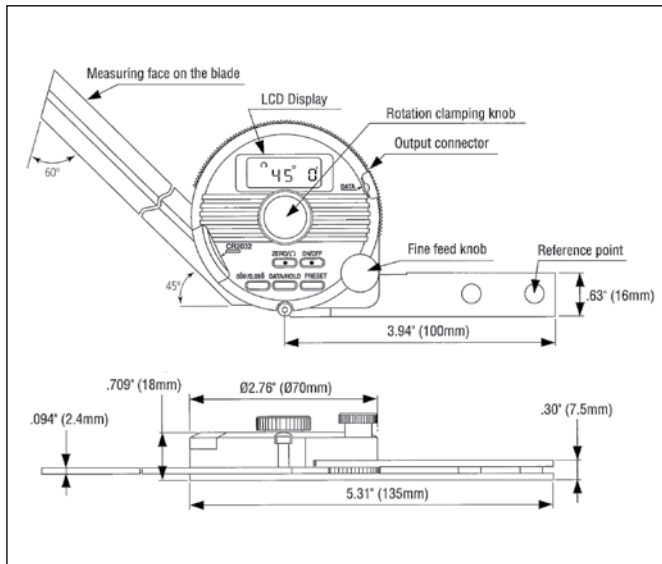
- Data output function make it easy to see the statistical data.
- Can be attached to height gages, gage holder (950750, metric)
- Setting preset value.
- Removable blade.



### SPECIFICATIONS

Code No.	187-552
Model	BP-D300E
Blade	12" (187-103)
Display	LCD - 5 digit, (-) sign, character height 6.5mm
Measuring range	-360° ~ +360°
Resolution	1' (0.01°)
Accuracy	± 2' (±0.03°)
Repeatability	1' (0.01°)
Mass	1.45 lbs (659g)
Dust / Water protection level	IP40
Function	Zero, Direction select, Data output / Data hold, Preset, Switchable Seagesimal or Decimal Natation
Max. response speed	3 rps
Battery	Lithium battery (CR2032) 1 pc. (Part No. 05SAA217)
Battery life	2,000 hours
Alarm	Battery voltage low, Over speed error (Err)
Temperature	Operation temperature: 0 to 40°C Storage temperature: -10 to 60°C

### DIMENSIONS



### Technical Data

Range:	-360° to +360°
Tolerance:	±2' (±0.03°)
Repeatability:	1'
Resolution:	1' (0.01°)
Battery:	Lithium Battery
Battery life:	2,000 hours

### Function

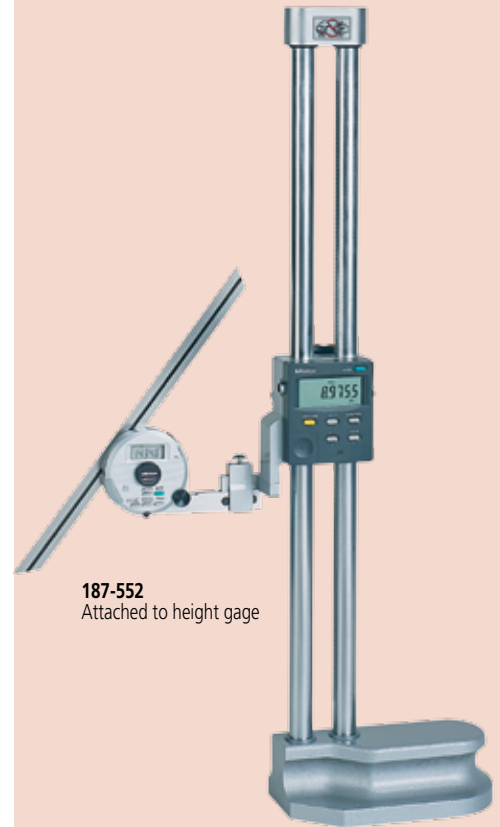
Presetting

### Standard Accessories

- 12" Blade (Code No. 187-103)
- Battery (CR2032) (Part No. 05SAA217)
- Clamp box for Inch Height Gage (Part No. 950749)
- Plastic Case

### Optional Accessories

- 187-104** 6" blade
- 187-105** Acute angle attachment
- 950750** Clamp box for Metric Height Gage
- 905338** Connecting cable (40" / 1m)
- 905409** Connecting cable (80" / 2m)



**187-552**  
Attached to height gage

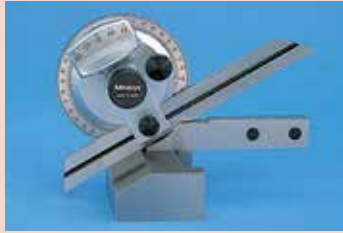


# Universal Bevel Protractor

## SERIES 187

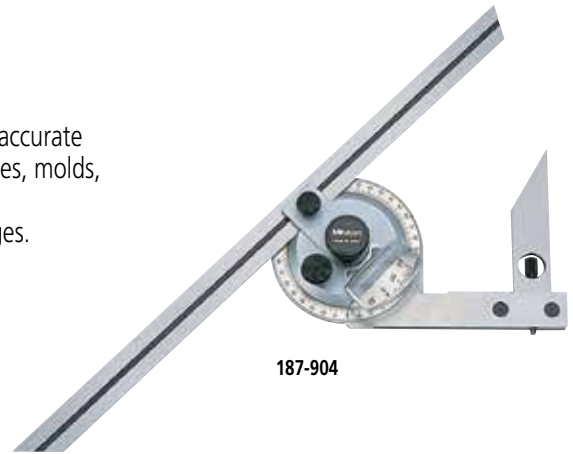
### Technical Data

Graduation:	5min. (0° - 90° - 0°)
Accuracy	
Vernier	±5'
Straightness	[.00016" + (.00005xL/2)]"
Parallelism	[.00016" + (.00005xL/2)]"
L = Length in inch	
Diameter:	2.56" / 70mm



### FEATURES

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



187-904

### SPECIFICATIONS

#### Universal Bevel Protractors

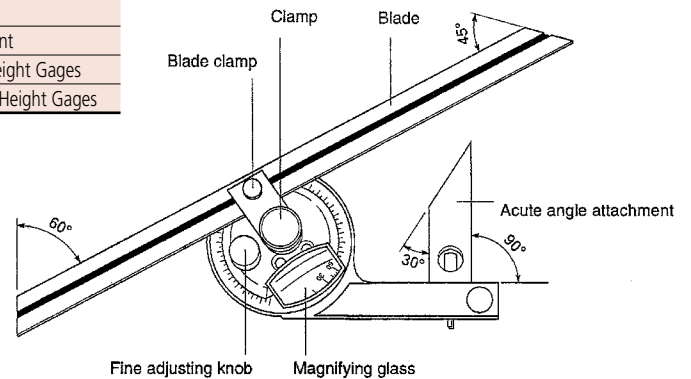
Graduation			
Order No.	Dial	Vernier	Remarks
187-904	1°	5 min	with 6" blade (187-104) and Clamp box for Inch Height Gages (950749)
187-906	1°	5min	with 12" blade (187-103) and Clamp box for Inch Height Gages (950749)

#### Universal Bevel Protractor

#### Accessories and Parts

Order No.	Remarks
187-103	12" Blade
187-104	6" Blade
187-105	Acute angle attachment
950749	Clamp box for Inch Height Gages
950750	Clamp box for Metric Height Gages

### DIMENSIONS



# Bevel Protractor

## SERIES 187

### Technical Data

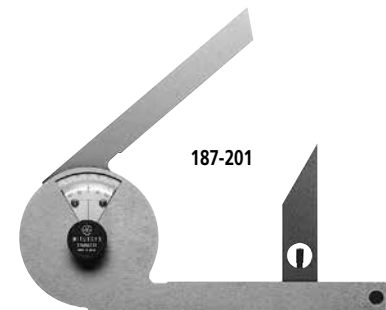
Graduation:	5 min. (0° - 90° - 0°)
Blade edge angle:	30° and 60°
Diameter:	2.56" / 70mm

### FEATURES

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

### SPECIFICATIONS

Order No.	Graduation	Remarks
187-201	1° / 5 min	Center black knob locks the blade position Protractor Graduation: 0°-90°, 90°-0°



187-201

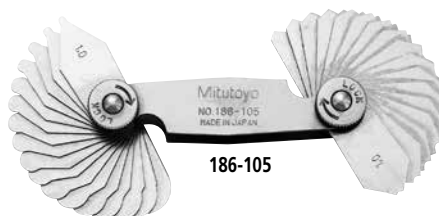


# Radius Gages

## SERIES 186

### FEATURES

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



186-105

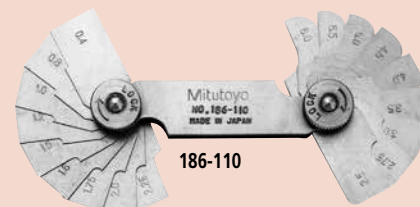
### SPECIFICATIONS

Metric			
Range	Order No.	Composition of leaves	Remarks
0.4 - 6mm	186-110	18 leaves: 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
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	15 pairs: 15.5 - 20mm by 0.5mm, 21 - 25mm by 1mm	180° arc

Inch			
Range	Order No.	Composition of leaves	Remarks
1/32" - 17/64"	186-103	16 leaves: 1/32" - 17/64" by 64ths	90° arc
1/32" - 1/4"	186-101	15 pairs: 1/32" - 1/4" by 64ths	180° arc
17/64" - 1/2"	186-102	16 pairs: 17/64" - 1/2" by 64ths	180° arc
9/32" - 33/64"	186-104	16 leaves: 9/32" - 33/64" by 64ths	90° arc

### Technical Data

Accuracy: ±.002"



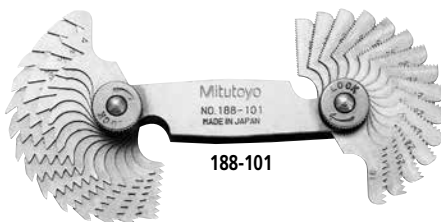
186-110

# Pitch Gages

## SERIES 188, 950

### FEATURES

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



188-101

### SPECIFICATIONS

#### Metric Screw Pitch Gages (60°)

Range	Order No.	Composition of leaves
0.25 - 2.5mm	188-153	28 leaves: 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 1.00, 1.10, 1.20, 1.25, 1.30, 1.40, 1.50, 1.60, 1.70, 1.75, 1.80, 1.90, 2.00, 2.50 mm
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 (60°)

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
4 - 84 TPI	950-253	51 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, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84 TPI

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

#### Metric and Unified Screw Pitch Gage Set (60°)

Range	Order No.	Composition of leaves
0.4 - 7mm / 4 - 42 TPI	188-151	51 leaves: Set of 188-122 and 188-111
0.5 - 6mm / 4 - 56 TPI	188-152	28 leaves: 4, 6, 8, 10, 11, 11-1/2, 12, 13, 16, 20, 28, 32, 40, 56 TPI 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00, 6.00 mm

#### Whitworth Screw Pitch Gages (55°)

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

### Technical Data

TPI	Metric	Accuracy	
		Pitch (mm)	Angular (minutes)
4-6	6.35-4.23	±0.05	±35
7-12	3.63-2.12	±0.05	±40
13-25	1.95-1.02	±0.05	±45
26-48	0.98-0.53	±0.05	±50
60	0.42	±0.05	±60

# Radius Gages-Sets

## SERIES 186

### FEATURES

Radius Gages are recommended for checking or laying out concave or convex radii. An individual gage for each dimension makes it possible to verify radius or fillet dimensions easier, faster and more accurately in machining, layout, inspection and pattern-making work. The measuring surfaces are precisely finished with smooth, accurate edges. Radius gages are available separately or in six sets. Each radius gage has five measuring locations, and it is identified with its particular radius dimensions. The gages have a satin or dull-chrome finish.

The holding cases, provided to protect the sets of radius gages, have indexed pockets to facilitate the selection of the proper size gage. A 4" long holder is furnished with Set No. 186-901 to make it possible to check radii in confined or hard-to-reach locations.



186-901

### SPECIFICATIONS

#### Metric

Order No.	No. of Leaves	Sizes	Remarks
186-902	26	0.5 - 13mm by 0.5mm	90° arc

#### Inch

Order No.	No. of Leaves	Sizes	Remarks
186-901	25	1/64"-17/64" by 64ths and 9/32"-1/2" by 32nds	Holder
186-903	17	1/64"-17/64" by 64ths	
186-904	8	9/32"-1/2" by 32nds	
186-905	8	9/16"-1" by 16ths	Holder
186-906	26	.010-.030" by .005" .040-.100" by .010" .120-.300" by .020" .350-.500" by .050"	Holder
186-907	10	.550-1" by .050"	

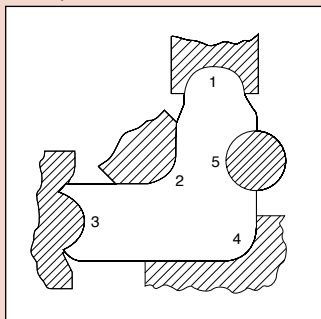
#### Decimal

Radius	Part No.	Radius	Part No.
.010"	211798	.240"	211816
.015"	211799	.260"	211817
.020"	211800	.280"	211818
.025"	211801	.300"	211819
.030"	211802	.350"	211820
.040"	211803	.400"	211821
.050"	211804	.450"	211822
.060"	211805	.500"	211823
.070"	211806	.550"	211824
.080"	211807	.600"	211825
.090"	211808	.650"	211826
.100"	211809	.700"	211827
.120"	211810	.750"	211828
.140"	211811	.800"	211829
.160"	211812	.850"	211830
.180"	211813	.900"	211831
.200"	211814	.950"	211832
.220"	211815	1.000"	211833

#### Fraction

Radius	Part No.	Radius	Part No.
1/64"	201441	5/16"	201459
1/32"	201442	11/32"	201460
3/64"	201443	3/8"	201461
1/16"	201444	13/32"	201462
5/64"	201445	7/16"	201463
3/32"	201446	15/32"	201464
7/64"	201447	1/2"	201465
1/8"	201448	9/16"	211790
9/64"	201449	5/8"	211791
5/32"	201450	11/16"	211792
11/64"	201451	3/4"	211793
3/16"	201452	13/16"	211794
13/64"	201453	7/8"	211795
7/32"	201454	15/16"	211796
15/64"	201455	1"	211797
1/4"	201456		
17/64"	201457		
9/32"	201458		

Accuracy:  $\pm 0.0016'' / 0.04\text{mm}$



5 concave and convex radii per leaf.

# Digital Protractor

## SERIES 950

### FEATURES

These digital protractors present inclination values on an easy-to-read LCD. The measurements are generated by an electronic gravity sensor and processed by the latest low-power electronic circuit technology.

- Full 360° range (90° x 4).
- Machined aluminum frame.
- Alternate reference (zero).
- Reading hold.
- Simple calibration requiring no special fixtures.
- Display remains upright to view at all angles. (950-317, Pro 360 Model).
- RS232C output. (950-318 Pro 3600 Model).
- Supplied in fitted carrying case.



Front View



950-317 Back View



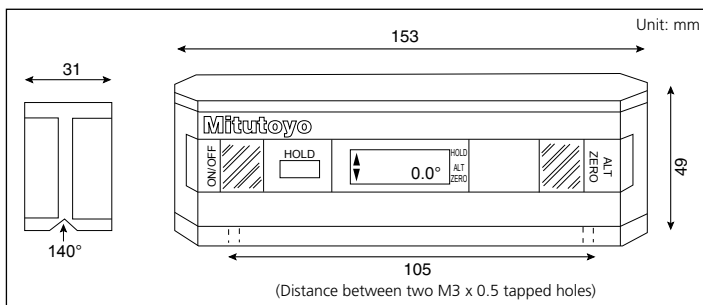
950-318 Back View

### SPECIFICATIONS

Order No.	950-317	950-318
Model	Pro 360	Pro 3600
Range	360° (90°x4)	360° (90°x4)
Resolution	0.1°	0.01° (0° to 9.99°) 0.1° (10° to 90°)
Accuracy	±0.1° Level ±10°, Plumb ±10° ±0.2° Maximum error	±0.05° (0° to 10°) ±0.1° (80° to 90°) ±0.2° (10° to 80°)
Repeatability	±0.1°	±0.05°
Cross Axis Error	Minimal	Minimal
Battery Life	500 Hrs. Standard 9-Volt Battery	500 Hrs. Standard 9-Volt Battery
Temperature Operation	-5°C to 50°C (23° to 122°F) -20°C to 65°C (-4°F to 149°F)	-5°C to 50°C (23° to 122°F) -20°C to 65°C (-4°F to 149°F)
Storage		
Weight	289g (10.2oz.)	295g (10.4oz.)
Output	N/A	RS-232C Compatible
Standard Accessories	Plastic Case	Plastic Case

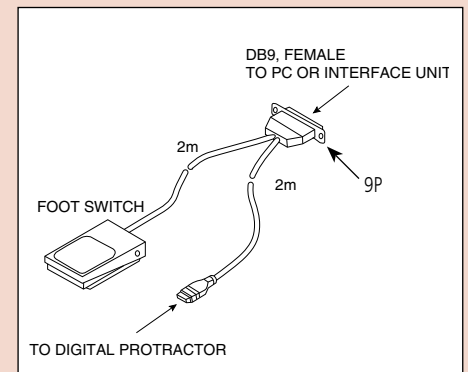
±Represents clockwise or counter-clockwise slope.

### DIMENSIONS



### Optional Accessories

**50AAA983A** RS-232C Output cable w/foot switch



**50AAA983A** RS-232C Output cable w/foot switch 10P-9P

# Digital Hand Tachometers

## SERIES 982

### FEATURES

- New digital hand tachometers are compact and easy to handle.
- NIST certification is supplied with each digital hand tachometer.
- Model PH-200LC (982-552) has laser diode detection and a combination of contact and non-contact measurement.
- Supplied with plastic carrying case.

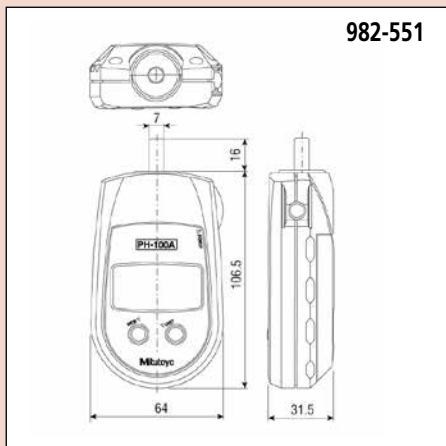


982-551

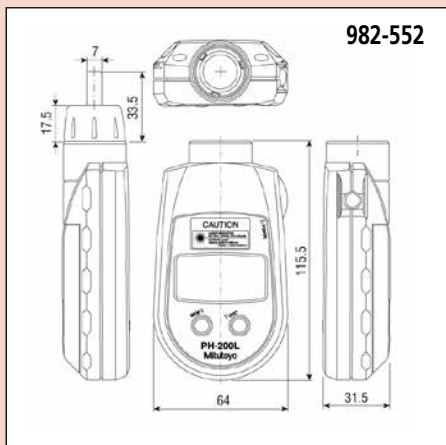


982-552

### DIMENSIONS



982-551



982-552

### SPECIFICATIONS

Order No.	982-551	982-552
Model No.	PH-100A	PH-200LC
Revolution per minute	1.0 – 25,000 rpm	—
Rotation speed	—	Non-contact: 6.0 – 99,999 rpm; Contact: 6.0 – 25,000 rpm
Measuring accuracy Revolution Surface, Speed, Length	1.0 – 599.9rpm: ±1rpm, 600.0 – 25,000 rpm: ±0.006% and ±0.5 digit ±0.4% and 1 digit	6.0 – 599.9 rpm: ±1rpm, 600.0 – 99,999 rpm ±0.006% and ±0.5 digit ±0.4% and ±1 digit
Detection	Optical coupler, 20 pulses per revolution	Laser diode
Outside dimensions	4.83" L x 2.52" W x 1.24" H (122.5mm x 64mm x 31.5mm)	4.55" L x 2.52" W x 1.24" H Overall length with contact adapter: 149mm
Mass	170 g	160 g
Power	Battery: AA 3 pcs.	Battery: AA 3 pcs.

### Optional Accessories for Digital Hand Tachometers

Order No.	Description	Dimension	Drawing
010049	Cone Adapter, Standard	D = 1/2"	
010051	Cone Adapter, 3/4"	D = 3/4"	
010052	Cone Adapter, 1-1/4"	D = 1-1/4" d = 1/2"	
010053	Funnel Adapter, Standard	D = 1/2"	
010054	Funnel Adapter, 3/4"	D = 3/4"	
010055	Measuring Wheel FPM (6" cir), Standard	D = 1.91"	
010056	Measuring Wheel FPM (12" cir)	D = 3.82"	
010057	Measuring Wheel YPM (0.1 yard cir)	D = 1.15"	
010058	Measuring Wheel MPM (0.1 meter cir)	D = 1.25"	
010059	Reflective Tabs 1/2" square (35 pcs)		
010060	Extension Shaft (3" length)		

# Bench Center

## SERIES 967

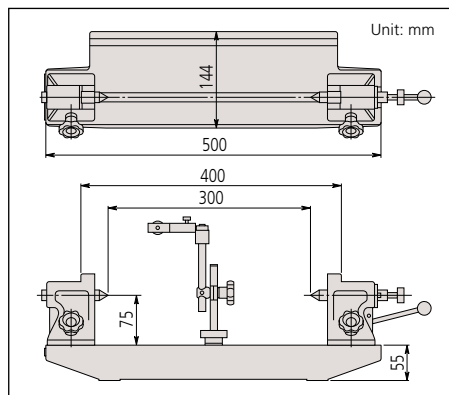
### FEATURES

- 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: 9.53mm / .375")

967-201-10



### DIMENSIONS



Order No.	A	B	C	D	E	F	G	H
967-203-10	310	40	50	70	178	41	60	134.5
967-201-10	500	45	75	80	370	36	60	194.5
967-204-10	700	80	100	140	500	65	110	194.5
967-202-10	900	100	125	160	600	50	104	230

### SPECIFICATIONS

Order No.	Center-to-Center	Workpiece Capacity Diameter	Max. Weight Hold	Parallelism of Centers	Flatness of Surface	Attachment Diameter	Mass (kg)
967-203-10	5.9" / 150mm	3.8"	17.5 lbs. (8kg)	.0002"	.0004"	Ø3/8"	7
967-201-10	11.8" / 300mm	5.8"	35 lbs. (16kg)	.0002"	.0006"	Ø3/8"	13
967-204-10	17.7" / 450mm	7.8"	44 lbs. (20kg)	.0002"	.0007"	Ø3/8"	60
967-202-10	23.6" / 600mm	9.8"	66 lbs. (30kg)	.00024"	.0008"	Ø3/8"	70

# Granite Surface Plate Accessories

## SERIES 517

These accessories are made from the same high-quality black granite as Mitutoyo surface plates, allowing flexibility in work holding and positioning.

### SPECIFICATIONS

**Angle Blocks** \_\_\_\_\_ with or without inserts

Grade	Laboratory*			Master**		
	Size	4 Face		2 Face	4 Face	
2 Face		no inserts	w/ inserts		no inserts	w/ inserts
4 x 4 x 4"	517-767	517-761	517-773	517-867	517-861	517-873
6 x 6 x 6"	517-768	517-762	517-774	517-868	517-862	517-874

\*Laboratory overall accuracy: .000025" per 6".

\*\*Master overall accuracy: .000050" per 6".

### Parallels

Grade	Pair Accuracy	Laboratory		Master		
		2 Face	4 Face	Accuracy	2 Face	4 Face
.75 x 1 x 6"	.00003"	517-755	517-750	.00006"	517-855	517-850
.75 x 1.5 x 9"	.00004"	517-756	517-751	.00008"	517-856	517-851
1 x 2 x 12"	.00006"	517-757	517-752	.0001"	517-857	517-852

### V-Blocks

V-1 type have matching accuracy on "V" from the bottom face only. V-5 type have four face matching accuracy plus "V".

Grade	Laboratory*		Master**	
	V-1	V-5	V-1	V-5
2 x 2 x 2.5"	517-787	517-783	517-887	517-883
3 x 3 x 3"	517-788	517-784	517-888	517-884
6 x 6 x 6"	517-789	517-785	517-889	517-885

\*Laboratory overall accuracy: .00005" per 6".

\*\*Master overall accuracy: .0001" per 6"

Angle Blocks



517-862  
(without inserts)

517-884 V-Blocks (matching pair)



517-852  
Parallels  
(in pairs)

### Technical Data

Maximum workpiece dia.: 300mm  
Maximum workpiece height: 150mm  
Mass: 13kg  
Spindle Tip Material: Hardened Steel

### Standard Accessories:

56AAK066 Indicator rod assembly  
967-201-10  
967-203-10

56AAK961R Indicator rod assembly  
967-202-10  
967-204-10

### Optional Accessories:

56AAJ988 Special attachment for mounting 967-201-10 in vertical position.

56AAJ987 Special attachment for mounting 967-203-10 in vertical position.