

Height Master

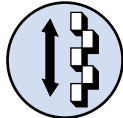
SERIES 515

FEATURES

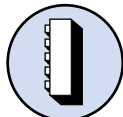
- Models with the the staggered arrangement of blocks have two measuring faces on the same level, one facing up and the other down (except for 515-310).



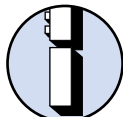
515-322



Staggered 20mm blocks (movable)



Vertical orientation



Riser block

- Each Height Master is supplied with a gauge block for reference-height setting.
- Fitted wooden case supplied.



SPECIFICATIONS

Metric		
Range (H)	Order No.	Block step
$5 < H \leq 310\text{mm}$	515-322	20mm (staggered)

Inch		
Range (H)	Order No.	Block step
$.2" < H \leq 12.2"$	515-310	.5" (straight)
$.2" < H \leq 12.2"$	515-311	1" (staggered)

Digital Height Master

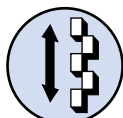
SERIES 515

FEATURES

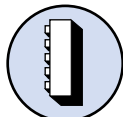
- Standard model with a digital display, featuring all essential specifications required for a versatile height standard.
- SPC output.
- Each Height Master is supplied with a gauge block for reference-height setting.



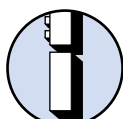
515-374



Staggered 20mm blocks (movable)



Vertical orientation



Riser block

SPECIFICATIONS

Metric		
Range (H)	Order No.	Block step
$10 < H \leq 310\text{mm}$	515-374	20mm (staggered)
$10 < H \leq 460\text{mm}$	515-376	20mm (staggered)
$10 < H \leq 610\text{mm}$	515-378	20mm (staggered)

Inch		
Range (H)	Order No.	Block step
$.5" < H \leq 12"$	515-375	1" (staggered)
$.5" < H \leq 18"$	515-377	1" (staggered)
$.5" < H \leq 24"$	515-379	1" (staggered)



(Refer to page VIII for details.)

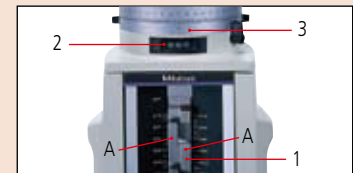
Technical Data

Measuring range (H): Refer to the list of specifications.
 Graduation: 0.001mm or .00001"
 Block arrangement: Staggered (515-310: straight)
 Micrometer adjustment: 20mm or 1"
 Micrometer feed: 0.5mm/rev or .025"/rev
 Block pitch accuracy: $\pm 1.5\mu\text{m}$
 Parallelism of blocks: $1\mu\text{m}$
 Feed error: $\pm 1\mu\text{m}$
 Retrace error: $1\mu\text{m}$
 Mass: 23kg

Optional Accessories

- 515-112:** Auxiliary block kit for bore gage (mm)
- 515-119:** Auxiliary block kit for bore gage (for 515-310)
- 515-121:** Auxiliary block kit for bore gage (for 515-311)
- : Riser block (see page E-29.)

Reading



Height A

1. Scale	280. mm
2. Counter	5.67 mm
3. Thimble	0.000 mm
285.670 mm	



(Refer to page VIII for details.)



Technical Data

Measuring range (H): Refer to the list of specifications.
 Graduation: 0.001mm or .00001"
 Block arrangement: Staggered
 Micrometer adjustment: 20mm or 1"
 Micrometer feed: 0.5mm/rev or .025"/rev
 Block pitch accuracy: $\pm 1.5\mu\text{m}$ ($0 < H \leq 310\text{mm}$)
 $\pm 2.5\mu\text{m}$ ($310 < H \leq 450\text{mm}$)
 $\pm 3.5\mu\text{m}$ ($450 < H \leq 610\text{mm}$)
 Parallelism of blocks: $2.0\mu\text{m}$ ($0 < H \leq 310\text{mm}$)
 $2.5\mu\text{m}$ ($310 < H \leq 610\text{mm}$)
 Feed error: $\pm 2.0\mu\text{m}$ (**515-378, 515-379**: $\pm 2.5\mu\text{m}$)
 Retrace error: $2.0\mu\text{m}$ (**515-378, 515-379**: $2.5\mu\text{m}$)
 Display: LCD
 Battery: SR44 (2 pcs.), **938882**
 Battery life: Approx. 1.8 years under normal use
 Mass: 9.5kg (**515-374, 515-375**)
 13.6kg (**515-376, 515-377**)
 16kg (**515-378, 515-379**)

Function

Zero setting, Presetting, ABS/INC switching, Data hold, Data output, inch/mm conversion (inch/mm models)
 Alarm: Low voltage, Counting value composition error

Optional Accessories

- 515-111:** Auxiliary block kit for bore gage (mm)
- 515-120:** Auxiliary block kit for bore gage (inch)
- : Riser block (see page E-29.)
- 959149:** SPC cable (1m)
- 959150:** SPC cable (2m)

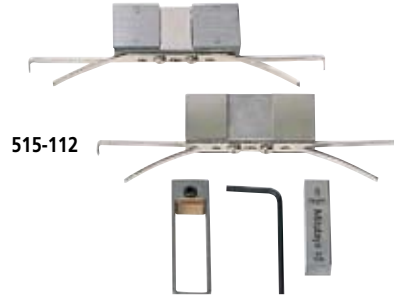
Auxiliary Block Kit

SERIES 515 — for Bore Gage

FEATURES

- Used for efficient reference-setting of dial bore gages and tubular inside micrometers (18 - 150mm) on a Height Master.

Bore gage reference-setting



SPECIFICATIONS

Metric	
Order No.	Model
515-110	Universal Height Master
515-111	Digital Height Master
515-112	Height Master

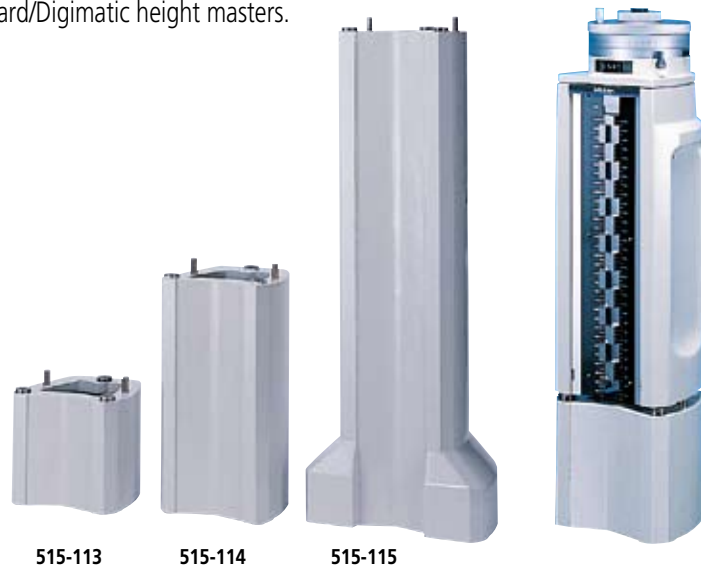
Inch	
Order No.	Model
515-119	Universal Height Master, Height Master (515-310)
515-120	Digital Height Master
515-121	Height Master (515-310)

Riser Blocks

SERIES 515

FEATURES

- These riser blocks are specially designed for standard/Digimatic height masters.



SPECIFICATIONS

Metric			
Height	Order No.	Accuracy	Mass
150mm	515-113	±0.6µm	5.7kg
300mm	515-114	±1.0µm	11.3kg
600mm	515-115	±2.0µm	31kg

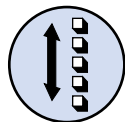
Inch			
Height	Order No.	Accuracy	Mass
6"	515-116	±20µin	12.5 lbs.
12"	515-117	±40µin	24.9 lbs.
24"	515-118	±80µin	68.2 lbs.

Universal Height Master

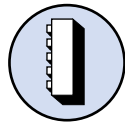
SERIES 515 — Usable in Vertical and Horizontal Orientations

FEATURES

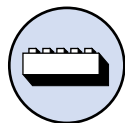
- The Universal Height Master is designed for both vertical and horizontal orientations, providing a wide range of applications such as accuracy checking of machine tool table movements.
- Fitted wooden case supplied.



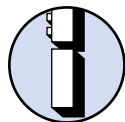
Single-row 10mm blocks (movable)



Vertical orientation



Horizontal orientation



Riser block

515-520

SPECIFICATIONS

Metric		
Range (R)	Order No.	Block step
$5 < R \leq 610\text{mm}$	515-520	10mm (straight)
$5 < R \leq 1010\text{mm}$	515-523	10mm (straight)

Inch		
Range (R)	Order No.	Block step
$.2" < R \leq 18.2"$	515-512	.5" (straight)
$.2" < R \leq 24.2"$	515-510	.5" (straight)
$.2" < R \leq 40.2"$	515-513	.5" (straight)



(Refer to page VIII for details.)

Technical Data

Measuring range (R): Refer to the list of specifications.
 Graduation: 0.001mm or .00001"
 Block arrangement: Straight
 Micrometer adjustment: 20mm or 1"
 Micrometer feed: 0.5mm/rev or .025"/rev
 Block pitch accuracy: $\pm 1.5\mu\text{m}$ ($0 < R \leq 310\text{mm}$)
 $\pm 2.5\mu\text{m}$ ($310 < R \leq 610\text{mm}$)
 $\pm 3.5\mu\text{m}$ ($610 < R \leq 1010\text{mm}$)
 Parallelism of blocks: 1.5 μm ($0 < R \leq 610\text{mm}$)
 2 μm ($610 < R \leq 1010\text{mm}$)
 Feed error: $\pm 1.2\mu\text{m}$ (**515-523, 515-513**): $\pm 1.5\mu\text{m}$
 Retrace error: 1.2 μm (**515-523, 515-513**): 1.5 μm
 Mass: 42kg (**515-520, 515-512**)
 50kg (**515-510**)
 63.5kg (**515-523, 515-513**)

Optional Accessories

- 900574:** Supporting base for vertical operation
 (*supplied as a standard for **515-523** and **515-513**)
515-110: Auxiliary block kit for bore gage (mm)
515-119: Auxiliary block kit for bore gage (inch)



Using in horizontal orientation



Supporting base

Check Master

SERIES 515



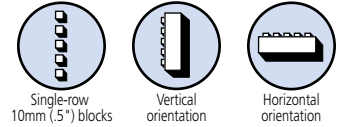
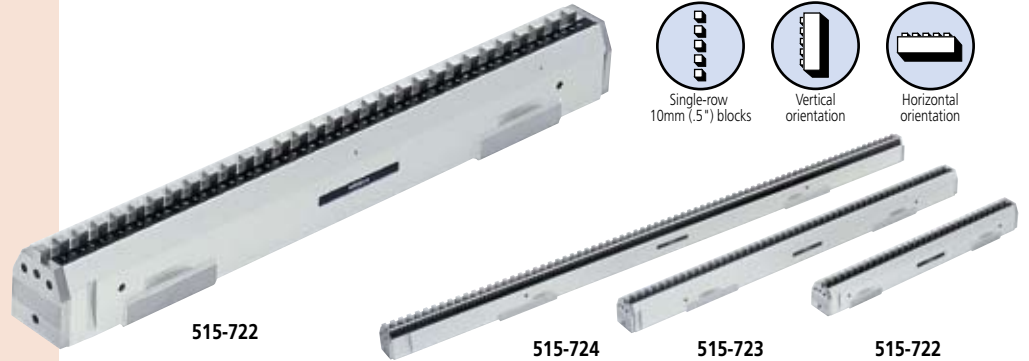
(Refer to page VIII for details.)

Technical Data

Measuring range (R): Refer to the list of specifications.
 Block pitch accuracy:
 ±2.5µm (0 < R ≤ 310mm)
 ±3.5µm (310 < R ≤ 610mm)
 ±5.0µm (610 < R ≤ 1010mm)
 ±8.0µm (1010 < R ≤ 1510mm)
 Parallelism of blocks:
 1.2µm (0 < R ≤ 310mm)
 1.5µm (310 < R ≤ 610mm)
 2.0µm (610 < R ≤ 1010mm)
 2.5µm (1010 < R ≤ 1510mm)
 Mass:
 7kg (515-720, 515-710)
 10kg (515-721, 515-711)
 13kg (515-722, 515-712)
 22kg (515-723, 515-713)
 30kg (515-724)

FEATURES

- Designed to check the accuracy of table movements of machine tools and calibrate CMMs. Permanently wrung stack of gauge blocks is housed in a rigid frame.
- Can be used in either vertical or horizontal orientation for models up to 1500mm range.
- Fitted wooden case supplied.



SPECIFICATIONS

Metric		
Range (R)	Order No.	Block step
300mm	515-720	10mm
450mm	515-721	10mm
600mm	515-722	10mm
1000mm	515-723	10mm
1500mm	515-724	10mm

Inch		
Range (H)	Order No.	Block step
12"	515-710	.5"
18"	515-711	.5"
24"	515-712	.5"
40"	515-713	.5"

High Accuracy Check Master

SERIES 515



(Refer to page VIII for details.)

Technical Data

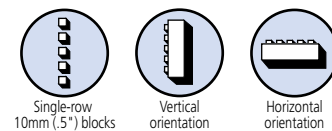
Measuring range (R): Refer to the list of specifications.
 Block pitch accuracy:
 ±1.2µm (0 < R ≤ 310mm)
 ±1.8µm (310 < R ≤ 610mm)
 ±2.5µm (610 < R ≤ 1010mm)
 ±4.0µm (1010 < R ≤ 1510mm)
 Parallelism of blocks:
 1.0µm (0 < R ≤ 450mm)
 1.5µm (450 < R ≤ 1010mm)
 2.0µm (1010 < R ≤ 1510mm)
 Mass:
 3.6kg (515-740, 515-730)
 5.4kg (515-741, 515-731)
 7.2kg (515-742, 515-732)
 12kg (515-743, 515-733)
 18kg (515-744, 515-734)

FEATURES

- Designed to check the accuracy of table movements of machine tools and calibrate CMMs. Permanently wrung stack of gauge blocks is housed in a rigid frame.
- Can be used in either vertical or horizontal orientation.
- Fitted wooden case supplied.

Specifications for Ceramic Check Master:

- Each measuring block is made of zirconia-based ceramic that requires no anti-corrosion treatment for measuring faces.
- Free from deterioration and dimensional changes over time.



SPECIFICATIONS

Metric		
Range (R)	Order No.	Block step
300mm	515-740 / 515-760*	10mm
450mm	515-741 / 515-761*	10mm
600mm	515-742 / 515-762*	10mm
1000mm	515-743 / 515-763*	10mm
1500mm	515-744 / 515-764*	10mm

Inch		
Range (R)	Order No.	Block step
12"	515-730 / 515-750*	.5"
18"	515-731 / 515-751*	.5"
24"	515-732 / 515-752*	.5"
40"	515-733 / 515-753*	.5"
60"	515-734 / 515-754*	.5"

*Ceramic Check Master

*Ceramic Check Master

Optional Accessories

601167: Supporting base for vertical operation



Supporting base

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 for use as a standard for calibrating graduated scales.



(Refer to page VIII for details.)

Technical Data

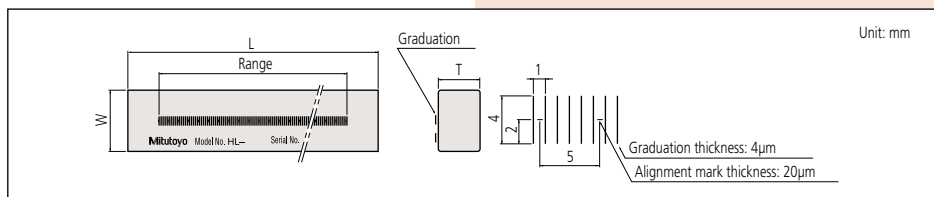
Accuracy (at 20°C): $(0.5+L/1000)\mu\text{m}$,
 L = Measured length (mm)
 Material: Low expansion glass
 Thermal expansion coefficient: $(0.00\pm 0.02)\times 10^{-6}/\text{K}$
 Graduation: 1mm
 Graduation line thickness: 4 μm
 Mass: 0.75kg (250mm), 1.8kg (500mm)

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.

Dimensions

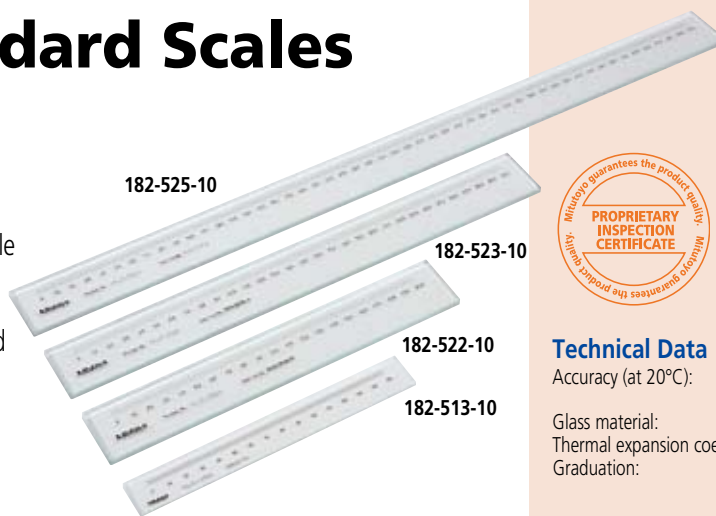


Working Standard Scales

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.



(Refer to page VIII for details.)

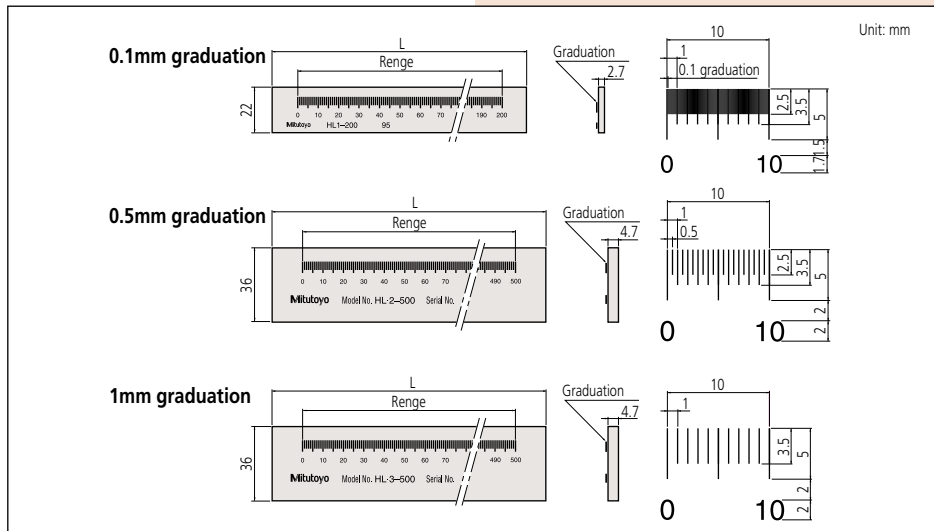
Technical Data

Accuracy (at 20°C): $(1.5+2L/1000)\mu\text{m}$,
 L = Measured length (mm)
 Glass material: Sodium glass
 Thermal expansion coefficient: $(8\pm 1)\times 10^{-6}/\text{K}$
 Graduation: 0.1mm (thickness: 20 μm)
 0.5mm (thickness: 50 μm)
 1mm (thickness: 100 μm)
 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

Dimensions



CERA Straight Master

SERIES 311 — Straightness Measuring Gage



(Refer to page VIII for details.)



FEATURES

The CERA Straight master is a gage used for inspecting the straightness of travel of moving elements on equipment such as machine tools, CMMs, form measuring machines and semiconductor related equipment.

- Alumina ceramic construction.
- 50mm-pitch graduated scales.
- Precision lapped reference surfaces.
- Double faced model has two reference faces for checking straightness in two orthogonal directions.
- Little secular change.
- Lightweight.



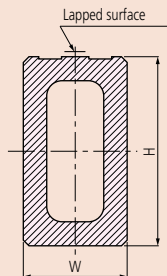
*Suffix Number for Inspection Certificate and Calibration Certificate

Suffix No.	Certificate provided
-20	Provided with Inspection Certificate
-22	Provided with Calibration Certificate

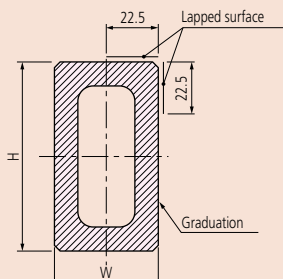
Technical Data

Cross section

(High accuracy and ultra-high accuracy types)



Double faced model



SPECIFICATIONS

Metric		Inch		High accuracy model		
Nominal length	Order No.*	Nominal length	Order No.*	Straightness	Size (L x W x H)	Mass
400mm	311-302	16"	311-322	0.3µm	440 x 35 x 50mm	1.8kg
700mm	311-305	28"	311-325	0.5µm	740 x 35 x 50mm	3kg
1000mm	311-307	40"	311-327	1.0µm	1040 x 45 x 80mm	8kg
1300mm	311-309	50"	311-329	1.5µm	1340 x 45 x 80mm	10kg

Metric		Inch		Ultra-high accuracy model		
Nominal length	Order No.*	Nominal length	Order No.*	Straightness	Size (L x W x H)	Mass
400mm	311-332	16"	311-342	0.2µm	440 x 35 x 50mm	1.8kg
700mm	311-335	28"	311-345	0.4µm	740 x 35 x 50mm	3kg
1000mm	311-337	40"	311-347	0.5µm	1040 x 45 x 80mm	8kg
1300mm	311-339	50"	311-349	0.7µm	1340 x 45 x 80mm	10kg

Double faced model



SPECIFICATIONS

Metric		Inch		Double faced model		
Nominal length	Order No.*	Nominal length	Order No.*	Straightness	Size (L x W x H)	Mass
400mm	311-352	16"	311-362	0.3µm	440 x 45 x 80mm	3.2kg
700mm	311-355	28"	311-365	0.5µm	740 x 45 x 80mm	5.5kg
1000mm	311-357	40"	311-367	1.0µm	1040 x 45 x 80mm	8kg
1300mm	311-359	50"	311-369	1.5µm	1340 x 45 x 80mm	10kg

Snap Gage Checker

SERIES 515

FEATURES

- Capable of inspecting snap gages quickly and accurately with resolution down to 0.0001mm.
- The digital display and constant-force measurement capability allow skill-free operation.
- Zirconia ceramic measuring blocks ensure a long service life with minimal maintenance.
- SPC output.



515-611

SPECIFICATIONS

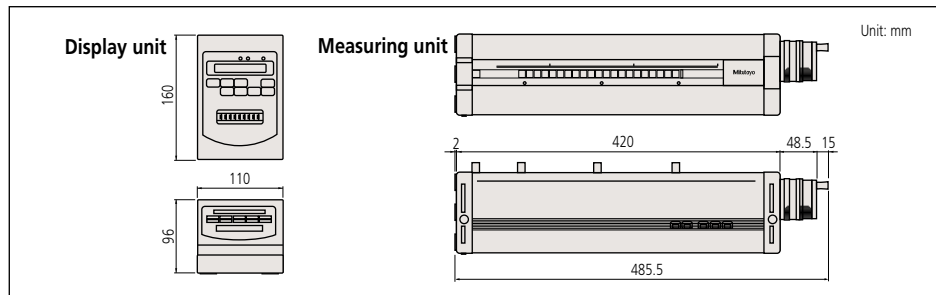
Metric	
Range	Order No.*
20 - 320mm	515-611

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **K** for EK, **No suffix** is required for JIS/100V

Inch	
Range	Order No.*
.8" - 12.8"	515-612

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **D** for CEE, **DC** for CCC, **E** for BS, **No suffix** is required for JIS/100V

Dimensions



(Refer to page VIII for details.)

Technical Data

Range:	20 - 320mm
Resolution:	0.0001mm/0.001mm or .00001"/.0001"
Block adjustment:	100mm
Block pitch accuracy:	±0.001mm
Parallelism of blocks*:	0.001mm (*between the anvil block and the 1st measuring block)
Feed error:	±0.002mm
Power supply:	Via AC adaptor
Mass:	12.5kg

Function

Data output

Optional Accessories

- 936937:** SPC cable (1m)
- 965014:** SPC cable (2m)
- 02AZD790D:** SPC cable for U-WAVE(160mm)
- 990554:** Workpiece rest

High Precision Square

SERIES 311

FEATURES

The High Precision Square is a gage 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 1µm/300mm straightness and perpendicularity.

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.



311-111



311-112



311-113

Square Master

SERIES 311 — Squareness / Straightness Measuring Instrument

Technical Data

Squareness:	3 μ m (311-215, 311-216)
	6 μ m (311-225, 311-226)
	9 μ m (311-245, 311-246)
Straightness:	2 μ m (311-215, 311-216)
	2.5 μ m (311-225, 311-226)
	3.5 μ m (311-245, 311-246)
Dial test indicator provided	
Range:	0.2mm or .008"
Graduation:	0.002mm or .0001"
Accuracy:	3 μ m or \pm .0001"
Dial reading:	0-100-0 (metric) or 0-4-0 (inch)
Mass:	13.7kg, 30.14 lbs (311-215, 311-216)
	16.2kg, 35.64 lbs (311-225, 311-226)
	24kg 52.8 lbs (311-245, 311-246)

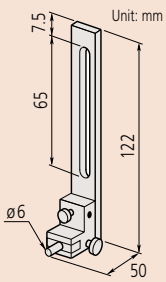
Optional Accessories

_____:	Riser blocks (see page E-29.)*
900571:	Adjustable holder
900551:	Extension holder
900565:	Feeler

*Not available for 450mm (18") model.

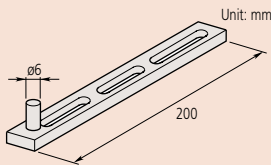
Adjustable holder

No.900571



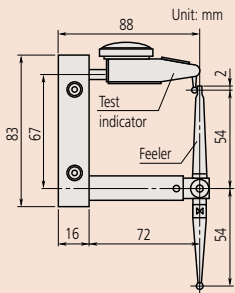
Extension holder

No.900551



Feeler

No.900565



FEATURES

- Squareness (perpendicularity) and straightness measurements can be performed accurately and efficiently by just moving a lever.
- Displacements read by dial test indicator supplied.
- Instrument squareness is adjustable for high accuracy measurement.



311-215



311-225

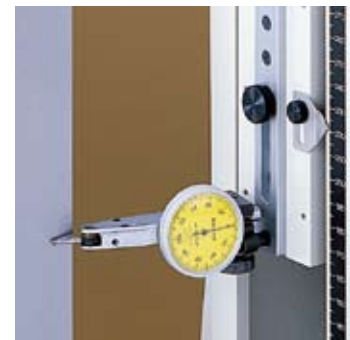
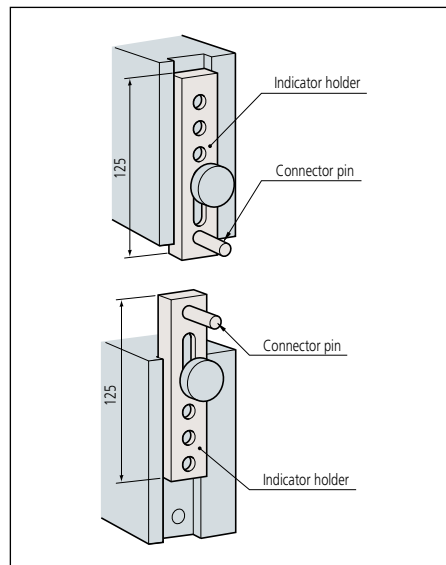


311-245

SPECIFICATIONS

Metric			
Vertical travel	Order No.	Squareness	Straightness
150mm	311-215	3 μ m	2 μ m
250mm	311-225	6 μ m	2.5 μ m
450mm	311-245	9 μ m	3.5 μ m

Inch			
Vertical travel	Order No.	Squareness	Straightness
6"	311-216	.00012"	.00008"
10"	311-226	.00024"	.0001"
18"	311-246	.00036"	.00014"



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 (H x W)	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
250 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
250 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

Squareness

	Outside	Inside
916-211	6μm	12.5μm
916-212	6.5μm	14μm
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

Combination Square Set

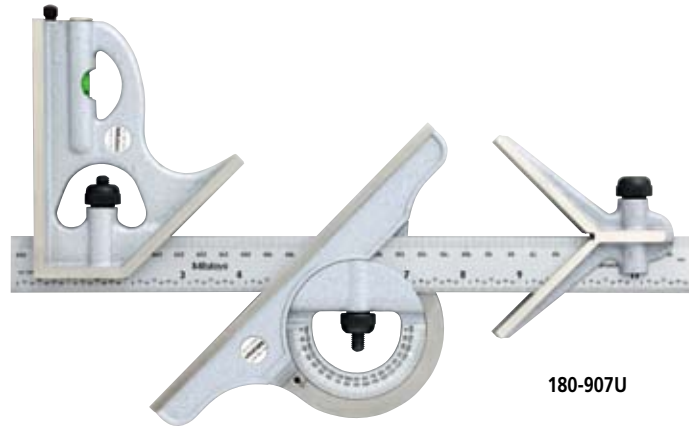
SERIES 180

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 heads are attachable to the stainless steel rule (blade), allowing versatile measurements on various types of workpieces.



180-907U

SPECIFICATIONS

Metric Combination Square Sets

Size	Order No.	Graduation
300mm	180-910U*	1mm, 0.5mm

*180-910U consists of blade, square head (180-102U), center head (180-202U) and protractor head (180-301U).

Inch/Metric Combination Square Sets

Size	Order No.	Graduation
12"/300mm	180-907U*	1/32", 1/64", 1mm, 0.5mm

*180-907U consists of blade, square head (180-102U), center head (180-202U) and protractor head (180-301U).

Heads (Individual)

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

Steel Rules

SERIES 182

FEATURES

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



182-101



182-201



182-102



182-202



182-103



182-203



182-105



182-302

SPECIFICATIONS

Metric Wide Rigid Rules

Graduations	Range	Order No.	Width
1mm, 0.5mm (on both faces)	150mm	182-111	19mm
	300mm	182-131	25mm
	450mm	182-151	30mm
	600mm	182-171	30mm

Metric Fully-Flexible Rules

Graduations	Range	Order No.	Width
1mm, 0.5mm (on both faces)	150mm	182-211	12mm
	300mm	182-231	12mm
	450mm	182-251	19mm
	600mm	182-271	19mm

Inch/Metric Semi-Flexible Rules

Graduations*	Range	Order No.	Width
1/16", 1/32", 1/64", 1mm, 0.5mm	6"/150mm	182-302	.51"
	8"/200mm	182-303	.51"
	12"/300mm	182-305	.59"
	20"/500mm	182-307	.59"
	40"/1000mm	182-309	.59"

*Engraved on the front side only.

Inch/Metric Wide Rigid Rules

Graduations	Range	Order No.	Width
1/32", 1/64", 1mm, 0.5mm	6"/150mm	182-105	.75"
	12"/300mm	182-125	.98"
	18"/450mm	182-145	1.18"
	24"/600mm	182-165	1.18"
1/50", 1/100", 1mm, 0.5mm	6"/150mm	182-106	.75"
	12"/300mm	182-126	.98"
1/10", 1/100", 1mm, 0.5mm	6"/150mm	182-107	.75"
	6"/150mm	182-108	.75"

Inch/Metric Fully-Flexible Rules

Graduations	Range	Order No.	Width
1/32", 1/64", 1mm, 0.5mm	6"/150mm	182-205	.47"
	12"/300mm	182-225	.47"
	18"/450mm	182-245	.75"
	24"/600mm	182-265	.75"
1/50", 1/100", 1mm, 0.5mm	6"/150mm	182-206	.47"
	12"/300mm	182-226	.47"
1/10", 1/100", 1mm, 0.5mm	6"/150mm	182-207	.47"
	6"/150mm	182-208	.47"

Inch Wide Rigid Rules

Graduations	Range	Order No.	Width
1/8", 1/16", 1/32", 1/64"	6"	182-101	.75"
	12"	182-121	.98"
	18"	182-141	0.71"
	24"	182-161	1.18"
1/50", 1/100", 1/32", 1/64"	6"	182-102	.75"
	12"	182-122	.98"
	18"	182-142	1.18"
	24"	182-162	1.18"
1/10", 1/100", 1/32", 1/64"	6"	182-103	.75"
	12"	182-123	.98"
	18"	182-143	1.18"
	24"	182-163	1.18"
1/10", 1/50", 1/32", 1/64"	6"	182-104	.75"
	12"	182-124	.98"

Inch Fully-Flexible Rules

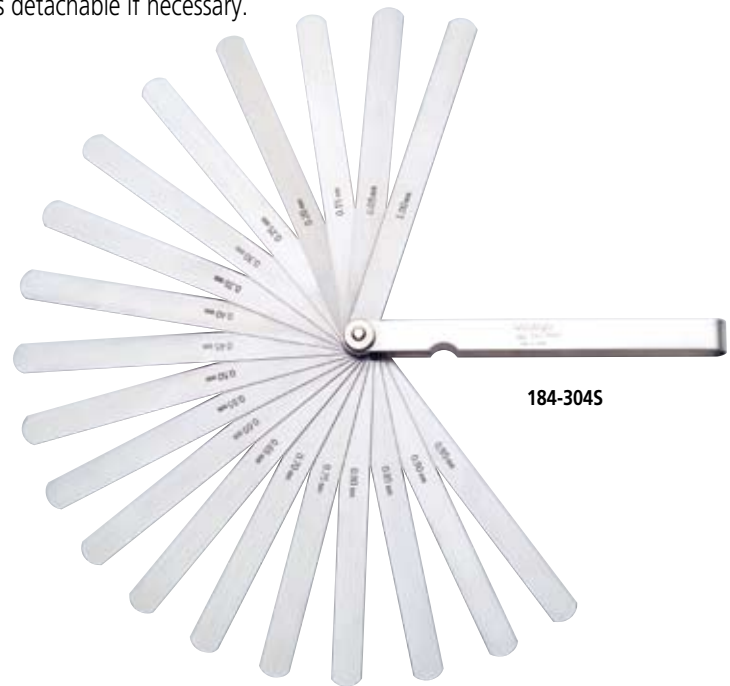
Graduations	Range	Order No.	Width
1/8", 1/16", 1/32", 1/64"	6"	182-201	.47"
	12"	182-221	.47"
	18"	182-241	1.18"
	24"	182-261	.75"
1/50", 1/100", 1/32", 1/64"	6"	182-202	.47"
	12"	182-222	.47"
	18"	182-242	.75"
	24"	182-262	.75"
1/10", 1/100", 1/32", 1/64"	6"	182-203	.47"
	12"	182-223	.47"
	18"	182-243	.75"
	24"	182-263	.75"
1/10", 1/50", 1/32", 1/64"	6"	182-204	.47"
	12"	182-224	.47"

Thickness Gages

SERIES 184

FEATURES

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



184-304S

SPECIFICATIONS

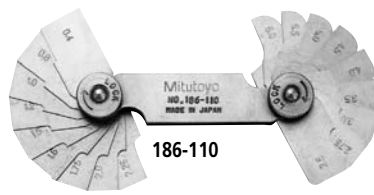
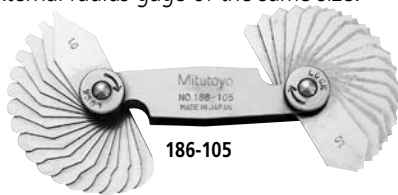
Metric			
Range	Order No.	Composition of leaves	Remarks
0.05 - 1mm	184-313S	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	—
	184-303S	28 leaves: 0.05 - 0.15mm by 0.01mm, 0.2 - 1mm by 0.05mm	Long leaf
0.05 - 1mm	184-304S	20 leaves: 0.05 - 1mm by 0.05mm	Long leaf
0.05 - 1mm	184-305S	13 leaves: 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

Radius Gages

SERIES 186

FEATURES

- Radius size is stamped on each gage leaf.
- Each leaf comprises an internal and an external radius gage of the same size.
- With locking clamp.



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
0.5 - 13mm	186-902	26 leaves: 0.5 - 13mm by 0.5mm	90° arc
1 - 7mm	186-105	34 leaves: 1 - 3mm by 0.25mm, 3.5 - 7mm by 0.5mm	180° arc
7.5 - 15mm	186-106	32 leaves: 7.5 - 15mm by 0.5mm	180° arc
15.5 - 25mm	186-107	30 leaves: 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 leaves: 1/32" - 1/4" by 64ths	180° arc
17/64" - 1/2"	186-102	16 leaves: 17/64" - 1/2" by 64ths	180° arc
9/32" - 33/64"	186-104	16 leaves: 9/32" - 33/64" by 64ths	90° arc
1/64" - 1/2"	186-901*	25 leaves: 1/64" - 17/64" by 64ths, 9/32" - 1/2" by 32nds	—

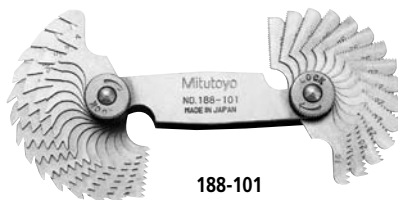
*Each gage has five measuring locations.

Thread Pitch Gages

SERIES 188

FEATURES

- Thread pitch 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).

Metric and Unified Screw Pitch Gage Set

Range	Order No.	Composition of leaves
0.4 - 7mm/4 - 42 TPI	188-151	51 leaves: Set of 188-122 and 188-111

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

Digital Universal Protractor

SERIES 187

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

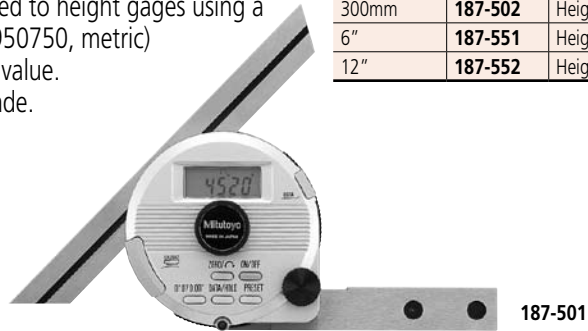
Presetting

FEATURES

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

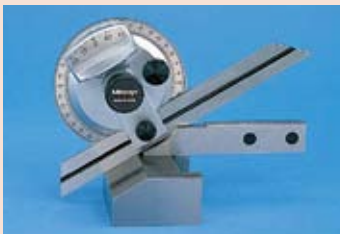
SPECIFICATIONS

Blade length	Order No.	Remarks (standard accessory)
150mm	187-501	Height gage holder (950750)
300mm	187-502	Height gage holder (950750)
6"	187-551	Height gage holder (950749)
12"	187-552	Height gage holder (950749)



Technical Data

Graduation:	5 min. (0° - 90° - 0°)
Blade edge angle:	30°* 45° and 60°
	*187-901, 187-902 only

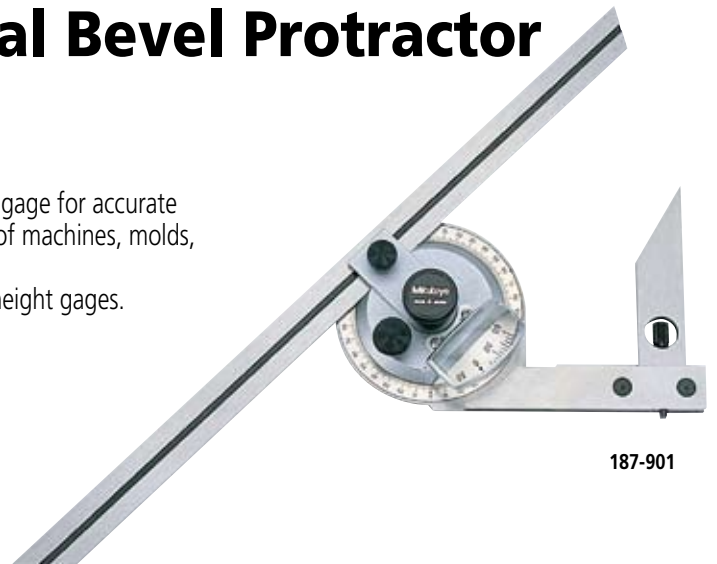


Universal Bevel Protractor

SERIES 187

FEATURES

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



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

Inch		
Blade length	Order No.	Remarks
6", 12"	187-902	w/60°, 45°, 30° edges
6"	187-904	w/60°, 45° edges
12"	187-906	w/60°, 45° edges

Bevel Protractor

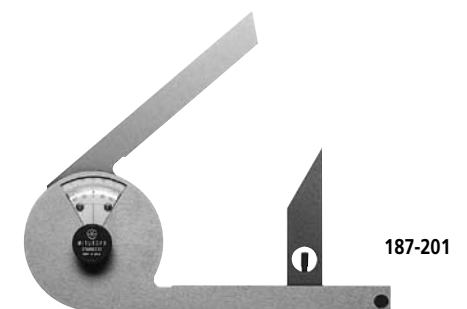
SERIES 187

FEATURES

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

SPECIFICATIONS

Blade length	Order No.	Remarks
137mm	187-201	w/60°, 30° edges



Technical Data

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

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 good contact with a workpiece.
- Inside Spring Caliper — Ends fully rounded to give good contact with a workpiece.



950-212
Spring divider



950-222
Outside spring calipers



950-232
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

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)
960-603	0.02mm/m	200 x 44 x 38.2mm
960-703	0.02mm/m	200 x 44 x 200mm

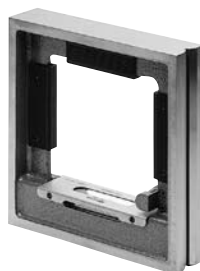
Technical Data

Accuracy of graduations: ± 0.7 DIV (960-603),
 ± 0.3 DIV (960-703)

960-603



960-703



Bench Micrometer

SERIES 162

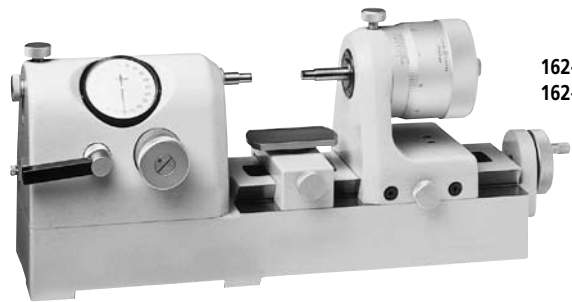
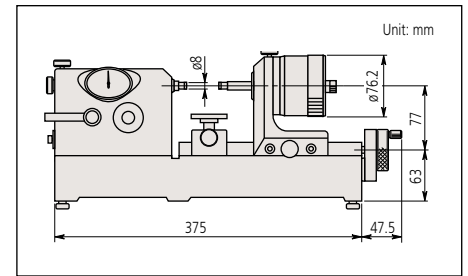
Technical Data

Micrometer head range: 25mm or 1"
Graduation: 0.001mm or .0001"
Dial indicator range: ± 0.1 mm or $\pm .005$ "
Maximum workpiece length: 100mm or 4"
Mass: 15kg

FEATURES

- 25mm/1" stroke micrometer head (Graduation: 0.001mm/.0001") is provided.
- Retractable anvil with dial indicator for high accuracy inspection of mass-produced parts.
- Anvil measuring force is variable.
- Adjustable workpiece stage height.
- Dial Indicator is shockproof.
- $\varnothing 8$ mm (or 3/8") stem probe from the Mitutoyo Mu-Checker can be attached for higher precision measurement if required.

Dimensions



162-101 (metric)
162-102 (inch)

Bench Centers

SERIES 967

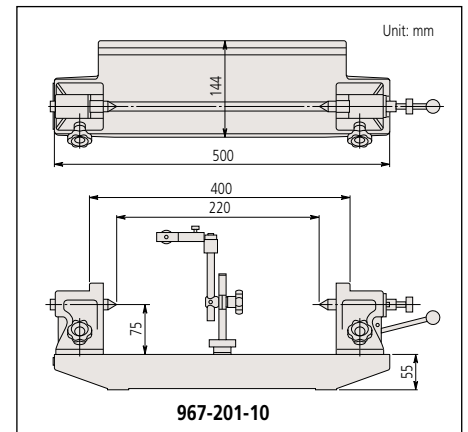
Technical Data

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

FEATURES

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

Dimensions



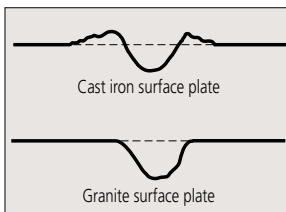
967-201-10

Black Granite Surface Plates

SERIES 517

FEATURES

- Natural granite seasoned for thousands of years is free from deterioration or dimensional change over time.
- Granite surface plates have many advantages over cast iron surface plates: Twice as hard as cast iron.
- 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 workpieces or instruments.
- Trouble-free operation for use with magnetic materials.
- Long life and rust-free, resulting in low maintenance costs.
- Temperature differences between the top and rear surfaces can affect flatness. Do not install black granite surface plates at locations where the granite surface is exposed to high temperatures, such as in direct sunlight or close to heating or cooling equipment. Use them only in environments where there are small temperature differences (recommended conditions of use: temperature = $20^{\circ} \pm 1^{\circ} \text{C}$, humidity = $58\% \pm 2\%$).
- Steel stands are optional.



(Refer to page VIII for details.)

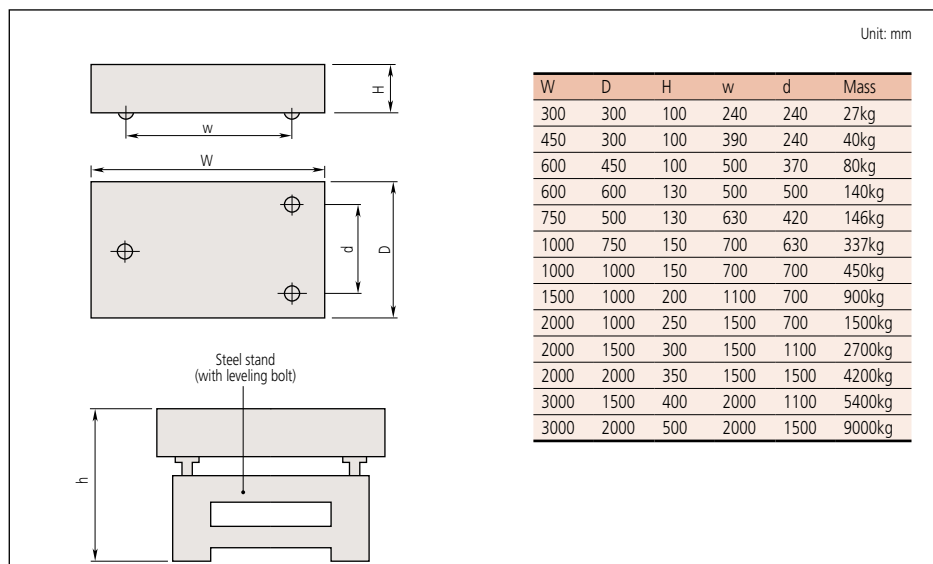
1000 x 750mm



600 x 600mm



Dimensions





Custom-made Granite Products

Mitutoyo can manufacture granite products to your design.

Mitutoyo provides products with a Certificate of Calibration and a traceability system diagram as required.

SPECIFICATIONS

Grade 00

Dimensions (W x D x H)	Order No.*	Flatness
300 x 300 x 100mm	517-401	0.002mm
450 x 300 x 100mm	517-411	0.002mm
600 x 450 x 100mm	517-414	0.0025mm
600 x 600 x 130mm	517-403	0.0025mm
750 x 500 x 130mm	517-405	0.003mm
1000 x 750 x 150mm	517-407	0.003mm
1000 x 1000 x 150mm	517-409	0.0035mm
1500 x 1000 x 200mm	517-413	0.004mm
2000 x 1000 x 250mm	517-410	0.0045mm
2000 x 1500 x 300mm	517-416	0.005mm
2000 x 2000 x 350mm	—	0.0055mm
3000 x 1500 x 400mm	—	0.0065mm
3000 x 2000 x 500mm	—	0.007mm

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 350mm	517-117	0.022mm
3000 x 1500 x 400mm	517-118	0.025mm
3000 x 2000 x 500mm	517-119	0.027mm

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	0.0095mm
2000 x 1500 x 300mm	517-316	0.010mm
2000 x 2000 x 350mm	—	0.011mm
3000 x 1500 x 400mm	—	0.0125mm
3000 x 2000 x 500mm	—	0.0135mm



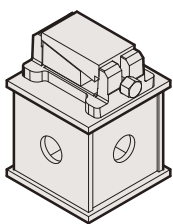
Stand

SPECIFICATIONS: Stand

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* / 203R / 203CR	755 - 775mm	With levelling bolt
600 x 600 x 130mm	517-204* / 204R / 204CR	755 - 775mm	With levelling bolt
750 x 500 x 130mm	517-205* / 205R / 205CR	755 - 775mm	With levelling bolt
1000 x 750 x 150mm	517-206* / 206R / 206CR	755 - 775mm	With levelling bolt
1000 x 1000 x 150mm	517-207* / 207R / 207CR	735 - 775mm	With levelling bolt
1500 x 1000 x 200mm	517-208* / 208R / 208CR	735 - 775mm	With levelling bolt
2000 x 1000 x 250mm	517-209* / 209R / 209CR	735 - 775mm	With levelling bolt
2000 x 1500 x 300mm	517-210* / 210R / 210CR	735 - 775mm	With levelling bolt
2000 x 2000 x 350mm	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 safety frame, Suffix "CR": with casters

Block platform for supporting legs



Block platform for auxiliary legs

