New Products

Ultra Low Expansion Ceramic Gauge Blocks (ZERO CERA Blocks)

Refer to page E-6 for details.

Gauge Block Comparator GBCD-100A

Refer to page E-31 for details.

Digital Height Master

Refer to page E-35 for details.

High Precision Square

Refer to page E-41 for details.

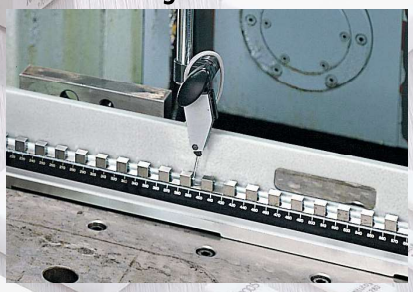
Gauge Blocks

Gauge Block

Height Master & Reference Gages

Height Master

Reference Gages



Granite Surface Plates

INDEX

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Features and Accuracies

Features of Mitutoyo Gauge Blocks

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

Accuracy

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

Wringing

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

Abrasion Resistance and Dimensional Stability of Steel Blocks

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

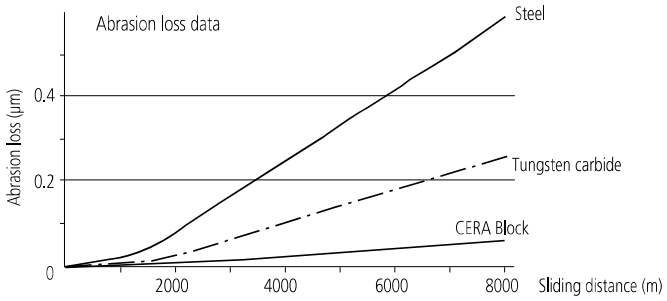
CERA Blocks

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

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

(2) No Burrs Caused by Accidental Mishandling
Since the CERA Block is very hard, it will not scratch easily and is highly resistant to burrs. If a burr is formed, it can easily be removed with a ceramic deburring stone (Ceraston).

(3) Abrasion Resistant
CERA Blocks have 10 times the abrasion resistance of steel gauge blocks.

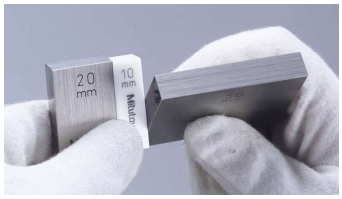


(4) Dimensionally Stable
CERA Blocks are free from dimensional change over time.

(5) Clearly Marked Sizes
Black characters, indicating the nominal length, are inscribed by laser and are clearly visible against the white surface of the block.

(6) Non-magnetic Nature Prevents Steel Swarf Contamination

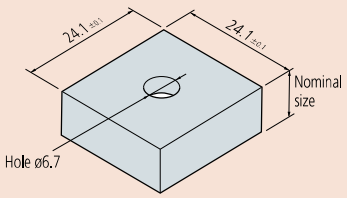
(7) High Wringing Force
Superior flatness and surface finish provides maximum wringing force.



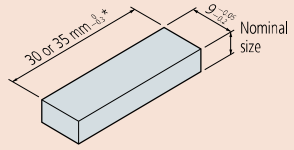
Classification of Gauge Blocks by Shape

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

Square gauge blocks

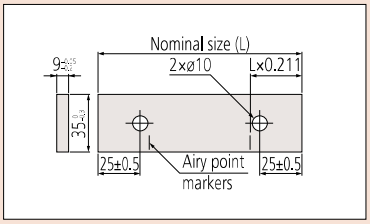


Rectangular gauge blocks



* Depends on the nominal size.
More than 10 mm: 35 mm
10 mm or less: 30 mm

Long rectangular gauge blocks



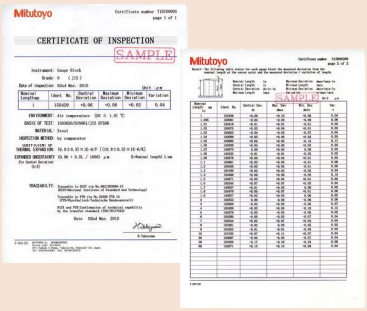
Two coupling holes are provided in this type of block for the purpose of joining two long blocks together and/or attaching accessories using special connectors. (See page E-19 for connector types available.)

Selecting Gauge Blocks

- Select gauge blocks in accordance with the combination range required.
  If a large length is required, use one or more blocks from a long-block set.
- Select gauge blocks in accordance with the minimum length step required. Add a wear block at each end of the stack if the workpiece material is abrasive, or the stack will be used frequently.
- If a set containing a large number of gauge blocks is selected, the number of gauge blocks required for any particular length is reduced and the number of combinations is increased. Accuracy of the blocks in the set will be retained longer because normal wear will be spread over a larger number of blocks.
- Gauge block sets dedicated to micrometer and caliper inspection are available (refer to page E-11 for details).
- If using only one length repeatedly, it is a good idea to purchase discrete gauge blocks (refer to pages E-13, E-14, E-15, E-16, E-23, and E-24 for details) .
- Products can be provided in combinations other than those in our standard sets. When placing such orders, please specify whether a storage box is required. Feel free to consult us if you need gauge blocks compliant with British (BS), American, or other standards.
  The U.S. Federal Specification for gauge blocks was replaced by ASME B89.1.9 in 2002. Please contact your local Mitutoyo sales office for further information.
- 2 mm-based gauge blocks, which take the base of the minimum length step as 2 mm, are available and many people find them easier to handle than 1 mm-based gauge blocks.
- All Mitutoyo gauge blocks, whether sold in sets or individually, come with a measurement inspection certificate.

Mitutoyo Gauge Blocks and Inspection Certificates

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



Grade and Application

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

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

Constructing a Gauge Block Stack

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

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

Example: Required length = 45.6785 mm

• For a 1 mm-based gauge block set

1.0005
1.008
1.17
17.5
+) 25
45.6785 mm

• For a 2 mm-based gauge block set

2.0005
2.008
2.17
14.5
+) 25
45.6785 mm

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

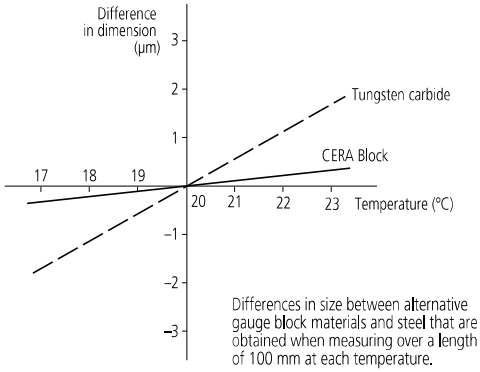
(8) Superior Material Characteristics of CERA Block

Property \ Material	CERA Block (ZrO_2)	Steel (Fe)	Tungsten Carbide (WC-Co)	ZERO CERA Blocks (Low thermal expansion)
Hardness (HV)	1350	800	1650	826
Coefficient of thermal expansion (10^{-6}/K)	9.3±0.5	10.8±0.5	5.5±1.0	0±0.02
Flexural strength by 3-point bending (MPa)	1270	1960	1960	210
Fracture toughness K_{1C} (MPa·$m^{1/2}$)	7	120	12	1.2
Young's modulus ×10^4 (MPa)	20.6	20.6	61.8	130
Poisson's ratio	0.3	0.3	0.2	0.3
Specific gravity	6.0	7.8	14.8	2.5
Thermal conductivity (W/m·k)	2.9	54.4	79.5	3.7

Note: Ceramics have the advantage of a slow response to temperature changes due to the low thermal conductivity. However, caution is required when using CERA blocks under conditions of rapid temperature change.

(9) Difference in expansion coefficient between steel and CERA blocks is just 1.5×10^{-6}/K

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



Differences in size between alternative gauge block materials and steel that are obtained when measuring over a length of 100 mm at each temperature.

(10) Highly Resistant to Dropping and Impact Damage

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

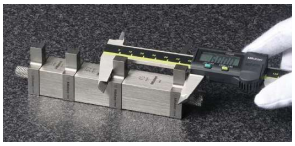
Features of Square Gauge Blocks

(1) Gauge blocks in a stack can be clamped together

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

(2) A height reference standard can easily be made

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



(3) A dedicated inspection jig can easily be made

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

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

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

Long and Ultra-Thin Gauge Blocks

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

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

ACCURACY SPECIFICATIONS: JIS B 7506-2004 (JAPAN)

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

ISO 3650: 1998

(at 20 °C)

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

ACCURACY SPECIFICATIONS: BS 4311: 2007 (UK)

Nominal length (in)		Grade K		Grade 0	
		Limit deviation of length at any point (µin)	Tolerance for the variation in length (µin)	Limit deviation of length at any point (µin)	Tolerance for the variation in length (µin)
over 0	up to 0.4	±8	2	±5	4
over 0.4	up to 1	±12	2	±6	4
over 1	up to 2	±16	3	±8	4
over 2	up to 3	±20	3	±10	5
over 3	up to 4	±24	3	±12	5

(at 20 °C)

Nominal length (in)		Grade 1		Grade 2	
		Limit deviation of length at any point (µin)	Tolerance for the variation in length (µin)	Limit deviation of length at any point (µin)	Tolerance for the variation in length (µin)
over 0	up to 0.4	±8	6	±18	12
over 0.4	up to 1	±12	6	±24	12
over 1	up to 2	±16	7	±32	12
over 2	up to 3	±20	7	±40	14
over 3	up to 4	±24	8	±48	14

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

Nominal length (in)		Grade K		Grade 00		Grade 0		Grade 1		Grade 2	
		Limit deviations of length at any point (µin)	Tolerance for the variation in length (µin)	Limit deviations of length at any point (µin)	Tolerance for the variation in length (µin)	Limit deviations of length at any point (µin)	Tolerance for the variation in length (µin)	Limit deviations of length at any point (µin)	Tolerance for the variation in length (µin)	Limit deviations of length at any point (µin)	Tolerance for the variation in length (µin)
	up to 0.05	±12	2	±4	2	±6	4	±12	6	±24	12
over 0.05	up to 0.4	±10	2	±3	2	±5	4	±8	6	±18	12
over 0.45	up to 1	±12	2	±3	2	±6	4	±12	6	±24	12
over 1	up to 2	±16	2	±4	2	±8	4	±16	6	±32	12
over 2	up to 3	±20	2	±5	3	±10	4	±20	6	±40	14
over 3	up to 4	±24	3	±6	3	±12	5	±24	8	±48	14
over 4	up to 5	±32	3	±8	3	±16	5	±32	8	±64	16
over 5	up to 6	±32	3	±8	3	±16	5	±32	8	±64	16
over 6	up to 7	±40	4	±10	4	±20	6	±40	10	±80	16
over 7	up to 8	±40	4	±10	4	±20	6	±40	10	±80	16
over 8	up to 10	±48	4	±12	4	±24	6	±48	10	±104	18
over 10	up to 12	±56	4	±14	4	±28	7	±56	10	±112	20
over 12	up to 16	±72	5	±18	5	±36	8	±72	12	±144	20
over 16	up to 20	±88	6	±20	6	±44	10	±88	14	±176	24
over 20	up to 24	±104	6	±25	6	±52	10	±104	16	±200	28
over 24	up to 28	±120	7	±30	7	±60	12	±120	18	±240	28
over 28	up to 32	±136	8	±34	8	±68	12	±136	20	±260	32
over 32	up to 36	±152	8	±38	8	±76	14	±152	20	±300	36
over 36	up to 40	±160	10	±40	10	±80	16	±168	24	±320	40

(at 20 °C)

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

Note 1: The accuracy of nominal lengths from 0.1 mm up to less than 0.5 mm follows that of nominal lengths from 0.5 mm up to 10 mm.
Note 2: Grade K gauge blocks are only available as made-to-order rectangular gauge blocks.
Note 3: Grade K gauge blocks are supplied with a JCSS calibration certificate. When ordering, kindly provide your formal name and contact information.

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

*1: Suffix No. (-■■■) for Selecting Standard Required

ISO/DIN/JIS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-01B	K	✔	✔

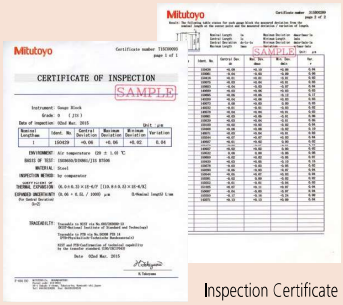
ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-51B	K	✔	✔

BS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-11B	K	✔	✔

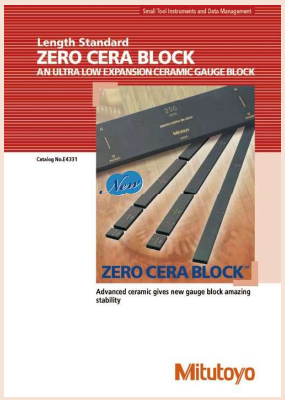
Note: Only for 100 mm type



Inspection Certificate

Refer to the Gauge Block with calibrated coefficient of thermal expansion Brochure (**E4334**) for more details.

An inspection certificate is supplied as standard.
Refer to page U-11 for details.



Refer to the ZERO CERA BLOCK Brochure (**E4331**) for more details.

Gauge Blocks with Calibrated Coefficient of Thermal Expansion

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

SPECIFICATIONS

Metric Blocks with CTE

Order No. (steel)*1	Order No. (CERA)*1	Length (mm)
611681	613681	100
611802	613802	125
611803	613803	150
611804	613804	175
611682	613682	200
611805	613805	250
611683	613683	300
611684	613684	400
611685	613685	500

Inch Blocks with CTE

Order No. (steel)*1	Order No. (CERA)*1	Length (in)
611204	613204	4
611205	613205	5
611206	613206	6
611207	613207	7
611208	613208	8
611222	613222	10
611223	613223	12
611224	613224	16
611225	613225	20

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

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

ZERO CERA Blocks

- Zero Cera Block is a next-generation gauge block made from a special lightweight ceramic having extremely low thermal expansion ($0\pm0.02\times10^{-6}$/K (20 °C)) and exhibiting almost no secular change, both in dimension and coefficient of thermal expansion.
- Available as rectangular gauge blocks in the range 30 to 1000 mm.

SPECIFICATIONS

Metric Blocks

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

Gauge Blocks

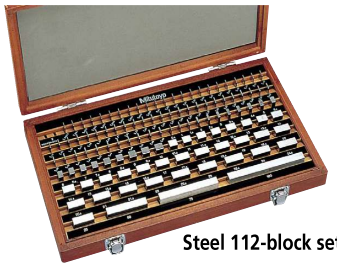
Length Standards Brought to You by Mitutoyo

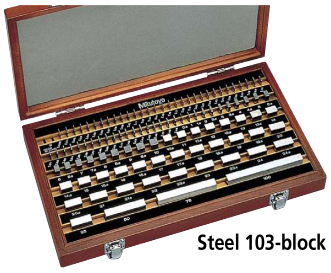
An inspection certificate is supplied as standard.
Refer to page U-11 for details.

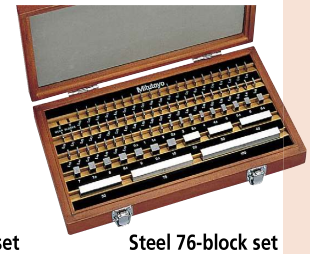
Metric/Inch Rectangular Gauge Block Sets
SERIES 516

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

Steel 1 mm Base Block Sets


Steel 112-block set


Steel 103-block set


Steel 76-block set


Steel 56-block set


Steel 47-block set


Steel 46-block set


Steel 34-block set


Steel 32-block set

Steel 0.001 mm Step Block Sets


Steel 9-block set
(1.001 to 1.009 mm)


Steel 9-block set
(0.991 to 0.999 mm)


Steel 18-block set

Steel Long Block Sets


Steel 8-block set

Steel Wear Block Sets


Steel (1 mm)

Steel Thin Block Sets


Steel 9-block set

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

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

CERA 1 mm Base Block Sets


CERA 112-block set


CERA 103-block set


CERA 76-block set


CERA 56-block set


CERA 47-block set


CERA 46-block set


CERA 34-block set


CERA 32-block set

CERA 0.001 mm Step Block Sets

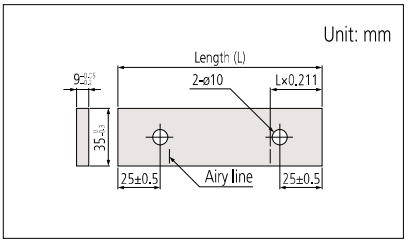

CERA 9-block set
(1.001 to 1.009 mm)


CERA 9-block set
(0.991 to 0.999 mm)


CERA 18-block set

CERA Long Block Sets


CERA 8-block set



CERA Wear Block Sets


CERA (1 mm)

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

Gauge Blocks

Length Standards Brought to You by Mitutoyo

SPECIFICATIONS

1 mm Base Block Sets

Blocks per set	Order No.		Standard/grade available and **Suffix No.**[*1]			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size (mm)	Step (mm)	Qty.
122	—	—	—	—	—	1.0005		1
	516-596	—	K: -■0	—	—	1.001 - 1.009	0.001	9
	516-597	—	0: -■0	—	—	1.01 - 1.49	0.01	49
	516-598	—	1: -■0	—	—	1.6 - 1.9	0.1	4
	516-599	—	2: -■0	—	—	0.5 - 24.5	0.5	49
						30 - 100	10	8
						25, 75		2
112	516-531	516-541	—	K: -■6	—	1.0005		1
	516-937	516-337	K: -■0	00: -■6	K: -■1	1.001 - 1.009	0.001	9
	516-938	516-338	0: -■0	0: -■6	0: -■1	1.01 - 1.49	0.01	49
	516-939	516-339	1: -■0	1: -■6	1: -■1	0.5 - 24.5	0.5	49
	516-940	516-340	2: -■0	2: -■6	2: -■1	25 - 100	25	4
103	516-533	516-542	—	K: -■6	—	1.005		1
	516-941	516-341	K: -■0	00: -■6	K: -■1	1.01 - 1.49	0.01	49
	516-942	516-342	0: -■0	0: -■6	0: -■1	0.5 - 24.5	0.5	49
	516-943	516-343	1: -■0	1: -■6	1: -■1	25 - 100	25	4
	516-944	516-344	2: -■0	2: -■6	2: -■1			
88	—	—	—	—	—	1.0005		1
	516-969	516-369	—	—	K: -■1	1.001 - 1.009	0.001	9
	516-970	516-370	0: -■0	—	0: -■1	1.01 - 1.49	0.01	49
	516-971	516-371	1: -■0	—	1: -■1	0.5 - 9.5	0.5	19
	516-972	516-372	2: -■0	—	2: -■1	10 - 100	10	10
87	516-535	515-543	—	K: -■6	—	1.001 - 1.009	0.001	9
	516-945	516-345	K: -■0	00: -■6	K: -■1	1.01 - 1.49	0.01	49
	516-946	516-346	0: -■0	0: -■6	0: -■1	0.5 - 9.5	0.5	19
	516-947	516-347	1: -■0	1: -■6	1: -■1	10 - 100	10	10
	516-948	516-348	2: -■0	2: -■6	2: -■1			
76	—	—	—	—	—	1.005		1
	516-949	516-349	K: -■0	—	—	1.01 - 1.49	0.01	49
	516-950	516-350	0: -■0	—	—	0.5 - 9.5	0.5	19
	516-951	516-351	1: -■0	—	—	10 - 40	10	4
	516-952	516-352	2: -■0	—	—	50 - 100	25	3
56	516-536	516-544	—	K: -■6	—	0.5		1
	516-953	516-353	K: -■0	00: -■6	—	1.001 - 1.009	0.001	9
	516-954	516-354	0: -■0	0: -■6	—	1.01 - 1.09	0.01	9
	516-955	516-355	1: -■0	1: -■6	—	1.1 - 1.9	0.1	9
	516-956	516-356	2: -■0	2: -■6	—	1 - 24	1	24
						25 - 100	25	4
47	516-537	516-545	—	K: -■6	—	1.005		1
	516-957	516-357	K: -■0	00: -■6	—	1.01 - 1.09	0.01	9
	516-958	516-358	0: -■0	0: -■6	—	1.1 - 1.9	0.1	9
	516-959	516-359	1: -■0	1: -■6	—	1 - 24	1	24
	516-960	516-360	2: -■0	2: -■6	—	25 - 100	25	4
47	—	—	—	—	—	1.005		1
	516-961	516-361	K: -■0	—	K: -■1	1.01 - 1.19	0.01	19
	516-962	516-362	0: -■0	—	0: -■1	1.2 - 1.9	0.1	8
	516-963	516-363	1: -■0	—	1: -■1	1 - 9	1	9
	516-964	516-364	2: -■0	—	2: -■1	10 - 100	10	10
46	—	—	—	—	—	1.001 - 1.009	0.001	9
	516-994	516-394	K: -■0	—	—	1.01 - 1.09	0.01	9
	516-995	516-395	0: -■0	—	—	1.1 - 1.9	0.1	9
	516-996	516-396	1: -■0	—	—	1 - 9	1	9
	516-997	516-397	2: -■0	—	—	10 - 100	10	10
34	—	—	—	—	—	1.0005		1
	516-128	516-178	K: -■0	—	K: -■1	1.001 - 1.009	0.001	9
	516-129	516-179	0: -■0	—	0: -■1	1.01 - 1.09	0.01	9
	516-130	516-180	1: -■0	—	1: -■1	1.1 - 1.9	0.1	9
	516-131	516-181	2: -■0	—	2: -■1	1 - 5	1	5
						10		1
32	—	—	—	—	—	1.005		1
	516-965	516-365	K: -■0	—	K: -■1	1.01 - 1.09	0.01	9
	516-966	516-366	0: -■0	—	0: -■1	1.1 - 1.9	0.1	9
	516-967	516-367	1: -■0	—	1: -■1	1 - 9	1	9
	516-968	516-368	2: -■0	—	2: -■1	10 - 30	10	3
						60		1

Thin Block Sets

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

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

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

*1: Suffix No. (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	
6	✔	✔

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

ASME

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	
6	✔	✔

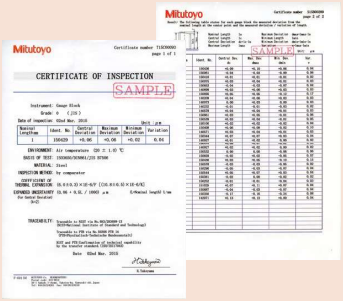
Suffix No. 1: Not available for Grade K sets.
Suffix No. 6: Only for Grade K sets.

BS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	
6	✔	✔

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

Inspection Certificate



An inspection certificate is supplied as standard.
Refer to page U-11 for details.

SPECIFICATIONS

0.001 mm Step Block Sets

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

Long Block Sets

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

Wear Block Sets

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

Inch Block Sets

Blocks per set	Order No.		Standard/grade available and **Suffix No.**[*1]			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size (in)	Step (in)	Qty.
82	**516-548** **516-905** **516-906** **516-907** **516-908**	**516-556** **516-305** **516-306** **516-307** **516-308**	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — 0: -■1 1: -■1 2: -■1	0.10005 0.1001 - 0.1009 0.101 - 0.149 0.05 - 0.95 1 - 4	 0.0001 0.001 0.05 1	1 9 49 19 4
81	**516-549** **516-901** **516-902** **516-903** **516-904**	**516-557** **516-301** **516-302** **516-303** **516-304**	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — 0: -■1 1: -■1 2: -■1	0.1001 - 0.1009 0.101 - 0.149 0.05 - 0.95 1 - 4	0.0001 0.001 0.05 1	9 49 19 4
49	— — **516-910** **516-911** **516-912**	— — — — —	— — — — —	— — — — —	— — 0: -■1 1: -■1 2: -■1	0.1001 - 0.1009 0.101 - 0.109 0.01 - 0.19 0.2 - 0.9 1 - 4	0.0001 0.001 0.01 0.1 1	9 9 19 8 4
35	**516-550** **516-913** **516-914** **516-915** **516-916**	**516-558** **516-313** **516-314** **516-315** **516-316**	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — 0: -■1 1: -■1 2: -■1	0.10005 0.1001 - 0.1009 0.101 - 0.109 0.11 - 0.19 0.1 - 0.3 0.5, 1, 2, 4	 0.0001 0.001 0.01 0.1	1 9 9 9 3 4

Thin Block Sets

Blocks per set	Order No.		Standard/grade available and **Suffix No.**[*1]			Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	BS	Size (in)	Step (in)	Qty.
28	**516-551** **516-917** **516-918** **516-919** **516-920**	— — — — —	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	0.02005 0.0201 - 0.0209 0.021 - 0.029 0.01 - 0.09	 0.0001 0.001 0.01	1 9 9 9
10	**516-926** **516-927** **516-928**	— — —	— — —	0: -■6 1: -■6 —	0: -■1 1: -■1 2: -■1	0.005 - 0.050	0.005	10

Long Block Sets

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

Wear Block Sets

Blocks per set	Order No.		Standard/grade available and **Suffix No.**[*1]			Blocks included in set		
	Carbide	CERA	ISO/DIN/JIS	ASME	BS	Size (in)	Step (in)	Qty.
2	**516-809** **516-808**	**516-836** **516-837**	— —	0: -■6 1: -■6	— —	0.05		2
2	**516-805** **516-804**	**516-834** **516-835**	— —	0: -■6 1: -■6	— —	0.1		2

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

Gauge Blocks

Length Standards Brought to You by Mitutoyo

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Micrometer Inspection Gauge Block Sets SERIES 516

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

Steel

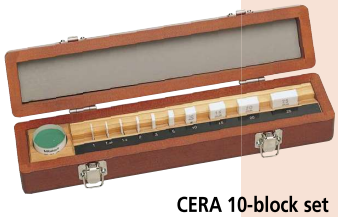
Steel 10-block set

Steel 10-block set

Steel 8-block set

Steel 10-block set

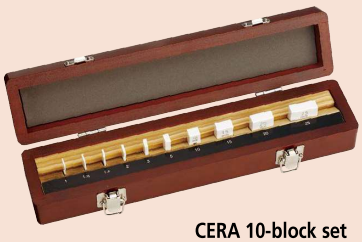
CERA



CERA 10-block set

CERA 10-block set

CERA 8-block set



CERA 10-block set

Gauge Block Sets for Micrometer Inspection

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

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

- **Micro Checker**

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

516-607

Typical application

(The gauge block and optical parallel shown are optional accessories.)

SPECIFICATIONS

Metric Micro Checker (holder only)

Order No.	516-607
Applicable gauge block sets	**516-106/107/108, 516-156/157/158**
Applicable gauge block sizes (mm)	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25

Inch Micro Checker (holder only)

Order No.	516-608
Applicable gauge block sets	**516-921/922/923, 516-321/322/323**
Applicable gauge block sizes (in)	0.105, 0.210, 0.315, 0.420, 0.5, 0.605, 0.710, 0.815, 0.920, 1

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

*1: Suffix No. (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	
6	✔	✔

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

ASME

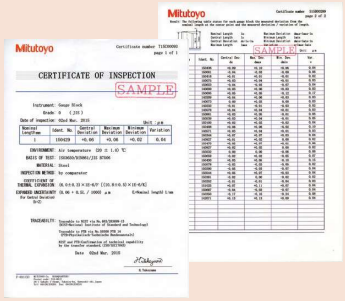
Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	
6	✔	✔

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

BS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	

Inspection Certificate



SPECIFICATIONS

Metric Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	ASME	BS	Blocks included in set
16	516-111 516-112 516-113	516-161 516-162 516-163	0: -■0 1: -■0 2: -■0	— — —	— — —	1.00, 1.25, 1.5, 2, 3, 5, 10, 15, 20, 25, 25.25, 30, 35, 40, 45, 50 mm, Cerastone, Optical parallels (t=12 mm, 25 mm)
10	516-977 516-978 516-979 516-980	— 516-378 516-379 516-380	K: -■0 0: -■0 1: -■0 2: -■0	— — — —	— — — —	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25 mm, Optical parallel (t=12 mm)
10	516-103 516-101 —	516-152 516-153 516-154	0: -■0 1: -■0 2: -■0	0: -■6 1: -■6 —	— — —	1.00, 1.25, 1.50, 2, 3, 5, 10, 15, 20, 25 mm
10	516-580 516-581 516-582	516-390 516-391 516-392	0: -■0 1: -■0 2: -■0	— — —	— — —	2.2, 4.8, 7.8, 10.4, 12, 15.2, 17.4, 19.6, 22.6, 25 mm
10	516-106 516-107 516-108	516-156 516-157 516-158	0: -■0 1: -■0 2: -■0	— — —	— — —	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25 mm, Optical parallel (t=12 mm)
10	516-132 516-133 516-134	516-182 516-183 516-184	0: -■0 1: -■0 2: -■0	— — —	— — —	1.25, 1.50, 1, 2, 3, 5, 10, 15, 20, 25 mm, Micro Checker, Optical parallel (t=12 mm)
10	516-135 516-136 516-137	516-185 516-186 516-187	0: -■0 1: -■0 2: -■0	— — —	— — —	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25 mm, Micro Checker, Optical parallel (t=12 mm)
8	— — 516-115 516-116 516-117	516-547 516-164 516-165 516-166 516-167	— K: -■0 0: -■0 1: -■0 2: -■0	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	25, 50, 75, 100, 125, 150, 175, 200 mm

Inch Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	ASME	BS	Blocks included in set
10	516-528 516-529 516-530	516-318 516-319 516-320	— — —	00: -■6 0: -■6 1: -■6	0: -■1 1: -■1 2: -■1	0.087, 0.189, 0.307, 0.409, 0.472, 0.598, 0.669, 0.772, 0.890, 1 in
10	516-552 516-921 516-922 516-923	516-559 516-321 516-322 516-323	— — — —	K: -■6 00: -■6 0: -■6 1: -■6	— 0: -■1 1: -■1 2: -■1	0.105, 0.210, 0.315, 0.420, 0.500, 0.605, 0.710, 0.815, 0.920, 1 in, Optical parallel (t=0.5 in)
10	516-553 516-138 516-139 516-140	516-560 516-188 516-189 516-190	— — — —	K: -■6 00: -■6 0: -■6 1: -■6	— 0: -■1 1: -■1 2: -■1	0.105, 0.210, 0.315, 0.420, 0.500, 0.605, 0.710, 0.815, 0.920, 1 in, Micro checker, Optical parallel (t=0.5 in)
9	516-554 516-929 516-930 516-931 516-932	516-561 516-333 516-334 516-335 516-336	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	0.0625, 0.100, 0.125, 0.200, 0.250, 0.300, 0.500, 1, 2 in, Optical parallel (t=0.5 in)
9	516-555 516-141 516-142 516-143 516-144	516-562 516-191 516-192 516-193 516-194	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	0.0625, 0.100, 0.125, 0.200, 0.250, 0.300, 0.500, 1, 2 in, Micro Checker, Optical parallel (t=0.5 in)
9	— — 516-934 516-935 516-936	516-563 516-329 516-330 516-331 516-332	— — — — —	K: -■6 00: -■6 0: -■6 1: -■6 2: -■6	— — — — —	0.0625, 0.100, 0.125, 0.200, 0.250, 0.300, 0.500, 1, 2 in
8	516-126 516-127	516-176 516-177	— —	0: -■6 1: -■6	— —	1, 2, 3, 4, 5, 6, 7, 8 in

SERIES 516 – Caliper Inspection Gauge Block Sets

SPECIFICATIONS

Metric Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No. ISO/DIN/JIS	ASME	BS	Blocks included in set
5	— —	— 516-174	— 2: -10	— —	— —	5 pcs.: 10.3, 24.5, 50, 75, 100 mm, Ceramic plain jaws, Holder (250 mm), Glove
4	516-526 516-527	516-566 516-567	1: -10 2: -10	— —	— —	4 pcs.: 10, 30, 50, 125 mm, Setting ring (ø4 mm, ø10 mm), Pin gage (ø10 mm), Glove
3	516-124 516-125	516-150 516-151	1: -10 2: -10	— —	— —	3 pcs.: 30, 41.3, 131.4 mm, Setting ring (ø4 mm, ø25 mm), Glove
2	516-122 516-123	516-172 516-173	1: -10 2: -10	— —	— —	2 pcs.: 41.3, 131.4 mm, Setting ring (ø20 mm), Glove

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Metric Rectangular Gauge Blocks

- If using only one length repeatedly, it is suggested to purchase individual gauge blocks.
- Nominal sizes which are not included in the chart below can be supplied custom-made on request.
- Each Grade K gauge block to ISO/DIN/JIS, BS or ASME standard is supplied with a Certificate of Calibration which certifies that the gauge block was calibrated by interferometry.

SPECIFICATIONS

Metric Blocks

Length (mm)	Order No.*1	
	Steel	CERA
0.1	611821	—
0.11	611860	—
0.12	611861	—
0.13	611862	—
0.14	611863	—
0.15	611822	—
0.16	611864	—
0.17	611865	—
0.18	611866	—
0.19	611867	—
0.2	611823	—
0.21	611868	—
0.22	611869	—
0.23	611870	—
0.24	611871	—
0.25	611824	—
0.26	611872	—
0.27	611873	—
0.28	611874	—
0.29	611875	—
0.3	611825	—
0.31	611876	—
0.32	611877	—
0.33	611878	—
0.34	611879	—
0.35	611826	—
0.36	611880	—
0.37	611881	—
0.38	611882	—
0.39	611883	—
0.4	611827	—
0.41	611884	—
0.42	611885	—
0.43	611886	—
0.44	611887	—
0.45	611828	—
0.46	611888	—
0.47	611889	—
0.48	611890	—
0.49	611891	—
0.5	611506	613506
0.51	611892	—
0.52	611893	—
0.53	611894	—
0.54	611895	—
0.55	611896	—
0.56	611897	—
0.57	611898	—
0.58	611899	—
0.59	611900	—
0.6	611901	—
0.61	611902	—
0.62	611903	—
0.63	611904	—
0.64	611905	—
0.65	611906	—
0.66	611907	—
0.67	611908	—
0.68	611909	—
0.69	611910	—
0.7	611911	—
0.71	611912	—
0.72	611913	—
0.73	611914	—
0.74	611915	—
0.75	611916	—
0.76	611917	—
0.77	611918	—
0.78	611919	—
0.79	611920	—
0.8	611921	—
0.81	611922	—
0.82	611923	—
0.83	611924	—
0.84	611925	—
0.85	611926	—
0.86	611927	—
0.87	611928	—
0.88	611929	—
0.89	611930	—
0.9	611931	—
0.91	611932	—
0.92	611933	—
0.93	611934	—
0.94	611935	—
0.95	611936	—
0.96	611937	—
0.97	611938	—
0.98	611939	—
0.99	611940	—
0.991	611551	613551
0.992	611552	613552
0.993	611553	613553
0.994	611554	613554
0.995	611555	613555
0.996	611556	613556
0.997	611557	613557
0.998	611558	613558
0.999	611559	613559
1	611611	613611
1.0005	611520	613520
1.001	611521	613521
1.002	611522	613522
1.003	611523	613523
1.004	611524	613524
1.005	611525	613525
1.006	611526	613526
1.007	611527	613527
1.008	611528	613528
1.009	611529	613529
1.01	611561	613561
1.02	611562	613562
1.03	611563	613563
1.04	611564	613564
1.05	611565	613565
1.06	611566	613566
1.07	611567	613567
1.08	611568	613568
1.09	611569	613569
1.1	611570	613570
1.11	611571	613571
1.12	611572	613572
1.13	611573	613573
1.14	611574	613574
1.15	611575	613575
1.16	611576	613576
1.17	611577	613577
1.18	611578	613578
1.19	611579	613579

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

PROPRIETARY INSPECTION CERTIFICATE — Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

*1: Suffix No. (-■■■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate	
			JCSS	RvA
-016	K	✔	✔	
-021	0	✔		
-026	0	✔	✔	
-031	1	✔		
-036	1	✔	✔	
-041	2	✔		
-046	2	✔	✔	

ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-516	K	✔	✔
-521	00	✔	
-531	0	✔	
-541	1	✔	
-551	2	✔	

BS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-116	K	✔	✔
-121	0	✔	
-126	0	✔	✔
-131	1	✔	
-136	1	✔	✔
-141	2	✔	
-146	2	✔	✔


Mitutoyo
CERTIFICATE OF INSPECTION
SAMPLE

Inspection Certificate

E

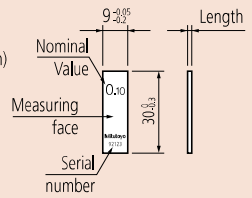
PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

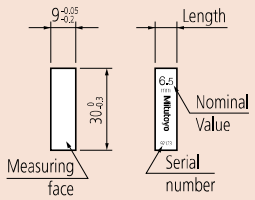
Dimensions

Unit: mm

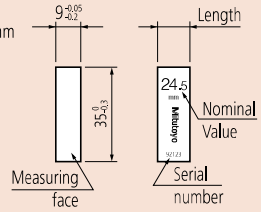
Nominal length:
0.1 mm to 5.5 mm
(0.004 in to 0.25 in)



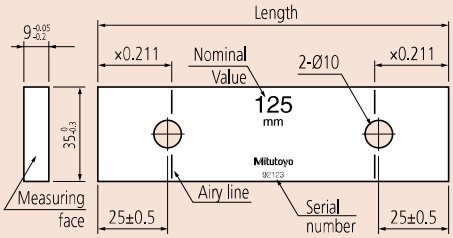
Nominal length:
6 mm to 10 mm
(0.3 in to 0.4 in)



Nominal length:
10.3 mm to 100 mm
(0.45 in to 4 in)



Nominal length 125 mm to 1000 mm (5 in to 20 in)



Length (mm)	Order No.*1 Steel	CERA
1.2	611580	613580
1.21	611581	613581
1.22	611582	613582
1.23	611583	613583
1.24	611584	613584
1.25	611585	613585
1.26	611586	613586
1.27	611587	613587
1.28	611588	613588
1.29	611589	613589
1.3	611590	613590
1.31	611591	613591
1.32	611592	613592
1.33	611593	613593
1.34	611594	613594
1.35	611595	613595
1.36	611596	613596
1.37	611597	613597
1.38	611598	613598
1.39	611599	613599
1.4	611600	613600
1.41	611601	613601
1.42	611602	613602
1.43	611603	613603
1.44	611604	613604
1.45	611605	613605
1.46	611606	613606
1.47	611607	613607
1.48	611608	613608
1.49	611609	613609
1.5	611641	613641
1.6	611516	613516
1.7	611517	613517
1.8	611518	613518
1.9	611519	613519
2	611612	613612
2.0005	611690	—
2.001	611691	—
2.002	611692	—
2.003	611693	—
2.004	611694	—
2.005	611695	—
2.006	611696	—
2.007	611697	—
2.008	611698	—
2.009	611699	—
2.01	611701	—
2.02	611702	—
2.03	611703	—
2.04	611704	—
2.05	611705	—
2.06	611706	—
2.07	611707	—
2.08	611708	—
2.09	611709	—
2.1	611710	—
2.11	611711	—
2.12	611712	—
2.13	611713	—
2.14	611714	—
2.15	611715	—
2.16	611716	—

Length (mm)	Order No.*1 Steel	CERA
2.17	611717	—
2.18	611718	—
2.19	611719	—
2.2	611720	—
2.21	611721	—
2.22	611722	—
2.23	611723	—
2.24	611724	—
2.25	611725	—
2.26	611726	—
2.27	611727	—
2.28	611728	—
2.29	611729	—
2.3	611730	—
2.31	611731	—
2.32	611732	—
2.33	611733	—
2.34	611734	—
2.35	611735	—
2.36	611736	—
2.37	611737	—
2.38	611738	—
2.39	611739	—
2.4	611740	—
2.41	611741	—
2.42	611742	—
2.43	611743	—
2.44	611744	—
2.45	611745	—
2.46	611746	—
2.47	611747	—
2.48	611748	—
2.49	611749	—
2.5	611642	613642
2.6	611750	—
2.7	611751	—
2.8	611752	—
2.9	611753	—
3	611613	613613
3.5	611643	613643
4	611614	613614
4.5	611644	613644
5	611615	613615
5.1	611850	613850
5.5	611645	613645
6	611616	613616
6.5	611646	613646
7	611617	613617
7.5	611647	613647
7.7	611851	613851
8	611618	613618
8.5	611648	613648
9	611619	613619
9.5	611649	613649
10	611671	613671
10.3	611852	613852
10.5	611650	613650
11	611621	613621
11.5	611651	613651
12	611622	613622
12.5	611652	613652
12.9	611853	613853

Length (mm)	Order No.*1 Steel	CERA
13	611623	613623
13.5	611653	613653
14	611624	613624
14.5	611654	613654
15	611625	613625
15.5	611655	613655
16	611626	613626
16.5	611656	613656
17	611627	613627
17.5	611657	613657
17.6	611854	613854
18	611628	613628
18.5	611658	613658
19	611629	613629
19.5	611659	613659
20	611672	613672
20.2	611855	613855
20.5	611660	613660
21	611631	613631
21.5	611661	613661
22	611632	613632
22.5	611662	613662
22.8	611856	613856
23	611633	613633
23.5	611663	613663
24	611634	613634
24.5	611664	613664
25	611635	613635
25.25	611754	613754
30	611673	613673
35	611755	613755
40	611674	613674
41.3	611857	613857
45	611756	613756
50	611675	613675
60	611676	613676
70	611677	613677
75	611801	613801
80	611678	613678
90	611679	613679
100	611681	613681
125	611802	613802
131.4	611858	613858
150	611803	613803
175	611804	613804
200	611682	613682
250	611805	613805
300	611683	613683
400	611684	613684
500	611685	613685
600	611840	—
700	611841	—
750	611842	—
800	611843	—
900	611844	—
1000	611845	—

Metric Wear Blocks

Length (mm)	Order No.*1 Tungsten carbide
1	612611
2	612612

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

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Inch Rectangular Gauge Blocks

SPECIFICATIONS

Inch Blocks

Length (inch)	Order No.*1	
	Steel	CERA
0.004	**611304**	—
0.005	**611305**	—
0.006	**611306**	—
0.007	**611307**	—
0.008	**611308**	—
0.009	**611309**	—
0.01	**611310**	—
0.011	**611311**	—
0.012	**611312**	—
0.013	**611313**	—
0.014	**611314**	—
0.015	**611315**	—
0.016	**611316**	—
0.017	**611317**	—
0.018	**611318**	—
0.019	**611319**	—
0.02	**611320**	—
0.02005	**611240**	—
0.0201	**611231**	—
0.0202	**611232**	—
0.0203	**611233**	—
0.0204	**611234**	—
0.0205	**611235**	—
0.0206	**611236**	—
0.0207	**611237**	—
0.0208	**611238**	—
0.0209	**611239**	—
0.021	**611321**	—
0.022	**611322**	—
0.023	**611323**	—

Length (inch)	Order No.*1	
	Steel	CERA
0.024	**611324**	—
0.025	**611325**	—
0.026	**611326**	—
0.027	**611327**	—
0.028	**611328**	—
0.029	**611329**	—
0.03	**611330**	—
0.031	**611331**	—
0.03125 (1/32)	**611101**	**613103**
0.032	**611332**	—
0.033	**611333**	—
0.034	**611334**	—
0.035	**611335**	—
0.036	**611336**	—
0.037	**611337**	—
0.038	**611338**	—
0.039	**611339**	—
0.04	**611340**	—
0.041	**611341**	—
0.042	**611342**	—
0.043	**611343**	—
0.044	**611344**	—
0.045	**611345**	—
0.046	**611346**	—
0.046875 (3/64)	**611102**	**613104**
0.047	**611347**	—
0.048	**611348**	—
0.049	**611349**	—
0.05	**611105**	**613105**
0.06	**611106**	—

Length (inch)	Order No.*1	
	Steel	CERA
0.0625	**611303**	**613303**
0.07	**611107**	—
0.078125 (5/64)	**611103**	**613100**
0.08	**611108**	—
0.09	**611109**	—
0.09375 (3/32)	**611104**	**613101**
0.1	**611191**	**613191**
0.100025	**611111**	**613110**
0.10005	**611135**	**613135**
0.100075	**611112**	**613111**
0.1001	**611121**	**613121**
0.1002	**611122**	**613122**
0.1003	**611123**	**613123**
0.1004	**611124**	**613124**
0.1005	**611125**	**613125**
0.1006	**611126**	**613126**
0.1007	**611127**	**613127**
0.1008	**611128**	**613128**
0.1009	**611129**	**613129**
0.101	**611141**	**613141**
0.102	**611142**	**613142**
0.103	**611143**	**613143**
0.104	**611144**	**613144**
0.105	**611145**	**613145**
0.106	**611146**	**613146**
0.107	**611147**	**613147**
0.108	**611148**	**613148**
0.109	**611149**	**613149**
0.109375 (7/64)	**611110**	**613102**

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

PROPRIETARY INSPECTION CERTIFICATE — Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

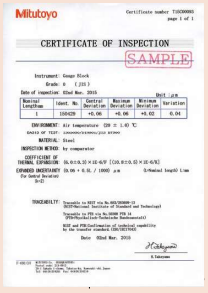
*1: Suffix No. (-■■■) for Selecting Standard and Certificate Provided

ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-516	K	✔	✔
-521	00	✔	
-531	0	✔	
-541	1	✔	
-551	2	✔	

BS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-121	0	✔	
-131	1	✔	
-141	2	✔	


Mitutoyo
CERTIFICATE OF INSPECTION
SAMPLE

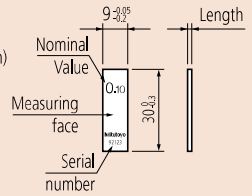
Inspection Certificate

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

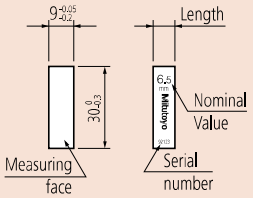
Dimensions

Unit: mm

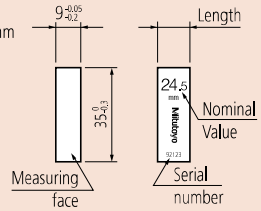
Nominal length:
0.1 mm to 5.5 mm
(0.004 in to 0.25 in)



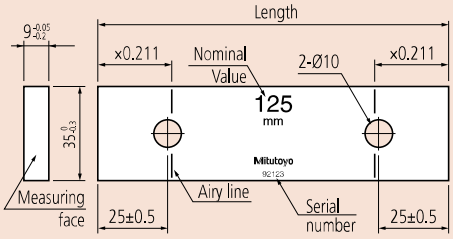
Nominal length:
6 mm to 10 mm
(0.3 in to 0.4 in)



Nominal length:
10.3 mm to 100 mm
(0.45 in to 4 in)



Nominal length 125 mm to 1000 mm (5 in to 20 in)



SPECIFICATIONS

Inch Blocks

Length (inch)	Order No.*1	
	Steel	CERA
0.11	**611150**	**613150**
0.111	**611151**	**613151**
0.112	**611152**	**613152**
0.113	**611153**	**613153**
0.114	**611154**	**613154**
0.115	**611155**	**613155**
0.116	**611156**	**613156**
0.117	**611157**	**613157**
0.118	**611158**	**613158**
0.119	**611159**	**613159**
0.12	**611160**	**613160**
0.121	**611161**	**613161**
0.122	**611162**	**613162**
0.123	**611163**	**613163**
0.124	**611164**	**613164**
0.125	**611165**	**613165**
0.126	**611166**	**613166**
0.127	**611167**	**613167**
0.128	**611168**	**613168**
0.129	**611169**	**613169**
0.13	**611170**	**613170**
0.131	**611171**	**613171**
0.132	**611172**	**613172**
0.133	**611173**	**613173**
0.134	**611174**	**613174**
0.135	**611175**	**613175**
0.136	**611176**	**613176**
0.137	**611177**	**613177**
0.138	**611178**	**613178**

Length (inch)	Order No.*1	
	Steel	CERA
0.139	**611179**	**613179**
0.14	**611180**	**613180**
0.141	**611181**	**613181**
0.142	**611182**	**613182**
0.143	**611183**	**613183**
0.144	**611184**	**613184**
0.145	**611185**	**613185**
0.146	**611186**	**613186**
0.147	**611187**	**613187**
0.148	**611188**	**613188**
0.149	**611189**	**613189**
0.15	**611115**	**613115**
0.16	**611116**	**613116**
0.17	**611117**	**613117**
0.18	**611118**	**613118**
0.19	**611119**	**613119**
0.2	**611192**	**613192**
0.21	**611221**	**613221**
0.25	**611212**	**613212**
0.3	**611193**	**613193**
0.315	**611209**	**613209**
0.35	**611213**	**613213**
0.375 (3/8)	**611113**	**613112**
0.4	**611194**	**613194**
0.420	**611210**	**613210**
0.45	**611214**	**613214**
0.5	**611195**	**613195**
0.55	**611215**	**613215**
0.6	**611196**	**613196**

Length (inch)	Order No.*1	
	Steel	CERA
0.605	**611211**	**613211**
0.65	**611216**	**613216**
0.7	**611197**	**613197**
0.710	**611220**	**613220**
0.75	**611217**	**613217**
0.8	**611198**	**613198**
0.815	**611226**	**613226**
0.85	**611218**	**613218**
0.9	**611199**	**613199**
0.920	**611227**	**613227**
0.95	**611219**	**613219**
1	**611201**	**613201**
2	**611202**	**613202**
3	**611203**	**613203**
4	**611204**	**613204**
5	**611205**	**613205**
6	**611206**	**613206**
7	**611207**	**613207**
8	**611208**	**613208**
10	**611222**	**613222**
12	**611223**	**613223**
16	**611224**	**613224**
20	**611225**	**613225**

Inch Wear Blocks

Length (inch)	Order No.*1 Tungsten carbide
0.05	**612105**
0.1	**612191**

Note: Details of the overall sizes for forms of block are given on page E-3 and the accuracy standards to which they are manufactured are given on page E-5.
4 inch or more is not listed in the standard of British Standards Institution.

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Rectangular Gauge Block Accessories SERIES 516

- Accessory sets for extending the range of application of rectangular gauge blocks. For example, constructing temporary snap gages for small batches of product where custom gages would be uneconomical to manufacture.
- Available in 22-piece and 14-piece sets. Each accessory is also available separately for applications where a full set is not needed.
- Can be used with steel or CERA blocks.

516-601
(22 pcs.)

516-602
(14 pcs.)

SPECIFICATIONS

Item Description	Order No.	Nominal capacity/ dimension (mm)	Set		Quantity Supplied
			22 pcs. **516-601**	14 pcs. **516-602**	
Holder	**619002**	15 to 60		✔	1 pc.
	619003	5 to 100	✔	✔	
	619004	15 to 160	✔	✔	
	619005	20 to 250	✔	✔	
Base	**619009**	35	✔	✔	
Half-round jaw	**619010**	2	✔	✔	One pair (2 pcs.)
	619011	5	✔	✔	
	619012	8	✔	✔	
	619013	12	✔		
	619014	20	✔		
Plain jaw	**619018**	160	✔		
Scriber point	**619019**	—	✔	✔	1 pc.
Center point	**619020**	—	✔	✔	
Tram point	**619021**	—	✔		One pair (2 pcs.)
Triangular straightedge	**619022**	100	✔	✔	1 pc.
	619023	160	✔		

Typical application 1

Accessories used in application 1:
Half-round jaw (**619013**) 2 pcs.
Holder (**619002**) 1 pc.
Gauge block

Typical application 2

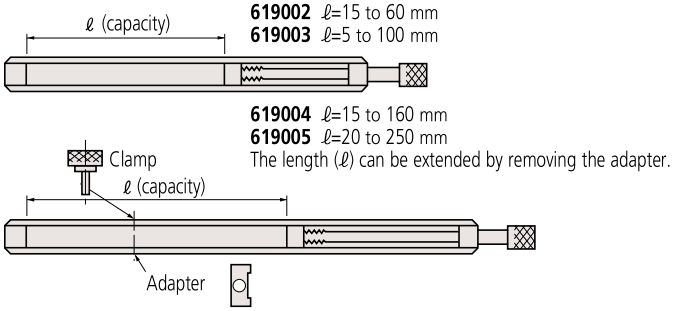
Accessories used in application 2:
Base (**619009**) 1 pc.
Holder (**619003**) 1 pc.
Scriber point (**619019**) 1 pc.
Gauge block

Typical application 3

Setting a bore gage using a holder with a pair of Type I half-round jaws arranged as flat contact surfaces

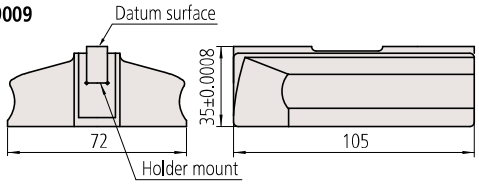
Holder

Thickness=15 mm
Width=29.5 mm



619002 ℓ=15 to 60 mm
619003 ℓ=5 to 100 mm
619004 ℓ=15 to 160 mm
619005 ℓ=20 to 250 mm
The length (ℓ) can be extended by removing the adapter.

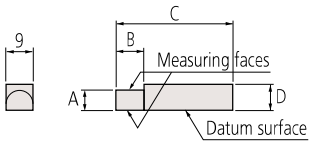
Base **619009**



Flatness of the datum surface 0.5 µm
Parallelism 0.8 µm
Flatness of the bottom surface 1 µm

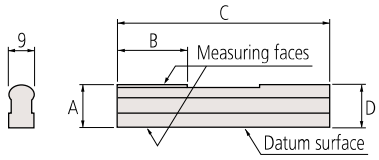
Half-round jaws

Type I



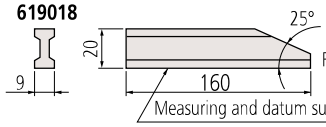
Flatness of the datum surface 0.5 µm
Parallelism of A 0.5 µm

Type II



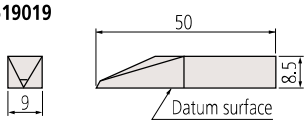
Order No.	Type	Size (mm)	A (mm)	B (mm)	C (mm)	D (mm)
619010	I	2	2±0.0005	5.5	40	7.5
619011		5	5±0.0005	15.5	45	7.5
619012		8	8±0.0005	20	50	8.5
619013	II	12	12±0.0005	25	75	13
619014		20	20±0.0005	25	125	20.5

Plain jaw (B type) **619018**



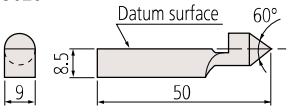
Flatness of the datum surface 1 µm

Scriber point **619019**



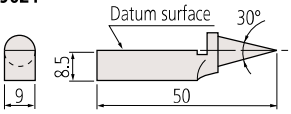
Flatness of the datum surface 0.5 µm

Center point **619020**



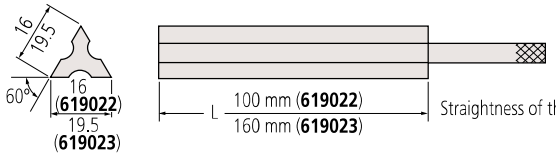
Eccentricity tolerance of the point ±10 µm
Flatness of the datum surface 0.5 µm

Tram point **619021**



Eccentricity tolerance of the point ±10 µm
Flatness of the datum surface 0.5 µm

Triangular straightedge (for handheld use only)



Straightness of the edges 1.2 µm

E

Mitutoyo

Gauge Blocks

Length Standards Brought to You by Mitutoyo

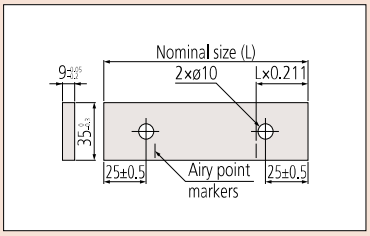
Accessories for Rectangular Gauge Blocks over 100 mm SERIES 516

- Specially designed for long rectangular gauge blocks of 100 mm and over which have two coupling holes in the body: coupling of two long gauge blocks, a stack of regular gauge blocks and attachment of jaws is possible.
- These accessories can be used for long steel or CERA blocks.

516-605
(14 pcs.)

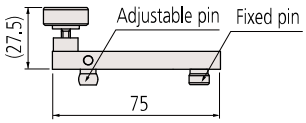
SPECIFICATIONS

Set Order No.	Order No.	Description	Quantity Supplied
516-605	**619031**	Connector A	1 pc.
	619032	Connector B	
	619033	Connector C	
	619034	Connector D	
	619035	Connector E	
	619036	Adapter	3 pcs.
	619009	Base	1 pc.
	619018	Plain jaw (B-type)	2 pcs.
	619013	Half-round jaw	
	619019	Scriber point	1 pc.



Coupling holes in long gauge blocks

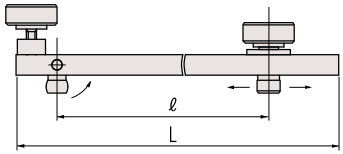
Connector A **619031**



Used for directly coupling two long gauge blocks.

Using an A-type connector

Connectors B and C



Unit: mm

Order No.	ℓ (max.)	L		Adapter Qty.
619032	90	126	Connector B	2
619033	200	236	Connector C	

Adapter (2 pcs.) **619036**

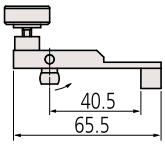
In addition to connecting long gauge blocks, the holders can also connect long gauge blocks with other types of gauge blocks inserted in between. Holder B is for gauge blocks with nominal size of 40 mm or less, and holder C for gauge blocks with nominal size of 150 mm or less (holder C can also be used to connect hole-less gauge blocks of 100 mm or less with various types of jaw). Adapters can be used to attach jaws on the edges of long gauge blocks.

Use of B-type connectors in gage construction

Typical application

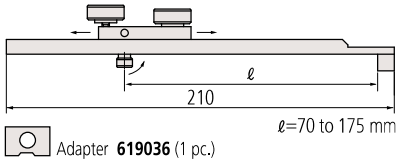
Setting a dial test indicator to a long-gauge-block stack attached to the base with a D-type connector

Connector D 619034



Used for attaching a long gauge block directly to the base.

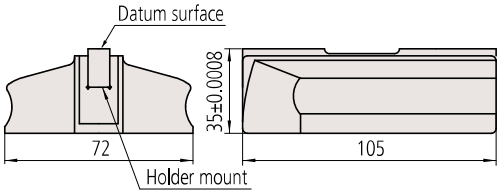
Connector E 619035



Adapter **619036** (1 pc.)

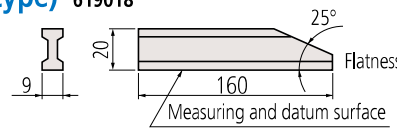
Used for attaching a long gauge block to the base over a stack of regular gauge blocks wrung between the base and long gauge block. The length ℓ is highly adjustable to accommodate the variable length of the stack.

Base 619009



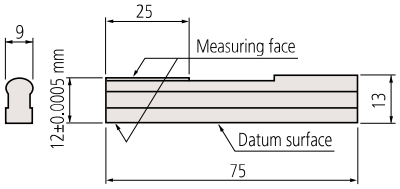
Flatness of the datum surface 0.5 µm
Parallelism 0.8 µm
Flatness of the bottom surface 1 µm

Plain jaw (B-type) 619018



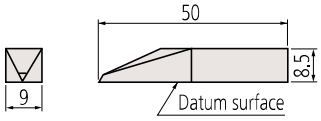
Flatness of the datum surface 1 µm

Half-round jaw 619013



Flatness of the datum surface 0.5 µm
Parallelism 0.5 µm

Scriber point 619019



Flatness of the datum surface 0.5 µm

Example of use of accessories with long gauge blocks

The table below shows the appropriate combination of long rectangular gauge blocks and accessories for making inside and outside measurements in the approximate range 300 mm to 1000 mm in 100 mm steps. The numbers in the table represent the number of gauge blocks or accessories in use. Note that the ranges shown do not take into account the combined thickness of the half-round jaws for inside measurement (24 mm) and the length of any regular gauge block stack used.

Items		Order No.	300 mm		400 mm		500 mm		600 mm		700 mm		800 mm		900 mm		1000 mm	
			Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Inner	Inner	Outer	Inner	Outer	Inner	Outer
Rectangular gauge block (nominal dimension)	200 mm	**611682**							1	1								
	300 mm	**611683**	1	1							1	1	1	1				
	400 mm	**611684**			1	1			1	1	1	1			1	1		
	500 mm	**611685**					1	1					1	1	1	1	2	2
Connector A		**619031**							1	1	1	1	1	1	1	1	1	1
Connector B*		**619032**	2		2		2		2		2		2		2		2	
Half-round jaws 2 pcs/set		**619013**	2		2		2		2		2		2		2		2	
Adapter		**619036**	(2)		(2)		(2)		(2)		(2)		(2)		(2)		(2)	

* Provided with adapters (2 pcs.).

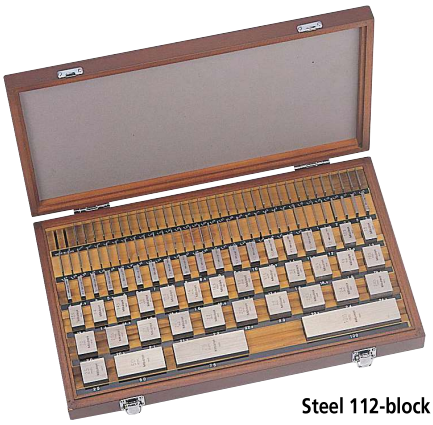
Gauge Blocks

Length Standards Brought to You by Mitutoyo

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Metric/Inch Square Gauge Block Sets
SERIES 516 — Metric Block Sets, Long Block Sets, Wear Block Sets

- Square gauge block sets have several unique characteristics (Refer to page E-4 for details). A wide choice is provided to best match the target applications: sets containing from 2 to 112 blocks are available.
- It is recommended to use only Mitutoyo accessory sets with these gauge blocks as the tolerances on the assembly hole countersinks in the blocks and mating screw heads in the sets are 5 times tighter than the applicable standard, and therefore are guaranteed to fit together correctly.



Steel 112-block set

Steel 103-block set

Steel 76-block set

Steel 47-block set

Steel 32-block set

Wear block set

Tungsten Carbide

These square wear gauge blocks made of cemented carbide have excellent resistance to abrasion, making them ideal for protecting the ends of a stack of blocks subject to frequent use. Available in two nominal sizes: 1 mm and 2 mm. We recommend that these wear gauge blocks of both sizes be wrung firmly to the stack when in use.

Long block set

Steel 8-block set

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

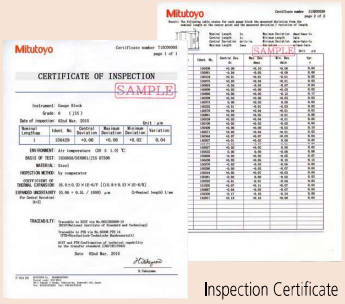
*1: Suffix No. (■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	
6	✔	✔

ASME

Suffix No.	Inspection Certificate	Calibration Certificate JCSS
1	✔	



Inspection Certificate

SPECIFICATIONS

Metric Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	Standard/grade available and Suffix No.*1 ASME	Blocks included in set Size (mm)	Step (mm)	Qty.
112	516-437	—	—	00: -■6	1.005		1
	516-438	—	0: -■0	0: -■6	1.001 - 1.009	0.001	9
	516-439	—	1: -■0	1: -■6	1.01 - 1.49	0.01	49
	516-440	—	2: -■0	2: -■6	0.5 - 24.5	0.5	49
	—	—	—	—	25 - 100	25	4
103	516-441	—	—	00: -■6	1.005		1
	516-442	—	0: -■0	0: -■6	1.01 - 1.49	0.01	49
	516-443	—	1: -■0	1: -■6	0.5 - 24.5	0.5	49
	516-444	—	2: -■0	2: -■6	25 - 100	25	4
76	516-449	—	—	00: -■6	1.005		1
	516-450	—	0: -■0	0: -■6	1.01 - 1.49	0.01	49
	516-451	—	1: -■0	1: -■6	0.5 - 9.5	0.5	19
	516-452	—	2: -■0	2: -■6	10 - 40	10	4
	—	—	—	—	50 - 100	25	3
47	516-457	—	—	00: -■6	1.005		1
	516-458	—	0: -■0	0: -■6	1.01 - 1.09	0.01	9
	516-459	—	1: -■0	1: -■6	1.1 - 1.9	0.1	9
	516-460	—	2: -■0	2: -■6	1 - 24	1	24
		—	—	—	25 - 100	25	4
32	516-465	—	—	00: -■6	1.005		1
	516-466	—	0: -■0	0: -■6	1.01 - 1.09	0.01	9
	516-467	—	1: -■0	1: -■6	1.1 - 1.9	0.1	9
	516-468	—	2: -■0	2: -■6	1 - 9	1	9
	—	—	—	—	10 - 30	10	3
	—				60		1

Metric Long Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	Standard/grade available and Suffix No.*1 ASME	Blocks included in set Size (mm)	Step (mm)	Qty.
8	516-751	—	—	00: -■6	125, 150, 175	25	3
	516-752	—	0: -■0	0: -■6	200, 250	50	2
	516-753	—	1: -■0	1: -■6	300, 400, 500	100	3
	516-754	—	2: -■0	2: -■6			

Metric Wear Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	Standard/grade available and Suffix No.*1 ASME	Blocks included in set Size (mm)	Step (mm)	Qty.
2	516-820	—	0: -■0	—	1	—	2
	516-821	—	1: -■0	—			
2	516-822	—	0: -■0	—	2	—	2
	516-823	—	1: -■0	—			

Inch Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	Standard/grade available and Suffix No.*1 ASME	Blocks included in set Size (in)	Step (in)	Qty.
81	516-401	516-201	—	00: -■6	0.1001 - 0.1009	0.0001	9
	516-402	516-202	—	0: -■6	0.101 - 0.149	0.001	49
	516-403	516-203	—	1: -■6	0.05 - 0.95	0.05	19
	516-404	516-204	—	2: -■6	1 - 4	1	4
36	516-421	516-221	—	00: -■6	0.05		1
	516-422	516-222	—	0: -■6	0.1001 - 0.1009	0.0001	9
	516-423	516-223	—	1: -■6	0.101 - 0.109	0.001	9
	516-424	516-224	—	2: -■6	0.11 - 0.19	0.01	9
	—	—	—	—	0.1 - 0.5	0.1	5
	—	—	—	—	1, 2, 4	1	3
28	516-417	—	—	00: -■6	0.02005		1
	516-418	—	—	0: -■6	0.0201 - 0.0209	0.0001	9
	516-419	—	—	1: -■6	0.021 - 0.029	0.001	9
	516-420	—	—	2: -■6	0.010 - 0.090	0.01	9
	—		—	—			

Inch Long Block Sets

Blocks per set	Order No. Steel	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	Standard/grade available and Suffix No.*1 ASME	Blocks included in set Size (in)	Step (in)	Qty.
8	516-762	—	—	0: -■0	5 - 7	1	3
	516-763	—	—	1: -■0	8, 10, 12	2	3
	—	—	—		16, 20	4	2

Inch Wear Block Sets

Blocks per set	Order No. Carbide	Order No. CERA	Standard/grade available and Suffix No.*1 ISO/DIN/JIS	Standard/grade available and Suffix No.*1 ASME	Blocks included in set Size (in)	Step (in)	Qty.
2	516-824	516-846	—	0: -■0	0.05	—	2
	516-825	516-847	—	1: -■0			
2	516-826	516-844	—	0: -■0	0.1	—	2
	516-827	516-845	—	1: -■0			

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Individual Metric Square Gauge Blocks

- Purchasing individual metric square gauge blocks is a cost-effective way to replace heavily used sizes.
- Please add the Suffix No. representing the national standard and grade required at the end of the Order No. when ordering these items.
- Special sizes that are not included in the charts can be supplied custom-made on request.
- It is recommended to use only Mitutoyo accessory sets with these gauge blocks as the tolerances on the assembly hole countersinks in the blocks and mating screw heads in the sets are 5 times tighter than the applicable standard, and therefore are guaranteed to fit together correctly.

SPECIFICATIONS

Metric Blocks

Length (mm)	Order No. Steel	Order No. CERA
0.5	614506	—
1	614611	—
1.0005	614520	—
1.001	614521	—
1.002	614522	—
1.003	614523	—
1.004	614524	—
1.005	614525	—
1.006	614526	—
1.007	614527	—
1.008	614528	—
1.009	614529	—
1.01	614561	—
1.02	614562	—
1.03	614563	—
1.04	614564	—
1.05	614565	—
1.06	614566	—
1.07	614567	—
1.08	614568	—
1.09	614569	—
1.1	614570	—
1.11	614571	—
1.12	614572	—
1.13	614573	—
1.14	614574	—
1.15	614575	—
1.16	614576	—
1.17	614577	—
1.18	614578	—
1.19	614579	—
1.2	614580	—
1.21	614581	—
1.22	614582	—
1.23	614583	—
1.24	614584	—
1.25	614585	—
1.26	614586	—
1.27	614587	—
1.28	614588	—
1.29	614589	—
1.3	614590	—
1.31	614591	—
1.32	614592	—

Length (mm)	Order No. Steel	Order No. CERA
1.33	614593	—
1.34	614594	—
1.35	614595	—
1.36	614596	—
1.37	614597	—
1.38	614598	—
1.39	614599	—
1.4	614600	—
1.41	614601	—
1.42	614602	—
1.43	614603	—
1.44	614604	—
1.45	614605	—
1.46	614606	—
1.47	614607	—
1.48	614608	—
1.49	614609	—
1.5	614641	—
1.6	614516	—
1.7	614517	—
1.8	614518	—
1.9	614519	—
2	614612	—
2.5	614642	—
3	614613	—
3.5	614643	—
4	614614	—
4.5	614644	—
5	614615	—
5.5	614645	—
6	614616	—
6.5	614646	—
7	614617	—
7.5	614647	—
8	614618	—
8.5	614648	—
9	614619	—
9.5	614649	—
10	614671	—
10.5	614650	—
11	614621	—
11.5	614651	—
12	614622	—
12.5	614652	—

Length (mm)	Order No. Steel	Order No. CERA
13	614623	—
13.5	614653	—
14	614624	—
14.5	614654	—
15	614625	—
15.5	614655	—
16	614626	—
16.5	614656	—
17	614627	—
17.5	614657	—
18	614628	—
18.5	614658	—
19	614629	—
19.5	614659	—
20	614672	—
20.5	614660	—
21	614631	—
21.5	614661	—
22	614632	—
22.5	614662	—
23	614633	—
23.5	614663	—
24	614634	—
24.5	614664	—
25	614635	—
30	614673	—
40	614674	—
50	614675	—
60	614676	—
75	614801	—
100	614681	—
125	614802	—
150	614803	—
175	614804	—
200	614682	—
250	614805	—
300	614683	—
400	614684	—
500	614685	—

Metric Wear Blocks

Length (mm)	Order No. Tungsten carbide
1	615611
2	615612

Note: Details of the overall sizes for forms of block are given on pages E-3 and E-24, and the accuracy standards to which they are manufactured are given on page E-5.

PROPRIETARY INSPECTION CERTIFICATE — Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

An inspection certificate is supplied as standard. Refer to page U-11 for details.

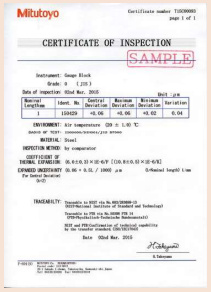
Suffix No. (-■■■) for Selecting Standard and Certificate Provided

ISO/DIN/JIS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-021	0	✔	
-026	0	✔	✔
-031	1	✔	
-036	1	✔	✔
-041	2	✔	
-046	2	✔	✔

ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-521	00	✔	
-531	0	✔	
-541	1	✔	
-551	2	✔	


Mitutoyo
CERTIFICATE OF INSPECTION
SAMPLE

Inspection Certificate

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

*1: Suffix No. (- ■■■) for Selecting Grade and Certificate Provided

ASME

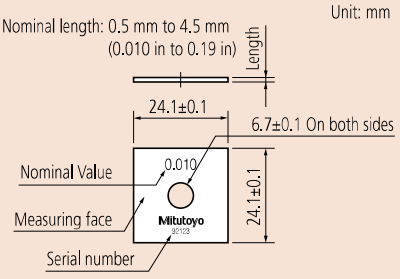
Suffix No.	Grade	Inspection Certificate	Calibration Certificate JCSS
-521	00	✔	
-531	0	✔	
-541	1	✔	
-551	2	✔	

Inspection Certificate

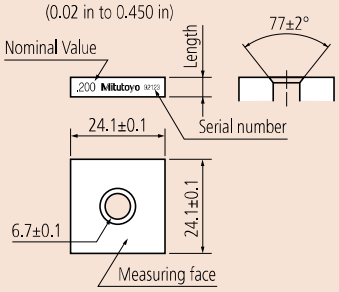
Dimensions

Unit: mm

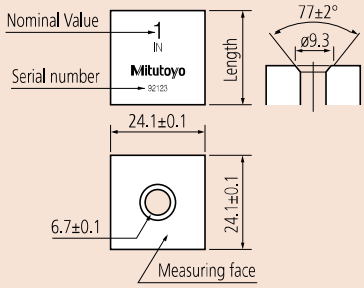
Nominal length: 0.5 mm to 4.5 mm
(0.010 in to 0.19 in)



Nominal length: 5 mm to 14.5 mm
(0.02 in to 0.450 in)



Nominal length: 15 mm to 500 mm
(0.500 in to 20 in)



Individual Inch Square Gauge Blocks

SPECIFICATIONS

Inch Blocks

Length (in)	Order No.*1 Steel	Order No.*1 CERA
0.01	614310	—
0.02005	614240	—
0.0201	614231	—
0.0202	614232	—
0.0203	614233	—
0.0204	614234	—
0.0205	614235	—
0.0206	614236	—
0.0207	614237	—
0.0208	614238	—
0.0209	614239	—
0.02	614320	—
0.021	614321	—
0.022	614322	—
0.023	614323	—
0.024	614324	—
0.025	614325	—
0.026	614326	—
0.027	614327	—
0.028	614328	—
0.029	614329	—
0.03	614330	—
0.03125 (1/32)	614301	—
0.04	614340	—
0.046875 (3/64)	614302	—
0.05	614105	616105
0.06	614106	—
0.0625	614303	616303
0.07	614107	—
0.078125 (5/64)	614304	—
0.08	614108	—
0.09	614109	—
0.09375 (3/32)	614305	—
0.1	614191	616191
0.100025	614307	—
0.10005	614135	616135
0.100075	614308	—
0.1001	614121	616121
0.1002	614122	616122
0.1003	614123	616123
0.1004	614124	616124
0.1005	614125	616125
0.1006	614126	616126
0.1007	614127	616127
0.1008	614128	616128
0.1009	614129	616129
0.101	614141	616141
0.102	614142	616142
0.103	614143	616143
0.104	614144	616144
0.105	614145	616145

Length (in)	Order No.*1 Steel	Order No.*1 CERA
0.106	614146	616146
0.107	614147	616147
0.108	614148	616148
0.109	614149	616149
0.109375 (7/64)	614306	—
0.11	614150	616150
0.111	614151	616151
0.112	614152	616152
0.113	614153	616153
0.114	614154	616154
0.115	614155	616155
0.116	614156	616156
0.117	614157	616157
0.118	614158	616158
0.119	614159	616159
0.12	614160	616160
0.121	614161	616161
0.122	614162	616162
0.123	614163	616163
0.124	614164	616164
0.125	614165	616165
0.126	614166	616166
0.127	614167	616167
0.128	614168	616168
0.129	614169	616169
0.13	614170	616170
0.131	614171	616171
0.132	614172	616172
0.133	614173	616173
0.134	614174	616174
0.135	614175	616175
0.136	614176	616176
0.137	614177	616177
0.138	614178	616178
0.139	614179	616179
0.14	614180	616180
0.141	614181	616181
0.142	614182	616182
0.143	614183	616183
0.144	614184	616184
0.145	614185	616185
0.146	614186	616186
0.147	614187	616187
0.148	614188	616188
0.149	614189	616189
0.15	614115	616115
0.16	614116	616116
0.17	614117	616117
0.18	614118	616118
0.19	614119	616119
0.2	614192	616192

Length (in)	Order No.*1 Steel	Order No.*1 CERA
0.25	614212	616212
0.3	614193	616193
0.35	614213	616213
0.375 (3/8)	614309	—
0.4	614194	616194
0.45	614214	616214
0.5	614195	616195
0.55	614215	616215
0.6	614196	616196
0.65	614216	616216
0.7	614197	616197
0.75	614217	616217
0.8	614198	616198
0.85	614218	616218
0.9	614199	616199
0.95	614219	616219
1	614201	616201
2	614202	616202
3	614203	616203
4	614204	616204
5	614205	—
6	614206	—
7	614207	—
8	614208	—
10	614222	—
12	614223	—
16	614224	—
20	614225	—

Inch Wear Blocks

Length (in)	Order No. Tungsten carbide
0.05	615105
0.1	615191

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

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Square Gauge Block Accessories Set SERIES 516

- To expand the application of square gauge blocks, Mitutoyo offers the Gauge Block Accessories Set. Square gauge blocks have a much broader range of application than rectangular gauge blocks due to the central clamping hole. Also, the accessories included in the set are sold individually depending on the application.
- It is recommended to use only Mitutoyo accessory sets with these gauge blocks as the tolerances on the assembly hole countersinks in the blocks and mating screw heads in the sets are 5 times tighter than the applicable standard, and therefore are guaranteed to fit together correctly.

516-611

SPECIFICATIONS

Metric

Order No. 516-611	Included in set	Quantity Supplied
619070	Half-round jaw 2 mm	2 pcs.
619071	Half-round jaw 5 mm	
619072	Plain jaw 10 mm	
619073	Center point 2 mm	1 pc.
619054	Scriber point	
619074	Base 10 mm	
619056	Stud	2 pcs.
619057	Flat head screw 1 1/4"	
619058	Flat head screw 5/8"	
619059	Slotted head nut	
619060	Adjustable tie rod 6"	
619061	Adjustable tie rod 4 1/2"	
619062	Tie rod 3"	1 pc.
619063	Tie rod 2 1/4"	
619064	Tie rod 1 1/2"	
619065	Tie rod 3/4"	
619066	Knurled head screw	2 pcs.

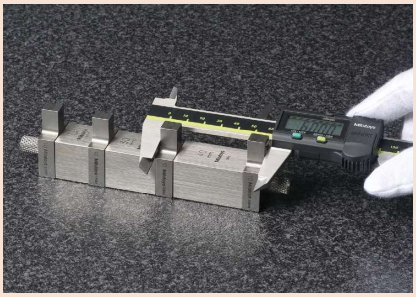
Inch

Order No. 516-612	Included in set	Quantity Supplied
619050	Half-round jaw 2 mm	2 pcs.
619051	Half-round jaw 5 mm	
619052	Plain jaw 10 mm	
619053	Center point 2 mm	1 pc.
619054	Scriber point	
619055	Base 10 mm	
619056	Stud	2 pcs.
619057	Flat head screw 1 1/4"	
619058	Flat head screw 5/8"	
619059	Slotted head nut	
619060	Adjustable tie rod 6"	
619061	Adjustable tie rod 4 1/2"	
619062	Tie rod 3"	1 pc.
619063	Tie rod 2 1/4"	
619064	Tie rod 1 1/2"	
619065	Tie rod 3/4"	
619066	Knurled head screw	2 pcs.

Note: 2 pcs. of half-round jaw, plain jaw, stud, flat head screw, slotted head nut, adjustable tie rod, and knurled head screw are included in each set. Please note that the abovementioned Order No. indicates only 1 set.

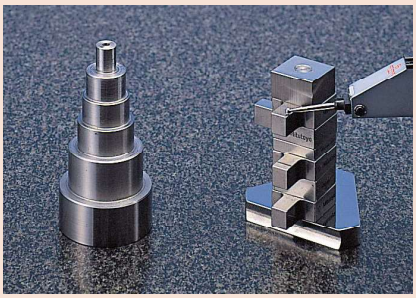
Square gauge block applications

Example of a gage for checking caliper accuracy



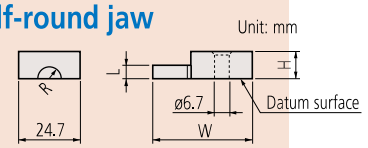
Using plain jaws, gauge blocks, a tie rod and a knurled-head screw a gage was constructed to enable rapid checking of the accuracy of a caliper at selected points.

Example of a gage for comparison measurement of a stepped workpiece



Using plain jaws, gauge blocks, a tie rod and a knurled-head screw a gage was constructed to enable rapid comparison measurement of a stepped workpiece. (Sample workpiece)

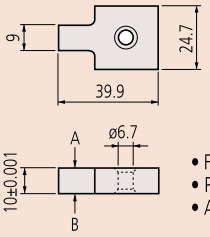
Half-round jaw



Order No.	R (mm)	L (mm)	W (mm)	H (mm)
619070	1.95	2	33.6	5.3
619071	4.95	5	39.9	10.3

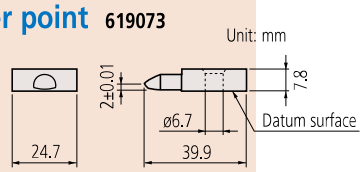
- Flatness 0.5 µm
- Parallelism of L 0.5 µm
- Tolerance of L ±0.5 µm

Plain jaw 619072



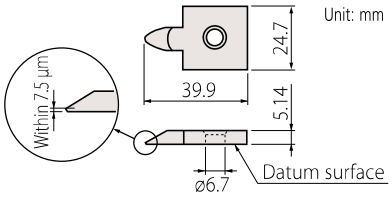
- Flatness 0.12 µm
- Parallelism 0.12 µm
- A and B are datum surfaces

Center point 619073



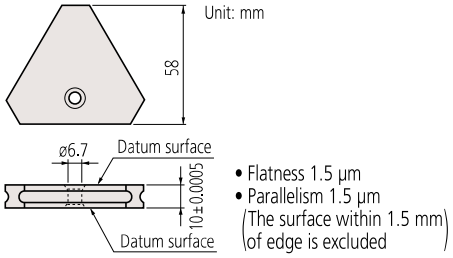
- Flatness 0.5 µm

Scriber point 619054



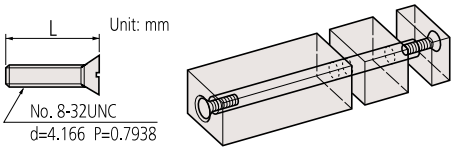
- Flatness of datum surface 0.5 µm

Base 619074



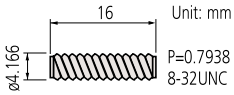
- Flatness 1.5 µm
- Parallelism 1.5 µm
(The surface within 1.5 mm of edge is excluded)

Flat head screw



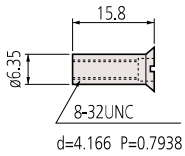
Order No.	L (mm)
619057	31.6
619058	15.8

Stud 619056



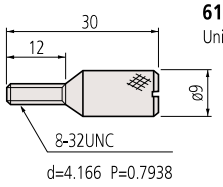
Slotted head nut

619059



Knurled head screw

619066

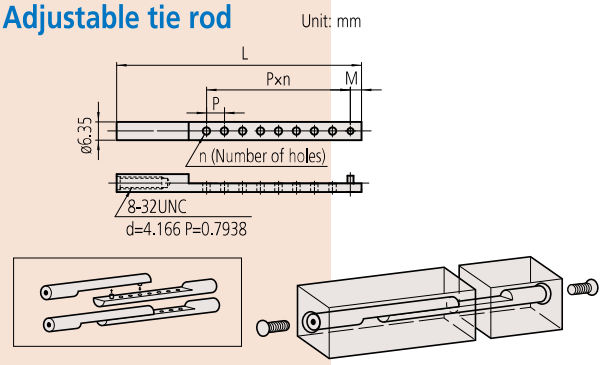


• Contraction caused by the clamping force

The minimum recommended torque to be applied to the clamping screws is approximately 600 mN·m. The chart below shows the approximate length contraction of a 100 mm gage stack using typical torque values.

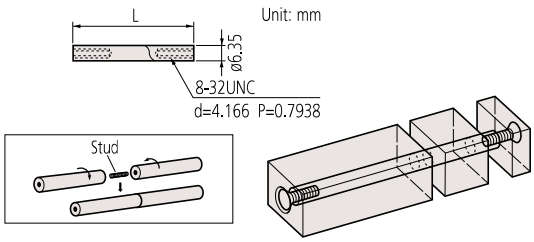
Driver	Contraction
Torque Driver 600 mN·m	0.2 µm/100 mm
Ordinary Driver 700 to 800 mN·m	0.3 µm/100 mm

Adjustable tie rod



Order No.	L (mm)	M (mm)	P (mm)	n (Number of holes)
619060	124.5	3.85	6.35	14
619061	86.5	3.95	6.35	8

Tie rod



Order No.	L (mm)
619065	19
619064	38
619063	57
619062	76

Accessories used for combining square gauge blocks

Overall length (mm)		Min.	21	36	34	41	45	58	64	72	77	82	91	95	109	117	130	148	121	167	143	160	205	180	223	240	258	295	375
Order No.	Included in set	Max.	30	43	43	50	60	72	79	88	91	97	107	109	125	135	150	169	180	184	210	255	270	285	288	345	363	445	520
619059	Slotted head nut		1	1		1																							
619058	Flat head screw		1		2	1	2	1	2		1	2		1		1			2			2							
619057				1				1		2	1		2	1	2	1	2	2		2	2		2	2	2	2	2	2	2	2
619056	Stud					1										1	1	1		1			1		1	1	1	1	2
619065	Tie rod				1	1										1	1												
619064							1	1		1								1												
619063									1		1		1							1			1			1				
619062												1		1	1	1	1	1		1					1		1		1
619061	Adjustable tie rod																		2		2		2		2			2	2
619060																						2		2		2	2	2	2

E

Mitutoyo

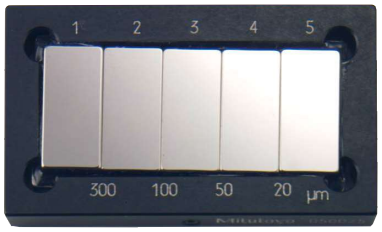
Gauge Blocks

Length Standards Brought to You by Mitutoyo

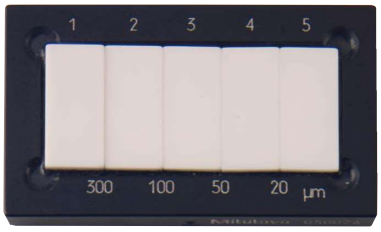
An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Step Master
SERIES 516

- The height of each step incrementally decreases from block No. 1 to block No. 5.
- Each step is defined as the difference in height between the centers of adjacent blocks, measured to a resolution of 0.01 µm by using an interferometer with an accuracy tolerance of within ±0.20 µm.
- Steel and ceramic types are available to suit the application.
- Height differences are measured between the centers of adjacent steps.



Steel type
516-199



Ceramic type
516-499

SPECIFICATIONS

Steel type

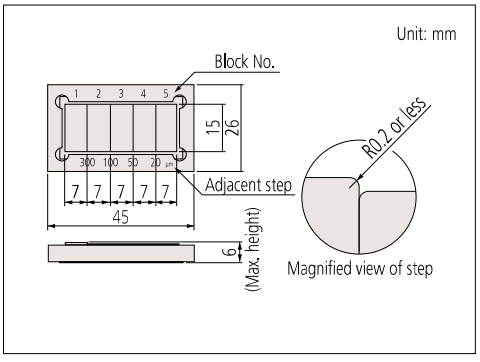
Order No.	516-198					516-199				
Block No.	1	2	3	4	5	1	2	3	4	5
Cumulative step (µm)	0	10	15	17	18	0	300	400	450	470
Step value between adjacent blocks (µm)		10	5	2	1		300	100	50	20

Ceramic type

Order No.	516-498					516-499				
Block No.	1	2	3	4	5	1	2	3	4	5
Cumulative step (µm)	0	10	15	17	18	0	300	400	450	470
Step value between adjacent blocks (µm)		10	5	2	1		300	100	50	20

Note: ○○○ - ○○○ **-24**: Provided with Calibration Certificate

DIMENSIONS

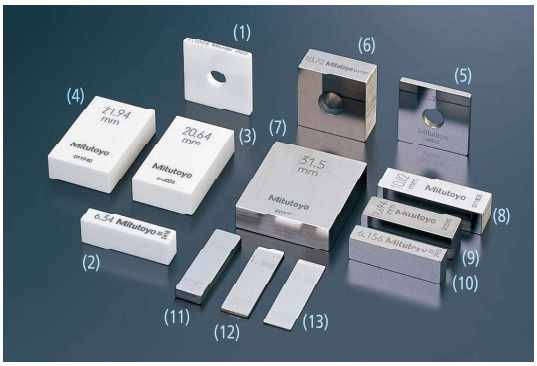


Custom-made Blocks & Gages

- Mitutoyo can manufacture Gauge Blocks and reference gages to your size and design, including precision spacers and stepped masters, which normally absorb much time and effort to manufacture in-house. Special processing including boring, step gaging and special marking is available. Consult us for details.
- Nominal size range
  - · 0.1 mm to 1000 mm (steel)
  - · 0.5 mm to 500 mm (ceramic)
  - · 5 mm to 1000 mm (low expansion ceramic)
- Nominal size increment
  - · 0.0005 mm (up to 100 mm)
  - · 0.001 mm (over 100 mm)
- Cross section (same as the standard product)
  - · Nominal length of 10 mm or less: 30×9 mm
  - · Nominal length of more than 10 mm: 35×9 mm
  - · Square types are also available.

Notes on "coupling holes" on custom gauge blocks:
· Steel, from 100 mm to less than 500 mm
Without coupling holes
(If needed, please notify.)
· Steel, from 500 mm to less than 1000 mm
With coupling holes
(If not needed, please notify.)
· Ceramic, from 100 mm to less than 500 mm
With coupling holes
(If not needed, please notify.)

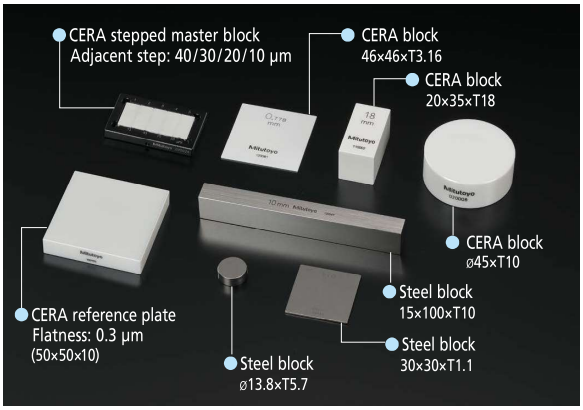
Typical applications of custom-made gauge blocks and reference gages.
Please enquire for price and delivery times for your particular requirements.



Ceramic
(1) Square gauge block (2.1005 mm)
(2) Rectangular gauge block (6.34 mm)
(3) Rectangular gauge block (20.64 mm)
(4) Rectangular gauge block (21.94 mm)

Steel
(5) Square gauge block (2.2065 mm)
(6) Square gauge block (10.72 mm)
(7) Rectangular gauge block (31.5 mm)
(8) Rectangular gauge block (10.02 mm)
(9) Rectangular gauge block (9.694 mm)
(10) Rectangular gauge block (6.156 mm)
(11) Rectangular gauge block (3.603 mm)
(12) Rectangular gauge block (1.1505 mm)
(13) Rectangular gauge block (0.555 mm)

Special gauge blocks (T: nominal), **CERA stepped master block**



Unit: mm

E

Gauge Blocks

Length Standards Brought to You by Mitutoyo

Maintenance Kit for Gauge Blocks SERIES 516

- Maintenance kit for gauge blocks includes all the necessary maintenance tools for removing burrs and contamination, and applying anti-corrosion treatment after use.

516-650E

Order No. 516-650E
Tools and accessories included:

(1) Ceraston (**601645**)
(both sides finished by lapping)
(100×25×12 mm)

(2) Optical flat (**158-117**)
(ø45, 12 mm thickness, Flatness 0.2 µm)
Used to check the wringing of thin gauge blocks and for the presence of burrs.

(3) Tweezers (**600004**)
Used for handling thin gauge blocks.

(4) Blower brush (**600005**)
Used for blowing dust from measuring surfaces.

(5) Cleaning paper (**600006**)
(lens paper, 82×304 mm, 500 pcs.)
Used for wiping off rust preventive oil and contamination. Lint free.

(6) Artificial leather mat (B4 size, Artificial buckskin) (**600007**)
Used as a gauge block mat in order to avoid scratches on the work table.

(7) Reagent bottle (**600008**)
(polyethylene container, 100 ml)
Bottle of wiping solution.
(Mitutoyo employs n-Heptane for solvent.)

(8) Gloves (**600009**)
Used for handling large gauge blocks. Effective for the prevention of corrosion and thermal expansion.

Recommendation for Regular Calibration

As is widely known, gauge blocks are end measures based on distance measurements traceable to the wavelength of the iodine stabilized He-Ne laser. Because they serve as the standard based on which measurement devices are adjusted, even the smallest of errors can be critical; nevertheless, users often neglect to periodically calibrate them because they are so rarely used. Please calibrate your gauge blocks as described in the table below (best practices may vary according to frequency of use and grade).

Application	Cycle (years)	Grade
Reference standard	1 to 2	K
Calibration	2	K or 0
Inspection	2	0 or 1
Shop floor	0.5 to 1	1 or 2

As an accredited calibration laboratory, Mitutoyo offers a traceable calibration service for customers' gauge blocks. Our regular calibration service features:

- Gauge blocks manufactured by any maker can be calibrated.
- Cleansing and removal of burrs.
- Central dimension and dimensional deviations of each block are measured.
- Calibration results are provided for immediate use and for building a calibration history of each block.

For detailed information, contact the nearest Mitutoyo sales office.

Typical application

Ceraston
SERIES 516 — Accessory for Gauge Block Maintenance

- Alumina-ceramic abrasive stone for removing burrs from hard materials such as ceramics that ordinary stones cannot handle.
- Can be used both for steel gauge blocks and CERA blocks.
- Excellent in the ease of removing burrs and durability compared with Arkansas stones.
- Both sides can be used.

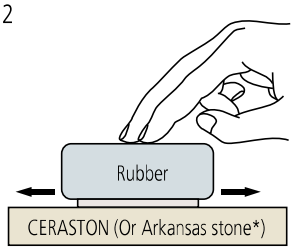
601644
150 (W) ×50 (D) ×20 (H) mm

601645
100 (W) ×25 (D) ×12 (H) mm

Removing burrs

Figure 1

Figure 2



(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 (or Arkansas stone*) 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 an abrasive stone. If so, discard the gauge block.

* Mitutoyo does not offer Arkansas stones.

E

Gauge Block Calibration

Length Standards Brought to You by Mitutoyo

Gauge Block Comparator GBCD-100A
SERIES 565 - Automatic Comparator with Dual Gage Heads

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

- Measures the length of rectangular gauge blocks in the size range 0.5 mm to 100 mm. It automatically compares a test block with an appropriate reference gauge block.
- The compensation result is not affected by any warping of thinner gauge blocks due to the use of upper and lower gage heads (dual-head system).
- Measurement configuration: 1 cycle of automatic comparison measurement with a standard gauge block.

- Gauge block set for comparator calibration (optional)
  Standard type **516-145-E2**

516-145-E2

Special bridge-type block

SPECIFICATIONS

Metric

Range	Resolution (µm)	Accuracy in narrow range (20 °C)	Upper gaging head		
			Type	Measuring force	Contact point
0.5 mm - 100 mm	0.01	±(0.03 + 0.3L/1000) µm* L=Gauge block length (mm)	Mu-Checker	1 N	Carbide contact point of radius 20 mm

Lower gaging head			Operating conditions
Type	Measuring force	Contact point	
Mu-Checker	0.6 N	Carbide contact point of radius 5 mm	20 °C±1 °C Humidity: 58 % RH ±15 % RH (Under less temperature change, and hot or cold direct air flow should be avoided.)

* Uncertainty of measurement at the 95 % confidence level (not including the calibration error of the reference gauge block).

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Gauge Block Comparator GBCD-250
SERIES 565 — Manual Comparator with Dual Gage Heads

- Measures Rectangular Gauge Blocks and Square Gauge Blocks (latter requires dedicated holder - optional accessory) by manual comparison with an appropriate reference gauge block in the size range 0.1 mm to 250 mm
- Measuring method: Differential measurement between upper and lower gage heads (dual head system)

SPECIFICATIONS

Metric

Range (mm)	Resolution	Accuracy [Comparison measurement of the same nominal length]	Accuracy [Dimensional deviations between standard gauge block and measurement gauge block: ±3 mm]
0.1 - 250	0.001 µm	±(0.03 + 0.3L/1000) µm* L=Gauge block length (mm)	±(0.06 + 0.3L/1000) µm* L=Gauge block length (mm)

Upper gaging head			Lower gaging head			Operating conditions
Type	Measuring force	Contact point	Type	Measuring force	Contact point	
Linear Gage	0.4 N	Carbide contact point of radius 20 mm	Linear Gage	0.2 N	Carbide contact point of radius 5 mm	20 °C±1 °C Humidity: 30 % RH to 60 % RH (Under less temperature change, and hot or cold direct air flow should be avoided.)

* Uncertainty of measurement at the 95 % confidence level (not including the calibration error of the reference gauge block).

E

Quick Guide to Precision Measuring Instruments

Gauge Blocks

Definition of the Meter

The 17th General Conference of Weights and Measures in 1983 decided on a new definition of the meter unit as the length of the path traveled by light in a vacuum during a time interval of 1/299792458 of a second. The gauge block is the practical realization of this unit and as such is used widely throughout industry.

Selection, Preparation and Assembly of a Gauge Block Stack

Select gauge blocks to be combined to make up the size required for the stack.

(1) Take the following things into account when selecting gauge blocks.
- a. Use the minimum number of blocks whenever possible.
- b. Select thick gauge blocks whenever possible.
- c. Select the size from the one that has the least significant digit required, and then work back through the more significant digits.

(2) Clean the gauge blocks with an appropriate cleaning agent.

(3) Check the measuring faces for burrs by using an optical flat as follows:

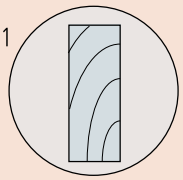
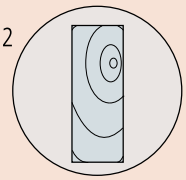
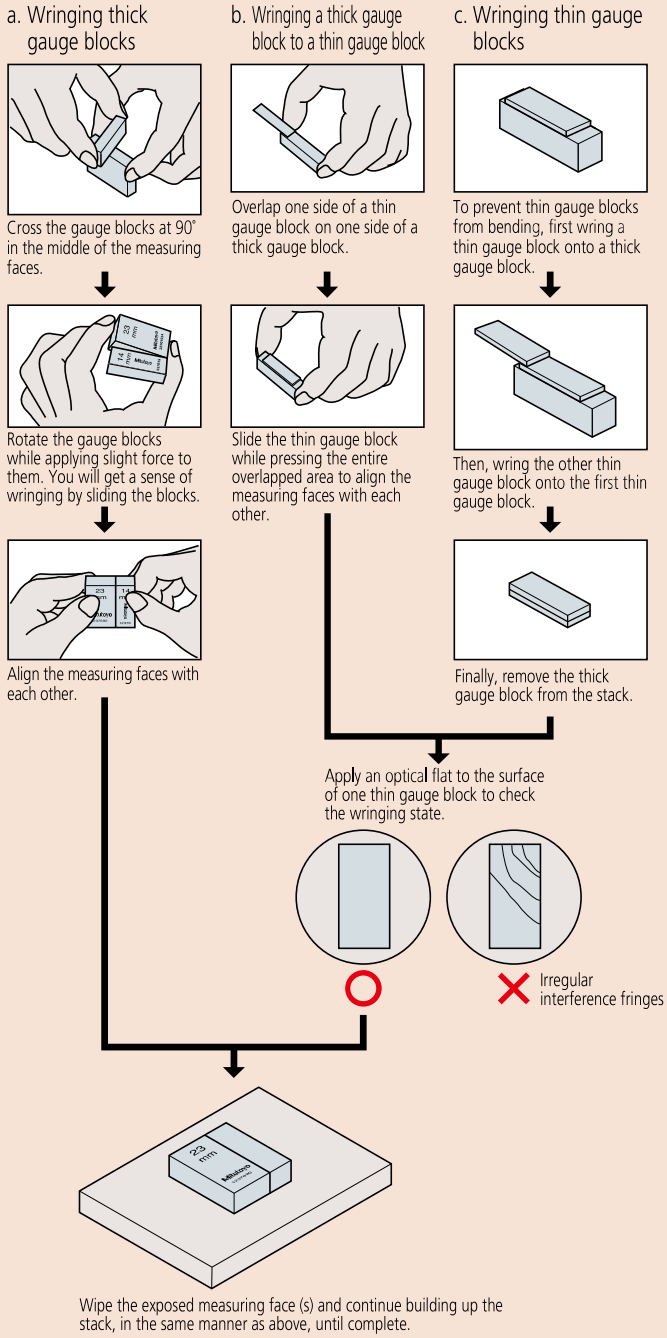
Figure 1 

Figure 2 

- a. Wipe each measuring face clean.
- b. Gently place the optical flat on the gauge block measuring face.
- c. Lightly slide the optical flat until interference fringes appear.
  Judgment 1: If no interference fringes appear, it is assumed that there is a large burr or contaminant on the measuring face.
- d. Lightly press the optical flat to check that the interference fringes disappear.
  Judgment 2: If the interference fringes disappear, no burr exists on the measuring face.
  Judgment 3: If some interference fringes remain locally while the flat is gently moved to and fro, a burr exists on the measuring face. If the fringes move along with the optical flat, there is a burr on the optical flat.
- e. To remove burrs, follow the directions on page E-30.

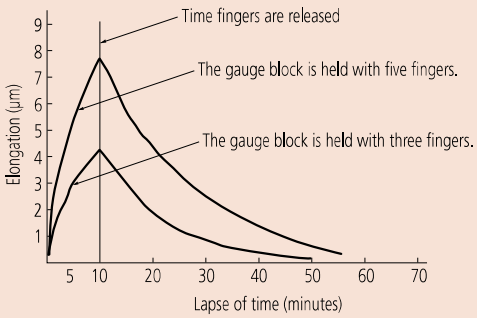
(4) Apply a very small amount of oil to the measuring face and spread it evenly across the face. (Wipe the face until the oil film is almost removed.) Grease, spindle oil, vaseline, etc., are commonly used.

(5) Gently overlay the faces of the gauge blocks to be wrung together. There are three methods to use (a, b and c as shown below) according to the size of blocks being wrung:



Thermal Stabilization Time

The following figure shows the degree of dimensional change when handling a 100 mm steel gauge block with bare hands.



E

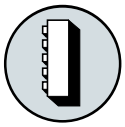
Reference Gages

Length Standards Brought to You by Mitutoyo

Height Master SERIES 515

- Height Master is a best-selling product with a name that has become the industry standard for height reference instruments.

Staggered 20 mm blocks (movable)



Vertical orientation

Riser block

515-322

SPECIFICATIONS

Metric

Order No.	515-322
Range (H)	5 < H ≤ 310 mm
Graduation (analog scale)	0.001 mm
Block step	20 mm (staggered)
Micrometer adjustment	20 mm
Micrometer feed	0.5 mm/rev
Block pitch accuracy	±1.5 µm
Parallelism of blocks	1.0 µm
Feed error	±1.0 µm
Retrace error	1.0 µm
Mass	23 kg

Note 1: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.
Note 2: Supplied with a wooden storage case as standard.

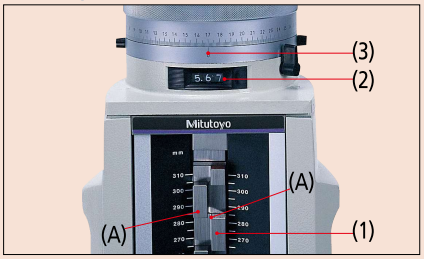
Inch

Order No.	515-310	515-311
Range (H)	0.2 in < H ≤ 12.2 in	0.2 in < H ≤ 12.2 in
Graduation (analog scale)	0.00001 in	
Block step	0.5 in (straight)	1 in (staggered)
Micrometer adjustment	1 in	
Micrometer feed	0.025 in/rev	
Block pitch accuracy	±50 µin	
Parallelism of blocks	40 µin	
Feed error	±40 µin	
Retrace error	40 µin	
Mass	23 kg	

Note 1: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.
Note 2: Supplied with a wooden storage case as standard.

Typical application

Reading



(A) Height A

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

PROPRIETARY INSPECTION CERTIFICATE — Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

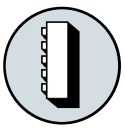
An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Digital Height Master SERIES 515

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- Best-selling height reference standard.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems. (Refer to Page A-3 for details)

Staggered 20 mm blocks (movable)



Vertical orientation

Riser block

515-374

SPECIFICATIONS

Metric

Order No.	515-374	515-376	515-378
Range (H)	10 < H ≤ 310 mm	10 < H ≤ 460 mm	10 < H ≤ 610 mm
Resolution (digital display)	0.001 mm		
Block step	20 mm (staggered)		
Micrometer adjustment	20 mm		
Micrometer feed	0.5 mm/rev		
Block pitch accuracy: 0 < H ≤ 310 mm	±1.5 µm		
Block pitch accuracy: 310 < H ≤ 460 mm	—	±2.5 µm	
Block pitch accuracy: 460 < H ≤ 610 mm	—	—	±3.5 µm
Parallelism of blocks: 0 < H ≤ 310 mm	2.0 µm		
Parallelism of blocks: 310 < H ≤ 610 mm	—	2.5 µm	
Feed error	±2.0 µm		±2.5 µm
Retrace error	2.0 µm		2.5 µm
Mass	9.5 kg	13.6 kg	16 kg

Note: The block accuracy and the parallelism of blocks are based on main unit installation surface, which does not include the retrace error.

Inch

Order No.	515-375	515-377	515-379
Range (H)	0.5 in < H ≤ 12 in	0.5 in < H ≤ 18 in	0.5 in < H ≤ 24 in
Resolution (digital display)	0.0001 in		
Block step	1 in (staggered)		
Micrometer adjustment	1 in		
Micrometer feed	0.025 in/rev		
Block pitch accuracy: 0 < H ≤ 12 in	±100 µin		
Block pitch accuracy: 12 in < H ≤ 18 in	—	±100 µin	
Block pitch accuracy: 18 in < H ≤ 24 in	—	—	±150 µin
Parallelism of blocks: 0<H≤12 in	50 µin		
Parallelism of blocks: 12 in < H ≤ 18 in	—	100 µin	
Feed error	±100 µin		±100 µin
Retrace error	100 µin		100 µin
Mass	9.5 kg	13.6 kg	16 kg

Note: The block accuracy and the parallelism of blocks are based on main unit installation surface, which does not include the retrace error.

PROPRIETARY INSPECTION CERTIFICATE — Mitutoyo guarantees the product quality. Mitutoyo guarantees the product quality.

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

MeasurLink® ENABLED
Data Management Software by Mitutoyo

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

Technical Data

- Display: LCD 6 digits
- Battery: SR44 (2 pcs.)
- Battery life: Approx. 1.8 years under normal use

Function

Zero setting, Origin-setting, Origin restoration, Data hold, Auto power off, Data output

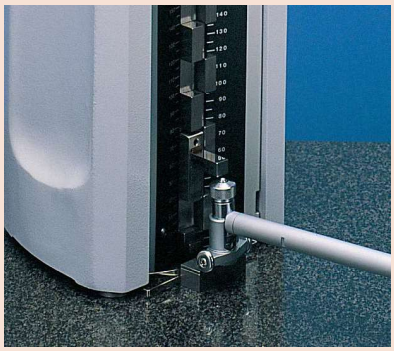
Optional Accessories

515-111: Auxiliary block kit for bore gage (mm)
515-120: Auxiliary block kit for bore gage (inch)
———: Riser block (see page E-36.)
959149: SPC cable (1 m)
959150: SPC cable (2 m)

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Height Master
SERIES 515 — Optional accessories

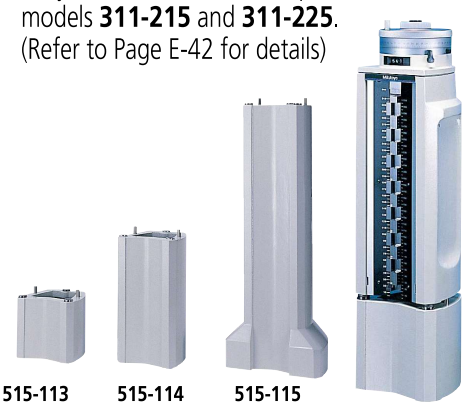
Typical application



Bore gage zero-setting

Riser Blocks
SERIES 515

- These riser blocks are designed to increase the measurable height.
- They can also be used on Square Master models **311-215** and **311-225**. (Refer to Page E-42 for details)



515-113 **515-114** **515-115**

SPECIFICATIONS

Metric

Order No.	Height (mm)	Accuracy (µm)	Variation in length (µm)	Mass (kg)
515-113	150	±0.6	0.6	5.7
515-114	300	±1.0	0.8	9.8
515-115	600	±2.0	1.0	26.8

Inch

Order No.	Height (in)	Accuracy (µin)	Variation in length (µin)	Mass (kg)
515-116	6	±20	20	4.8
515-117	12	±40	30	11.3
515-118	24	±80	40	31

Auxiliary Block Kit
SERIES 515 – for Bore Gage

- Enables efficient zero point adjustment of cylinder gages using the Height Master.
- Zero point adjustment range: 18 to 150 mm.

515-112

SPECIFICATIONS

Metric

Order No.	Model
515-110	Universal Height Master
515-111	Digital Height Master (**515-374 / 376 / 378**)
515-112	Height Master (**515-322**)

Inch

Order No.	Model
515-119	Universal Height Master, Height Master (**515-310**)
515-120	Digital Height Master (**515-375 / 377 / 379**)
515-121	Height Master (**515-311**)

E

Reference Gages

Length Standards Brought to You by Mitutoyo

Universal Height Master
SERIES 515 — Usable in Vertical and Horizontal Orientations

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

515-520

- Analog display by the built-in counter – the appearance and specifications are the same as model **515-322**.
(Refer to Page E-35 for details)

SPECIFICATIONS

Metric

Order No.		515-520	515-523
Range (H)		5 < H ≤ 610 mm	5 < H ≤ 1010 mm
Graduation (analog scale)		0.001 mm	
Block step		10 mm (straight)	
Micrometer adjustment		20 mm	
Micrometer feed		0.5 mm/rev	
Block pitch accuracy	H ≤ 310 mm	±1.5 µm	
	310 < H ≤ 610 mm	±2.5 µm	
	610 < H ≤ 1010 mm	—	±3.5 µm
Parallelism of blocks	H ≤ 610 mm	1.5 µm	
	610 < H ≤ 1010 mm	—	2.0 µm
Feed error		±1.2 µm	±1.5 µm
Retrace error		1.2 µm	1.5 µm
Mass		42 kg	63.5 kg

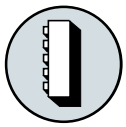
Note 1: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.
Note 2: Supplied with a wooden storage case as standard.

Inch

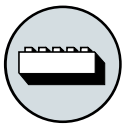
Order No.		515-512	515-510	515-513
Range (H)		0.2 in < H ≤ 18.2 in	0.2 in < H ≤ 24.2 in	0.2 in < H ≤ 40.2 in
Graduation (analog scale)		0.00001 in		
Block step		0.5 in (straight)		
Micrometer adjustment		1 in		
Micrometer feed		0.025 in/rev		
Block pitch accuracy	H ≤ 12 in	±50 µin		
	12 in < H ≤ 24 in	—	±100 µin	
	24 in < H ≤ 40 in	—	—	±150 µin
Parallelism of blocks	H ≤ 24 in	60 µin		
	24 in < H ≤ 40 in	—	80 µin	
Feed error		±40 µin		±60 µin
Retrace error		40 µin		60 µin
Mass		42 kg		63.5 kg

Note 1: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.
Note 2: Supplied with a wooden storage case as standard.

Single-row 10 mm blocks (movable)



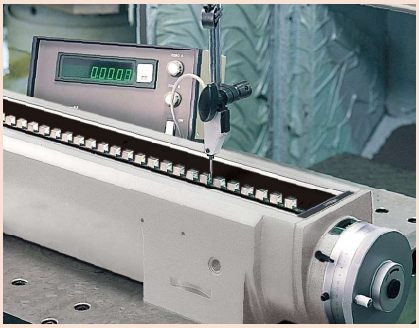
Vertical orientation



Horizontal orientation

Riser block

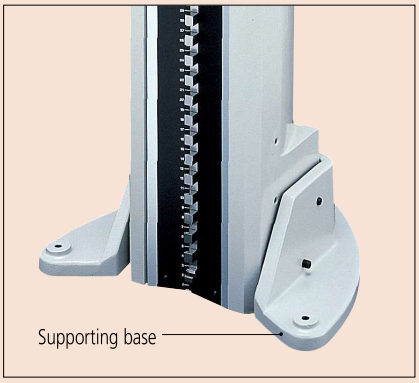
An inspection certificate is supplied as standard.
Refer to page U-11 for details.



Typical application using in horizontal orientation

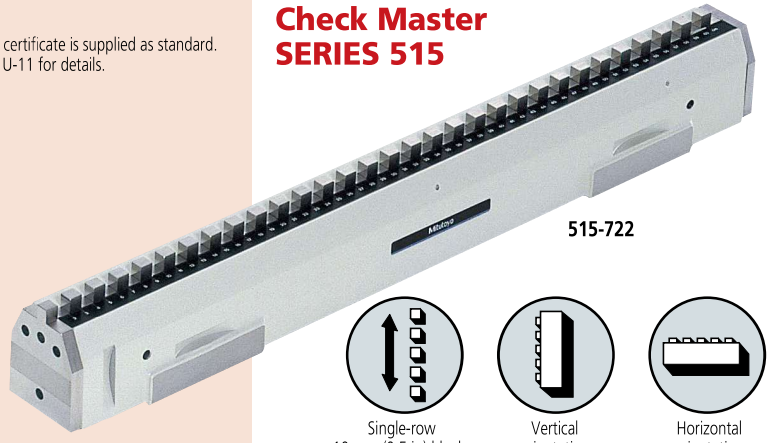
Optional Accessories

Supporting base
900574 (Dedicated for the Universal Height Master. Provided for **515-523** and **515-513** as standard.)
- Stable vertical orientation is available.



An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Check Master SERIES 515



515-722

- Designed to check the accuracy of table movements of machine tools and calibrate CMMs.
- Can be used in either vertical or horizontal orientation.

515-724 515-723 515-722

Single-row
10 mm (0.5 in) blocks

Vertical orientation

Horizontal orientation

SPECIFICATIONS

Metric

Order No.		515-720	515-721	515-722	515-723	515-724
Range (H)		310 mm	450 mm	610 mm	1010 mm	1510 mm
Block step		10 mm				
Block pitch accuracy	H ≤ 310 mm	±2.5 µm				
	310 < H ≤ 610 mm	—	±3.5 µm			
	610 < H ≤ 1010 mm	—	—	—	±5.0 µm	
	1010 < H ≤ 1510 mm	—	—	—	—	±8.0 µm
Parallelism of blocks	H ≤ 310 mm	1.2 µm				
	310 < H ≤ 610 mm	—	1.5 µm			
	610 < H ≤ 1010 mm	—	—	—	2.0 µm	
	1010 < H ≤ 1510 mm	—	—	—	—	2.5 µm
Mass		7 kg	10 kg	13 kg	22 kg	30 kg

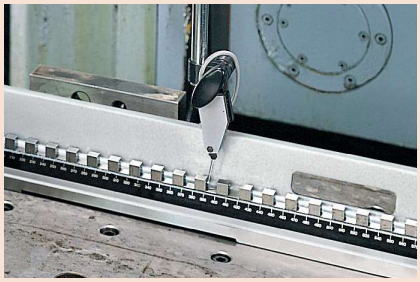
Note 1: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.
Note 2: Supplied with a wooden storage case as standard.

Inch

Order No.		515-710	515-711	515-712	515-713
Range (H)		12.5 in	18.5 in	24.5 in	40.5 in
Block step		0.5 in			
Block pitch accuracy	H ≤ 12.5 in	±100 µin			
	12.5 in < H ≤ 24.5 in	—	±150 µin		
	24.5 in < H ≤ 40.5 in	—	—	—	±200 µin
Parallelism of blocks	H ≤ 12.5 in	50 µin			
	12.5 in < H ≤ 24.5 in	—	60 µin		
	24.5 in < H ≤ 40.5 in	—	—	—	80 µin
Mass		7 kg	10 kg	13 kg	22 kg

Note 1: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.
Note 2: Supplied with a wooden storage case as standard.

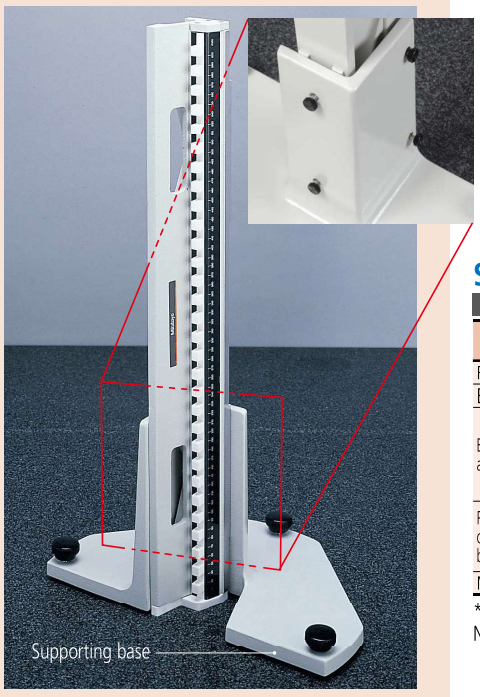
An inspection certificate is supplied as standard.
Refer to page U-11 for details.



Typical application using in horizontal orientation

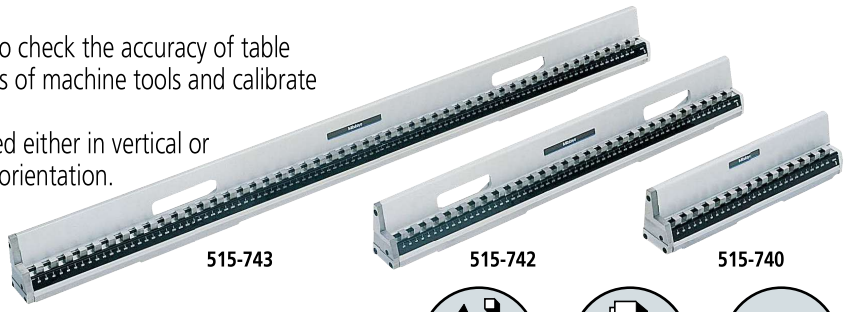
Optional Accessories

Supporting base
601167: Supporting base for vertical operation
• Enables stable operation in the vertical orientation.

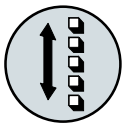


High Accuracy Check Master SERIES 515

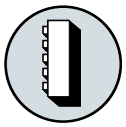
- Designed to check the accuracy of table movements of machine tools and calibrate CMMs.
- Can be used either in vertical or horizontal orientation.



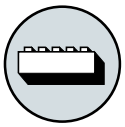
515-743 515-742 515-740



Single-row
10 mm (5 in) blocks



Vertical orientation



Horizontal orientation

SPECIFICATIONS

Metric

Order No.		515-740*/ 515-760*	515-741*/ 515-761*	515-742*/ 515-762*	515-743*/ 515-763*	515-744*/ 515-764*
Range (H)		310 mm	450 mm	610 mm	1010 mm	1510 mm
Block step		10 mm				
Block pitch accuracy	H ≤ 310 mm	±1.2 µm				
	310 < H ≤ 610 mm	—	±1.8 µm			
	610 < H ≤ 1010 mm	—	—	—	±2.5 µm	
	1010 < H ≤ 1510 mm	—	—	—	—	±4.0 µm
Parallelism of blocks	H ≤ 450 mm	1.0 µm				
	450 < H ≤ 1010 mm	—	—	1.5 µm		
	1010 < H ≤ 1510 mm	—	—	—	—	2.0 µm
Mass		3.6 kg	5.4 kg	7.2 kg	12 kg	18 kg

* Ceramic Check Master
Note: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.

Inch

Order No.		515-730*/ 515-750*	515-731*/ 515-751*	515-732*/ 515-752*	515-733*/ 515-753*	515-734*/ 515-754*
Range (H)		12.5 in	18.5 in	24.5 in	40.5 in	60.5 in
Block step		0.5 in				
Block pitch accuracy	H ≤ 12.5 in	±50 µin				
	12.5 in < H ≤ 24.5 in	—	±70 µin			
	24.5 in < H ≤ 40.5 in	—	—	—	±100 µin	
	40.5 in < H ≤ 60.5 in	—	—	—	—	±158 µin
Parallelism of blocks	H ≤ 18.5 in	40 µin				
	18.5 in < H ≤ 40.5 in	—	60 µin			
	40.5 in < H ≤ 60.5 in	—	—	—	—	80 µin
Mass		3.6 kg	5.4 kg	7.2 kg	12 kg	18 kg

* Ceramic Check Master
Note: The block accuracy and the parallelism of blocks are relative to the main unit installation surface.

E

Mitutoyo

Reference Gages

Length Standards Brought to You by Mitutoyo

Standard Scales
SERIES 182 — Made of Low Expansion Glass

- Standard scales can be used as a traceable standard of length for calibrating measuring instruments.
- These scales are manufactured using Mitutoyo's high-definition lithography technology in an underground scale manufacturing facility dedicated to the production of high-accuracy, high-quality line standards. They are considered top-grade length standards.

182-501

182-502

Technical Data

- Material: Low expansion glass
- Thermal expansion coefficient: (0.00±0.02)×10^{-6}/K
- Graduation line thickness: 4 µm
- Graduation: 1 mm
- Accuracy (at 20 °C): (0.5 + L/1000) µm,
  L=Measured length (mm)

SPECIFICATIONS

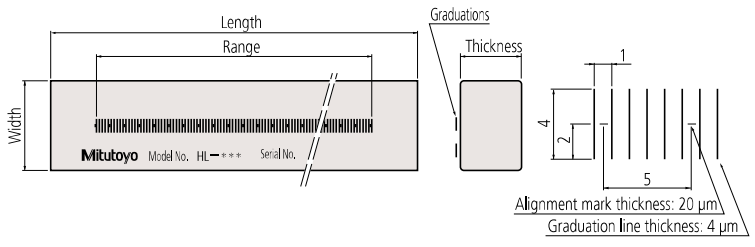
Metric

Order No.	Range (mm)	Length (mm)	Width (mm)	Thickness (mm)
182-501-50	250	280	20	10
182-501-60*				
182-502-50	500	530	30	20
182-502-60*				

* With English JCSS certificate.

DIMENSIONS

Unit: mm



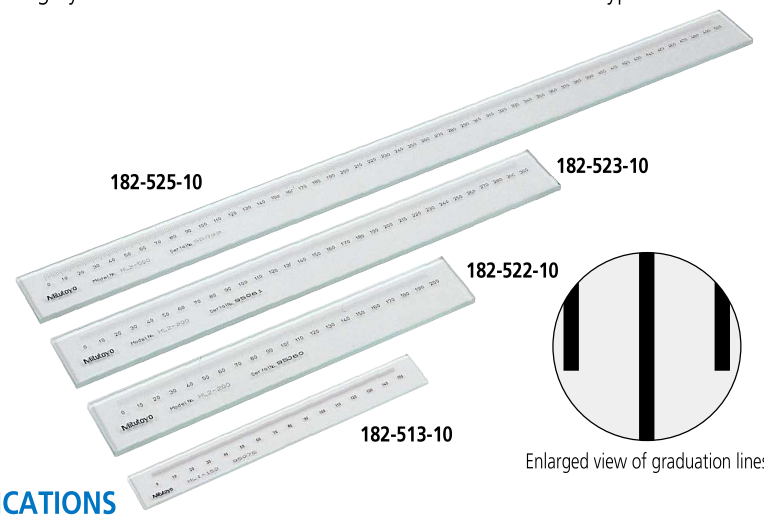
E

Technical Data

- Glass material: Soda-lime glass
- Thermal expansion coefficient: 8.5×10^{-6}/K
- Accuracy (at 20 °C): (1.5 + 2L/1000) µm,
  L=Measured length (mm)

Working Standard Scales
SERIES 182

- These standard scales can be used to calibrate various measuring instruments and to confirm traceability to upper-level calibration devices and reference instruments. For example, they can be used in daily and periodic inspections of profile projector/microscope stages and of optical length measurement systems.
- These scales are manufactured using high-accuracy lithographic technologies. Mitutoyo has developed these technologies at the dedicated underground facility which was custom-built to produce highly accurate scales. Various sizes are available for each type to suit the application.



Enlarged view of graduation lines

SPECIFICATIONS

Metric

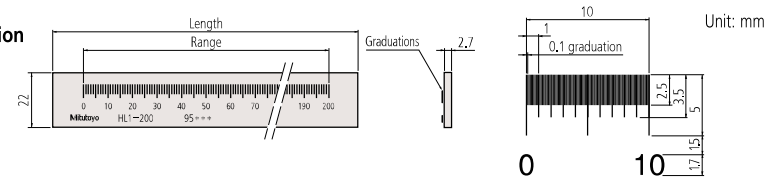
Order No.	Range (mm)	Graduation (mm)	Length (mm)	Inspection pitch (mm)	Graduation line thickness (µm)	Mass (kg)
182-511-10	50	0.1	75	5	20	0.23
182-512-10	100		125	10		0.24
182-513-10	150		175			0.25
182-514-10	200		225			0.26
182-521-10	100	0.5	130	20	50	0.27
182-522-10	200		230			0.32
182-523-10	300		330			0.57
182-524-10	400		430			0.71
182-525-10	500		530			0.86
182-531-10	250	1	280	25	100	0.55
182-532-10	500		530			1.22
182-533-10	750		780			0.23
182-534-10	1000		1030			1.54

Note: An inspection certificate produced by a standard scale automatic calibration system is supplied as standard.

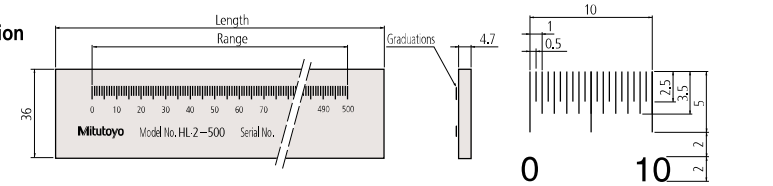
DIMENSIONS

Unit: mm

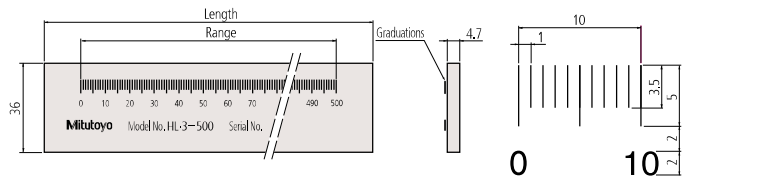
- **0.1 mm graduation**



- **0.5 mm graduation**



- **1 mm graduation**



E

Reference Gages

Length Standards Brought to You by Mitutoyo

High Precision Square SERIES 311

- 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.
- All four surfaces, finished using ultra-precision technology built on our experience in gauge blocks and other products, can be used as reference surfaces.
- Better than 1 µm/300 mm straightness and perpendicularity of each (four) reference surface. In addition, front and back faces are accurate to better than 5 µm/300 mm.
- Three nominal sizes are available (90×110, 160×210 and 260×310 mm) so that you can select the size that best suits the application.

311-111

311-112

311-113

SPECIFICATIONS

Metric

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

* Supplied with a removable handle.

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Technical Data

- Reference surface
  Perpendicularity tolerance: 1 µm
  Straightness tolerance: 1 µm
- Front/back faces
  Perpendicularity tolerance: 5 µm
  Straightness tolerance: 5 µm
- Dedicated wooden case is provided.

Square Master
SERIES 311 — Squareness/Straightness Measuring

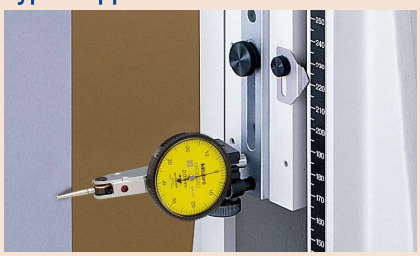
- Squareness (perpendicularity) and straightness measurements can be performed accurately and efficiently by just moving a lever. Use the vertical motion handle on the rear of the main unit for operation.
- Highly accurate measurement of squareness and straightness is available by calibrating a square as a master using the built-in perpendicularity adjustment mechanism. Prepare a square to be used for accuracy check/adjustment separately.
- Sliding force: Approx. 2 to 5 N

311-215

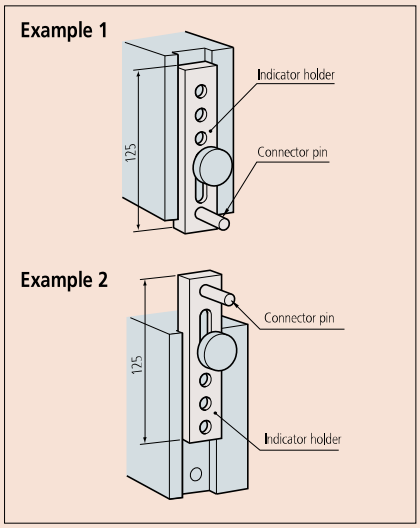
311-225

311-245

Typical application



Mounting the Indicator Holder



Standard Accessories

- **513-401-10H** (Metric)
- **902053**: Clamp
- **601471**: Indicator holder
- **538616**: Hexagonal-head wrench (3 mm)

Note: Inspection certificate is not attached. Contact your local Mitutoyo sales office.

Optional Accessories

- **900565**: Feeler
- **900571**: Adjustable holder
- **900551**: Extension holder

SPECIFICATIONS

Metric

Order No.	Vertical travel (mm)	Squareness (µm)	Straightness (µm)	Dimension (mm)			Mass (kg)
				Width	Depth	Height	
311-215*	150	3	2	180	200	420	13.7
311-225*	250	6	2.5	180	200	520	16.2
311-245	450	9	3.5	220	220	720	24

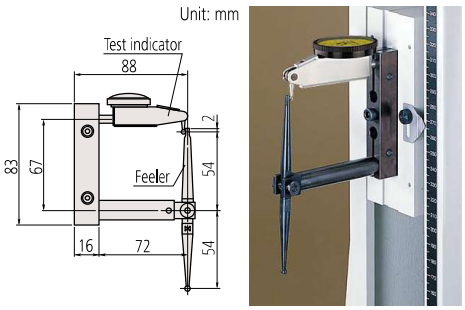
* Riser blocks to extend the height of Square Masters can be used. (Refer to Page E-36 for details)

Optional accessory

900565: Feeler

For probing surfaces that the contact point of a detector cannot reach.

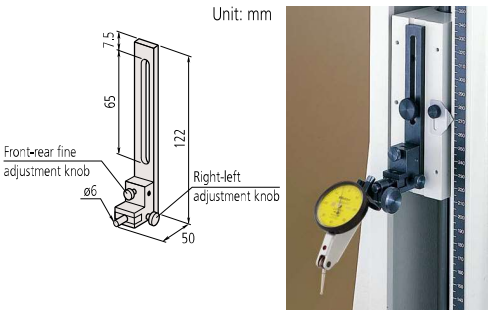
Unit: mm



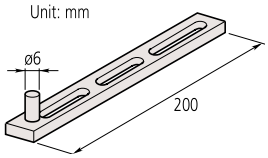
900571: Adjustable holder

Enables easy adjustment of indicator position.

Unit: mm



Unit: mm



900551: Extension holder

Measurement position can be extended by using this 200 mm length holder instead of the indicator holder.

E

Reference Gages

Length Standards Brought to You by Mitutoyo

Precision Levels
SERIES 960

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

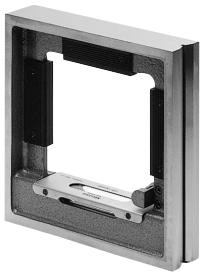
SPECIFICATIONS

Order No.	Sensitivity (mm/m)	Dimensions (W×D×H) (mm)
960-603	0.02	200×44×38.2
960-703	0.02	200×44×200

Technical Data

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

960-603



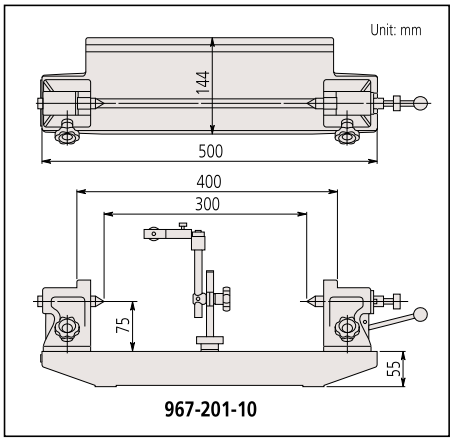
960-703

Bench Centers
SERIES 967

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: 8 mm)

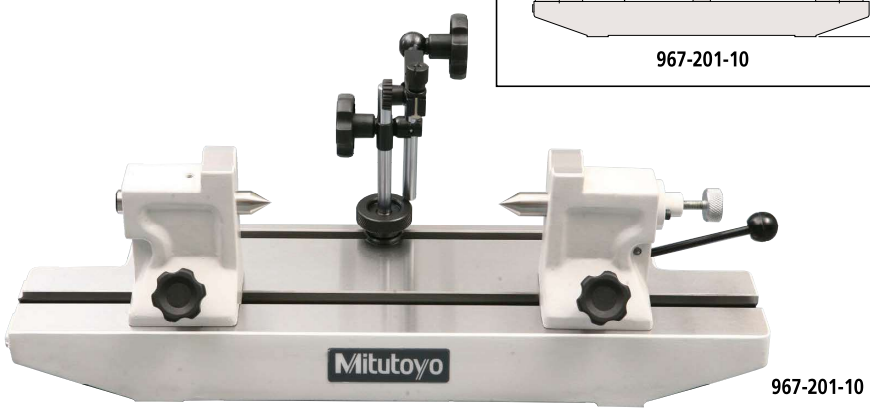
Dimensions



967-201-10

Technical Data

- Maximum workpiece length: 300 mm
- Maximum workpiece dia.: 150 mm
- Mass: 13 kg



967-201-10

E

Steel Rules
SERIES 182

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

182-101

182-102

182-103

182-105

182-201

182-202

182-205

182-302

SPECIFICATIONS

Metric Wide Rigid Rules

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

Metric Fully-Flexible Rules

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

Inch/Metric Semi-Flexible Rules

Order No.	Graduations*	Range	Width (in)
182-302	1/16 in, 1/32 in, 1/64 in, 1 mm, 0.5 mm	6 in/150 mm	0.51
182-303		8 in/200 mm	0.51
182-305		12 in/300 mm	0.59
182-307		20 in/500 mm	0.59
182-309		40 in/1000 mm	0.59

* Engraved on the front side only.

Inch/Metric Wide Rigid Rules

Order No.	Graduations	Range	Width (in)
182-105	1/32 in, 1/64 in, 1 mm, 0.5 mm	6 in/150 mm	0.75
182-125		12 in/300 mm	0.98
182-145		18 in/450 mm	1.18
182-165		24 in/600 mm	1.18
182-106	1/50 in, 1/100 in, 1 mm, 0.5 mm	6 in/150 mm	0.75
182-126		12 in/300 mm	0.98
182-107	1/10 in, 1/100 in, 1 mm, 0.5 mm	6 in/150 mm	0.75
182-108	1/10 in, 1/50 in, 1 mm, 0.5 mm	6 in/150 mm	0.75

Inch/Metric Fully-Flexible Rules

Order No.	Graduations	Range	Width (in)
182-205	1/32 in, 1/64 in, 1 mm, 0.5 mm	6 in/150 mm	0.47
182-225		12 in/300 mm	0.47
182-245		18 in/450 mm	0.75
182-265		24 in/600 mm	0.75
182-206	1/50 in, 1/100 in, 1 mm, 0.5 mm	6 in/150 mm	0.47
182-226		12 in/300 mm	0.47
182-207	1/10 in, 1/100 in, 1 mm, 0.5 mm	6 in/150 mm	0.47
182-208	1/10 in, 1/50 in, 1 mm, 0.5 mm	6 in/150 mm	0.47

Inch Wide Rigid Rules

Order No.	Graduations (in)	Range (in)	Width (in)
182-101	1/8, 1/16, 1/32, 1/64	6	0.75
182-121		12	0.98
182-141		18	0.71
182-161		24	1.18
182-102	1/50, 1/100, 1/32, 1/64	6	0.75
182-122		12	0.98
182-142		18	1.18
182-162		24	1.18
182-103	1/10, 1/100, 1/32, 1/64	6	0.75
182-123		12	0.98
182-143		18	1.18
182-163		24	1.18
182-104	1/10, 1/50, 1/32, 1/64	6	0.75
182-124		12	0.98

Inch Fully-Flexible Rules

Order No.	Graduations (in)	Range (in)	Width (in)
182-201	1/8, 1/16, 1/32, 1/64	6	0.47
182-221		12	0.47
182-241		18	1.18
182-261		24	0.75
182-202	1/50, 1/100, 1/32, 1/64	6	0.47
182-222		12	0.47
182-242		18	0.75
182-262		24	0.75
182-203	1/10, 1/100, 1/32, 1/64	6	0.47
182-223		12	0.47
182-243		18	0.75
182-263		24	0.75
182-204	1/10, 1/50, 1/32, 1/64	6	0.47
182-224		12	0.47

E

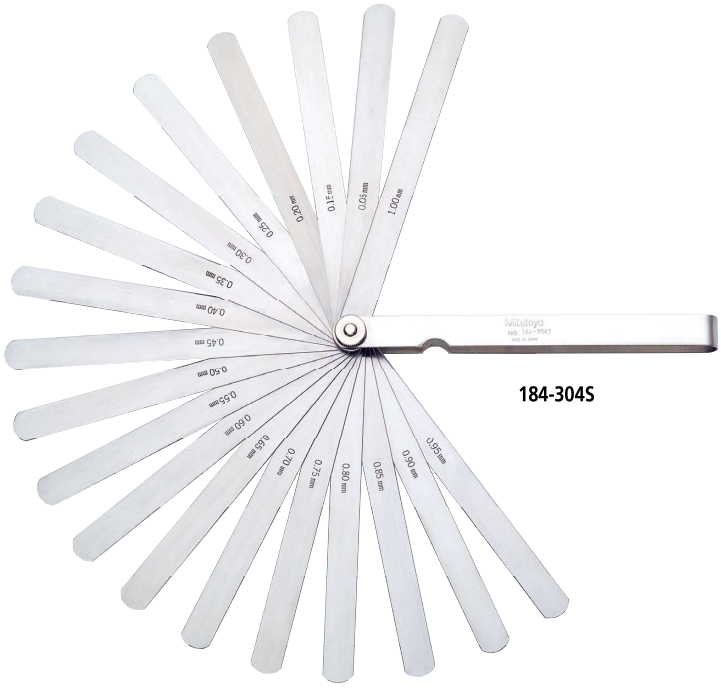
Mitutoyo

Reference Gages

Length Standards Brought to You by Mitutoyo

Thickness Gages
SERIES 184

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



184-304S

SPECIFICATIONS

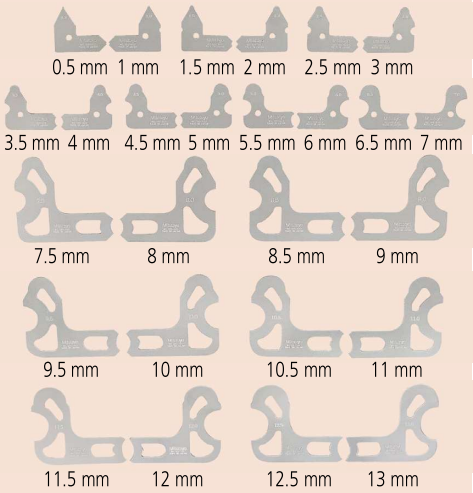
Metric

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

DIMENSIONS

Unit: mm

Order No.	L1	L2
184-313S	100	106
184-303S	150	156
184-304S	150	156
184-305S	100	106
184-301S	150	156
184-306S	100	106
184-308S	150	156
184-307S	100	106
184-302S	150	156

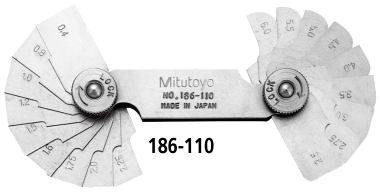


Composition of leaves for **186-902**

Radius Gages SERIES 186

- 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.

186-105



186-110

SPECIFICATIONS

Metric

Order No.	Range (mm)	Accuracy	Composition of leaves	Remarks
186-110	0.4 - 6	±0.04 mm	18 leaves: 0.4, 0.8, 1, 1.2, 1.5, 1.6 mm, 1.75 - 3 mm by 0.25 mm, 3.5 - 6 mm by 0.5 mm	90° arc
186-902	0.5 - 13		26 leaves: 0.5 - 13 mm by 0.5 mm	90° arc, separate part type
186-105	1 - 7		34 leaves: 1 - 3 mm by 0.25 mm, 3.5 - 7 mm by 0.5 mm	180° arc
186-106	7.5 - 15		32 leaves: 7.5 - 15 mm by 0.5 mm	180° arc
186-107	15.5 - 25		30 leaves: 15.5 - 20 mm by 0.5 mm, 21 - 25 mm by 1 mm	180° arc

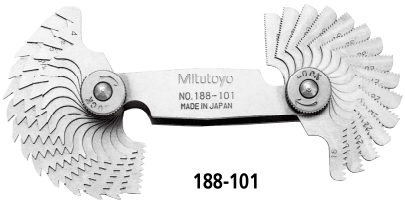
Inch

Order No.	Range (in)	Accuracy	Composition of leaves	Remarks
186-103	1/32 - 17/64	±0.002 in	16 leaves: 1/32 in - 17/64 in by 64ths	90° arc
186-101	1/32 - 1/4		30 leaves: 1/32 in - 1/4 in by 64ths	180° arc
186-102	17/64 - 1/2		16 leaves: 17/64 in - 1/2 in by 64ths	180° arc
186-104	9/32 - 33/64		16 leaves: 9/32 in - 33/64 in by 64ths	90° arc
186-901*	1/64 - 1/2		25 leaves: 1/64 in - 17/64 in by 64ths, 9/32 in - 1/2 in by 32nds	—

* Each gage has five measuring locations.

Thread Pitch Gages SERIES 188

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



188-101

SPECIFICATIONS

Metric Screw Pitch Gages

Order No.	Range (mm)	Integration pitch error	Composition of leaves
188-130	0.35 - 6	±0.05 mm	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, 6 mm and 60° angle gage
188-122	0.4 - 7		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, 7 mm
188-121	0.4 - 7		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, 7 mm

Unified Screw Pitch Gages

Order No.	Range	Integration pitch error	Composition of leaves
188-111	4 - 42 TPI	±0.002 in	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.

Metric and Unified Screw Pitch Gage Set

Order No.	Range	Integration pitch error	Composition of leaves
188-151	0.4 - 7 mm/4 - 42 TPI	±0.05 mm/ ±0.002 in	51 leaves: Set of **188-122** and **188-111**

Whitworth Screw Pitch Gages

Order No.	Range	Integration pitch error	Composition of leaves
188-101	4 - 42 TPI	±0.002 in	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
188-102	4 - 60 TPI		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

E

Reference Gages

Length Standards Brought to You by Mitutoyo

Digimatic Universal Protractor SERIES 187

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

187-501

Technical Data

- Battery: Lithium Battery
- Battery life: 2,000 hours

Function

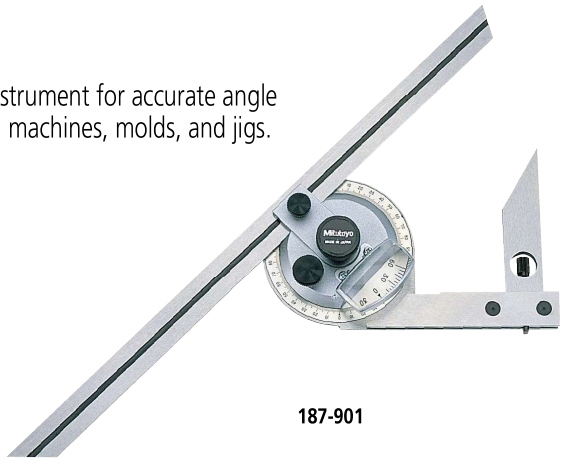
- Presetting

SPECIFICATIONS

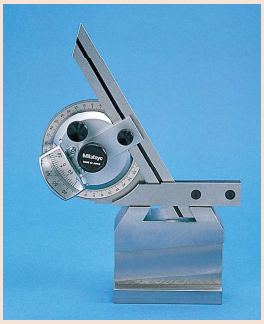
Order No.	Blade length	Range	Resolution	Accuracy	Repeatability	Remarks (standard accessory)
187-501	150 mm	-360 ° to +360 °	1' (0.01 °)	±2' (±0.03 °)	1'	Height gage holder (**950750**)
187-502	300 mm					Height gage holder (**950750**)
187-551	6 in					Height gage holder (**950749**)
187-552	12 in					Height gage holder (**950749**)

Universal Bevel Protractor SERIES 187

- High-precision instrument for accurate angle measurement on machines, molds, and jigs.
- Graduation: 5'



187-901



SPECIFICATIONS

Metric

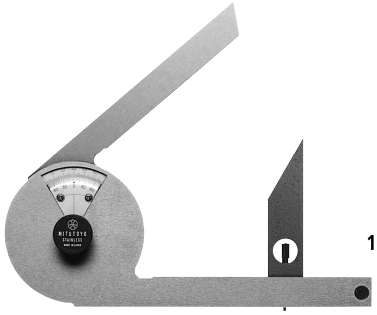
Order No.	Blade length (mm)	Remarks
187-901	150, 300	w/60°, 45°, 30° edges
187-907	150	w/60°, 45° edges
187-908	300	w/60°, 45° edges

Inch

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

Bevel Protractor
SERIES 187

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



187-201

SPECIFICATIONS

Order No.	Blade length (mm)	Range	Graduation	Blade edge angle	Mass (g)	Remarks
187-201	137	90°×4 (360°)	5' (0° to 90° to 0°)	30° and 60°	260	w/60°, 30° edges

E

Reference Gages

Length Standards Brought to You by Mitutoyo

An inspection certificate is supplied as standard.
Refer to page U-11 for details.

Black Granite Surface Plates SERIES 517

- Natural granite is free from deterioration or dimensional change over time.
- Black Granite Plate's most distinctive feature is its hardness, twice that of cast iron.
- Free from wringing effects, so there is no interruption of work.
- Since granite is harder, finer grained, and more brittle than cast iron it does not throw up burrs or protrusions if scratched. (See Figure 1.) This ensures a high degree of flatness with no risk of damaging instruments or workpieces.
- Use these plates in a stable temperature environment. Since flatness error occurs when there is a temperature difference between the working surface and the underside, avoid working in direct sunlight. Also, do not place a plate in the vicinity of an air conditioner or heater. (Recommended environment: Temperature 20±1 °C, Humidity 58±2 %)

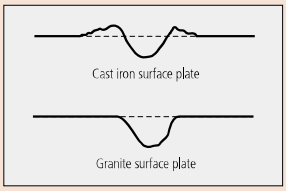


Figure 1

1000×750 mm

600×600 mm

Custom-made Granite Products

Mitutoyo can manufacture granite products to your design (such as main structural components of semiconductor instruments and process machinery). For detailed information, contact the nearest Mitutoyo sales office.

E

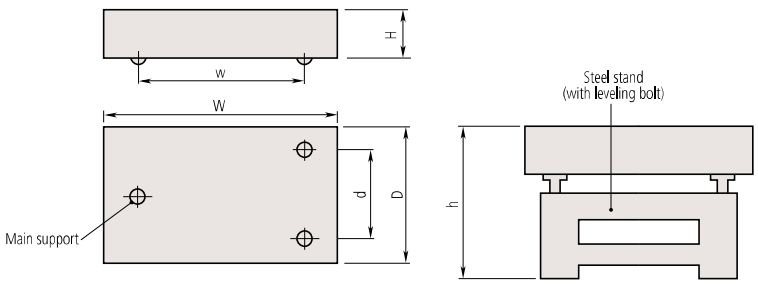
SPECIFICATIONS

Order No.	Size (mm)			Flatness (μm)	Mass (kg)	Optional stands for black granite surface plates			h (mm)
	W×D×H	d	w			Standard type	with safety frame	with casters (with safety frame)	
517-401-4	300×300×100	240	240	2	27	—	—	—	—
517-301				3					
517-101				5					
517-411-4	450×300×100	240	390	2	40	—	—	—	—
517-311				3					
517-111				6					
517-414-4	600×450×100	370	500	2.5	80	**517-203-2**	**517-203R**	**517-203CR**	755 to 775
517-314				4					
517-114				8					
517-403-4	600×600×130	500	500	2.5	140	**517-204-2**	**517-204R**	**517-204CR**	755 to 775
517-303				5					
517-103				8					
517-405-4	750×500×130	420	630	3	146	**517-205-2**	**517-205R**	**517-205CR**	755 to 775
517-305				5					
517-105				9					
517-407-4	1000×750×150	630	700	3	337	**517-206-2**	**517-206R**	**517-206CR**	755 to 775
517-307				6					
517-107				12					
517-409-4	1000×1000×150	700	700	3.5	450	**517-207-2**	**517-207R**	**517-207CR**	735 to 775
517-309				7					
517-109				13					
517-413-4	1500×1000×200	700	1100	4	900	**517-208-4**	**517-208R**	**517-208CR**	735 to 775
517-313-4				8					
517-113-4				16					
517-410-4	2000×1000×250	700	1500	4.5	1500	**517-209-4**	**517-209R**	**517-209CR**	735 to 775
517-310-4				9.5					
517-110-4				19					
517-416-4	2000×1500×300	1100	1500	5	2700	**517-210-4**	**517-210R**	**517-210CR**	735 to 775
517-316-4				10					
517-116-4				20					
517-317-4	2000×2000×350	1500	1500	11	4200	—	—	—	700 to 706*
517-117-4				22					
517-318-4	3000×1500×400	1100	2000	12.5	5400	—	—	—	700 to 706*
517-118-4				25					
517-319-4	3000×2000×500	1500	2000	13.5	9000	—	—	—	700 to 706*
517-119-4				27					

* Distance from the bottom of the large granite plate block mount to the granite plate top surface.

DIMENSIONS

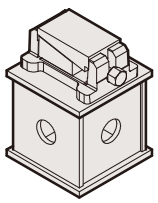
Unit: mm



SPECIFICATIONS: Main and auxiliary supports for large surface plates

Support sets			Applicable surface plates	
Order No.	Main support	Auxiliary support	**Order No.**	Size (W×D×H) (mm)
06AAY174	3 pcs.	2 pcs.	**517-317**	2000×2000×350
			517-117	
06AAY175	3 pcs.	3 pcs.	**517-318**	3000×1500×400
			517-118	
06AAY176			**517-319**	3000×2000×500
			517-119	

Main support (3 required)



Auxiliary support (2 or 3 required)