

MEASURING TOOLS

GAUGE BLOCKS

Gauge Blocks

Features and Accuracies	G-002-004
Gauge Block with Calibrated Coefficient of Thermal Expansion	G-005
ZERO CERA Blocks	G-005
Metric/Inch Rectangular Gauge Block Sets	G-006-009
Micrometer Inspection Gauge Block Sets	G-010-011
Individual Metric Rectangular Gauge Blocks	G-012-013
Rectangular Gauge Block Accessories	G-014
Accessories for Gauge Blocks over 100mm	G-015-016
Metric/Inch Square Gauge Block Sets	G-017-018
Square Gauge Block Accessories	G-019-020
Step Master	G-021
Custom-made Blocks & Gages	G-022
Individual Metric Square Gauge Blocks	G-023
Ceraston	G-024

Gauge Block Calibration

Automatic Gauge Block Interferometer GBI	G-024
Gauge Block Comparator GBCD-100A	G-025
Gauge Block Comparator GBCD-250	G-025

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

เกจบล็อก

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

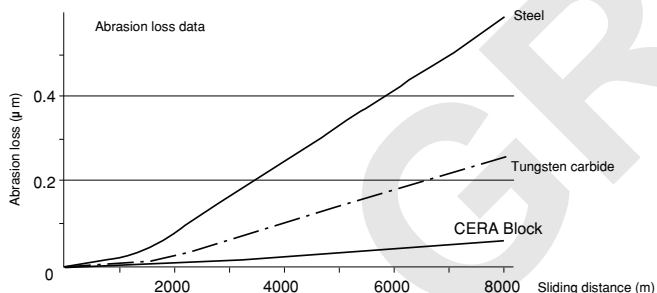
Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.

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

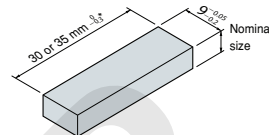
Superior flatness and surface finish provides maximum wringing force.



Classification of Gauge Blocks by Shape

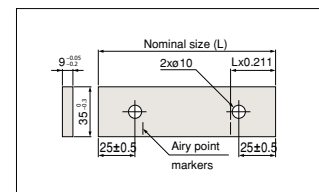
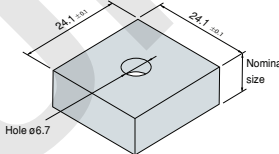
Mitutoyo broadly divides gauge blocks into two categories according to the block shape.

Rectangular gauge blocks



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

Square gauge blocks



Coupling holes in long rectangular gauge blocks

Selecting Gauge Blocks

- Select gauge blocks in accordance with the combination range required.
If a large length is required, 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 page E-012, E-013 for details).
- 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.

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

Constructing a Gauge Block Stack

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

Example: Required length = 45.6785mm

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

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

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

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

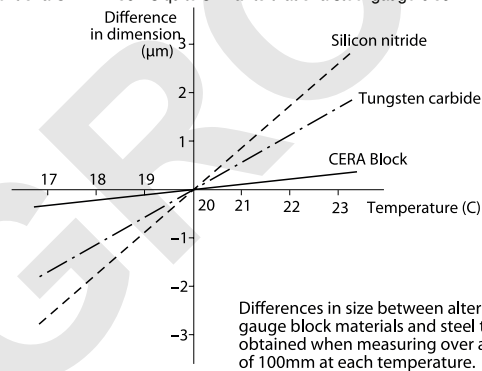
**8. Superior Material Characteristics of CERA Block**

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 x10 ⁻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. Closest Expansion Coefficient to Steel

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

**10. Highly Resistant to Dropping and Impact Damage**

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

Features of Square Gauge Blocks**1. Gauge blocks in a stack can be clamped together**

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

2. A height reference standard can easily be made

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

3. A dedicated inspection jig can easily be made

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

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

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

Long and Ultra-Thin Gauge Blocks

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

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

ACCURACY SPECIFICATIONS: JIS B 7506-2004 (JAPAN)

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

ACCURACY SPECIFICATIONS: BS 4311: 2007

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

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

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

BS EN ISO 3650: 1999 (UK)

(at 20°C)

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

(at 20°C)

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

(at 20°C)

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

เกจบล็อก

Gauge Blocks with a Calibrated Coefficient of Thermal Expansion



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

ISO / DIN / JIS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-01B	K	O	O

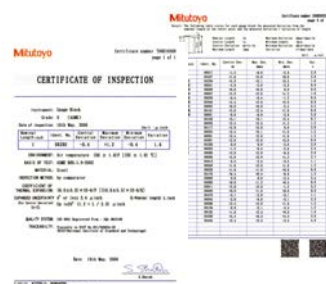
ASME

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-51B	K	O	O

BS

Suffix No.	Grade	Inspection Certificate	Calibration Certificate
-11B	K	O	O

*Only for 100mm type



FEATURE

• Mitutoyo offers top-quality gauge blocks (steel and ceramic), superior to K class blocks due to their advanced manufacturing technologies.



- Features an accurately calibrated thermal expansion coefficient measured with a proprietary double-faced interferometer (DFI).
- Each gauge block is calibrated for length on a highly accurate gauge block interferometer (GBI) system.
- Available as rectangular gauge blocks in the range 100 to 500mm.

Metric Block with CTE

Order No. (Steel)	Order No. (CERA)	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

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

* An inspection certificate and a JCSS calibration certificate are supplied as standard.

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

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องควิเบรทเกจบล็อก

เกจบล็อก

ZERO CERA Blocks



FEATURE

- Thermal expansion in the temperature range $20 \pm 1^{\circ}C$ less than 1/500 that of steel ($0 \pm 0.02 \times 10^{-6}/K(20^{\circ}C)$)
- Almost no secular change both in dimension and coefficient of thermal expansion
- Complementary ultra-low thermal expansion and high specific rigidity (Young's modulus/specific gravity)

Metric Block

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



SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

เกจบล็อก

Metric/Inch Rectangular Gauge Block Sets SERIES 516

FEATURE

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



Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องปรับเทียบเกจบล็อก

Steel 1mm Base Block Sets



Steel 112-block set



Steel 103-block set



Steel 76-block set



Steel 56-block set



Steel 47-block set



Steel 46-block set



Steel 34-block set



Steel 32-block set

Steel 0.001mm Step Block Sets



Steel 9-block set



Steel 9-block set



Steel 18-block set

Steel Long Block Sets



Steel 8-block set

Steel Wear Block Sets



Steel 2-block set

Steel Thin Block Sets



Steel 9-block set



CERA 1mm Base Block Sets



CERA 112-block set

CERA 103-block set

CERA 76-block set

CERA 56-block set



CERA 47-block set

CERA 46-block set

CERA 34-block set

CERA 32-block set

CERA 0.001mm Step Block Sets



CERA 9-block set

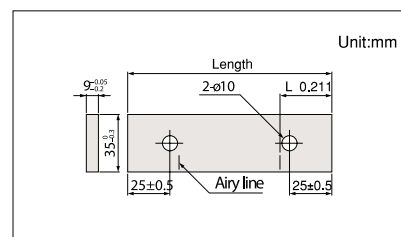
CERA 9-block set

CERA 18-block set

CERA Long Block Sets



CERA 8-block set

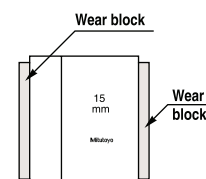


Unit:mm

CERA Wear Block Sets



CERA 2-block set



Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องวัดวิเบรทเกจบล็อก

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

1mm Base Block Sets

Blocks per set	Order No.		Standard/ grade available and Suffix No.*			Blocks included in set		
	Steel	CERA	ISO/DIN/ JIS	ASME	BS	Size	Step	Qty.
122	516-596	—	—	—	—	1.0005	—	1
	516-597	—	K: 0	—	—	1.001 - 1.009	0.001	9
	516-598	—	0: 0	—	—	1.01 - 1.49	0.01	49
	516-599	—	1: 0	—	—	1.6 - 1.9	0.1	4
	516-599	—	2: 0	—	—	0.5 - 24.5	0.5	49
112	516-531	516-541	—	K: 6	—	1.0005	—	1
	516-937	516-337	K: 0	00: 6	K: 1	1.001 - 1.009	0.001	9
	516-938	516-338	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	516-969	516-369	—	—	—	1.0005	—	1
	516-970	516-370	0: 0	—	K: 1	1.001 - 1.009	0.001	9
	516-971	516-371	1: 0	—	1: 1	1.01 - 1.49	0.01	49
	516-972	516-372	2: 0	—	2: 1	0.5 - 9.5	0.5	19
	516-972	516-372	—	—	—	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	516-949	516-349	—	—	—	1.005	—	1
	516-950	516-350	K: 0	—	—	1.01 - 1.49	0.01	49
	516-951	516-351	0: 0	—	—	0.5 - 9.5	0.5	19
	516-952	516-352	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
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	516-961	516-361	—	—	—	1.005	—	1
	516-962	516-362	K: 0	—	K: 1	1.01 - 1.19	0.01	19
	516-963	516-363	0: 0	—	0: 1	1.2 - 1.9	0.1	8
	516-964	516-364	1: 0	—	1: 1	1 - 9	1	9
	516-964	516-364	2: 0	—	2: 1	10 - 100	10	10
46	516-994	516-394	—	—	—	1.001 - 1.009	0.001	9
	516-995	516-395	K: 0	—	—	1.01 - 1.09	0.01	9
	516-996	516-396	0: 0	—	—	1.1 - 1.9	0.1	9
	516-997	516-397	1: 0	—	—	1 - 9	1	9
	516-997	516-397	2: 0	—	—	10 - 100	10	10
34	516-128	516-178	—	—	—	1.0005	—	1
	516-129	516-179	K: 0	—	K: 1	1.001 - 1.009	0.001	9
	516-130	516-180	0: 0	—	0: 1	1.01 - 1.09	0.01	9
	516-131	516-181	1: 0	—	1: 1	1.1 - 1.9	0.1	9
	516-131	516-181	2: 0	—	2: 1	1 - 5	1	5
32	516-965	516-365	—	—	—	1.005	—	1
	516-966	516-366	K: 0	—	K: 1	1.01 - 1.09	0.01	9
	516-967	516-367	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



* Suffix Number () for Selecting Standard and Certificate Provided

ISO / DIN / JIS

Suffix No.	Inspection Certificate	Calibration Certificate
1	O	-
6	O	O

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

ASME

Suffix No.	Inspection Certificate	Calibration Certificate
1	O	-
6	O	O

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

Suffix No. 6: Only for Grade K sets.

BS

Suffix No.	Inspection Certificate	Calibration Certificate
1	O	-
6	O	O

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

Suffix No. 6: Only for Grade K sets.

Inspection Certificate



Thin Block Sets

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

Note: Details of the overall sizes for forms of block are given on page E-002 and the accuracy standards to which they are manufactured are given on page E-004.

0.001mm Step Block Set

* Details of the overall sizes for forms of block are given on page E-002 and the accuracy standards to which they are manufactured are given on page E-004.

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

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ติเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องมือปรับเทียบเกจบล็อก

Long Block Sets

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

Wear Block Sets

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

Long Block Sets

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

Wear Block Sets

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

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

เกจบล็อก

Micrometer Inspection Gauge Block Sets SERIES 516

FEATURE

• Dedicated gauge block sets for micrometer inspection.

Sets **516-106/7/8** and **516-322/3** are recommended for checking instrumental errors in micrometers due to the choice of block sizes ensuring that the instrument is checked through a full rotation of the spindle over the range 0-25 mm (or 0-1").

Sets **516-115/6/7**, **516-165/6** and **516-177** contain blocks in 25 mm (or 1") steps for aiding inspection of large micrometers in conjunction with one of the abovementioned sets. Sets **516-580/1/2**, **516-390/1/2** are dedicated to the QuantuMike with its 2mm/rev spindle feed.

Steel



Steel 10-block set



Steel 10-block set



Steel 8-block set



Steel 10-block set

CERA



CERA 10-block set



CERA 10-block set



CERA 8-block set



CERA 10-block set

Micro Checker

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



516-607

(The gauge blocks are optional.)



Gauge Block Sets for Micrometer Inspection

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

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



Metric Micro checker (Holder only)

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



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

ISO / DIN / JIS

Suffix No.	Inspection Certificate	Calibration Certificate
		JCSS
1	O	-
6	O	O

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

ASME

Suffix No.	Inspection Certificate	Calibration Certificate
		JCSS
1	O	-
6	O	O

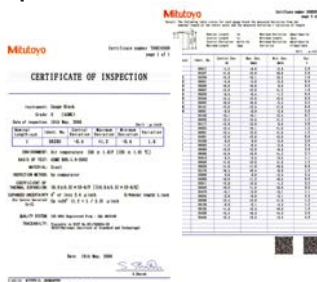
Suffix No. 1: Not available for Grade K sets.

Suffix No. 6: Only for Grade K sets.

BS

Suffix No.	Inspection Certificate	Calibration Certificate
		JCSS
1	O	-

Inspection Certificate



Metric Block Sets

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

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ติเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องมือวัดแบบเกจบล็อก

เกจบล็อก

SERIES 516 - Caliper Inspection Gauge Block Sets

Metric Block Sets

Blocks per set	Order No.		Standard/ grade available and Suffix No.*			Blocks included in set
	Steel	CERA	ISO/DIN/JIS	ASME	BS	
5	—	—	—	—	—	5 pcs.: 10.3, 24.5, 50, 75, 100mm, Ceramic plain jaws, Holder (250mm), Glove
	—	516-174	2: -10	—	—	
4	516-526	516-566	1: -10	—	—	4 pcs.: 10, 30, 50, 125mm, Setting ring (ø4mm, ø10mm), Pin gage (ø10mm), Glove
	516-527	516-567	2: -10	—	—	
3	516-124	516-150	1: -10	—	—	3 pcs.: 30, 41.3, 131.4mm, Setting ring (ø4mm, ø25mm), Glove
	516-125	516-151	2: -10	—	—	
2	516-122	516-172	1: -10	—	—	2 pcs.: 41.3, 131.4mm, Setting ring (ø20mm), Glove
	516-123	516-173	2: -10	—	—	

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

เกจบล็อก

Individual Metric Rectangular Gauge Blocks

FEATURE

- If using only one length repeatedly, it is a good idea 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.



Metric Blocks

* Details of the overall sizes for forms of block are given on page E-002 and the accuracy standards to which they are manufactured are given on page E-004.

Length (mm)	Order No.*		Length (mm)	Order No.*		Length (mm)	Order No.*	
	Steel	CERA		Steel	CERA		Steel	CERA
0.1	611821	—	0.61	611902	—	1.002	611522	613522
0.11	611860	—	0.62	611903	—	1.003	611523	613523
0.12	611861	—	0.63	611904	—	1.004	611524	613524
0.13	611862	—	0.64	611905	—	1.005	611525	613525
0.14	611863	—	0.65	611906	—	1.006	611526	613526
0.15	611822	—	0.66	611907	—	1.007	611527	613527
0.16	611864	—	0.67	611908	—	1.008	611528	613528
0.17	611865	—	0.68	611909	—	1.009	611529	613529
0.18	611866	—	0.69	611910	—	1.01	611561	613561
0.19	611867	—	0.7	611911	—	1.02	611562	613562
0.2	611823	—	0.71	611912	—	1.03	611563	613563
0.21	611868	—	0.72	611913	—	1.04	611564	613564
0.22	611869	—	0.73	611914	—	1.05	611565	613565
0.23	611870	—	0.74	611915	—	1.06	611566	613566
0.24	611871	—	0.75	611916	—	1.07	611567	613567
0.25	611824	—	0.76	611917	—	1.08	611568	613568
0.26	611872	—	0.77	611918	—	1.09	611569	613569
0.27	611873	—	0.78	611919	—	1.1	611570	613570
0.28	611874	—	0.79	611920	—	1.11	611571	613571
0.29	611875	—	0.8	611921	—	1.12	611572	613572
0.3	611825	—	0.81	611922	—	1.13	611573	613573
0.31	611876	—	0.82	611923	—	1.14	611574	613574
0.32	611877	—	0.83	611924	—	1.15	611575	613575
0.33	611878	—	0.84	611925	—	1.16	611576	613576
0.34	611879	—	0.85	611926	—	1.17	611577	613577
0.35	611826	—	0.86	611927	—	1.18	611578	613578
0.36	611880	—	0.87	611928	—	1.19	611579	613579
0.37	611881	—	0.88	611929	—	1.2	611580	613580
0.38	611882	—	0.89	611930	—	1.21	611581	613581
0.39	611883	—	0.9	611931	—	1.22	611582	613582
0.4	611827	—	0.91	611932	—	1.23	611583	613583
0.41	611884	—	0.92	611933	—	1.24	611584	613584
0.42	611885	—	0.93	611934	—	1.25	611585	613585
0.43	611886	—	0.94	611935	—	1.26	611586	613586
0.44	611887	—	0.95	611936	—	1.27	611587	613587
0.45	611828	—	0.96	611937	—	1.28	611588	613588
0.46	611888	—	0.97	611938	—	1.29	611589	613589
0.47	611889	—	0.98	611939	—	1.3	611590	613590
0.48	611890	—	0.99	611940	—	1.31	611591	613591
0.49	611891	—	0.991	611551	613551	1.32	611592	613592
0.5	611506	613506	0.992	611552	613552	1.33	611593	613593
0.51	611892	—	0.993	611553	613553	1.34	611594	613594
0.52	611893	—	0.994	611554	613554	1.35	611595	613595
0.53	611894	—	0.995	611555	613555	1.36	611596	613596
0.54	611895	—	0.996	611556	613556	1.37	611597	613597
0.55	611896	—	0.997	611557	613557	1.38	611598	613598
0.56	611897	—	0.998	611558	613558	1.39	611599	613599
0.57	611898	—	0.999	611559	613559	1.4	611600	613600
0.58	611899	—	1	611611	613611	1.41	611601	613601
0.59	611900	—	1.0005	611520	613520	1.42	611602	613602
0.6	611901	—	1.001	611521	613521	1.43	611603	613603

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

ISO / DIN / JIS

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

ASME

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

BS

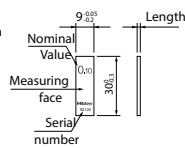
Suffix No.	Grade	Inspection Certificate	Calibration Certificate
			JCSS
-116	K	O	O
-121	0	O	-
-126	0	O	O
-131	1	O	-
-136	1	O	O
-141	2	O	-
-146	2	O	O



Inspection Certificate

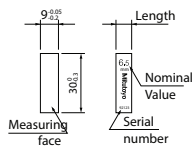


Nominal length:
0.1mm - 5.5mm
(.004" - .25")

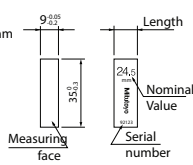


Unit: mm

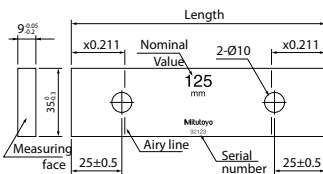
Nominal length:
6mm - 10mm
(.3" - .4")



Nominal length:
10.3mm - 100mm
(.45" - 4")



Nominal length 125mm - 1000mm (5" - 20")



Length (mm)	Order No.*	
	Steel	CERA
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	—
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	—

Length (mm)	Order No.*	
	Steel	CERA
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
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

Length (mm)	Order No.*	
	Steel	CERA
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	—

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องหาวิเบรทเกจบล็อก

Metric Wear Blocks

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

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

เกจบล็อก

Rectangular Gauge Blocks Accessories SERIES 516

FEATURE

- To expand the range of rectangular gauge block (steel and CERA) applications, Mitutoyo offers the gauge block accessories set. By assembling the items in the set, together with gauge blocks, you can easily and quickly build up a precision gage.



516-601
(22 pcs)



516-602
(14 pcs)



Gaging a bore using a pair of half round jaws and a holder



Marking a workpiece using the base, a holder and the scriber point



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

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

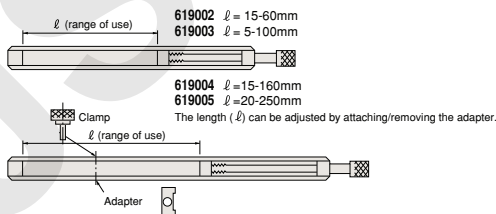
* Only 1 pc is supplied for each Order No. However, half round jaw, plain jaw, and tram point are supplied in a pair. (2 pcs.)

Order	Type	Size	A	B	C	D
619010*1	I	2	2±0.0005	5.5	40	7.5
619011*1		5	5±0.0005	15.5	45	7.5
619012*1		8	8±0.0005	20	50	8.5
619013*1	II	12	12±0.0005	25	75	13
619014*1		20	20±0.0005	25	125	20.5

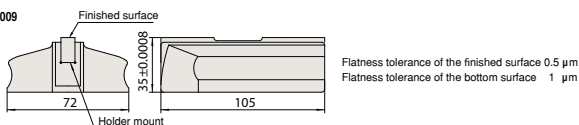
DIAMETER

Holder

Thickness = 15mm
Width = 29.5mm

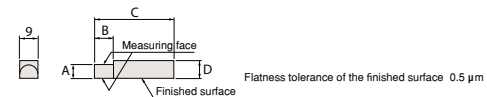


Base 619009

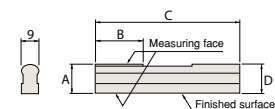


Half round jaw

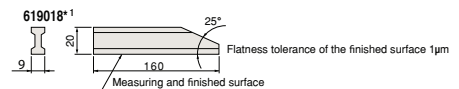
Type I



Type II



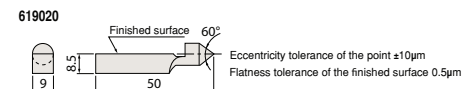
Plain jaw (B type)



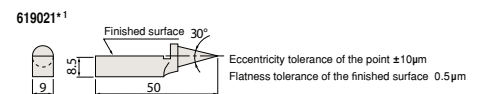
Scriber point



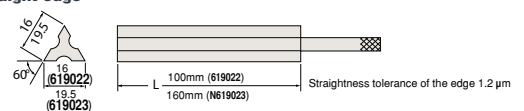
Center point



Tram point



Triangular straight edge



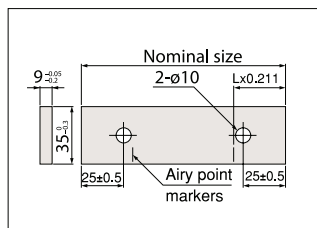
*1 Qty: One pair (2 pcs)

เกจบล็อก

Accessories for Rectangular Gauge Blocks over 100mm
SERIES 516

FEATURE

- 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.



Coupling holes in long gauge blocks



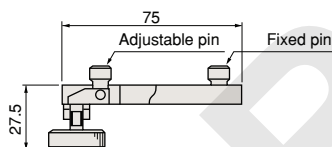
Use of B-type connectors in gage construction

516-605
(14 pcs)

Set Order No.	Individual Item Order No.	Item 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.
	619013	Half round jaw	(2 pcs.)
	619018	Plain jaw	
	619019	Scriber point	1 pc.

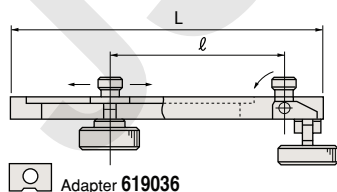
* Only 1 pc is supplied for each Order No. However, half round jaw, plain jaw, and tram point are supplied in a pair. (2 pcs).

Connector A 619031



Used for directly coupling two long gauge blocks.

Connectors B and C



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

Used for clamping jaws to the ends of one or more long gauge blocks in conjunction with adapters (619036). The length l is highly adjustable to accommodate the variable length of a stack of regular gauge blocks that would be wrung to one of the long gauge blocks to achieve the required gaging size.

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องมือปรับเบรทเกจบล็อก

SMALL TOOLS

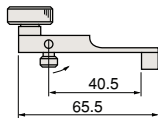
เครื่องมือวัดละเอียด

Mitutoyo

GAUGE BLOCKS
เกจบล็อก

Connector D

619034



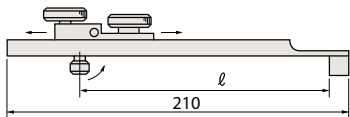
Used for attaching a long gauge block directly to the base.



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

Connector E

619035

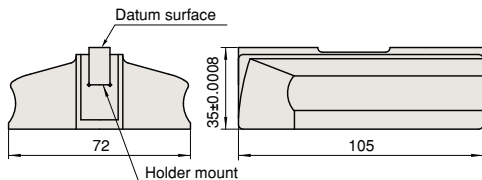


Used for attaching a long gauge block to the base over a stack of regular gauge blocks wrung between the base and long gauge block. The length l is highly adjustable to accommodate the variable length of the stack.

Adapter 619036 (1pc.)

Base

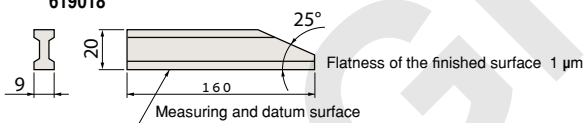
619009



Flatness of the datum surface 0.5 μ m
Flatness of the bottom surface 1 μ m

Plain jaw

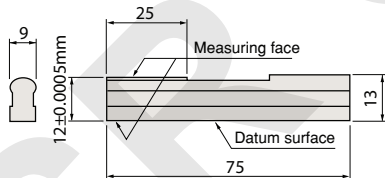
619018



Flatness of the finished surface 1 μ m

Half round jaw

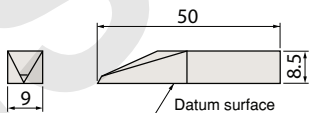
619013



Flatness of the datum surface 0.5 μ m

Scriber point

619019



Flatness of the datum surface 0.5 μ m

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.

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.

1Item	Order No.	300mm		400mm		500mm		600mm		700mm		800mm		900mm		1000mm	
		Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer
Rectangular gauge block (nominal dimension)	200mm	611682						1	1								
	300mm	611683	1	1						1	1	1	1				
	400mm	611684			1	1		1	1	1	1			1	1		
	500mm	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)

เกจบล็อก

Metric/Inch Square Gauge Block Sets

SERIES 516 — Metric Block Sets, Long Block Sets, Wear Block Sets

FEATURE

- Square gauge block sets have several unique characteristics (refer to page E-003 for details.).
- A wide choice is provided to best match the target applications: sets containing from 2 to 112 blocks are available.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.



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 2-block set

Long block set



Steel 8-block set

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องมือวัดแบบเกจบล็อก

The wear to a frequently used square gauge block set can be drastically reduced by using tungstencarbide wear blocks on the ends of a stack. There are two available, of nominal dimension 1mm and 2mm. These blocks are much more wear-resistant than steel blocks, and they also absorb most of the wear that would otherwise occur to the blocks in the set due to contact, and therefore maximize the set's longevity. Wear blocks are relatively inexpensive and can be readily discarded when no longer serviceable. To achieve maximum protection, the same face of each wear block should always be wrung to a set block, so the opposite, wearing, face never touches a set block.

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

GAUGE BLOCKS

เกจบล็อก

Metric Block Sets

Blocks per set	Order No.		Standard/ grade available and Suffix No.*		Blocks included in set		
	Steel	CERA	ISO/DIN/JIS	ASME	Size	Step	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



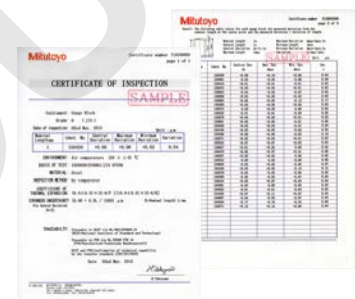
* Suffix Number () for Selecting Standard and Certificate Provided

ISO / DIN / JIS

Suffix No.	Inspection Certificate	Calibration Certificate
		JCSS
1	O	-
6	O	O

ASME

Suffix No.	Inspection Certificate	Calibration Certificate
		JCSS
1	O	-



Inspection Certificate

Metric Long Block Sets

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

Stands
ขาตั้ง

Gauge Block
เกจบล็อก

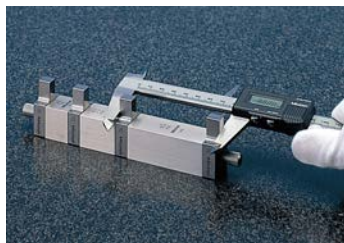
Gauge Block Calibration
เครื่องปรับเทียบเกจบล็อก

เกจบล็อก

Square Gauge Block Accessories Set

FEATURE

- 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.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.



516-611

Metric

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

* 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.

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

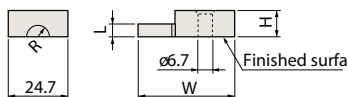
เครื่องควาวิเบรทเกจบล็อก

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

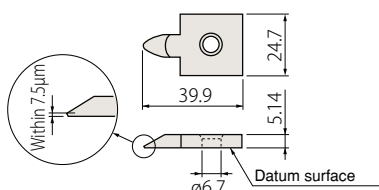
Half round jaw



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

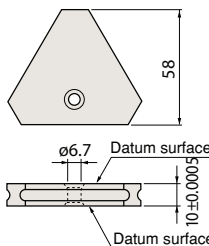
- Flatness 0.5 μ m
- Parallelism of L 0.5 μ m
- Tolerance of L ± 0.5 μ m

Scriber point 619054



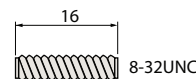
- Flatness of datum surface 0.5 μ m

Base 619074

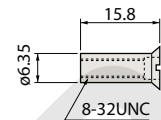


- Parallelism 1.5 μ m
- Flatness 1.5 μ m (The surface within 1.5 mm of edge is excluded)

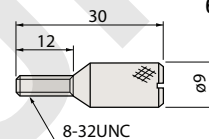
Stud 619056



Slotted head nut 619059



Knurled head screw 619066

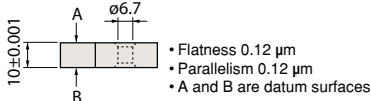
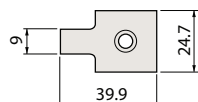


•Contraction caused by the clamping force

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

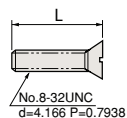
Driver	Contraction
Torque Driver 600mN m	0.2 μ m/100mm
Ordinary Driver 700 - 800mN m	0.3 μ m/100mm

Plain jaw 619072



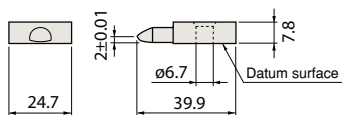
- Flatness 0.12 μ m
- Parallelism 0.12 μ m
- A and B are datum surfaces

Flat head screw



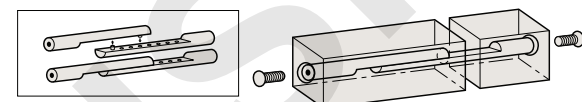
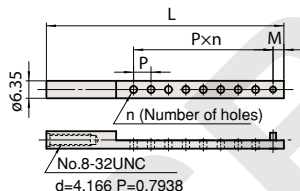
Order No.	L
619057	31.6mm
619058	15.8mm

Center point 619073



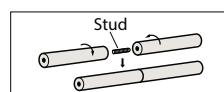
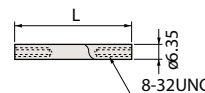
- Flatness 0.5 μ m

Adjustable tie rod



Order No.	L	M	P	n
619060	124.5mm	3.85mm	6.35mm	14
619061	86.5mm	3.95mm	6.35mm	8

Tie rod



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

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 inset	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
619056	Stud					1										1	1	1		1			1		1	1	1	1	2
619065					1	1																							
619064	Tie rod						1	1		1								1											
619063									1			1		1						1									
619062													1		1	1	1	1	1		1								
619061	Adjustable tie rod																			2					2			2	2
619060																						2		2		2	2	2	2

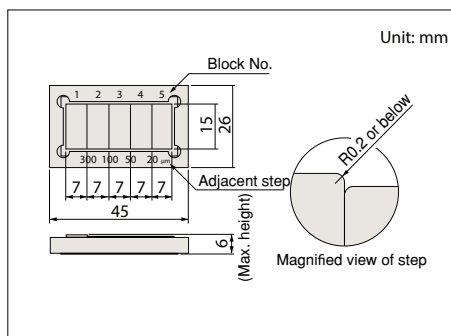
เกจบล็อก

Step Master
SERIES 516

FEATURE

- Step Master is a gauge providing 4 small increments in height (steps) constructed from an assembly of 5 highly accurate steel or ceramic blocks.
- Each step is defined as the difference in height between the center of adjacent blocks, measured to a resolution of $0.01\mu\text{m}$ by using an interferometer with an accuracy tolerance of $\pm 0.20\mu\text{m}$.
- Steel and ceramic types are available to suit the application.
- Height differences are measured between the centers of adjacent steps.

DIAMETER

Steel type
516-199Ceramic type
516-499

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

○○○ - ○○○ -64: Provided with Calibration Certificate
 ○○○ - ○○○ -84: Provided with Calibration Certificate and Traceability System Chart



Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ทีเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องควิเบรทเกจบล็อก

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

เกจบล็อก

Custom-made Blocks & Gages

FEATURE

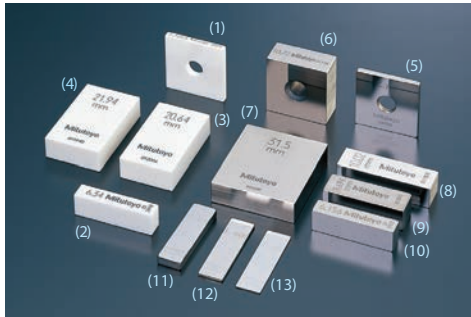
- Typical examples of custom-made gauge blocks and reference gages. Mitutoyo can manufacture Gauge Blocks and reference gages to your size and design.
- Nominal size range
 - 0.1mm to 1000mm (steel)
 - 0.5mm to 500mm (ceramic)
- Nominal size increment
 - 0.0005mm (up to 100mm)
 - 0.001mm (over 100mm)
- Cross section (same as the standard product)
 - Nominal length of 10mm or less: 30 x 9mm
 - Nominal length of more than 10mm: 35 x 9mm
- Square types are also available.

- **Special Gauge**
Gauge Blocks and reference gages to your specifications (section dimensions) are available, including precision spacers which normally absorb much time and effort to manufacture in-house. Special processing including boring, step gaging and special marking are available. Consult us for details.
- **Special stepped master** We make special stepped masters based on the requested adjacent step.

Notes on "extension hole" on the special size gauge block:

- Steel, from 100 mm to less than 500 mm
 - Without extension hole
 - (If needed, please notify.)
- Steel, from 500 mm to less than 1000 mm
 - With extension hole
 - (If not needed, please notify.)
- Ceramic, from 100 mm to less than 500 mm
 - With extension hole
 - (If not needed, please notify.)

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



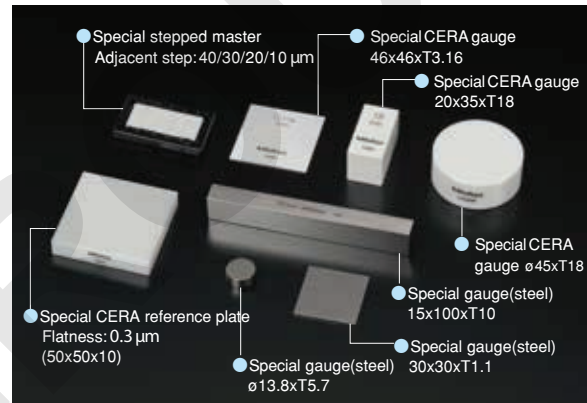
Ceramic

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

Steel

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

Special gauge (T: nominal), Special stepped master



เกจบล็อก

Individual Metric Square Gauge Blocks



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

ISO / DIN / JIS

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

ASME

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



Inspection Certificate

FEATURE

- Purchasing individual metric square gauge blocks is a cost-effective way to replace heavily used sizes.
- Please add the suffix number 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.
- Mitutoyo accessory sets are available for expanding the range of square gauge block applications, especially for rapid assembly of precision gages.



Metric Blocks

* Details of the overall sizes for forms of block are given on page E-002, and the accuracy standards to which they are manufactured are given on page E-004.

Length (mm)	Order No.*	
	Steel	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	—
1.33	614593	—
1.34	614594	—
1.35	614595	—
1.36	614596	—
1.37	614597	—

Length (mm)	Order No.*	
	Steel	CERA
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	614610	—
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	614625	—
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	—

Length (mm)	Order No.*	
	Steel	CERA
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

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องมือปรับเบรทเกจบล็อก

SMALL TOOLS

เครื่องมือวัดละเอียด

Mitutoyo

เกจบล็อก

Ceraston

SERIES 516 — Accessory for Gauge Block Maintenance



601644
150 (W) x 50 (D) x 20 (H) mm



601645
100 (W) x 25 (D) x 12 (H) mm

FEATURE

- 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.

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

*1 Mitutoyo does not offer Arkansas stones.

Removing burrs

Figure 1

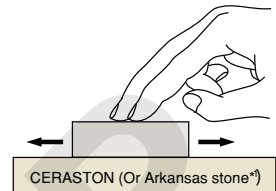
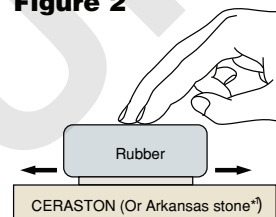
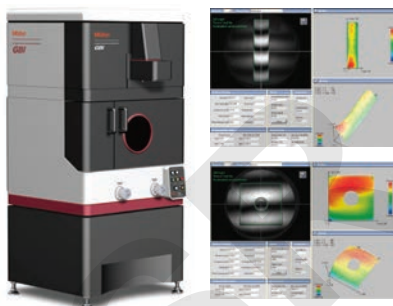


Figure 2



เกจบล็อก

Automatic Gauge Block Interferometer GBI (Interference-fringe analysis principle)



- Automatic primary-level measuring instrument for gauge block lengths between 0.1 mm and 250 mm using the principle of optical interference. The GBI is a Twyman-Green interferometer which employs the method of multiple wavelength coincidence to calibrate gauge blocks by an absolute method to the highest level of accuracy.
- The GBI automatically detects the distribution of interference fringes with a CCD camera and processes the data. Measurement of parallelism and flatness is provided as well as lengths based on the phase shift method and the interference fringe analysis software.
- The intensity and wavelength of the He-Ne laser light source and Nd:YVO4 light source are highly stable. These light sources allow highly accurate and repeatable measurement.
- Both the refractive index of air and the thermal expansion of gauge blocks are automatically compensated for by computer which is linked to a thermometer, hygrometer and barometer.

Metric

Range	Measuring Uncertainty (Coverage range factor k=2)	Number of gauge blocks that can be mounted on the measuring table	Light sources	Operating conditions
0.1mm - 250mm	0.025μm+0.2x10 ⁻⁶ L L = Gauge block length (mm)	12	633nm frequencystabilized He-Ne laser 532nm frequencystabilized Nd:YVO4 laser	20±0.5°C Under mild temperature change without direct exposure to cold or warm air

เกจบล็อก

Gauge Block Comparator GBCD-100A

SERIES 565 - Automatic Comparator with Dual Gage Heads



- 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.



Special bridge-type block

516-145-E2



Metric

Range	Resolution	Accuracy in narrow range (0.5°C)	Upper gage head		
			Type	Measuring force	Contact point
0.5mm - 100mm	0.01μm	$\pm(0.03+0.3L/1000)\mu\text{m}^*$ L = Gauge block length (mm)	Mu-Checker	1N	Carbide contact point of radius of 20mm

Lower gaging head			Operating condition	
Type	Measuring force	Contact point		
Mu-Checker	0.6N	Carbide contact point of radius of 5mm	Temperature: 20°C ±1°C Humidity: 58%RH ±15%RH	

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

Micrometer

ไมโครมิเตอร์

Inside

Measurement

เครื่องมือวัดภายใน

Calipers

คาร์ลิเปอร์

Height Gages

เกจวัดความสูง

Linear Height

เครื่องมือวัดความสูง

Depth Gages

เกจวัดความลึก

Gauge Blocks

เกจบล็อก

Reference Gages

เครื่องมืออ้างอิง

Indicators

อินดิเคเตอร์

Stands

ขาตั้ง

Gauge Block

เกจบล็อก

Gauge Block Calibration

เครื่องวัดเบรเกจบล็อก

เกจบล็อก

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)



Metric

Range	Resolution	Accuracy (Confidence level 95%) Comparison measurement of the same nominal length	Accuracy (Confidence level 95%) Dimensional deviations between standard gauge block and measurement gauge block: ±3mm
0.1mm - 250mm	0.001μm	$\pm(0.03+0.3L/1000)\mu\text{m}^*$ L = Gauge block length (mm)	$\pm(0.06+0.3L/1000)\mu\text{m}^*$ L = Gauge block length (mm)

Upper gage head			Lower gaging head			Operating condition
Type	Measuring force	Contact point	Type	Measuring force	Contact point	
Linear Gage	0.4N	Carbide contact point of radius 20mm	Linear Gage	0.2N	Carbide contact point of radius 5mm	Temperature: 20°C ±1°C Humidity: 30 %RH to 60 %RH

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

SMALL TOOLS

เครื่องมือวัดละเอียด

GAUGE BLOCKS

เกจบล็อก

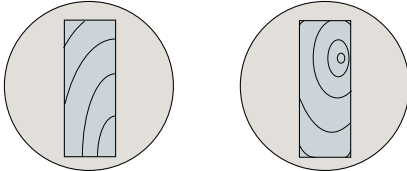
Definition of the Meter

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 $1/299\,792\,458$ 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:



- 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.
 - 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.
- d. Lightly press the optical flat to check that the interference fringes disappear.
- e. Remove burrs, if any, from the measuring face using a flat, finegrained abrasive stone. Refer to the figures below for procedures.

Figure 1

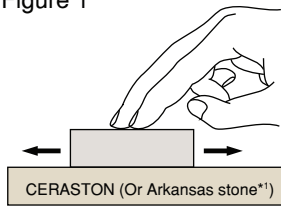
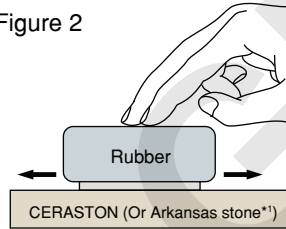


Figure 2



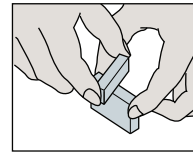
- (1) Wipe any dust and oil films from the gauge block and the Ceraston (or Arkansas stone) using a solvent.
- (2) Place the gauge block on the Ceraston so that the measuring face that has burrs is on the abrasive surface of the stone. While applying light pressure, move the gauge block to and fro about 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.

*1 Mitutoyo does not offer Arkansas stones.

- (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.

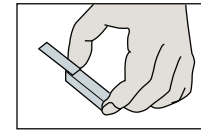
- (5) Gently overlay the faces of the gauge blocks to be wrung together. There are three methods to use (a, b and c as shown below) according to the size of blocks being wrung:

a. Wringing thick gauge blocks



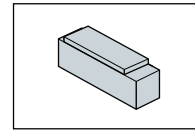
Cross the gauge blocks at 90° in the middle of the measuring faces.

b. Wringing a thick gauge block to a thin gauge block

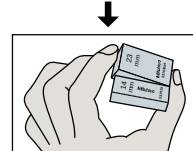


Overlap one side of a thin gauge block on one side of a thick gauge block.

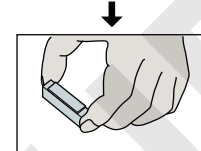
c. Wringing thin gauge blocks



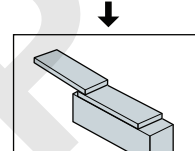
To prevent thin gauge blocks from bending, first wring a thin gauge block onto a thick gauge block.



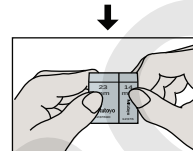
Rotate the gauge blocks while applying slight force to them. You will get a sense of wringing by sliding the blocks.



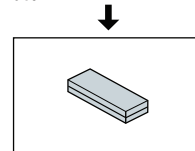
Slide the thin gauge block while pressing the entire overlapped area to align the measuring faces with each other.



Then, wring the other thin gauge block onto the first thin gauge block.

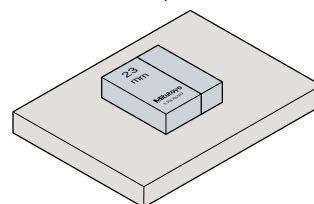
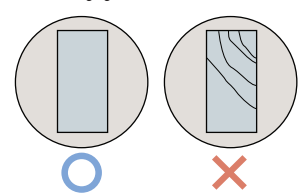


Align the measuring faces with each other.



Finally, remove the thick gauge block from the stack.

Apply an optical flat to the surface of one thin gauge block to check the wringing state.



Wipe the exposed measuring face(s) and continue building up the stack, in the same manner as above, until complete.

Thermal Stabilization Time

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

