

Height Gage

Digimatic Height Gage
SERIES 192 — Multi-function Type with SPC Data Output

- Double-column structure ensures high measuring accuracy.
- Ergonomic base fits comfortably in the hand.
- The drive handle is inclined for better operation.
- **192-663-10, 192-664-10, 192-665-10, 192-670-10, 192-671-10, 192-672-10 and 192-673-10** are provided with a long scriber (150 mm).



192-663-10

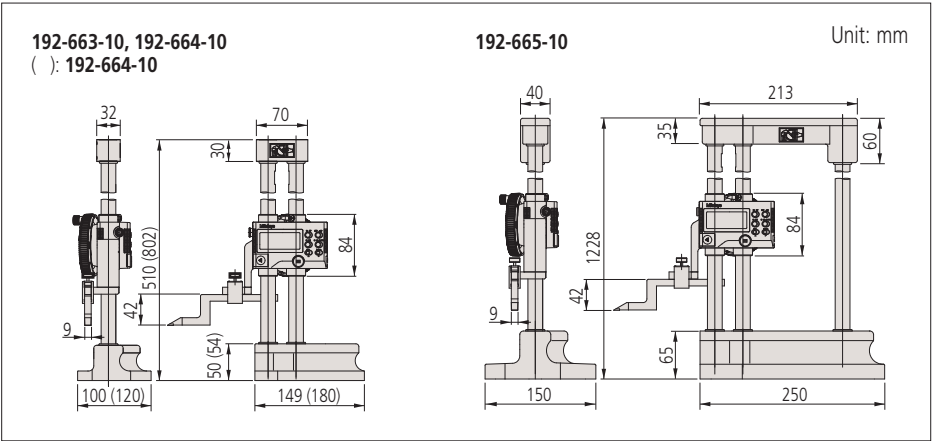
SPECIFICATIONS

Metric						
Order No.	Range (mm)	Resolution (mm)	Maximum permissible error E_{MPE} (mm)*	Max. response speed (mm/s)	Height (mm)	Mass (kg)
192-663-10	0 - 300	0.01 / 0.005 (selectable)	±0.02	500	510	5.7
192-664-10	0 - 600		±0.04		802	8.3
192-665-10	0 - 1000		±0.06		1228	15.7

Inch / Metric						
Order No.	Range (in)	Resolution	Maximum permissible error E_{MPE} (in)*	Max. response speed (mm/s)	Height (mm)	Mass (kg)
192-670-10	0 - 12	0.01 mm / 0.005 mm (selectable)	±0.001	500	510	5.7
192-671-10	0 - 18		±0.0015		649	7.5
192-672-10	0 - 24	0.0005 in / 0.0002 in (selectable)	±0.0015		802	8.3
192-673-10	0 - 40		±0.0025		1228	15.7

- Battery: SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)
- Battery life: Approx. 3,500 hours in continuous use
- Standard Accessories: Scriber **905200** (**192-663-10, 192-664-10, 192-665-10**), Scriber clamp **05GZA033**
- * Maximum permissible error, E_{MPE} is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

DIMENSIONS



MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

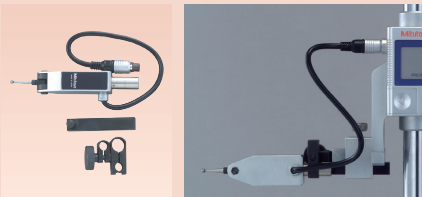
Functions

- Origin-setting (ABS measurement mode): Any arbitrary value can be stored as the origin point.
- Zero-setting (INC measurement mode): Displayed value can be set to zero at any arbitrary position of the slider.
- Origin restoration: Previously set origin is restored when switching back to ABS mode.
- Presetting (ABS INC measurement mode): Displayed value can be set to any arbitrary value, including negative values.
- Measuring direction: Measuring direction can be switched at the press of a button.
- Data hold: Display value can be held. Reverts to ABS or INC mode when cancelled.
- Alarm: Error message is displayed when overflow or overspeed of displayed value arises and measurement is stopped.
- Data output: Allows integration into statistical process control and measurement systems. (Refer to page A-3.)
- Fine and coarse height adjustment through knob and wheel combination. Slider height adjustment wheel allows fine and coarse height adjustment.
- Probe-tip diameter compensation: An adjustment is applied to the raw measurement data to compensate for the effect of the size of the spherical contact point used by the bidirectional touch-trigger probe.
- Presetting (2 positions): With two preset functions, two reference heights can be used relative to a surface plate.

Optional Accessories

Order No.	Type	Description
905338	F	Connecting cables for IT/DP/MUX (1 m)
905409	F	Connecting cables for IT/DP/MUX (2 m)
06AFM380F	F	USB Input Tool Direct (2 m)
02AZD790F	F	Connecting cables for U-WAVE-T (160 mm)
02AZE140F	F	Connecting cables for U-WAVE-T For foot switch

- Bidirectional touch-trigger probe: **192-007** (mm), **192-008** (inch)
Improves accuracy in step, internal thickness, and outside width measurement by minimizing reproducibility error. A bidirectional touch-trigger probe is available as an optional accessory for **192-663-10, 192-664-10, 192-665-10, 192-670-10, 192-671-10, 192-672-10 and 192-673-10**.



Digimatic Height Gage
SERIES 192 — Multi-function Type with SPC Data Output

- Double-column structure ensures high measuring accuracy.
- Ergonomic base fits comfortably in the hand.
- A bidirectional touch-trigger probe is not available as an optional accessory.



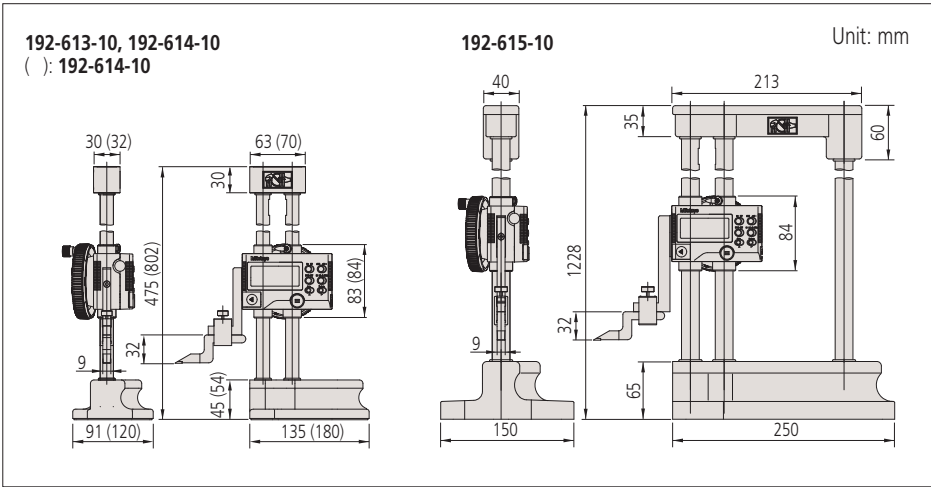
SPECIFICATIONS

Metric						
Order No.	Range (mm)	Resolution (mm)	Maximum permissible error E_{MPE} (mm)*	Max. response speed (mm/s)	Height (mm)	Mass (kg)
192-613-10	0 - 300	0.01 / 0.005 (selectable)	±0.02	500	475	4.7
192-614-10	0 - 600		±0.05		802	8.3
192-615-10	0 - 1000		±0.07		1228	15.7

Inch / Metric						
Order No.	Range (in)	Resolution	Maximum permissible error E_{MPE} (in)*	Max. response speed (mm/s)	Height (mm)	Mass (kg)
192-630-10	0 - 12	0.01 mm / 0.005 mm (selectable)	±0.001	500	475	4.7
192-631-10	0 - 18		±0.002		649	7.5
192-632-10	0 - 24	0.0005 in / 0.0002 in (selectable)	±0.002		802	8.3
192-633-10	0 - 40		±0.003		1228	15.7

- Battery: SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)
 - Battery life: Approx. 3,500 hours in continuous use
 - Standard Accessories: Scriber **07GZA000**
Scriber clamp **05GZA033**
- * Maximum permissible error, E_{MPE} is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

DIMENSIONS



Height Gage

ABSOLUTE Digimatic Height Gage
SERIES 570 — with Ergonomic Base

- Single column, Digimatic Height Gage entry model with large display and bottom for good operability.
- The handle for moving the slider enables smooth vertical movement.
- The highly rigid pillars and large clamp levers provide smooth and reliable workability.

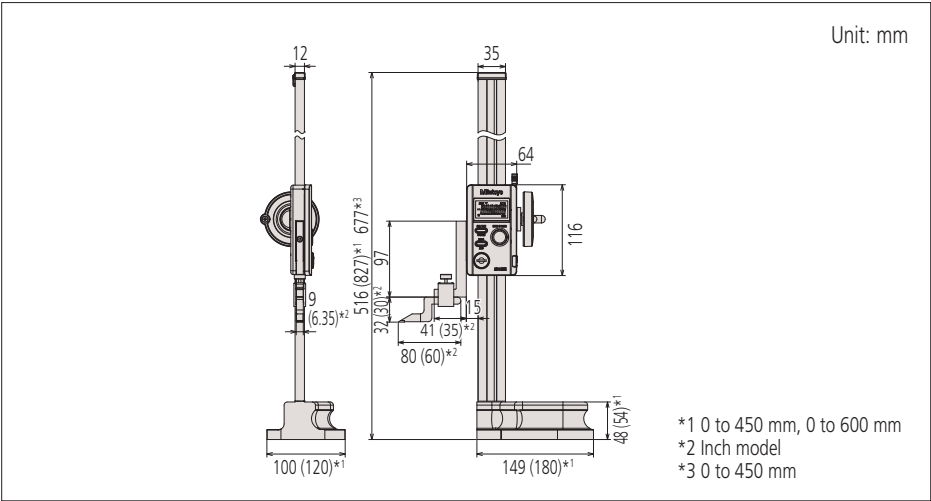


SPECIFICATIONS

Metric						
Order No.	Range (mm)	Resolution (mm)	Maximum permissible error E_{MPE} (mm)*	Max. response speed	Mass (kg)	
570-402	0 - 300	0.01	±0.03	Unlimited	4.6	
570-404	0 - 600		±0.05		6.4	
Inch/Metric						
Order No.	Range	Resolution	Maximum permissible error E_{MPE} *	Max. response speed	Mass (kg)	
570-412	0 to 12 in/0 to 300 mm	0.0005 in/ 0.01 mm	±0.0015 in/±0.03 mm	Unlimited	4.6	
570-413	0 to 18 in/0 to 450 mm		±0.0020 in/±0.05 mm		5.9	
570-414	0 to 24 in/0 to 600 mm				6.4	

Standard Accessories: Scriber clamp **05GZA033**, Scriber **07GZA000**
* Maximum permissible error, E_{MPE} is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

DIMENSIONS



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Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

Measurement example



Functions

- Origin-setting:
Any convenient reference surface, such as a surface plate, etc., can be stored as the absolute origin point.
- Absolute measurement:
After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. Absolute origin position can be changed by ORIGIN button.
- Incremental measurement: Allows origin setting at any arbitrary position. In this case, the origin point is not stored after turning off the power.
- Data hold
Display value can be held.
- Data output:
Allows integration into statistical process control and measurement systems. (Refer to page A-3.)
- Low-voltage alert:
Low-voltage alert: If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible so that the battery can be changed in good time.

Optional Accessories

Order No.	Type	Description
905338	F	Connecting cables for IT/DP/MUX (1 m)
905409	F	Connecting cables for IT/DP/MUX (2 m)
06AFM380F	F	USB Input Tool Direct (2 m)
02AZD790F	F	Connecting cables for U-WAVE-T (160 mm)
902053	—	Clamp (with dovetail groove)*
953638	—	Holding bar*

* For mounting test indicators, etc. (Refer to page F-67 for details.)

ABSOLUTE Digimatic Height Gage SERIES 570 — Standard model

Functions

- Zero-setting
- +/- directional measurement
- Data hold
- Data output
- Presetting
- inch/mm reading (inch/mm models)
- Preset value memory
- Origin restoration
- Low battery voltage alert
- Counting value composition error alert

Standard Accessories

Order No.	Description	Models
900173	Carbide-tipped scriber	570-227 570-244
905200	Carbide-tipped scriber	570-230 570-248
901338	Scriber clamp	570-227 570-244
05GZA033	Scriber clamp	570-230 570-248

Optional Accessories

Order No.	Type	Description
905338	F	Connecting cables (1 m)
905409	F	Connecting cables (2 m)
06AFM380F	F	USB Input Tool Direct (2 m)
02AZD790F	F	Connecting cables for U-WAVE-T (160 mm)
02AZE140F	F	Connecting cables for U-WAVE-T For foot switch

- ABS and INC measurement modes allow efficient operation.
- Rigid structure makes instrument suitable for use in severe work environments.
- The +/- measurement function widens the application range.
- Carbide-tipped scriber is provided as a standard accessory.
- When a dial indicator or test indicator is used with **570-227** and **244**, the dedicated holding bar (**953639**, overall length 50 mm) is recommended for use. However, MPE (Maximum permissible error) may be larger because the measurement point is further from the beam.



570-227

SPECIFICATIONS

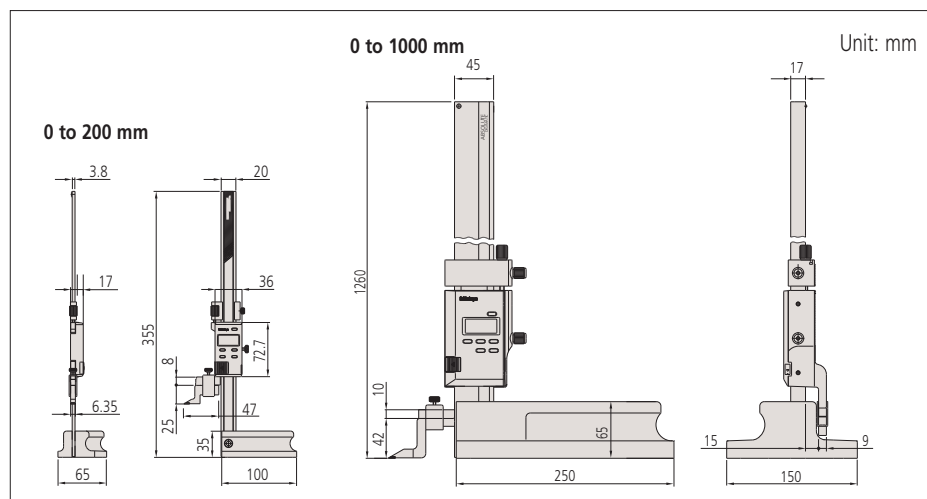
Metric						
Order No.	Range (mm)	Resolution (mm)	Fine feed (mm)	Maximum permissible error E_{MPE} (mm)*	Height (mm)	Mass (kg)
570-227	0 - 200	0.01	4	±0.03	355	1.4
570-230	0 - 1000		6	±0.07	1260	16.8
Inch / Metric						
Order No.	Range (in)	Resolution	Fine feed (in)	Maximum permissible error E_{MPE} (in)*	Height (mm)	Mass (kg)
570-244	0 - 8	0.0005 in/0.01 mm	0.16	±0.002	355	1.4
570-248	0 - 40		0.24	±0.003	1260	16.8

• Battery: SR44 (1 pc.), **938882**, for initial operational checks (standard accessory)

• Battery life: Approx. 5,000 hours under normal use

* Maximum permissible error, E_{MPE} is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

DIMENSIONS



Height Gage

Vernier Height Gage
SERIES 514, 506 — Standard Height Gage with Adjustable Main Scale

- Fits comfortably in the hand and moves easily on the surface plate.
- Carbide-tipped scriber is provided as a standard accessory.
- The main scale slides and clamps within the column for quick and convenient zero-setting.



Standard Accessories

Order No.	Description	Models
07GZA000	Carbide-tipped scriber	514-102, 514-104, 514-106, 514-103, 514-105, 514-107
905200	Carbide-tipped scriber	514-108, 514-109
05GZA033	Scriber clamp	514-102, 514-104, 514-106, 514-108, 514-103, 514-105, 514-107, 514-109

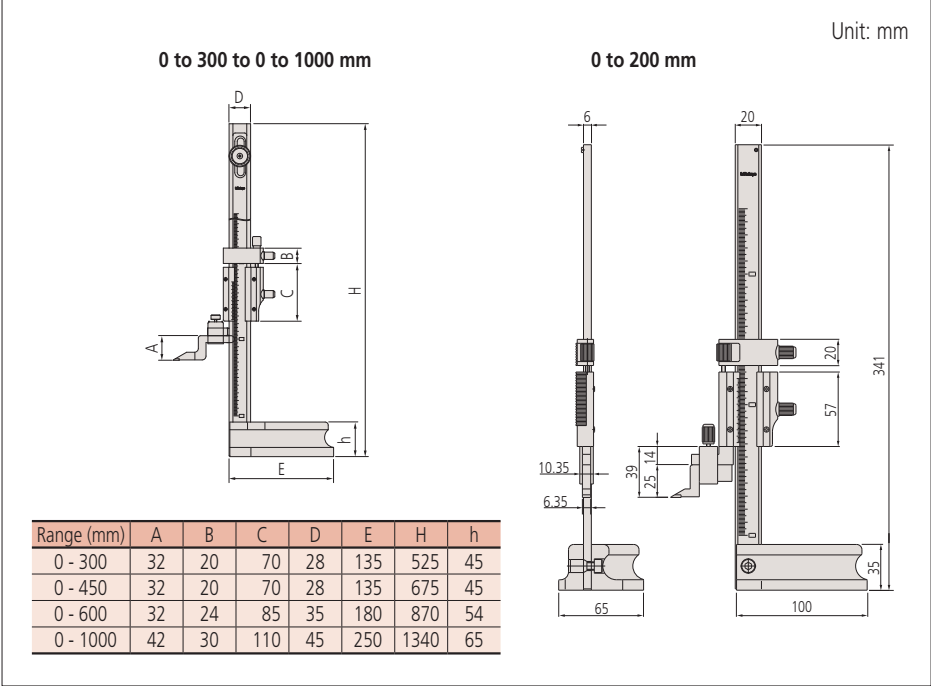
SPECIFICATIONS

Metric							
Order No.	Range (mm)	Minimum reading (mm)	Scale adjustment (mm)	Fine feed (mm)	Maximum permissible error E_{MPE} (mm)*	Height (mm)	Mass (kg)
506-207	0 - 200	0.02	—	4	±0.03	341	1.4
514-102	0 - 300		15		±0.04	525	3.1
514-104	0 - 450		7	±0.05	675	3.4	
514-106	0 - 600				870	7.4	
514-108	0 - 1000		25	6	±0.07	1340	20

Inch / Metric							
Order No.	Range (in)	Minimum reading	Scale adjustment (in)	Fine feed (in)	Maximum permissible error E_{MPE} (in)*	Height (mm)	Mass (kg)
506-208	0 - 8	0.001 in/0.02 mm	—	0.16	±0.001	341	1.4
514-103	0 - 12		0.6		±0.002	525	3.1
514-105	0 - 18			675		3.4	
514-107	0 - 24			0.27	870	7.4	
514-109	0 - 40		1	0.24	±0.003	1340	20

• Reading magnifier (optional): 514-102/104/ 106: 07GZA003, 514-108: 07GZA015
* Maximum permissible error, *E_{MPE}* is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

DIMENSIONS



D

Height Gage

Dial Height Gage
SERIES 192 — With digital counter

- Easy and error-free reading with both up and down digital counters as well as a dial.
- Can be zero-set at any arbitrary position.
- Provided with a large feed wheel for easy height adjustment.
- Carbide tipped scriber (**07GZA000**) is attached as standard. (Standard accessory: Scriber clamp **05GZA033**)



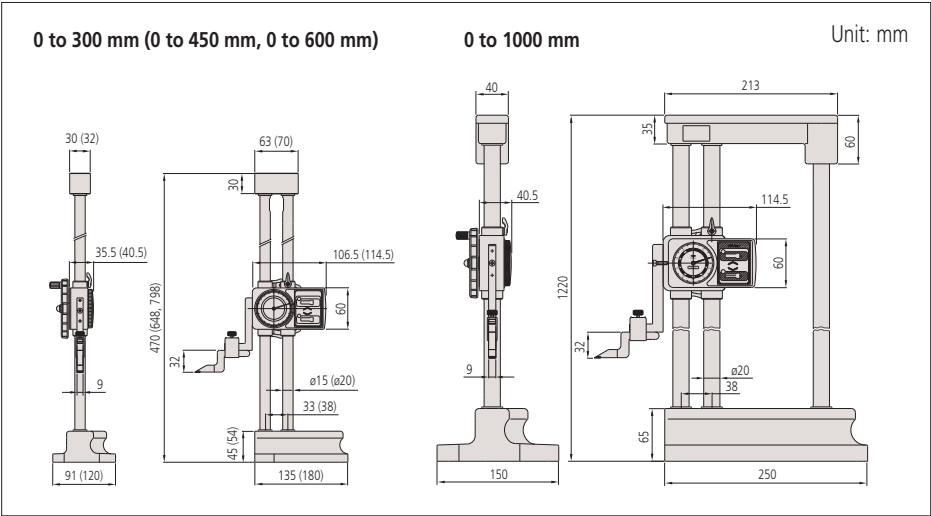
SPECIFICATIONS

Metric					
Order No.	Range (mm)	Graduation (mm)	Maximum permissible error <i>E</i> _{MPE} (mm)*	Height (mm)	Mass (kg)
192-130	0 - 300	0.01	±0.03	470	4.2
192-131	0 - 450		±0.05	648	9.2
192-132	0 - 600			798	9.8
192-133	0 - 1000		±0.07	1220	17.0

Inch					
Order No.	Range (in)	Graduation (in)	Maximum permissible error <i>E</i> _{MPE} (in)*	Height (mm)	Mass (kg)
192-150	0 - 12	0.001	±0.0015	470	4.2
192-151	0 - 18		±0.002	648	9.2
192-152	0 - 24			798	9.8
192-153	0 - 40		±0.003	1220	17.0

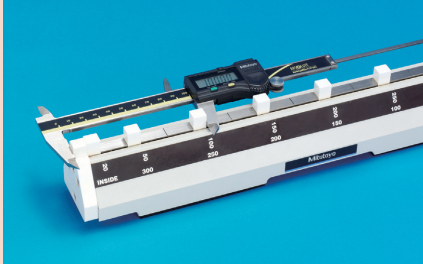
* Maximum permissible error, *E*_{MPE} is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

DIMENSIONS

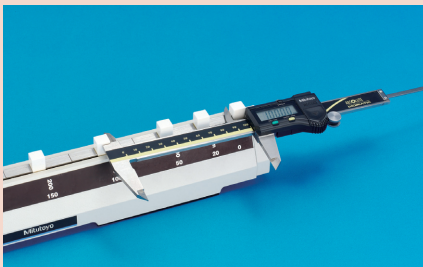




Typical applications



Checking accuracy of caliper (outside measurement)



Checking accuracy of caliper (inside measurement)



Checking accuracy of height gage

Optional Accessories

- 602162: Wooden case for 300 mm, 12 inch model
- 602164: Wooden case for 600 mm model

Height Gage

CERA Caliper Checker SERIES 515

- Enables efficient setting and inspection of calipers and height gages.



515-555

SPECIFICATIONS

Metric

Order No.	Range (mm)	Block pitch accuracy*		Parallelism of blocks*		Mass (kg)
		20 - 300 mm	350 - 600 mm	20 - 300 mm	350 - 600 mm	
515-555	0 - 300	$\pm 5.0 \mu\text{m}$	—	2.0 μm	—	4
515-556-2	0 - 600		$\pm 7.0 \mu\text{m}$		4.0 μm	8.5

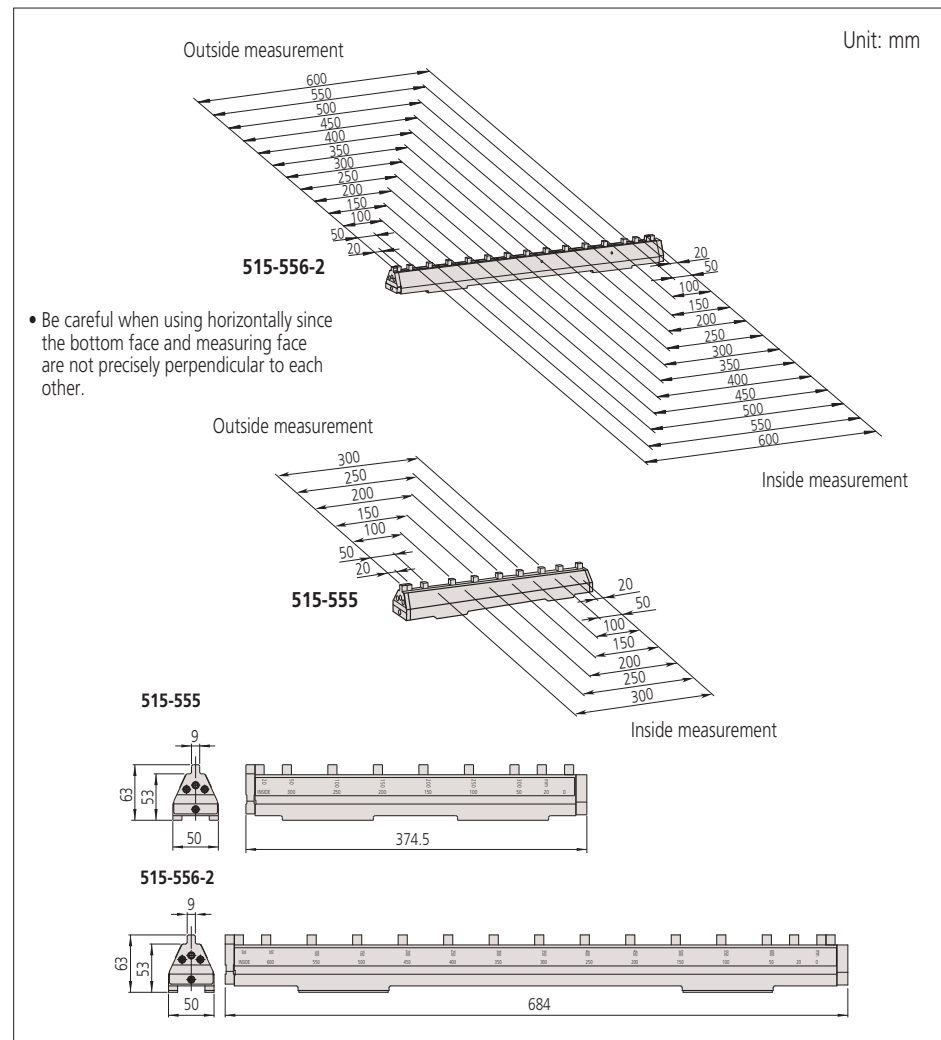
Inch

Order No.	Range (in)	Block pitch accuracy*		Parallelism of blocks*		Mass (kg)
		1 - 12 in	1 - 12 in	1 - 12 in	1 - 12 in	
515-565	0 - 12	$\pm 0.0002 \text{ in}$		0.00008 in		4

* The block accuracy and the parallelism of blocks are based on the following:

- Outside caliper and height gage: lower end reference plane
- Inside caliper: inside reference plane

DIMENSIONS



Dial Test Indicators

- For information about the attachment of test indicators, refer to page F-75.

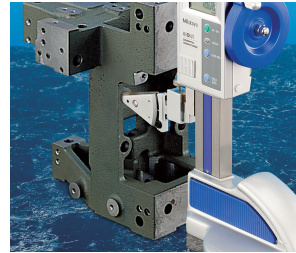
Contact Sensor



900872

- Attached to both the workpiece*¹ and height gage*² when measuring heights using a height gage with a scribe, the contact sensor is a convenient detector that gives a lamp display when the scribe touches the workpiece.
- *1 Conductive workpieces only.
- *2 Attach to a conductive part.
- Magnet is incorporated.
- Battery (PR44, 2 pcs. required) is not included.
- For precision Black Granite Surface Plates, refer to page E-47.

Center Probe



951144

- Allows quick measurement of center-to-center distance between holes.
- Measurable hole diameters: 1 to 38 mm
- Mounting bar section: 9x9 mm

Depth Gage Attachment



900764

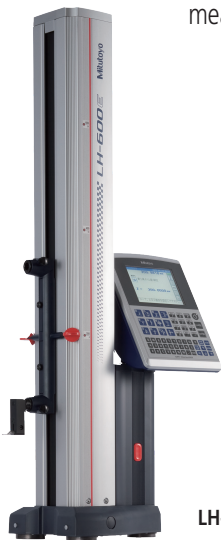
- Attaches to a height gage for measuring groove and hole depth.
- Minimum hole diameter: 5.5 mm
- Maximum distance from the bottom of the holding bar to the contact point: 80 mm (metric type), 2.95 in (inch type)
- Dial indicator contact points are usable. (Refer to pages F-57 and F-58.)
- Mounting bar section: 9x9 mm
- Holding bar length: 100 mm

D

Height Gage

Linear Height
SERIES 518 — High Performance 2D Measurement System

- High precision 2D measurement system, indication accuracy (1.1 + 0.6L/600) μm, incorporating a wide range of functions.
- To achieve best-in-class, a high-accuracy reflective-type linear encoder and guide are used.
- Icon-based commands support easy one-key operation.
- Full/Semi-floating mode can be selected. Full for movement, Semi for measuring.
- Equipped with various interfaces for RS-232C communication in addition to connectability to printers and Digimatic measuring instruments.



LH-600E

With power grip



LH-600EG

SPECIFICATIONS

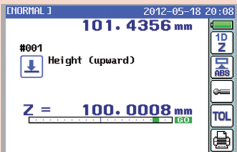
Metric			
Model		LH-600E*3 (without power grip)	LH-600EG*3 (with power grip)
Measuring range (Stroke)		0 to 977 mm (600 mm) 0 to 38 in (24 in)	
Resolution		0.0001/0.001/0.01/0.1 mm (selectable) 0.000001/0.00001/0.0001/0.001 in (selectable)	
Accuracy at 20 °C	Indication accuracy*1	(1.1 + 0.6L/600) μm, L=Measured length (mm)	
	Repeatability*1	Plane: 0.4 μm (2 σ), Hole: 0.9 μm (2 σ)	
	Perpendicularity (forward and backward)*2	5 μm (after compensation)	
	Straightness (forward and backward)*2	4 μm (mechanical accuracy)	
Guiding method		Roller bearing	
Driving method		Motor-driven (5, 10, 15, 20, 25, 30, 40 mm/s: 7 steps)/Manual	
Scale unit		Reflective-type linear encoder	
Measuring force		1 N (automatic constant-force function)	
Balancing method		Counter weight balance	
Main unit moving mode		Full-floating (moving)/Semi-floating (measuring) air bearing	
Air source		Built-in compressor	
Monitor		5.7 inch COLOR TFT LCD	
Max. number of programs		50	
Max. number of measured data		60,000 (Max. number of data is 30,000/per program)	
Power supply		AC adapter/Battery (NiMH)	
Battery operation time		Approx. 5 hours (compressor duty cycle 25% max.)	
Battery charging time		Approx. 3 hours (usable during charge)	
Dimensions (WxDxH)		237x438x1013 mm	247x438x1013 mm
Mass		24 kg	24.5 kg
Operating temperature/humidity ranges		5 to 40 °C/20 to 80% RH (non-condensing)	
Storage temperature/humidity ranges		-10 to 50 °C/5 to 90% RH (non-condensing)	

Standard Accessories: **12AAF634** ø5 mm stepped probe, **12AAA715** Ball-diameter corrected block*4, **12AAF674** Auxiliary weight*5
Note: To obtain maximum measurement accuracy, please note the following:
• Use in an environment that is as close as possible to 20 °C, and subject to minimal temperature change over time.
• Use in conjunction with a surface plate of JIS 1 class, or higher, flatness specification.
*1 Guaranteed when using the standard eccentric ø5 probe.
*2 Guaranteed when using the Lever Head (**519-521**), Mu-Checker (**519-561**).
*3 Order No. depends on the destination as shown in the table on the right.
*4 When the correction is performed by using the taper type contact point, the ball-diameter corrected block **12AAA787** (for taper type contact point) is required.
*5 Two auxiliary weights come with the main unit.

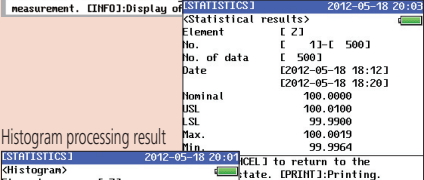


Screenshot examples

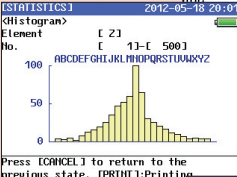
Measurement screen



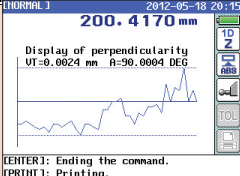
Statistical processing result



Histogram processing result



Squareness measurement result: Graphical display*



Squareness measurement result: Numeric display*

* To use this function, a Digimatic indicator or a lever head plus a digital Mu-checker are required.

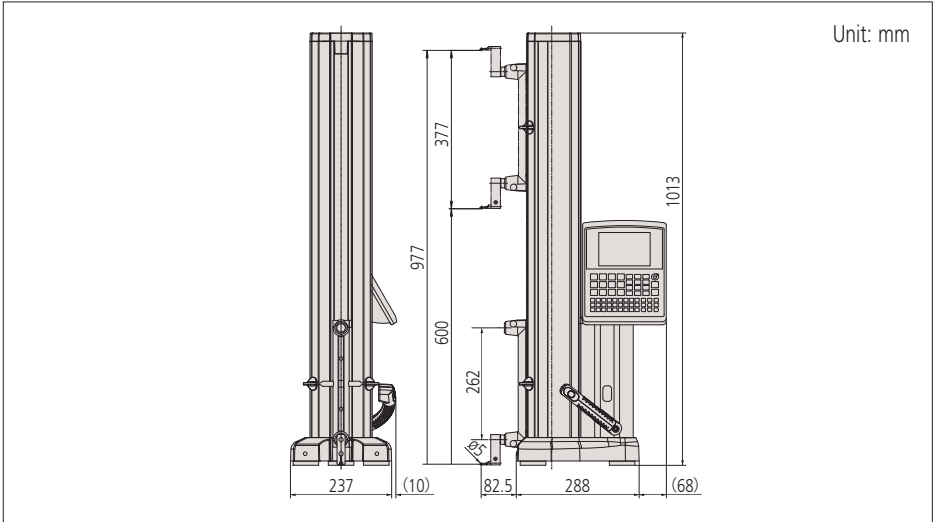
Model without power grip

Order No.	Remarks
518-351-10	Model for Japan, Japanese manual
518-351A-21	Model for North America, English manual
518-351A-22	Model for South America, Spanish manual
518-351D-21	Model for EU, English manual
518-351E-21	Model for U.K., English manual
518-351DC	Model for China, Chinese manual
518-351K	Model for Korea, Korean manual

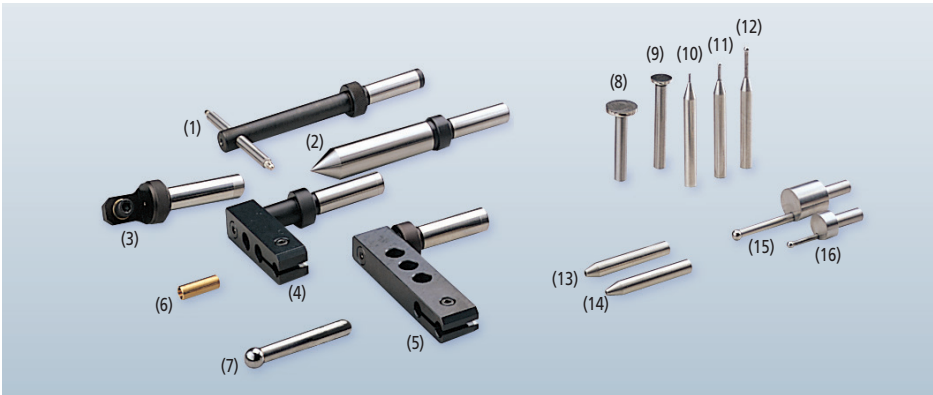
Model with power grip (Power grip pre-installed model)

Order No.	Remarks
518-352-10	Model for Japan, Japanese manual
518-352A-21	Model for North America, English manual
518-352A-22	Model for South America, Spanish manual
518-352D-21	Model for EU, English manual
518-352E-21	Model for U.K., English manual
518-352DC	Model for China, Chinese manual
518-352K	Model for Korea, Korean manual

DIMENSIONS



Optional Accessories



No.	Order No.	Item	Order No.	Item
(1)	12AAC072	Depth probe	12AAB136	ø10 mm cylindrical probe
(2)	12AAC073	Taper probe	12AAF666	ø1 mm ball probe (coaxial type)
(3)	932361	Mu-checker lever head holder* ¹ *1 Two additional pieces of auxiliary weights required (total 4 pcs.)	12AAF667	ø2 mm ball probe (coaxial type) Ruby ball
(4)	12AAA792	Dial indicator holder	12AAF668	ø10 mm ball probe (coaxial type) L: 82 mm
(5)	12AAA793	Probe extension holder	12AAF669	ø10 mm ball probe (coaxial type) L: 120 mm
(6)	226116	ø6 stem	12AAF670	ø5 mm disk probe
(7)	12AAB552	ø10 mm ball probe (coaxial type)	12AAF671	ø10 mm disk probe
(8)	957265	ø20 mm disk probe	12AAF672	ø1 mm ball offset probe
(9)	957264	ø14 mm disk probe	05HAA394	ø5 mm ball offset probe
(10)	957261	ø2 mm ball probe (coaxial type)	12AAA879	Sample workpiece
(11)	957262	ø3 mm ball probe (coaxial type)	932377A	ø2 mm CMM ball probes
(12)	957263	ø4 mm ball probe (coaxial type)	932378A	ø3 mm CMM ball probes
(13)	226118	M3 CMM stylus adapter* ²	932379A	ø5 mm CMM ball probes
(14)	226117	M2 CMM stylus adapter* ²	932380A	ø6 mm CMM ball probes
(15)	12AAA789	ø6 mm ball offset probe	532328	ø10 mm CMM ball probes
(16)	12AAA788	ø4 mm ball offset probe	532345	ø20 mm CMM disk probes
			930803	ø30 mm CMM disk probes
			12AAF712	Battery pack

*2 For enabling CMM stylus to be used.

Note: A gauge block may be required for zero-setting depending on the probe and contact point.

Various peripheral devices

Order No.	Item
12AAN048*	Receipt printer (for Japan)
12AAN049*	Receipt printer (for North America)
12AAN050*	Receipt printer (for EU; excluded U.K.)
12AAN051*	Receipt printer (for U.K.)
12AAN052	Receipt paper (10-roll set)
12AAA804	Cable for page printer (2 m)
12AAA807	RS-232C cable (2 m/80 in)
936937	Digimatic cable (1 m)
965014	Digimatic cable (2 m)

* Attachment for fixing the connecting cable is provided as standard.

D

Height Gage

QM-Height SERIES 518 — High-Performance Height Gage

- Best-in-class accuracy $\pm(2.4 + 2.1L/600) \mu\text{m}$
- With/Without air-floating structure model. The function enables smooth movement on the surface plate.
- Easy-to-view, simple control panel enables most measurements to be made with a single keystroke.
- Eco-friendly product, operable for approximately 1,200 hours with four AA alkaline batteries. (Four commercially available nickel hydride batteries can also be used.)



518-246

SPECIFICATIONS

Order No.	Metric Inch / Metric	518-240 518-241	518-242 518-243	518-244 518-245	518-246 518-247
Measuring range (stroke)		0 to 465 mm (350 mm / 14 in)	0 to 715 mm (600 mm / 24 in)	0 to 465 mm (350 mm / 14 in)	0 to 715 mm (600 mm / 24 in)
Resolution	Metric	0.001 mm/0.005 mm (Selectable)			
	Inch / Metric	0.001/0.005 mm 0.00005/0.0001/0.0002 in (Selectable)			
Accuracy at 20 °C	Indication accuracy*1	± (2.4 + 2.1L/600) μm			
	Repeatability*1	2 σ ≤ 1.8 μm			
Perpendicularity*2 (20 °C)		7 μm	12 μm	7 μm	12 μm
Guiding method		Roller bearing			
Drive method		Manual (wheel)			
Measurement principle		Electromagnetic induction absolute encoder			
Measuring force		1.5±0.5 N			
Data output ports		Digimatic / USB*3			
Air-floating system		Not included		Included (for positioning only)*4	
Power supply		Alkaline AA /LR6 batteriesx4 (standard accessories)/AC adapter (optional accessory)*5/ Supports NiMH (HR6) rechargeable batteriesx4			
Battery life guidelines*6		Approx. 1,200 hours (without using the air-floating system)			
		Approx. 90 hours (when using the air-floating system)			
Mass		25 kg	29 kg	26 kg	30 kg
Dimensions (WxDxH)		Stroke 350 mm type: 280x273x784 mm Stroke 600 mm type: 280x273x1016 mm			
Operating temperature range (recommended)		0 to 40 °C (10 to 30 °C)			
Operating humidity range		20 to 80% RH (non-condensing)			
Storage temperature range		-10 to 50 °C			
Storage humidity range		5 to 90% RH (non-condensing)			

• Standard Accessories: **05HZA148** ϕ 5 mm stepped probe, **12AAA715** Probe diameter calibration block, Alkaline batteries x4 (AA/LR6)

*1 The indication accuracy and repeatability represent the values obtained from the height measurement of a flat surface using the standard holder with ϕ 5 ball contact point. In the case of diameter, minimum (maximum) value, circle pitch or difference measurement, measuring errors may be larger than the accuracy ratings listed in the table due to variations in measuring force during a scanning measurement, which differs from height measurement.

*2 Indicates the value obtained from the measurement of a straight surface placed perpendicular to the the base reference surface using the Lever Head (**519-521**) and Mu-checker (**519-551**).

*3 Requires special communication driver. Consult your local Mitutoyo Sales Office for details.

These can be downloaded from the Mitutoyo web site. <https://www.mitutoyo.co.jp/eng/contact/products/usb/index.html>

*4 When using a model with the air-floating system, it is advisable to use a JIS 1 class, or higher, surface plate. Using on surfaces with scratches or unevenness may prevent the system operating to the specified performance.

*5 The AC adapter cannot be used to recharge rechargeable batteries.

*6 Battery life depends on the operating conditions. In particular, it is more economical to use the optional AC adapter to power the instrument if the application requires prolonged use of the air-floating system.

MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

ABSOLUTE[™]

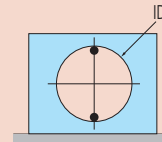


Measurement example

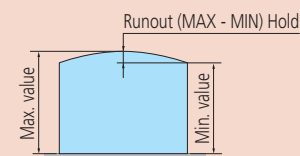
- Height measurement



- ID measurement



- Runout measurement

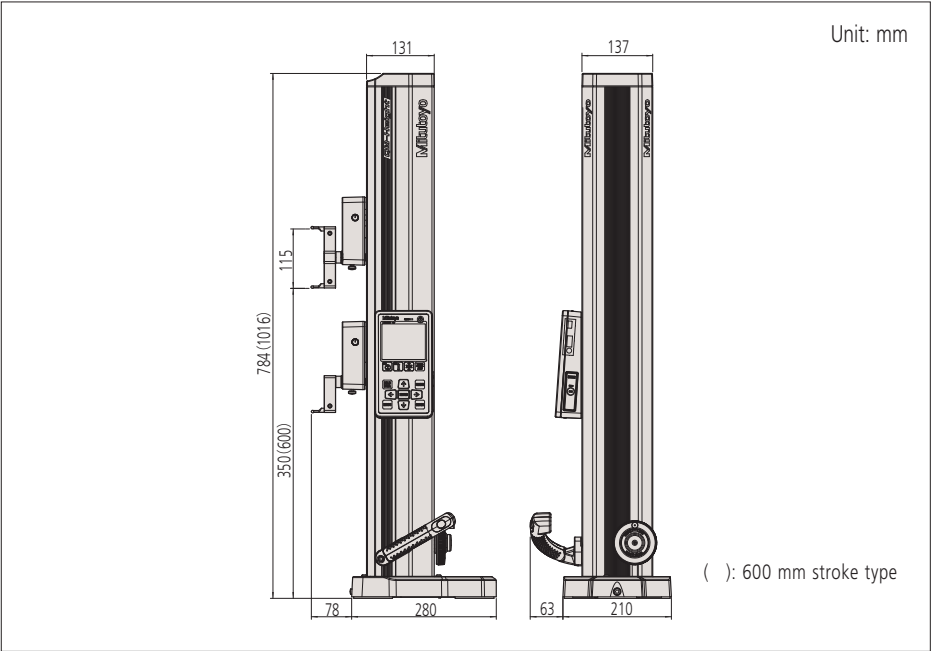


Mitutoyo

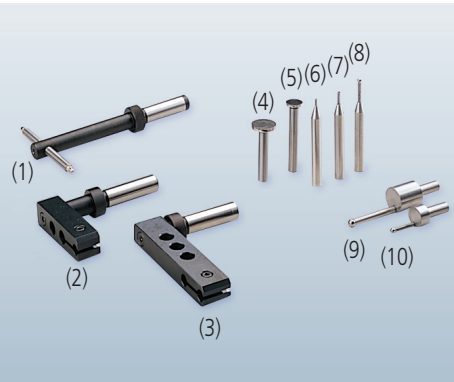
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DIMENSIONS



Optional Accessories



Contact points for a wide range of measurements

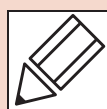
Item	Order No.	Description
Depth probe		
(1)	12AAC072	Depth probe
Special holder		
(2)	12AAA792	Holder for dial indicator
(3)	12AAA793	Holder (Long)
Interchangeable contact points for ø5 mm stepped probe		
(4)	957265	ø20 mm disk
(5)	957264	ø14 mm disk
(6)	957261	ø2 mm ball (coaxial type)
(7)	957262	ø3 mm ball (coaxial type)
(8)	957263	ø4 mm ball (coaxial type)
(9)	12AAA789	ø6 mm ball (eccentric type)
(10)	12AAA788	ø4 mm ball (eccentric type)
AC Adapter		
	06AFZ950JA	AD620JA for Japan/U.S.
	06AFZ950D	AD620D for the EU
	06AFZ950E	AD620E for the UK
	06AFZ950K	AD620K for Korea
	06AEG180DC	AD620DC for China
Others		
	05HZA143	9x9 mm adapter (clamp underneath is required)
	05GZA033	Clamp (for 9x9 mm adapter)
	05HZA144	6.35x12.7 mm adapter (clamp underneath is required)
	901385	Clamp (for 6.35x12.7 mm adapter)
	05HZA173	Scriber*

Optional accessories that enable centralized data management

Order No.	Item name
Small printer equipped with Data Logger	
264-505	DP-1VA LOGGER
936937	Digimatic connecting cable (1 m)
965014	Digimatic connecting cable (2 m)
06AFZ050	USB cable (A-microB)
Measurement Data Input Unit	
06AFM380D	USB Input Tool Direct USB-ITN-D
Measurement data wireless communication system	
02AZD730G	U-WAVE-T (Transmission unit) (IP67 type)
02AZD880G	U-WAVE-T (Transmission unit) (Buzzer type)
02AZD790D	U-WAVE-T dedicated cable (Standard use)
02AZE140D	U-WAVE-T dedicated cable (For foot switch)
02AZD810D	U-WAVE-R receiver
02AZE990	U-WAVE mounting plate
Measurement data collection software for Excel USB-IT PAK V2.1	
Measurement data network system MeasurLink®	

* Used for measurements, cannot be used for scribing.
Note: A gauge block may be required for zero-setting depending on the probe or contact point to be used.

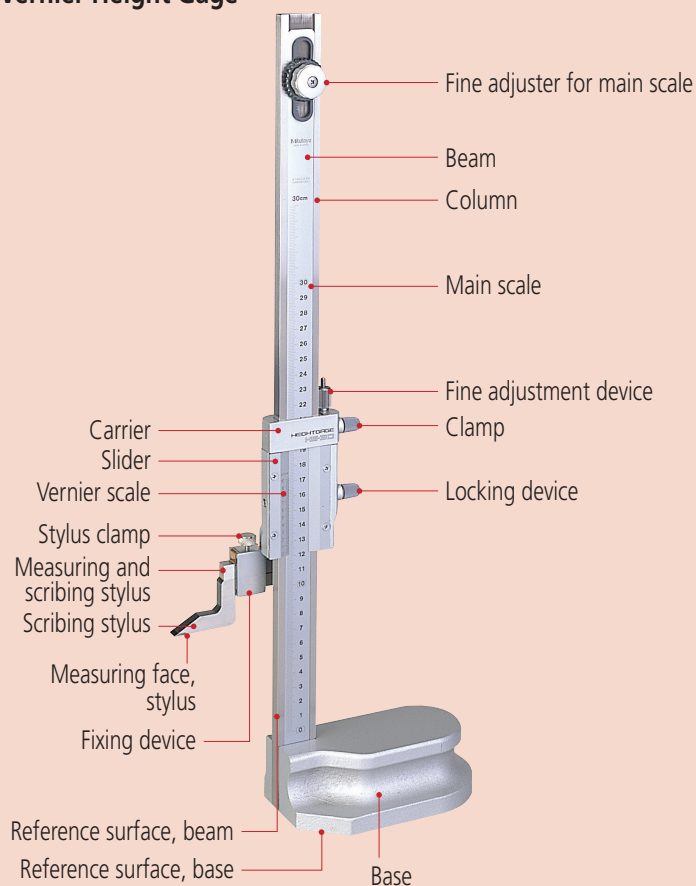
Quick Guide to Precision Measuring Instruments



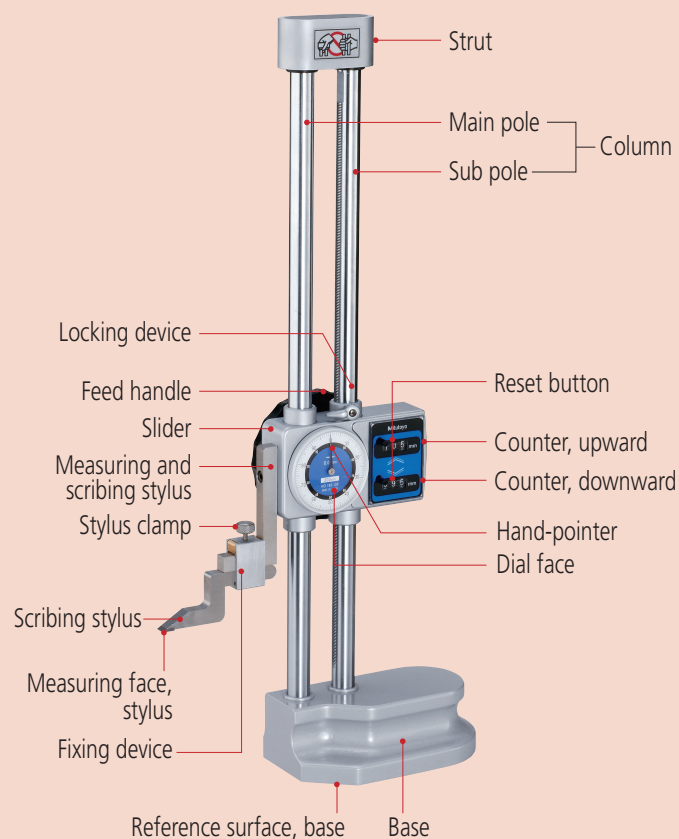
Height Gages

Nomenclature

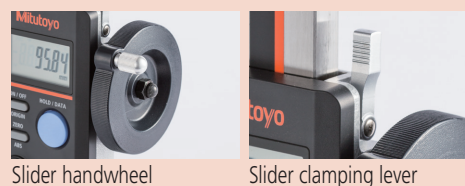
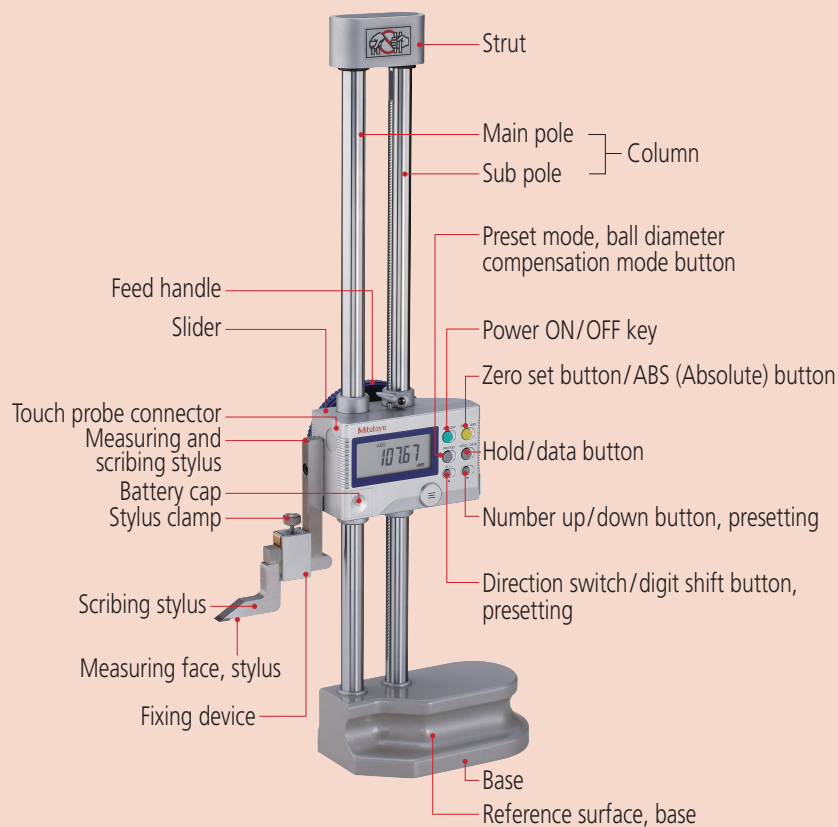
Vernier Height Gage



Mechanical Digit Height Gage



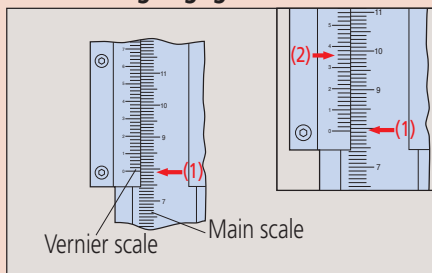
Digimatic Height Gages



Mitutoyo

D-63

How to read Vernier Height gage



Graduation 0.02 mm

(1) Main scale	79 mm
(2) Vernier	0.36 mm
Reading	79.36 mm

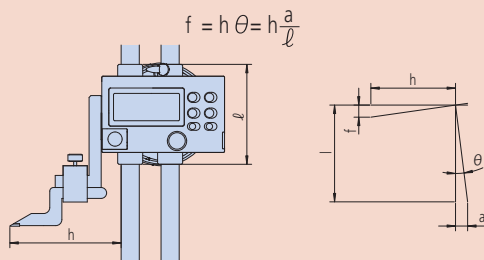
General notes on use of Height Gages

1. Potential causes of error

Like the caliper, the error factors involved include parallax effects, error caused by excessive measuring force due to the fact that a height gage does not conform to Abbe's Principle, and differential thermal expansion due to a temperature difference between the height gage and workpiece. There are also other error factors caused by the structure of the height gage. In particular, the error factors related to a warped reference edge and scriber installation described below should be studied before use.

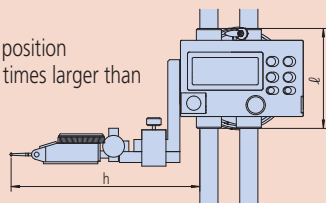
2. Reference edge (column) warping and scriber installation

Like the caliper, and as shown in the following figure, measurement errors result when using the height gage if the reference column, which guides the slider, becomes warped. This error can be represented by the same calculation formula for errors caused by nonconformance to Abbe's Principle.



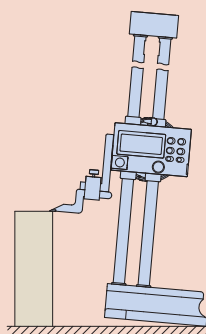
Installing the scriber (or a lever-type dial indicator) requires careful consideration because it affects the size of any error due to a warped reference column by increasing dimension h in the above formula. In other words, if an optional long scriber or lever-type dial indicator is used, the measurement error becomes larger.

Example: Effect of measuring point position
When h is 150 mm, the error is 1.5 times larger than when h is 100 mm.



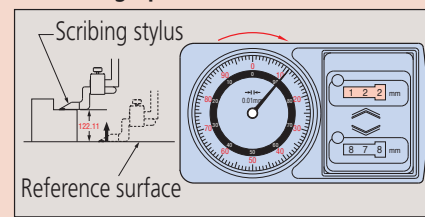
3. Lifting of the base from the reference surface

When setting the scriber height from a gauge block stack, or from a workpiece feature, the base may lift from the surface plate if excessive downwards force is used on the slider, and this results in measurement error. For accurate setting, move the slider slowly downwards while moving the scriber tip to and fro over the gauge block surface (or feature). The correct setting is when the scriber is just felt to lightly touch as it moves over the edge of the surface. It is also necessary to make sure that the surface plate and height gage base reference surface are free of dust or burrs before use.



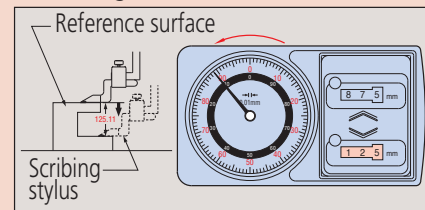
Mechanical Digit Height gage

Measuring upwards from a reference surface



Counter	122 mm
Dial	0.11 mm
Reading	122.11 mm

Measuring downwards from a reference surface



Counter	125 mm
Dial	0.11 mm
Reading	125.11 mm

4. Error due to inclination of the main scale (column)

According to JIS standards, the perpendicularity of the column reference edge to the base reference surface should be better than:

$$\left(0.01 + \frac{L}{1000}\right) \text{ mm} \quad L \text{ indicates the measuring length (unit: mm)}$$

This is not a very onerous specification. For example, the perpendicularity limit allowable is 0.61 mm when L is 600 mm. This is because this error factor has a small influence and does not change the inclination of the slider, unlike a warped column.

5. Relationship between accuracy and temperature

Height gages are made of several materials. Note that some combinations of workpiece material, room temperature, and workpiece temperature may affect measuring accuracy if this effect is not allowed for by performing a correction calculation.

- The tip of a height gage scriber is very sharp and must be handled carefully if personal injury is to be avoided.
- Do not damage a digital height gage scale by engraving an identification number or other information on it with an electric marker pen.
- Carefully handle a height gage so as not to drop it or bump it against anything.

Notes on using the height gage

- Keep the column, which guides the slider, clean. If dust or dirt accumulates on it, sliding becomes difficult, leading to errors in setting and measuring.
- When scribing, securely lock the slider in position using the clamping arrangements provided. It is advisable to confirm the setting after clamping because the act of clamping on some height gages can alter the setting slightly. If this is so, allowance must be made when setting to allow for this effect.
- Parallelism between the scriber measuring face and the base reference surface should be 0.01 mm or better.
Remove any dust or burrs on the mounting surface when installing the scriber or lever-type dial indicator before measurement. Keep the scriber and other parts securely fixed in place during measurement.
- If the main scale of the height gage can be moved, move it as required to set the zero point, and securely tighten the fixing nuts.
- Errors due to parallax error are not negligible. When reading a value, always look straight at the graduations.
- Handling after use: Completely wipe away any water and oil. Lightly apply a thin coating of anti-corrosion oil and let dry before storage.
- Notes on storage:
 - Avoid direct sunlight, high temperatures, low temperatures, and high humidity during storage.
 - If a digital height gage will not be used for more than three months, remove the battery before storage.
 - If a protective cover is provided, use the cover during storage to prevent dust from adhering to the column.

Height Gage Performance Evaluation Method

JIS B 7517 was revised and issued in 2018 as the Japanese Industrial Standards of the height gage, and the "Instrumental error" indicating the indication error of the height gage has been changed to "Maximum permissible error (MPE) of indication".

The "Instrumental error" of the conventional JIS adopts acceptance criteria that the specification range (precision specification) equals acceptance range, and the OK/NG judgment does not include measurement uncertainty (Fig. 1). The "Maximum permissible error (MPE) of indication" of the new JIS employs the basic concept of the OK/NG judgment taking into account the uncertainty adopted in the ISO standard (ISO 14253-1).

The verification of conformity and nonconformity to the specifications is clearly stipulated to use the internationally recognized acceptance criteria (simple acceptance) when the specification range equals the acceptance range, and it is accepted that the specification range equals the acceptance range if a given condition considering uncertainty is met.

The above said internationally recognized acceptance criterion is ISO/TR 14253-6: 2012 (Fig. 2).

The following describes the standard inspection method including the revised content of JIS 2018.

Fig. 1 Conventional JIS Instrumental error
JIS B 7517-1993

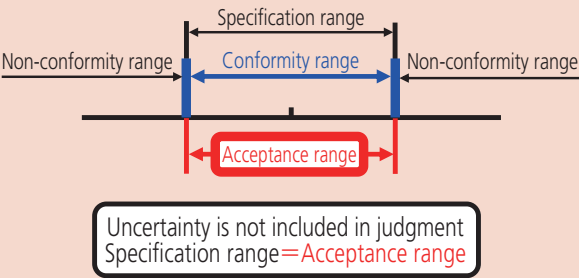
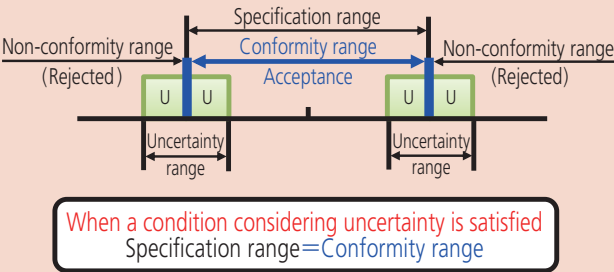


Fig. 2 New JIS Maximum permissible error (MPE)
JIS B 7517: 2018 (ISO/TR 14253-6: 2012)



Maximum permissible error of height measurement E_{MPE} [JIS B 7517: 2018]

The height measurement error in a height gage is the indication error when the reference edge (column) is perpendicular to the base reference surface and the direction of contact is downward. Table 1 shows the maximum permissible height measurement error E_{MPE} .

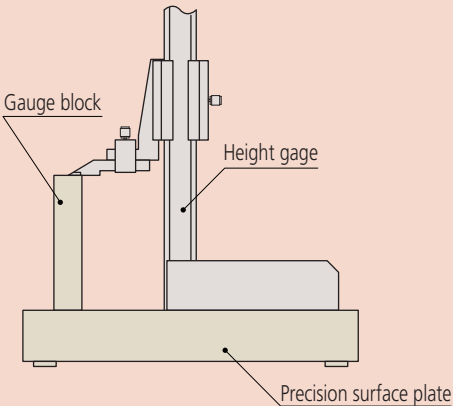
E_{MPE} for any desired height is obtained by measuring a gauge block, or equivalent, with a height gage on a precision surface plate (Fig. 3) and then subtracting the gauge block size from the measured size.

Table 1: Maximum permissible height measurement error E_{MPE} of a conventional height gage

Measurement height	Scale interval, graduation or resolution	
	0.05	0.02 or 0.01
50 or less	±0.05	±0.02
Over 50, 100 or less	±0.06	±0.03
Over 100, 200 or less	±0.07	
Over 200, 300 or less	±0.08	±0.04
Over 300, 400 or less	±0.09	
Over 400, 500 or less	±0.10	±0.05
Over 500, 600 or less	±0.11	
Over 600, 700 or less	±0.12	±0.06
Over 700, 800 or less	±0.13	
Over 800, 900 or less	±0.14	±0.07
Over 900, 1000 or less	±0.15	

Note: E_{MPE} includes the measurement error arising from straightness, flatness of the measuring surface and parallelism with the reference surface.

Fig. 3: Determination of height measurement error



The "Instrumental error" indicating the indication error of JIS has been changed to "Maximum permissible error (MPE) of indication" for the following models:

- **SERIES 192 Digimatic Height Gage** described on page D-49 (All models)
- **SERIES 570 ABSOLUTE Digimatic Height Gage** described on page D-51 (All models)
- **SERIES 570 ABSOLUTE Digimatic Height Gage** described on page D-52 (All models)
- **SERIES 514, 506 Standard Height Gage with Adjustable Main Scale** described on page D-53 (All models)
- **SERIES 192 With digital counter** described on page D-55 (All models)