

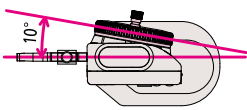
Height Gage

A standard measuring tool of industry

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

MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

- Double-column structure ensures high measuring accuracy.
- Ergonomic base fits comfortably in the hand.
- 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**.
- Better readability is provided thanks to display of measurement result with a large character height (11 mm) and high-contrast LCD.
- The drive handle is inclined to improve slider operability.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector. (Refer to page A-3.)
- Battery: SR44 (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 3,500 hours in continuous use.
- **192-663-10, 192-664-10** and **192-665-10** are provided with a long scribe (overall length of 150 mm).
- For precision Black Granite Surface Plates, refer to page E-49.



192-663-10



192-613-10

SPECIFICATIONS

Metric

Order No.	Range (mm)	Resolution (mm)	Maximum Permissible Error* (mm)/ E_{MPE}	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
192-613-10	0 - 300		±0.02		475	4.7
192-614-10	0 - 600		±0.05		802	8.3
192-615-10	0 - 1000		±0.07		1228	15.7

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

Inch / Metric

Order No.	Range (in)	Resolution	Maximum Permissible Error* (in)/ E_{MPE}	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		±0.0015		802	8.3
192-673-10	0 - 40		±0.0025		1228	15.7
192-630-10	0 - 12	0.0005 in/0.0002 in (selectable)	±0.001		475	4.7
192-631-10	0 - 18		±0.002		649	7.5
192-632-10	0 - 24		±0.002		802	8.3
192-633-10	0 - 40		±0.003		1228	15.7

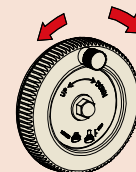
* Maximum Permissible Error, E_{MPE} , is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

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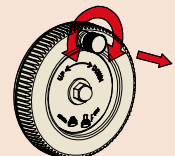
Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

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.



Coarse adjustment



Fine adjustment

Push the small fine-adjustment knob in to disengage gearing and then turn the large wheel.

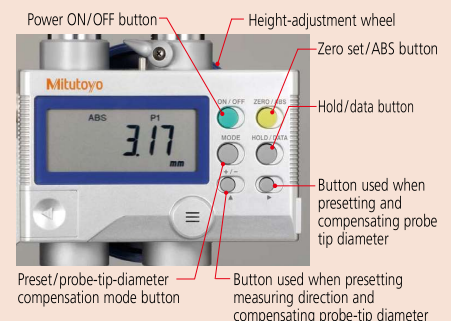
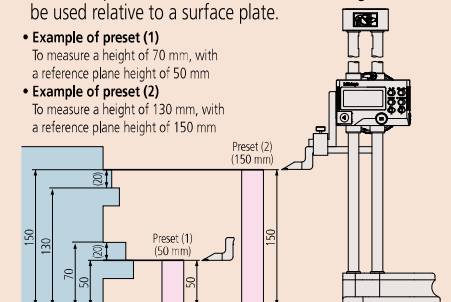
Pull the fine-adjustment knob out to engage gearing and then turn this knob, which then slowly turns the wheel.

- Low-voltage alert: When battery voltage becomes low, a warning appears in the display.
- 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.

- **Example of preset (1)**
To measure a height of 70 mm, with a reference plane height of 50 mm
- **Example of preset (2)**
To measure a height of 130 mm, with a reference plane height of 150 mm

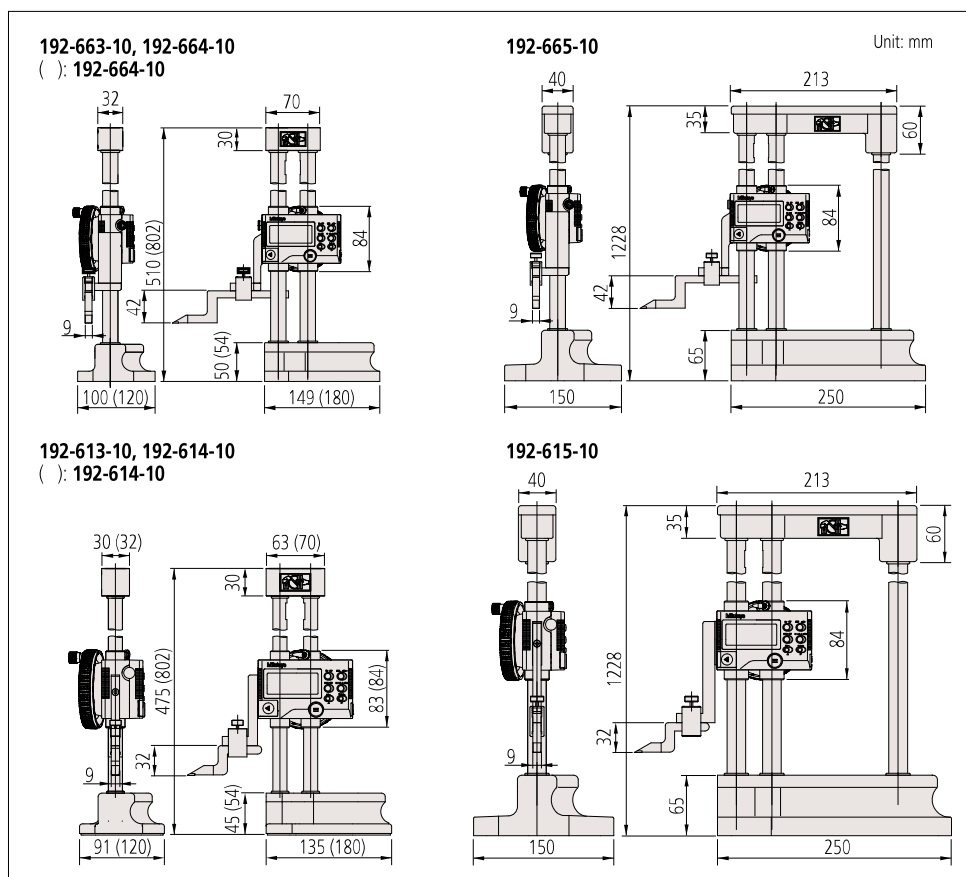


Note: Probe-tip-diameter compensation mode is a function provided for **192-663-10/192-664-10/192-665-10/192-670-10/192-671-10/192-672-10/192-673-10**.

Standard Accessories

- Scriber
192-663-10, 192-664-10,
192-665-10: 905200
192-613-10, 192-614-10,
192-615-10: 07GZA000
- Scriber clamp
05GZA033

DIMENSIONS



Optional Accessory

• Bidirectional touch-trigger probe

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.



SPECIFICATIONS

Metric							
Order No.	Measuring direction	Relay contact type	Probe overtravel (mm)	Probe size (mm)	Repeatability (μm)	Measuring force (N)	Standard accessories
192-007	Bidirectional	Normally Open	1.5	ø3	σ: 2	0.4	Holder arm, Clamp
Inch							
Order No.	Measuring direction	Relay contact type	Probe overtravel (mm)	Probe size (mm)	Repeatability (μm)	Measuring force (N)	Standard accessories
192-008	Bidirectional	Normally Open	1.5	ø3	σ: 2	0.4	Holder arm, Clamp

For details of the connecting cable, refer to page A-27, and for the holder arm and clamp, refer to page F-75.

• Connecting cables for IT/DP/MUX

- 905338: SPC cable (1 m)
- 905409: SPC cable (2 m)



• USB Input Tool Direct

- 06AFM380F: SPC cable for USB-ITN-F (2 m)

• Connecting cables for U-WAVE-T

- 02AZD790F: SPC cable (160 mm)
- 02AZE140F: SPC cable for foot switch

- 953638: Holding bar*
- 902053: Swivel clamp*

* A test indicator can be mounted on a height gage using a holding bar and clamp.

Height Gage

A standard measuring tool of industry

ABSOLUTE Digimatic Height Gage SERIES 570 — with Ergonomic Base

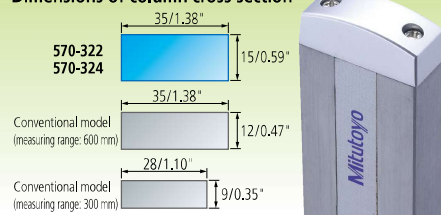
MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

- Allows smooth elevation by the slider adjustment wheel, which is the same as the well-established double-column structure height gage.
- Large slider-clamp lever ensures positive and accurate clamping action.
- High durability and high accuracy are ensured by an improved column design (35×15 mm).

- Allows integration into statistical process control and measurement systems for models with measurement data output connector. (Refer to page A-3.)
- Battery: SR44 (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 20,000 hours under normal use.
- For precision Black Granite Surface Plates, refer to page E-49.

Note: Do not hold the height gage by the column as this can affect the accuracy.

Dimensions of column cross section



- Character height of the LCD display is 10 mm.
- Ergonomic and stylish base fits comfortably in the hand.
- Due to the built-in ABSOLUTE scale function, origin setting is not required each time power is turned ON.



570-322



570-324

SPECIFICATIONS

Metric

Order No.	Range (mm)	Resolution (mm)	Maximum Permissible Error* (mm)/EMPE	Max. response speed	Mass (kg)
570-322	0 - 300	0.01	±0.03	Unlimited	4.6
570-324	0 - 600		±0.05		6.4

* Maximum Permissible Error, EMPE, is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

Inch/Metric

Order No.	Range (in)	Resolution	Maximum Permissible Error* (in)/EMPE	Max. response speed	Mass (kg)
570-312	0 - 12	0.0005 in/0.01 mm	±0.0015	Unlimited	4.6
570-313	0 - 18		±0.002		5.9
570-314	0 - 24		±0.002		6.4

* Maximum Permissible Error, EMPE, is the term (notation) used in JIS B 7517: 2018, revised based on ISO/TR 14253-6: 2012.

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Data Management Software by Mitutoyo

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

ABSOLUTE[™]

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.

Standard Accessories

For 570-322, 324

07GZA000 Scriber

05GZA033 Scriber clamp

For 570-312 and 570-313, 570-314

900258 Scriber

901385 Scriber clamp

05GZA033



953638

902053

07GZA000

(Refer to page F-75 for details)



Optional Accessories

For details, refer to page A-25.

- Connecting cables for IT/DP/MUX

905338: SPC cable with data button (1 m)

905409: SPC cable with data button (2 m)

- USB Input Tool Direct

06AFM380F: SPC cable for USB-ITN-F (2 m)

- Connecting cables for U-WAVE-T

02AZD790F: SPC cable with data button (160 mm)

02AZE140F: SPC cable for foot switch



Slider height adjustment wheel

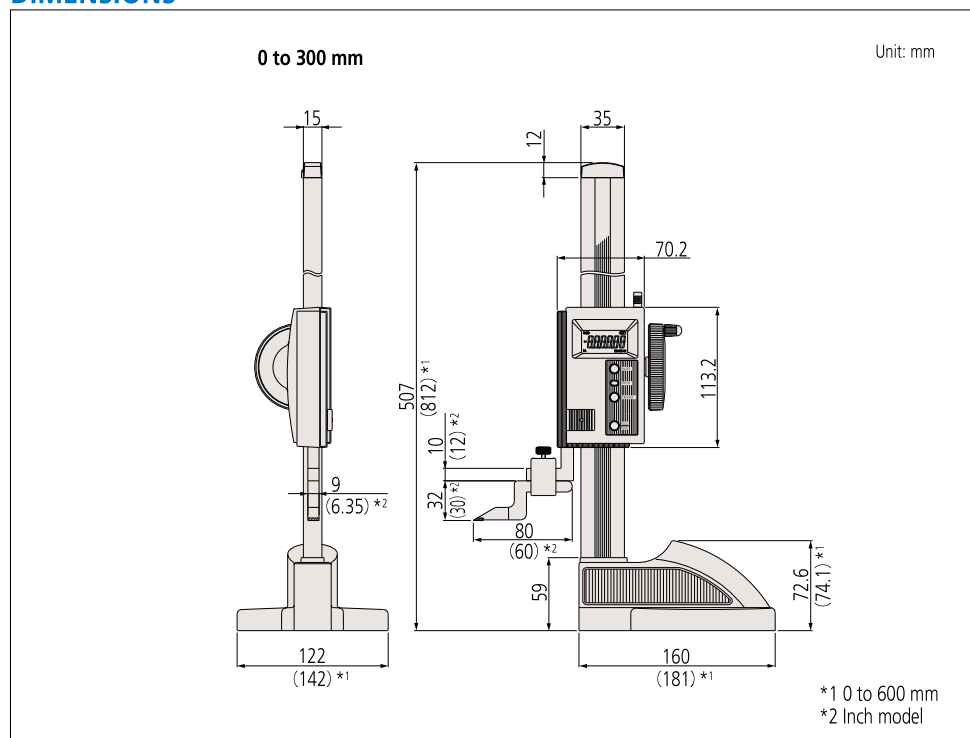


Large clamp lever



Base that fits the hand comfortably

DIMENSIONS



Height Gage

A standard measuring tool of industry

ABSOLUTE Digimatic Height Gage SERIES 570 — Standard model

MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

- 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.
- Allows integration into statistical process control and measurement systems. (Refer to page A-3.)
- Battery: SR44 (1 pc), **938882**. For initial operational checks (standard accessory)
- Battery life is 5,000 hours under normal use.
- Carbide-tipped scribe (**900173** for **570-227** and **244**, and **905200** for **570-230** and **248**) is provided as a standard accessory. (Standard accessory: scribe clamp **901338** for **570-227** and **244**, and **05GZA033** for **570-230** and **248**)
- 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.
- For precision Black Granite Surface Plates, refer to page E-49.



570-227

SPECIFICATIONS

Metric

Order No.	Range (mm)	Resolution (mm)	Fine feed (mm)	Maximum Permissible Error* (mm)/ E_{MPE}	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

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

Inch / Metric

Order No.	Range (in)	Resolution	Fine feed (in)	Maximum Permissible Error* (in)/ E_{MPE}	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

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

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Data Management Software by Mitutoyo

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

ABSOLUTE[™]

Functions

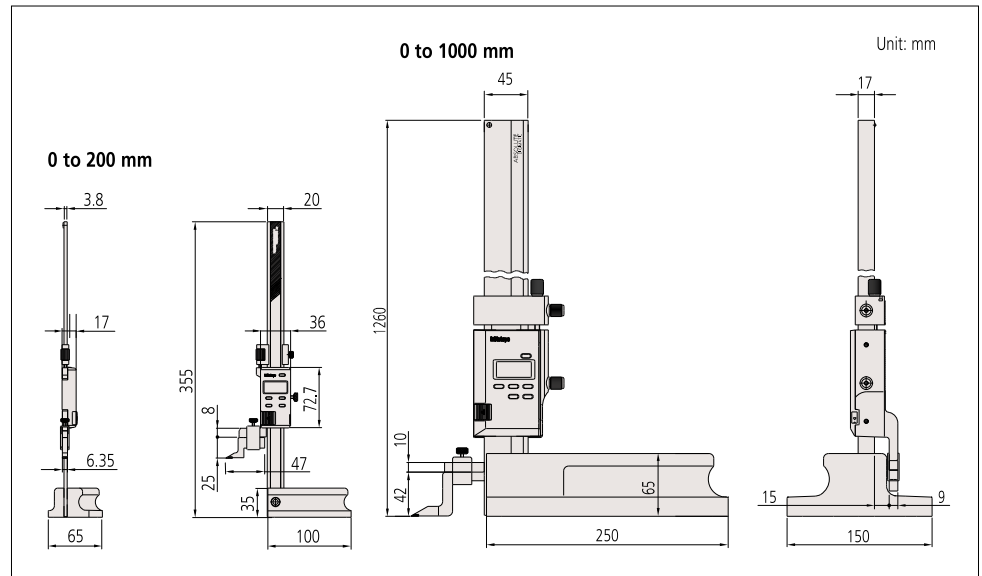
Zero-setting
+/- directional measurement
Data hold
Data output
Presetting
inch/mm reading (inch/mm models)
Preset value memory
Origin restoration
Low battery voltage alert
Counting value composition error alert

Optional Accessories

For details, refer to page A-25.

- Connecting cables for **IT/DP/MUX**
905338: SPC cable with data button (1 m)
905409: SPC cable with data button (2 m)
- USB Input Tool Direct
06AFM380F: SPC cable for **USB-ITN-F** (2 m)
- Connecting cables for **U-WAVE-T**
02AZD790F: SPC cable with data button (160 mm)
02AZE140F: SPC cable for foot switch

DIMENSIONS



Height Gage

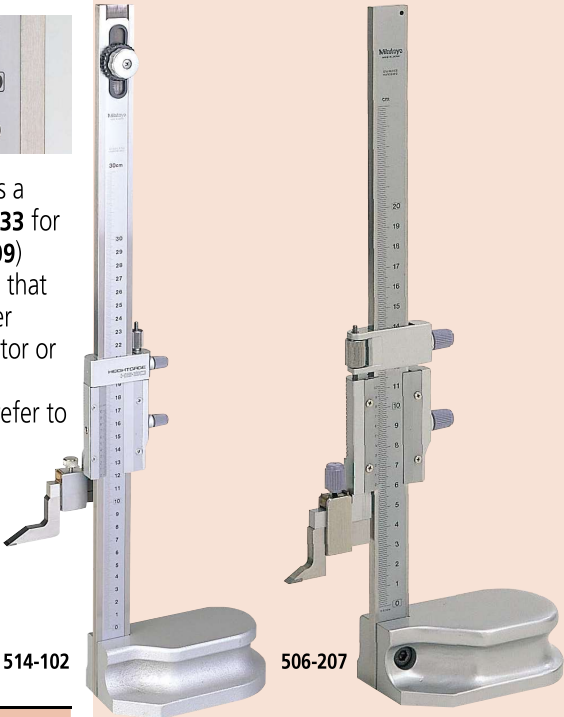
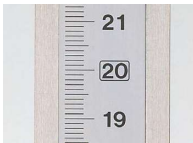
A standard measuring tool of industry

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.
- The main scale slides and clamps within the column for quick and convenient zero-setting.
- Large locking knobs are used both for the slider and fine adjustment clamps to make clamping easy and secure.
- Operability of slider has been improved.



- Large main-scale engraving for fatigue-free working.
- Carbide-tipped scriber (07GZA000 for 514-102/104/106/103/105/107, 905200 for 514-108 and 109) is provided as a standard accessory. (Scriber clamp 05GZA033 for 514-102/104/106/108/103/105/107/109)
- It is important for personal safety to ensure that any height gage remains stable in use after attaching an accessory such as a test indicator or probe.
- For precision Black Granite Surface Plates, refer to page E-49.



SPECIFICATIONS

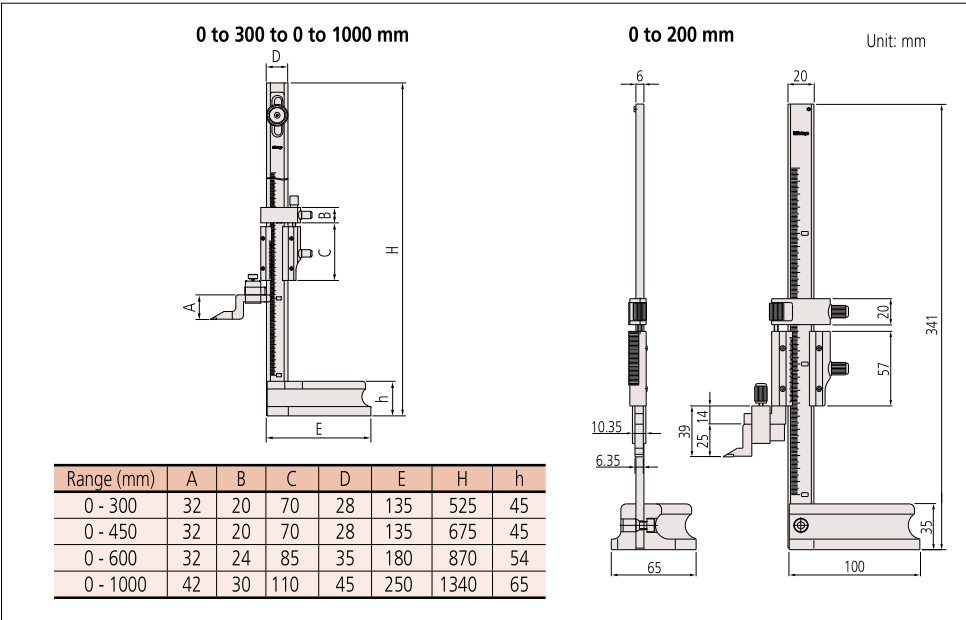
Metric								
Order No.	Range (mm)	Minimum reading (mm)	Scale adjustmen (mm)	Fine feed (mm)	Maximum Permissible Error* (mm)/E _{MPE}	Height (mm)	Mass (kg)	Remarks
506-207	0 - 200	0.02	—	4	±0.03	341	1.4	—
514-102	0 - 300		15		±0.04	525	3.1	—
514-104	0 - 450		7	±0.05	675	3.4	—	
514-106	0 - 600			±0.05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

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

Inch / Metric								
Order No.	Range (in)	Minimum reading	Scale adjustment (in)	Fine feed (in)	Maximum Permissible Error* (in)/E _{MPE}	Height (mm)	Mass (kg)	Remarks
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			0.27	±0.002	675	3.4	—
514-107	0 - 24				±0.002	870	7.4	—
514-109	0 - 40		1	0.24	±0.003	1340	20	—

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

DIMENSIONS



Optional Accessories

- **07GZA000**: Scriber
- **953638**: Holding bar for test indicator (length: 50 mm)
- **900209**: Holding bar for test indicator (length: 100 mm)
- **953639**: Holding bar for test indicator (length: 2 in)
- **900306**: Holding bar for test indicator (length: 4 in)
- **900321**: Swivel clamp used with holding bar (metric)
- **900322**: Swivel clamp used with holding bar (inch)
- **902053**: Clamp (with dovetail groove, $\phi 6$ and $\phi 8$ holes)

Note: A test indicator can be mounted on a height gage using a holding bar and clamp.

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.



- Fits comfortably in the hand and moves easily on the surface plate.



- Can be zero-set at any arbitrary position.
- Provided with a large adjustment wheel for easy height adjustment.
- Clamp can be operated easily and securely.



192-130

- Carbide tipped scriber (**07GZA000**) is attached as standard. (Standard accessory: Scriber clamp **05GZA033**)
- For precision Black Granite Surface Plates, refer to page E-49.

Note: Do not hold the height gage by the column as this can affect the accuracy.

SPECIFICATIONS

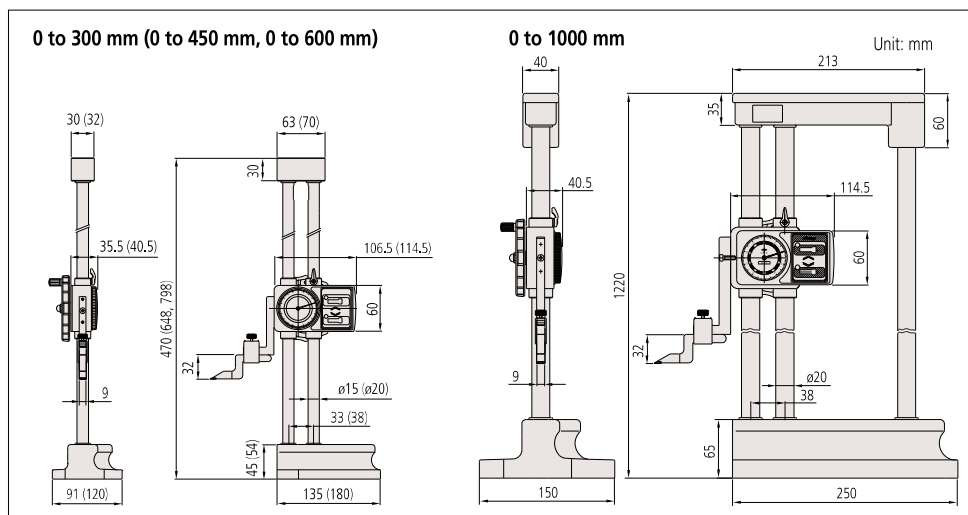
Metric					
Order No.	Range (mm)	Graduation (mm)	Maximum Permissible Error* (mm)/ E_{MPE}	Height (mm)	Mass (kg)
192-130	0 - 300	0.01	± 0.03	470	4.2
192-131	0 - 450		± 0.05	648	9.2
192-132	0 - 600			798	9.8
192-133	0 - 1000		± 0.07	1220	17.0

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

Inch					
Order No.	Range (in)	Graduation (in)	Maximum Permissible Error* (in)/ E_{MPE}	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

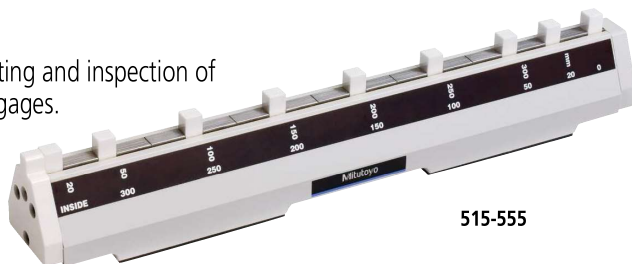


Height Gage

A standard measuring tool of industry

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	±5.0 μm	—	2.0 μm	—	4
515-556-2	0 - 600		±7.0 μm		4.0 μm	

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

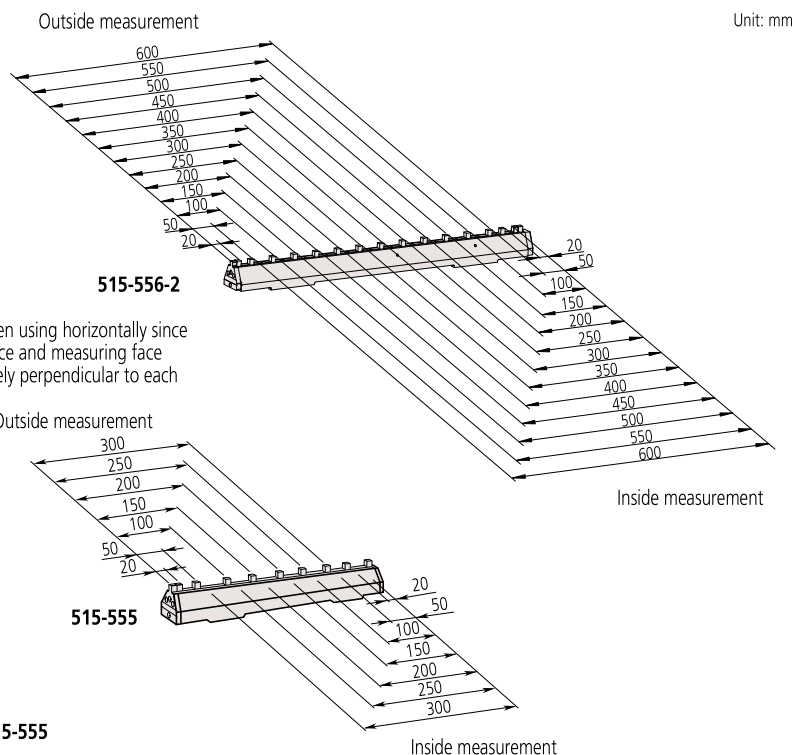
- Outside caliper and height gage: lower end reference plane
- Inside caliper: inside reference plane

Inch						
Order No.	Range (in)	Block pitch accuracy*		Parallelism of blocks*		Mass (kg)
		1 - 12 in		1 - 12 in		
515-565	0 - 12	±0.0002 in		0.00008 in		4

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

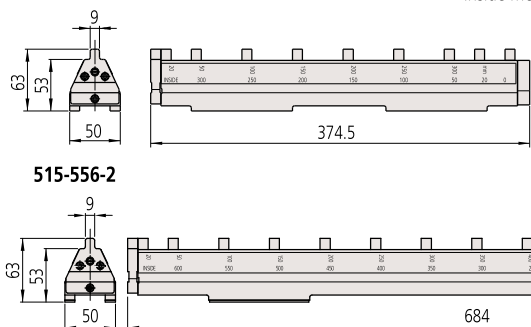
- Outside caliper and height gage: lower end reference plane
- Inside caliper: inside reference plane

DIMENSIONS



515-555

515-556-2



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

Typical applications



Checking accuracy of caliper (outside measurement)



Checking accuracy of caliper (inside measurement)



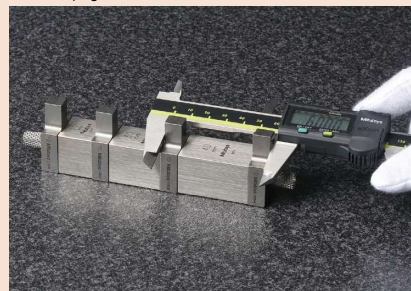
Checking accuracy of height gage

Optional Accessories

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

Square Gauge Block Accessories Set

Refer to page E-25 for details.

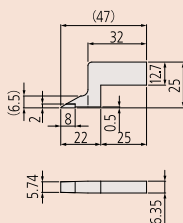


Using plain jaws, a tie rod, knurled-head screws and square gauge blocks to construct a temporary caliper checker.

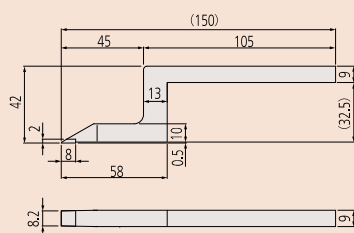
Scriber DIMENSIONS

900173

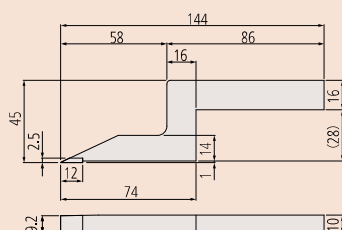
Unit: mm



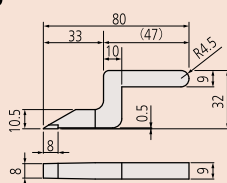
905200



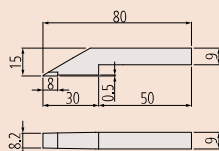
900390



07GZA000



900168



Height Gage Optional accessories for height gages

SPECIFICATIONS

Metric	
Order No.	Applicable Height Gages
07GZA000	192 Series Digimatic Height Gages (192-613-10, 192-614-10, 192-615-10)
	570 Series Digimatic Height Gages (570-302, 570-304)
	192 Series Dial Height Gages (192-130, 192-131, 192-132, 192-133)
	514 Series Vernier Height Gages (514-102, 514-104, 514-106, 514-103, 514-105, 514-107)
	574 Series Heightmatic (574-112-1, 574-111-1, 574-110-1)
900168	570 Series Digimatic Height Gages (570-322 / 324)
905200	514 Series Vernier Height Gages (514-160 / 172)
	192 Series Digimatic Height Gages (192-663-10, 192-664-10, 192-665-10)
900390	570 Series Digimatic Height Gages (570-230)
	514 Series Vernier Height Gages (514-108, 514-109)
900390	514 Series Vernier Height Gage (514-170)

Inch	
Order No.	Applicable Height Gages
900173	570 Series Digimatic Height Gages (570-227, 570-244)
	506 Series Vernier Height Gages (506-201 / 207 / 204, 506-208)
900258	192 Series Digimatic Height Gages (192-630-10, 192-631-10, 192-632-10, 192-633-10)
	570 Series Digimatic Height Gages (570-312, 570-313, 570-314)
	574 Series Heightmatic (574-212-1, 574-211-1, 574-210-1)
905201	192 Series Digimatic Height Gages (192-670-10, 192-671-10, 192-672-10, 192-673-10)
	570 Series Digimatic Height Gages (570-248)

Dial Test Indicators

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

Contact Sensor



900872

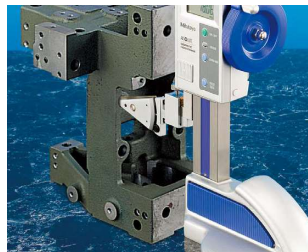
- Attached to both the workpiece*1 and height gage*2 when measuring heights using a height gauge with a scriber, the contact sensor is a convenient detector that gives a lamp display when the scriber touches the workpiece.

*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-49.

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

Height Gage

A standard measuring tool of industry

Linear Height SERIES 518 — High Performance 2D Measurement System

- Achieves indication accuracy of $(1.1 + 0.6L/600) \mu\text{m}$.
- High-accuracy Height Gage incorporating a wide range of measurement functions.
- To achieve best-in-class accuracy, a high-accuracy reflective-type linear encoder and high-accuracy guide are used.
- Measurement can be implemented by icon-based commands that also support easy one-key operation.
- The TFT LCD provides excellent visibility and operability.
- Pneumatic full/semi-floating system allows adjustment of air-cushion height.
- Equipped with various interfaces for RS-232C communication in addition to connectability to printers and Digimatic measuring instruments.
- For precision Black Granite Surface Plates, refer to page E-49.
- Backup/Restore of data and measurement part programs can be implemented using USB storage devices (FAT16/32 format compatible).



LH-600E

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	$(1.1 + 0.6L/600) \mu\text{m}$, 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
Mass		24 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)

*1 Guaranteed when using the standard eccentric $\phi 5$ 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.

Note: To obtain maximum measurement accuracy, please note the following:

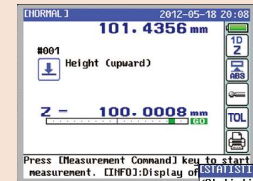
- Use in an environment that is as close as possible to 20 °C, and subject to minimal temperature change over time.
- Use in conjunction with a surface plate of JIS 1 class, or higher, flatness specification.



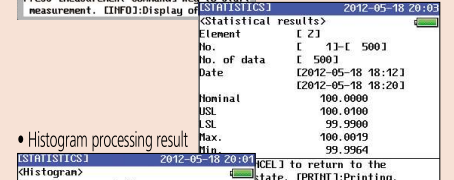
An inspection certificate is supplied as standard. Refer to page U-11 for details.

Screenshot examples

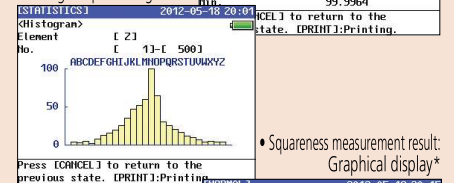
- Measurement screen



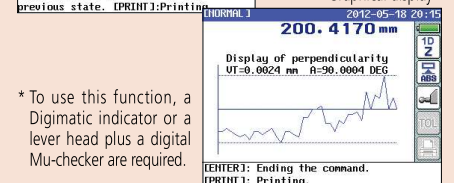
- Statistical processing result



- Histogram processing result

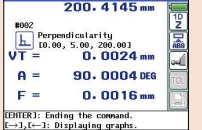


- Squareness measurement result: Graphical display*



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

- Squareness measurement result: Numeric display*



Standard Accessories

- 12AAF634 $\phi 5$ mm stepped probe
- 12AAA715 Ball-diameter corrected block
Note: 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.
- 12AAF674 Auxiliary weight*

* Two auxiliary weights come with the main unit.

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

Thickness measurement (Outside)

Height measurement (Upward facing)

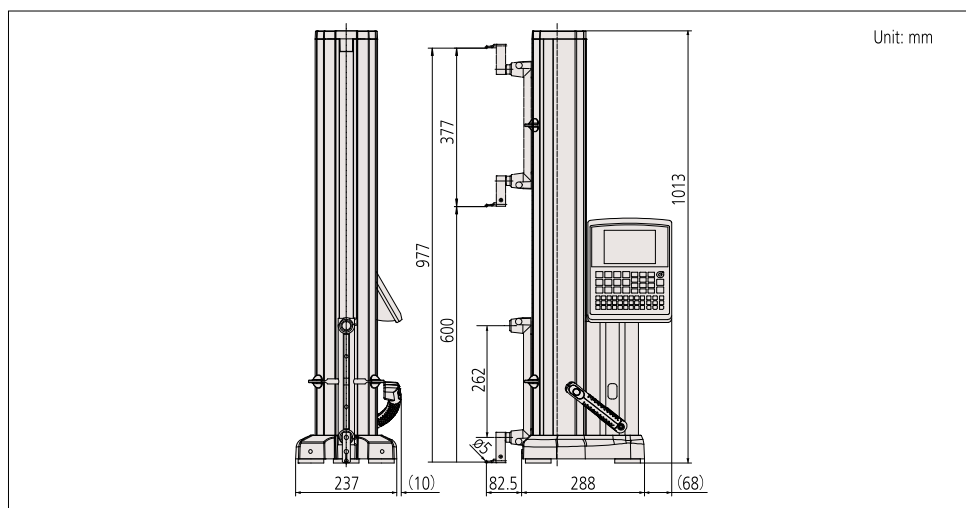
Height measurement (Downward facing)

Width measurement (Inside)

Diameter measurement (Hole)



DIMENSIONS



A collection of 15 numbered metalworking tools, including various types of drills, reamers, and end mills, arranged on a light blue background.

No.	Order No.	Item
(1)	12AAC072	Depth probe
(2)	12AAC073	Taper probe
(3)	932361	Mu-checker lever head holder* ¹ *1 Two additional pieces of auxiliary weights required (total 4 pcs.)
(4)	12AAA792	Dial indicator holder
(5)	12AAA793	Probe extension holder
(6)	12AAB552	ø10 mm ball probe (coaxial type)
(7)	957265	ø20 mm disk probe
(8)	957264	ø14 mm disk probe
(9)	957261	ø2 mm ball probe (coaxial type)
(10)	957262	ø3 mm ball probe (coaxial type)
(11)	957263	ø4 mm ball probe (coaxial type)
(12)	226118	M3 CMM stylus adapter* ²
(13)	226117	M2 CMM stylus adapter* ²
(14)	12AAA789	ø6 mm ball offset probe
(15)	12AAA788	ø4 mm ball offset probe

Order No.	Item
12AAB136	ø10 mm cylindrical probe
12AAF666	ø1 mm ball probe (coaxial type)
12AAF667	ø2 mm ball probe (coaxial type) Ruby ball
12AAF668	ø10 mm ball probe (coaxial type) L: 82 mm
12AAF669	ø10 mm ball probe (coaxial type) L: 120 mm
12AAF670	ø5 mm disk probe
12AAF671	ø10 mm disk probe
12AAF672	ø1 mm ball offset probe
05HAA394	ø5 mm ball offset probe
12AAA879	Sample workpiece
932377A	ø2 mm CMM ball probes
932378A	ø3 mm CMM ball probes
932379A	ø5 mm CMM ball probes
932380A	ø6 mm CMM ball probes
532328	ø10 mm CMM ball probes
532345	ø20 mm CMM disk probes
930803	ø30 mm CMM disk probes
12AAF712	Battery pack

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

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)

D-52

Height Gage

A standard measuring tool of industry

QM-Height SERIES 518 — High-Performance Height Gage

MeasurLink[®] ENABLED
Data Management Software by Mitutoyo



- Best-in-class accuracy $\pm(2.4 + 2.1L/600)$ μm
- Built-in air-suspension feature mechanism enables smooth movement over a surface plate. (Lower-cost version **AX** type without air suspension also available.)
- 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.)
- By installing the **U-WAVE-T** measurement data wireless communication system or USB communication driver in your PC, the optional functions that enhance operability, including output of measurement data to your PC, become available. The USB communication driver can be downloaded from the Mitutoyo website. (Communication software is separately required.)
<https://www.mitutoyo.co.jp/eng/contact/products/usb/index.html>

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			
	Inch / Metric	0.001 / 0.005 mm 0.00005 / 0.0001 / 0.0002 in			
Accuracy at 20 °C	Measurement*1	$\pm(2.4 + 2.1L/600)$ μm			
	Repeatability*1	$2\sigma \leq 1.8$ 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 \pm 0.5 N			
Data output ports		Digimatic / USB*3			
Air-suspension feature		Not included			
Power supply		Alkaline AA / LR6 batteries x4 (standard accessories) / AC adapter (optional accessory)*5 / Supports NiMH (HR6) rechargeable batteries x4			
Battery life guidelines*6		Approx. 1,200 hours (without using the air-suspension feature)			
		Approx. 90 hours (when using the air-suspension feature)			
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 °C to 50 °C			
Storage humidity range		5 to 90 % RH (non-condensing)			

*1 The indication accuracy and repeatability represent the values obtained from the height measurement of a flat surface using the standard holder with $\phi 5$ 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-suspension feature, 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-suspension feature.

MeasurLink[®] ENABLED
Data Management Software by Mitutoyo

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

ABSOLUTE[™]



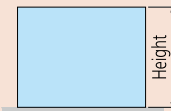
An inspection certificate is supplied as standard. Refer to page U-11 for details.

Standard Accessories

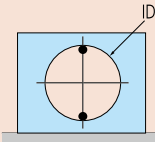
- **05HZA148** $\phi 5$ mm stepped probe
- **12AAA715** Probe diameter calibration block
- Alkaline batteries x4 (AA/LR6)

Measurement example

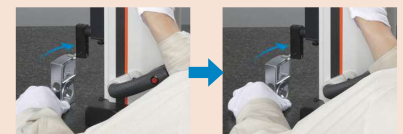
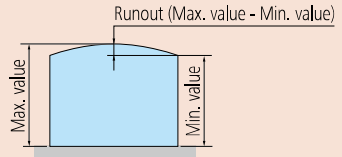
- Height measurement



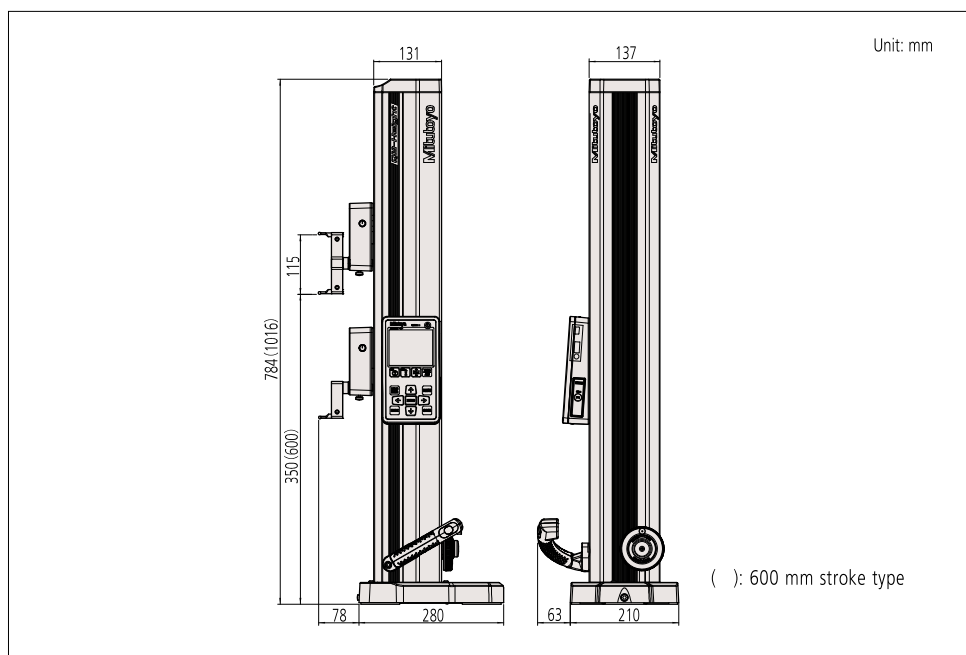
- ID measurement



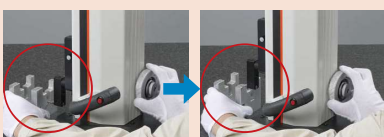
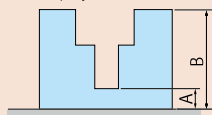
- Runout measurement



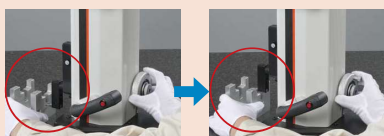
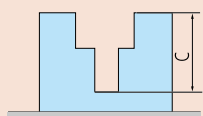
DIMENSIONS



- Height difference measurement (1)
Height A and height B from the surface plate will be displayed.



- Height difference measurement (2)
After measuring heights A and B, the height difference C between them can be shown in the bottom row of the display.



Optional Accessories



Optional accessories that enable centralized data management

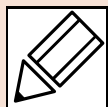
Order No.	Item name
Small printer equipped with Data Logger	
264-505	DP-1VA LOGGER
936937	Digimatic connecting cable (1 m)
965014	Digimatic connecting cable (2 m)
06AFZ050	USB cable (A-microB)
Measurement Data Input Unit	
06AFM380D	USB Input Tool Direct USB-ITN-D
Measurement data wireless communication 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	

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*

* 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.

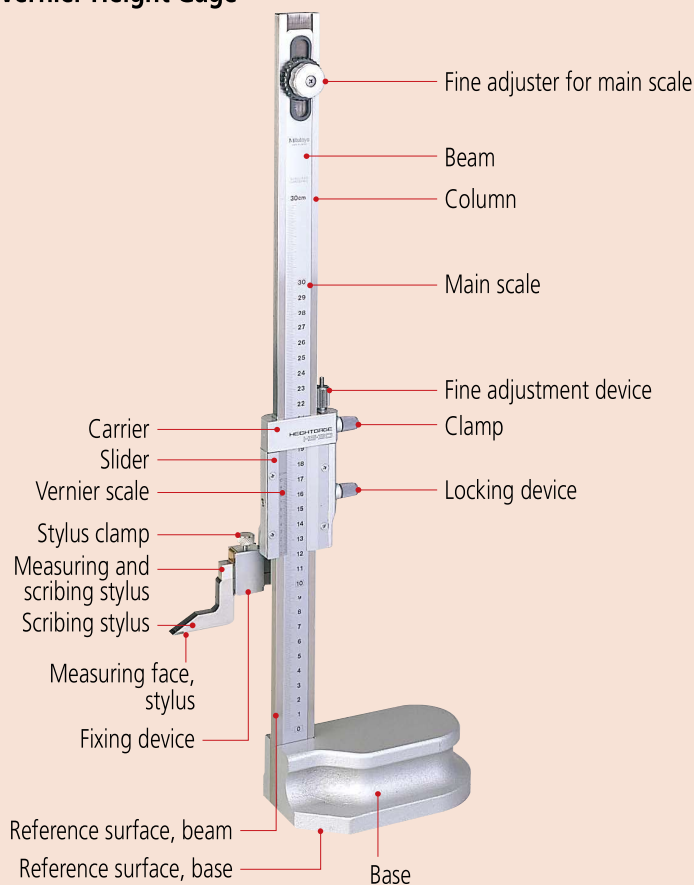
Quick Guide to Precision Measuring Instruments



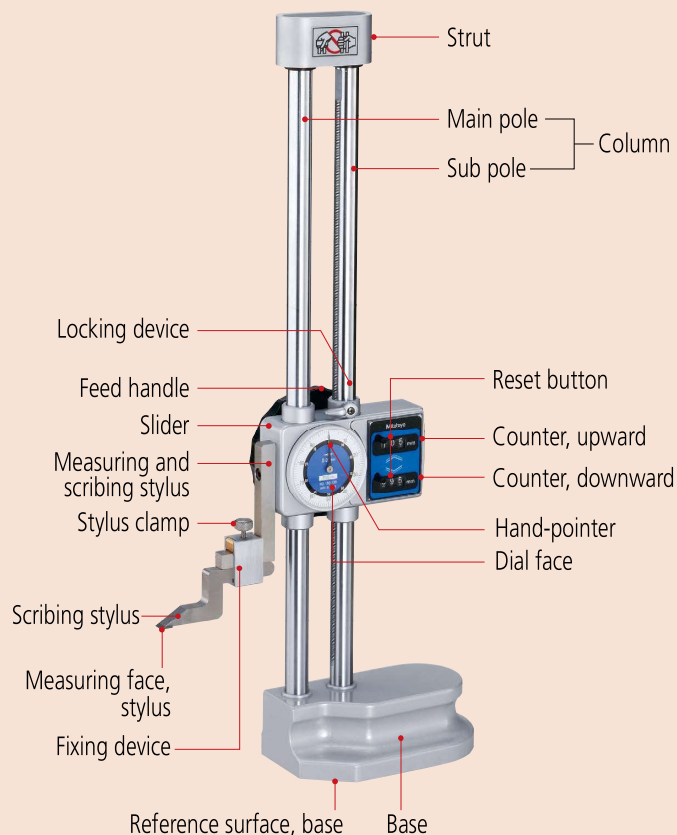
Height Gages

Nomenclature

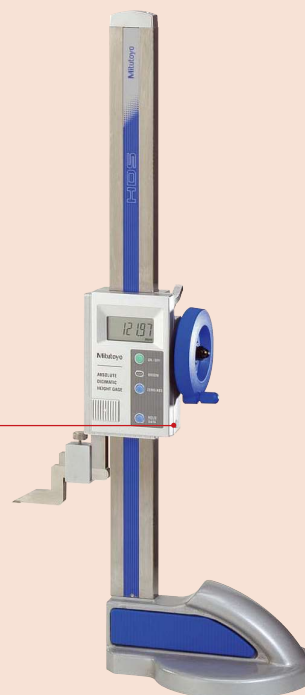
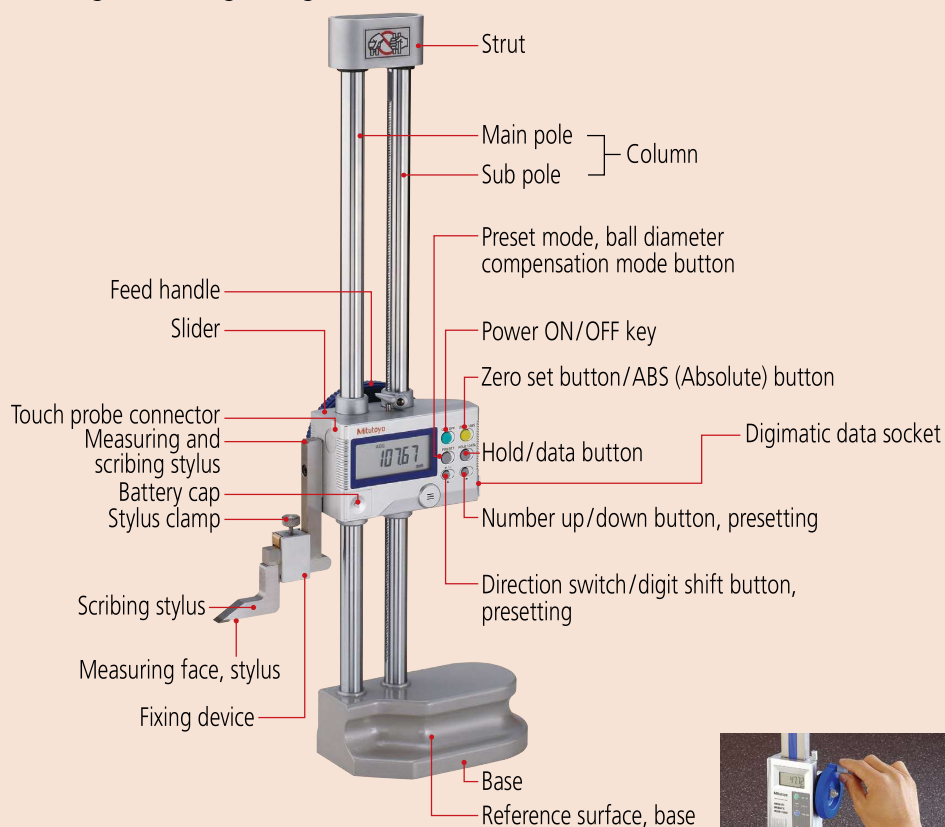
Vernier Height Gage



Mechanical Digit Height Gage



Digimatic Height Gages



Slider handwheel



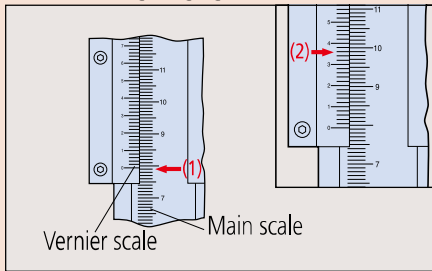
Slider clamping lever



Ergonomic base

How to read

Vernier Height gage



Graduation 0.02 mm

(1) Main scale 79 mm

(2) Vernier 0.36 mm

Reading 79.36 mm

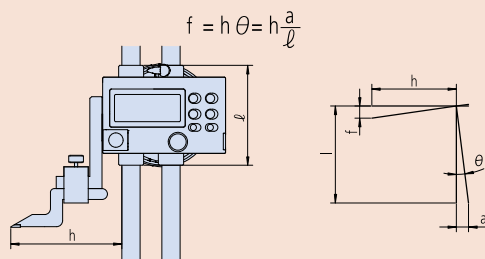
General notes on use of Height Gages

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.

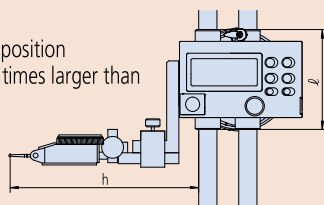
2. Reference edge (column) warping and scriber installation

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.



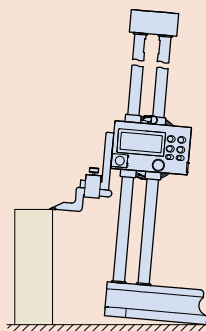
Installing the scriber (or a lever-type dial indicator) requires careful consideration because it affects the size of any error due to a warped reference column by increasing dimension h in the above formula. In other words, if an optional long scriber or lever-type dial indicator is used, the measurement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



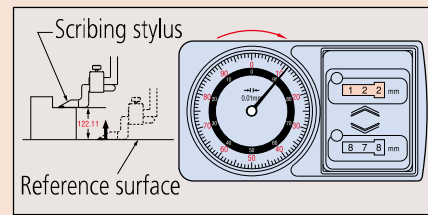
3. Lifting of the base from the reference surface

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

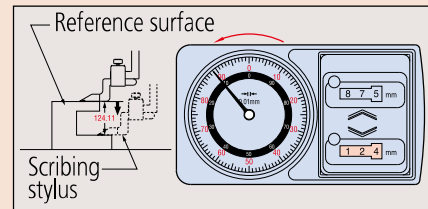


Counter 122 mm

Dial 0.11 mm

Reading 122.11 mm

Measuring downwards from a reference surface



Counter 124 mm

Dial 0.11 mm

Reading 124.11 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 old 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 Old JIS Instrumental error
JIS B 7517-1993

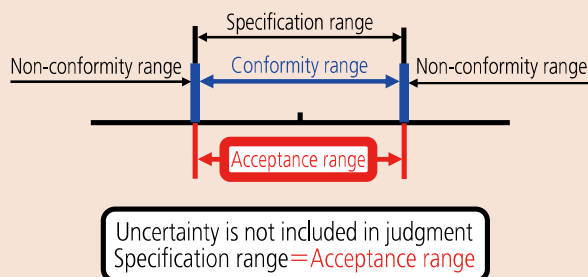
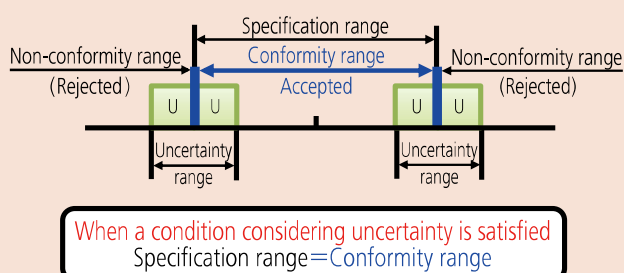


Fig. 2 New JIS Maximum Permissible Error (MPE)
JIS B 7517: 2018 (ISO/TR 14253-6: 2012)



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.

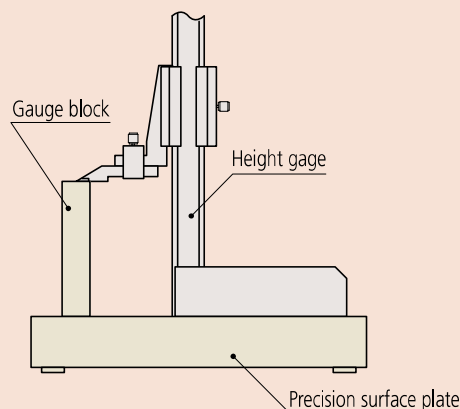
Table 1: Maximum permissible height measurement error E_{MPE} of a conventional height gage

Unit: mm

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:

- **192 Series Digimatic Height Gage** described on page D-41 (All models)
- **570 Series ABSOLUTE Digimatic Height Gage** described on page D-43 (All models)
- **570 Series Digimatic Height Gage** described on page D-45 (All models)
- **514, 506 Series Standard Height Gage with Adjustable Main Scale** described on page D-47 (All models)
- **192 Series With digital counter** described on page D-48 (All models)