

High-precision Roundness / Cylindricity Measuring System ROUNDTEST RA-H5200 SERIES

Form Measurement



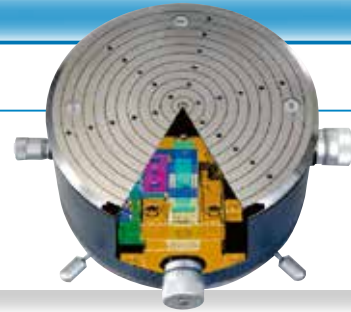
World-class Accuracy with Simple Operation

ROUNDTTEST RA-H5200

World-Class Accuracy

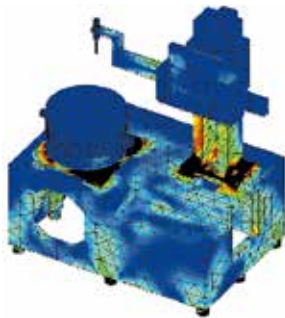
High-accuracy, automatic centering/leveling turntable

A highly accurate, highly rigid turntable has been achieved through exceptional manufacturing accuracy of the critical components, in addition to a high-accuracy air-bearing that provides superior rigidity. The resulting rotational accuracy, the heart of the roundness/cylindricity measuring system, is world-class at $(0.02+3.5 H/10000) \mu\text{m}$.



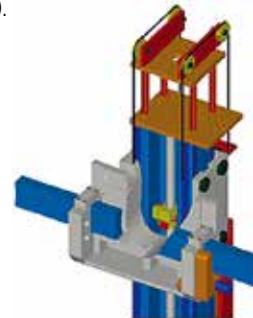
High-rigidity base

For a measurement system to be able to achieve high accuracy, the base, which forms the foundation of the system, must be completely rigid. Therefore, we utilized FEM structural analysis simulation to thoroughly analyze the base and its application. The result is the development of a high-rigidity base.



High-accuracy Z-axis column

Attaining the ultimate level of improvement in the manufacturing accuracy of the column guide surface, which is critical for achieving perfect straightness, and adopting Mitutoyo's proprietary system and mechanisms have led to the achievement of the ultra-high column straightness of $0.05 \mu\text{m}/100 \text{mm}$ (in narrow range).



High-accuracy positioning sensors

Mitutoyo's linear encoders have been incorporated into the positioning sensors in the X- and Z-axis drive units to directly sense the displacement the drive units, thereby achieving the highly accurate positioning essential for repeat measurements.

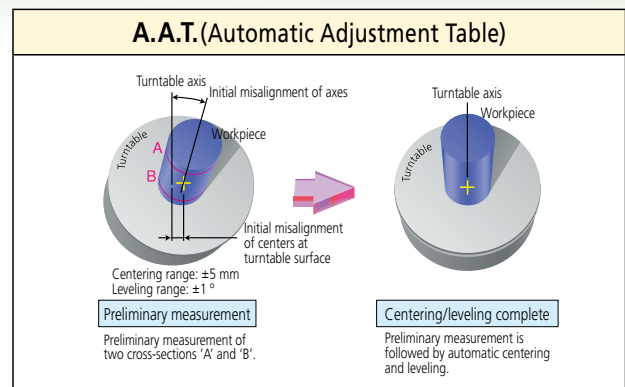
High-performance vibration isolator as a standard feature

The measurement accuracy of a roundness/cylindricity measuring system is greatly affected by external disturbances such as vibration. Therefore, the **RA-H5200** is supplied as standard with a high-performance vibration isolator that possesses excellent vibration attenuation.

Simple and fast high-speed automatic centering and leveling

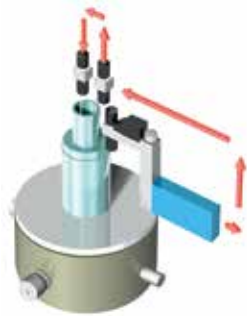
The centering/leveling mechanism section is equipped with high-precision glass encoders in each axis of the turntable unit to reduce positioning errors and achieve high-speed automatic centering/leveling, greatly reducing the time from workpiece setting to measurement.

The Automatic Adjustment Table (A.A.T.) with centering/leveling adjustment is supplied as standard, which frees the operator from the task of centering and leveling the workpiece.



Continuous OD/ID measurement function

Continuous internal/external diameter measurement is possible without changing the detector position.



High accuracy even at high positioning speeds

Continual development has resulted in the highest drive speed within the class.

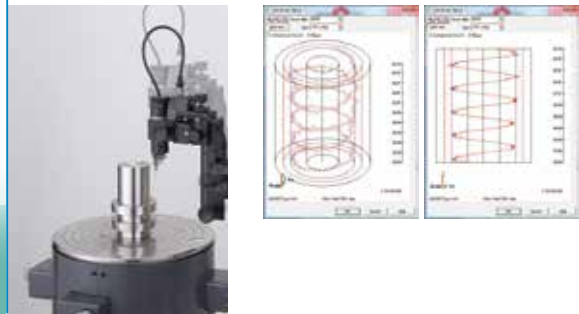
- Vertical direction (Z-axis column): Max. 60 mm/s
- Radial direction: Max. 50 mm/s

Partial circle measurement function

Even if a workpiece cannot be measured by physically rotating it by a full turn due to some obstruction (projection), segments of the circumference can be measured.

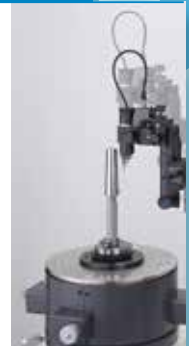
Spiral Measurement/Analysis

The spiral-mode measurement function combines table rotation and rectilinear action allowing cylindricity, coaxiality, and other data to be loaded as a continuous data set.



Measurement through X-axis tracking

Measurement while tracing is possible through a built-in linear scale in the X-axis. This type of measurement is useful when displacement due to form variation exceeds the measuring range of the sensor, and X-axis motion is necessary to maintain contact with the workpiece surface.



Surface-roughness measuring function (optional roughness unit)

The system is a multi-sensor type, compatible both with a standard probe that meets the specifications of the roundness measuring system and a surface roughness detector unit.

Incorporating the optional roughness detector unit into the system enables roughness measurement in the circumferential direction around the θ -axis, as well as in the direct-drive directions along the X- and Z-axes with the table stopped. Thus, surface roughness and geometric tolerances, such as roundness and cylindricity, can both be validated using only a single system.



RA-H5200



RA-H5200 PLUS

World-class Accuracy with Simple Operation

ROUNDTTEST RA-H5200

RA-H5200

A roundness/cylindricity measuring system developed to combine world-class accuracy with high maneuverability/analytical capability. This system can perform many other functions as well, such as tracking measurement and automatic OD/ID measurement. Available with the standard column specification (Z-axis traverse of 350 mm) or an extended specification (Z-axis traverse of 550 mm) for handling taller workpieces.



Sliding detector-unit holder provided as a standard feature

The detector-unit holder is equipped with a sliding mechanism, enabling one-touch measurement of a workpiece with a deep hole having a thick wall, which has been difficult with the conventional standard arm.

Sliding distance: 112 mm



Safety mechanism provided as a standard feature

Patent pending in Japan

A safety mechanism is incorporated into the detector unit area. A collision-sensing function has been added to the detector unit (when it is in the vertical orientation) to prevent collision in the Z-axis direction. Additionally, an accidental collision prevention function, which stops the system when the detector unit displacement exceeds its range, has been added. When an accidental touch is detected, the dedicated analysis software (**ROUNDPAK**) senses the error and automatically stops the system.



Retrofit kits can be used with models equipped with motorized detector-unit holders

Retrofit kits are available for the RA-H5200AS and RA-H5200AH to add the automatic measurement functionality found in their PLUS counterparts.

*See page 5 for details.

RA-H5200 PLUS

This system combines high accuracy with automatic measurements to greatly improve productivity and efficiency. Automatic orientation control for the detector unit enables this system to automatically execute high-speed, operator-less measurements. Available with the standard column specification (Z-axis traverse of 350 mm) or an extended column specification (Z-axis traverse of 550 mm) for handling taller measurement workpieces.



Changes the detector-unit holder orientation for automatic measurement

This function controls the orientation of the holder arm of the detector unit (between vertical and horizontal) and the detector unit rotation mechanism (in 1-degree increments to match the tilt angle of the measurement workpiece), making it possible to measure internal and external diameters as well as top and bottom surfaces continuously and automatically. Additionally, a fully-featured offline teaching function simplifies the creation of part programs.



Detector unit II (option)

This highly adjustable detector unit can be installed on motorized detector-unit holders. Features of this detector unit include the ability to use alternative styli for the **RA-H5200*** and freely change the angle of the stylus.
*See page 8 for alternative styli.



Roundness/Cylindricity measurement/Analysis software **ROUNDPAK**

ROUNDPAK provides simple manipulation using a mouse and icons

Simple operations even with a full set of parameters and analysis functions

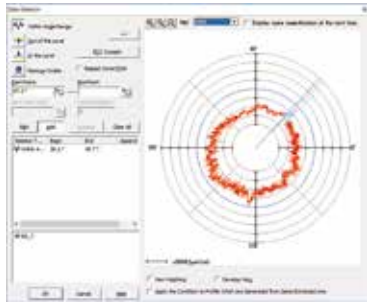
A wide variety of parameters, including those for roundness and cylindricity, as well as flatness and parallelism, are provided as standard features. You can visually select these parameters using icons.



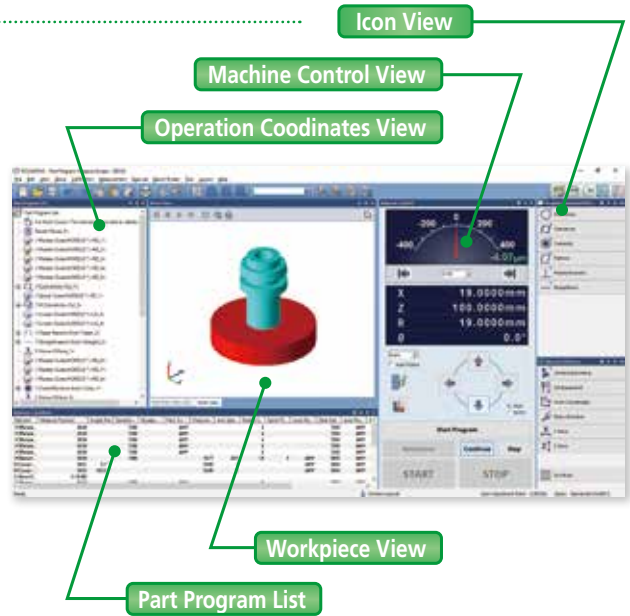
ROUNDPAK also comes with specialized analysis functions for design value best-fit, harmonics, and detection of peak or trough points on a circumference. Data that has already been collected can be easily used for re-calculation or deleted.



Recalculation

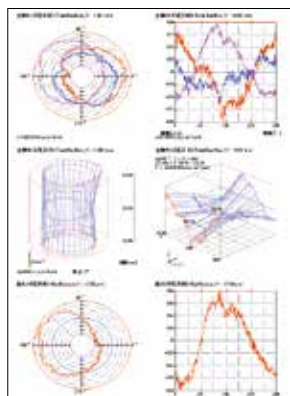
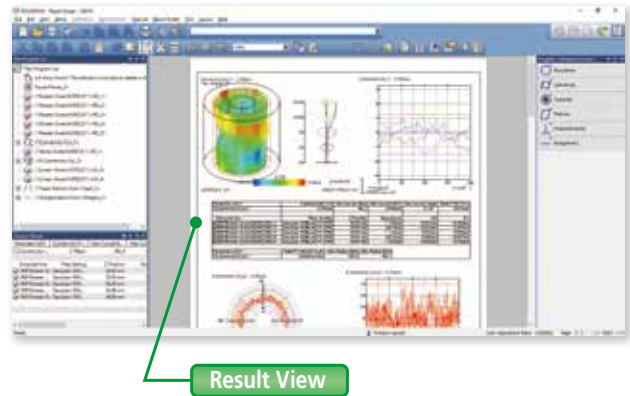


Data deletion



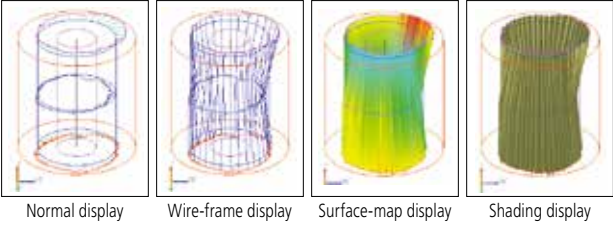
Freedom in laying out the graphics and data obtained from measurements

The customer can create reports in custom formats by specifying how the analysis results will be displayed, as well as the sizes and positions of graphics. The analysis result window can be directly utilized as a layout window. Since the measurement procedure, including the layout information, is saved, the entire process, from measurement start, calculation, result saving, and finally to printing, can be automatically executed.



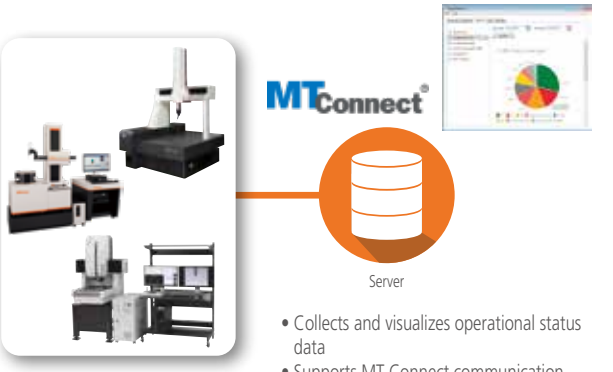
A wide variety of graphics functions

Analysis results such as cylindricity and coaxiality can be visually expressed in 3D graphics.

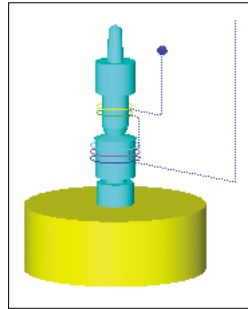


StatusMonitor

Remote machine monitoring



Off-line measurement procedure programming function



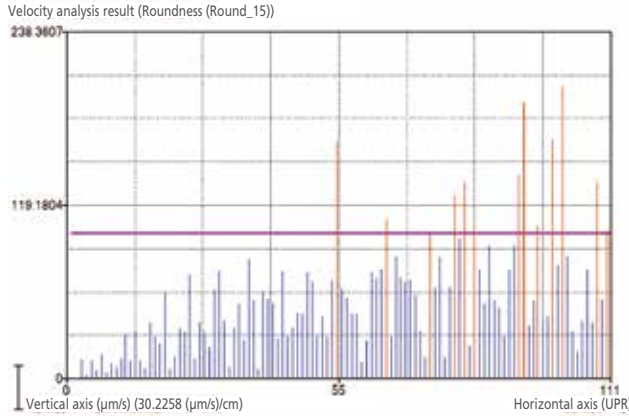
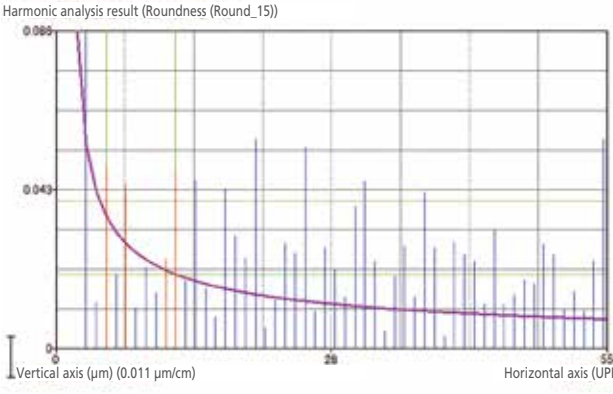
An offline teaching function is provided to create a part program (measurement procedure) without an actual measurement target, enabling the user to virtually execute the measurement operation in a 3D simulation window. You can also display warnings* about the risk of collision in the simulation window. *This function is for **RA-H5200 PLUS** only.

MitutoyoLauncher support

Quick Launcher is provided as a standard feature. This enables simple and intuitive operation, so part programs can be run easily. Part programs can also be run by scanning barcodes or QR codes.

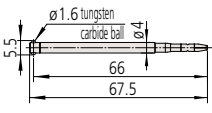
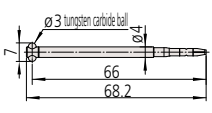
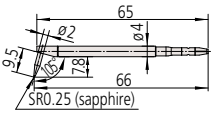
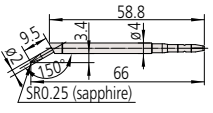
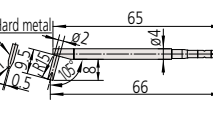
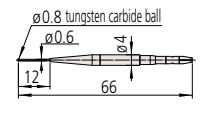
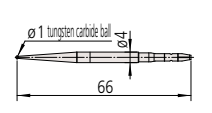
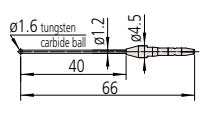
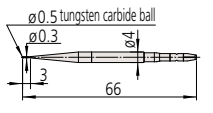
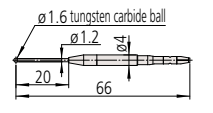
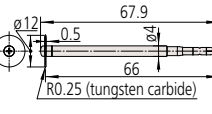
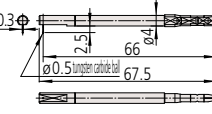
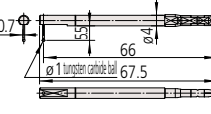
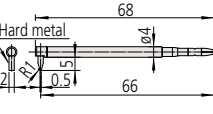
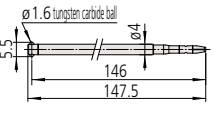
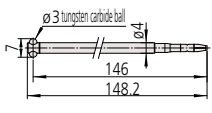
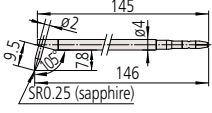
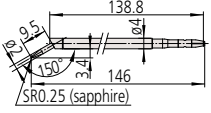
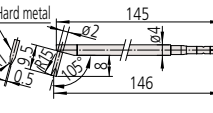
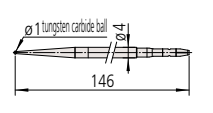
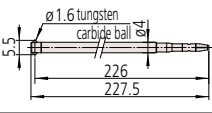
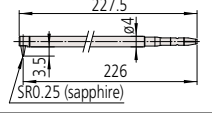
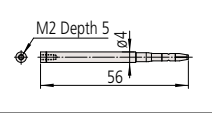
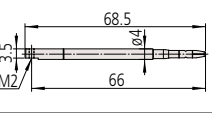
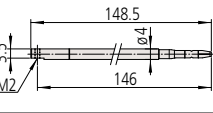
Harmonic tolerance verification / Velocity analysis

Analysis of bearing sliding surfaces is provided as a standard feature.



Options

Styli for RA-H5200AS/AH (Option)

| | | | | | |
|-----------------|---|---|---|--|---|
| Type | Standard (Standard accessory) | Notch | Deep groove | Corner | Cutter mark |
| Order No. | 12AAL021 | 12AAL022 | 12AAL023 | 12AAL024 | 12AAL025 |
| Stylus tip | ø 1.6 mm tungsten carbide | ø 3 mm tungsten carbide | SR0.25 mm sapphire | SR0.25 mm sapphire | tungsten carbide |
| Dimensions (mm) |  |  |  |  |  |
| Type | Small hole (ø 0.8) | Small hole (ø 1.0) | Small hole (ø 1.6) | Extra small hole (Depth 3 mm) | ø 1.6 mm ball |
| Order No. | 12AAL026 | 12AAL027 | 12AAL028 | 12AAL029 | 12AAL030 |
| Stylus tip | ø 0.8 mm tungsten carbide | ø 1 mm tungsten carbide | ø 1.6 mm tungsten carbide | ø 0.5 mm tungsten carbide | ø 1.6 mm tungsten carbide |
| Dimensions (mm) |  |  |  |  |  |
| Type | Disk | Crank (ø 0.5) | Crank (ø 1.0) | Flat surface | 2X-long type*1 |
| Order No. | 12AAL031 | 12AAL032 | 12AAL033 | 12AAL034 | 12AAL035 |
| Stylus tip | ø 12 mm tungsten carbide | ø 0.5 mm tungsten carbide (Depth 2.5 mm) | ø 1 mm tungsten carbide (Depth 5.5 mm) | tungsten carbide | ø 1.6 mm tungsten carbide |
| Dimensions (mm) |  |  |  |  |  |
| Type | 2X-long type notch*1 | 2X-long type deep groove*1 | 2X-long type corner*1 | 2X-long type cutter mark*1 | 2X-long type Small hole*1 |
| Order No. | 12AAL036 | 12AAL037 | 12AAL038 | 12AAL039 | 12AAL040 |
| Stylus tip | ø 3 mm tungsten carbide | SR0.25 mm sapphire | SR0.25 mm sapphire | tungsten carbide | ø 1 mm tungsten carbide |
| Dimensions (mm) |  |  |  |  |  |
| Type | 3X-long type*1 | 3X-long type deep groove*1 | Stylus shank | Stylus shank(standard groove) | Stylus shank(2X-long groove)*1 |
| Order No. | 12AAL041 | 12AAL042 | 12AAL043 | 12AAL044 | 12AAL045 |
| Stylus tip | ø 1.6 mm tungsten carbide | SR0.25 mm sapphire | For mounting CMM stylus (mounting thread M2) | For mounting CMM stylus (mounting thread M2) | For mounting CMM stylus (mounting thread M2) |
| Dimensions (mm) |  |  |  |  |  |

*1: Measuring is only possible in the vertical direction.

Note A five-piece alternative stylus set (Order No. **12AAL020**) with five types of general-purpose optional styli (for notches, for grooves, for small holes (ø 1.0), ø 1.6 ball, and 2X-long) is also available.

Note that customized special interchangeable styli are available on request. Please contact any Mitutoyo office for more information.

Styli for RA-H5200 PLUS (Option)

| Type | Deep groove | Flat surface | Standard | Notch | Deep hole A |
|-----------------|---------------------------|---------------------------|---------------------------|-------------------------|---------------------------|
| Order No. | 12AAE310 | 12AAE302 | 12AAE301 | 12AAE309 | 12AAE306 |
| Stylus tip | ø 1.6 mm tungsten carbide | ø 1.6 mm tungsten carbide | ø 1.6 mm tungsten carbide | ø 3 mm tungsten carbide | ø 1.6 mm tungsten carbide |
| Dimensions (mm) | | | | | |

| Type | ø 1.6 mm ball | ø 0.8 mm ball | ø 0.5 mm ball | Deep groove | Deep hole B |
|-----------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Order No. | 12AAE303 | 12AAE304 | 12AAE305 | 12AAE308 | 12AAE307 |
| Stylus tip | ø 1.6 mm tungsten carbide | ø 0.8 mm tungsten carbide | ø 0.5 mm tungsten carbide | ø 1.6 mm tungsten carbide | ø 1.6 mm tungsten carbide |
| Dimensions (mm) | | | | | |

Options common to the RA-H5200 SERIES



Centering chuck (key operated)

211-014

Suitable for holding longer parts and those requiring a relatively powerful clamp.

- Holding range:
Inner jaws: OD = ø2 - ø35 mm,
ID = ø25 - ø68 mm
Outer jaws: OD = ø35 - ø78 mm
- External dimensions: ø157 x 70.6 mm
- Mass: 3.8 kg



Centering chuck (ring operated)

211-032

Suitable for holding small parts with easy-to-operate knurled-ring clamping.

- Holding range:
Inner jaws: OD = ø1 - ø36 mm,
ID = ø16 - ø69 mm
Outer jaws: OD = ø25 - ø79 mm
- External dimensions (DxH):
ø118 x 41 mm
- Mass: 1.2 kg



Micro-chuck

211-031

Used for clamping a workpiece (less than ø1 mm dia.) that the centering chuck cannot handle.

- Holding range:
ø0.2 - ø1.5 mm
- External dimensions (DxH):
ø107 x 48.5 mm
- Mass: 0.6 kg



Magnification calibration gage

211-045

Used for normalizing detector magnification by calibrating detector travel against displacement of a micrometer spindle.

- Maximum calibration range: 400 µm
- Graduation: 0.2 µm
- External dimensions (WxDxH):
235 (max) x 185 x 70 mm
- Mass: 4 kg

Cylindrical square

350850

- Straightness: 1 µm
- Cylindricity: 2 µm
- External dimensions (DxH):
ø70 x 250 mm
- Mass: 7.5 kg

RA-H5200 Series Specifications / Dimensions

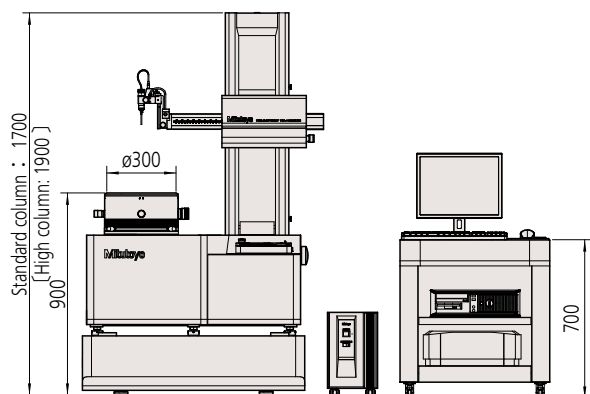
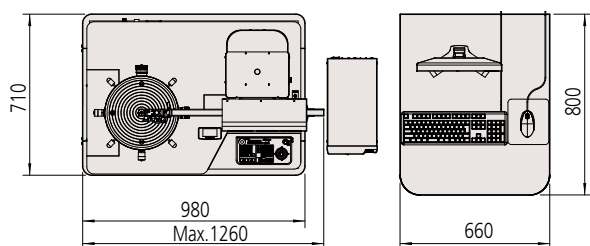
Specifications

| Model No. | | | RA-H5200AS | RA-H5200AH | RA-H5200 PLUS | |
|------------------------------|--|--|--|---|---|---------------------------------|
| Z-axis | | | Standard column | High column | Standard column | High column |
| Turntable unit | Rotational accuracy | Radial direction | (0.02+3.5 H/10000) μm (H: probing height (mm)) | | | |
| | | Axial direction | (0.02+3.5X/10000) μm (X: distance from rotational center (mm)) | | | |
| | Rotating speed | | 2,4,6,10 rpm (Auto centering: 20 rpm) | | | |
| | Table effective diameter | | ø300 mm | | | |
| | Centering/leveling adjustment | | A.A.T. | | | |
| | Centering adjustment range | | ±5 mm | | | |
| | Leveling adjustment range | | ±1 ° | | | |
| | Max. lording weight | | 80 kg (Auto centering: 65 kg) | | | |
| | Max. probing diameter | | ø400 mm | | ø356 mm | |
| Max. lording diameter | | ø680 mm | | | | |
| Vertical drive unit (Z-axis) | Straightness accuracy (λc2.5 mm) | | 0.05 μm/100 mm 0.14 μm/350 mm | 0.05 μm/100 mm 0.2 μm/550 mm | 0.05 μm/100 mm 0.14 μm/350 mm | 0.05 μm/100 mm 0.2 μm/550 mm |
| | Parallelism to rotation center (Reterential generattix line) | | 0.2 μm/350 mm | 0.32 μm/550 mm | 0.2 μm/350 mm | 0.32 μm/550 mm |
| | Traverse speed | | Max. 60 mm/s (Measurement: 0.5/1.0/2.0/5.0 mm/s) | | | |
| | Vertical Travel amount | | 350 mm | 550 mm | 350 mm | 550 mm |
| | Max. probing height | ID/OD | 350 mm | 550 mm | 350 mm | 550 mm |
| | | | Max. probing depth (with standard stylus) | | 85 mm for ø32 mm or more 50 mm for ø7 mm or more | |
| Radial drive unit (X-axis) | straightness accuracy | | 0.4 μm/200 mm (λc2.5 mm) | | | |
| | Horizontal to rotation center | | 0.5 μm/200 mm (Reterential generattix line) | | | |
| | Travel amount | | 225 mm (Including -25 mm travel from rotational center) | | | |
| | Travel speed | | Max. 50 mm/s (Measurement: 0.5/1.0/2.0/5.0 mm/s) | | | |
| Detector | Measuring force | | approx 10~50 mN (switching 5 levels) | | approx 40 mN | |
| | Stylus design, material | | ø1.6 mm tungsten carbide ball | | ø1.6 mm tungsten carbide ball | |
| | Measuring range | Standard | ±400 μm / ±40 μm / ±4 μm | | ±400 μm / ±40 μm / ±4 μm | |
| | | Follow | ±5 mm | | ±5 mm | |
| Other | | In-out switching feature Measuring force switching feature (5-step) Collision detection function for Z-axis direction Stylus angle scale markings (±45 °) | | Accidental touch function Measuring direction: 1 | | |
| Other | Power supply | | 100 V~240 V | | | |
| | Air pressure | | 0.39 MPa | | | |
| | Air consumption | | 45 L/min (Standard state) (Air supply of 80 L/min or higher) | | | |
| | Weight (measurement main unit) | | 650 kg | 670 kg | 650 kg | 670 kg |
| | Weight (vibration isolator) | | 170 kg | | | |

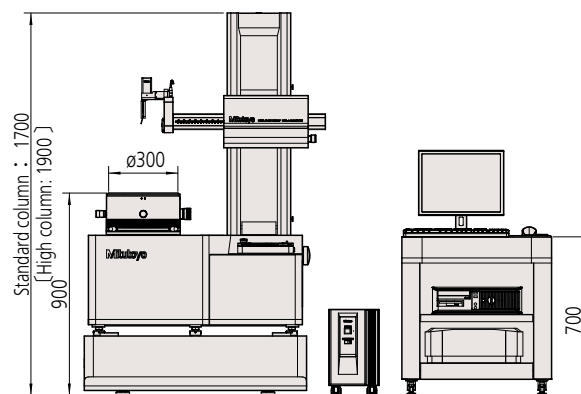
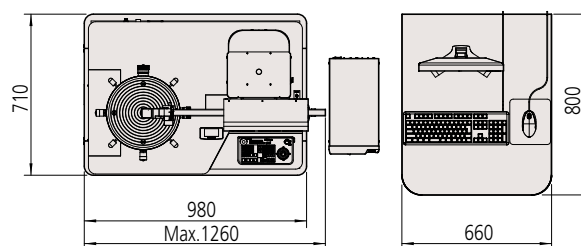
Dimensions

Unit: mm

RA-H5200AS/AH



RA-H5200 PLUS



Note: Side table (PC table) is an option.



Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.



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