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Mitutoyo Quality

Form Measurement

Compact Roundness Measurement
ROUNDTEST RA-120/120P

Bulletin No. 2138(2)

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Roundtest RA-120

This compact roundness measuring machine includes numerous features that are user-friendly such as a wider range for the detector, an easy-to-understand operation panel with large color LCD, a D.A.T. function for centering and leveling adjustments, and many others.

- **Best-in-class rotational accuracy in compact type roundness measuring instruments**
- **Fine adjustment on both X- and Z-axes**
- **Multiple analyses through simple operation**
- **D.A.T. function** *except for Analog mic-head type centering/leveling device.
- **Scaled Z-axis**
- **Continuous ID and OD measurement**
- **High-precision air bearing**
- **Wide-range detector**
- **Simple setup and display of results**
- **Built-in printer**
- **Supports 16 languages**

Simple, interactive display screen

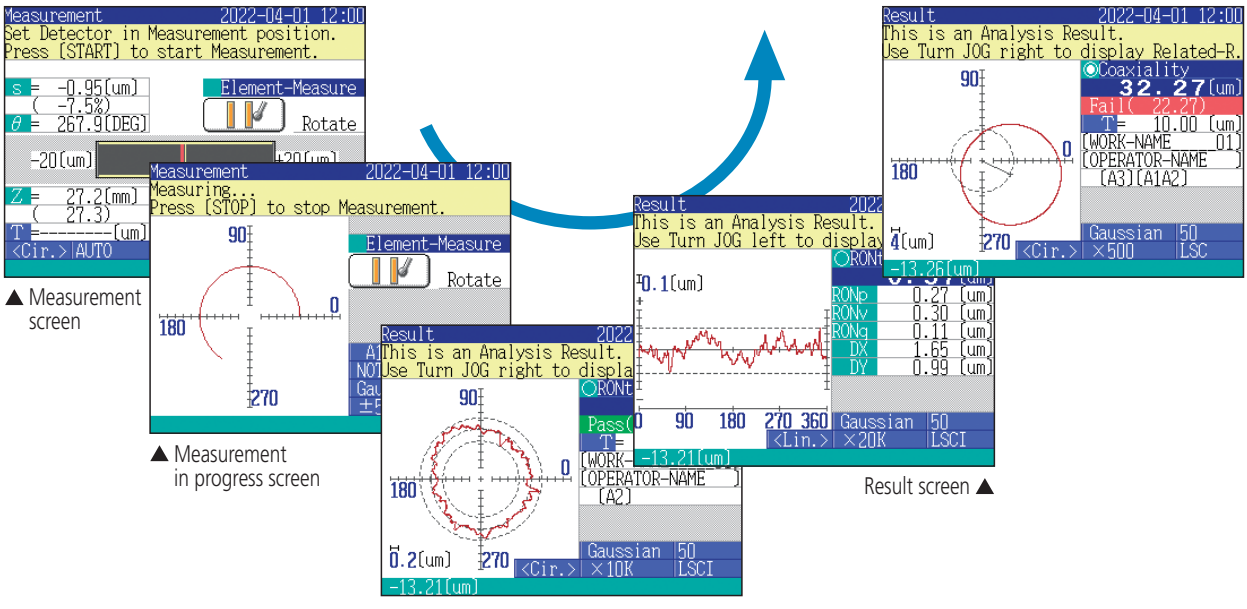
The large LCD screen with backlight shows easy-to-understand measurement results and graphs. Forms can be checked and notch processing can be set while observing the displayed graphs.

Measurement screen

- Set the position of the detector and measurement conditions here
- During measurement, graphs are displayed in real time

Measurement results

- Filter, display magnification, etc., can be altered
- Besides circles, development views can also be displayed



▲ Measurement screen

▲ Measurement in progress screen

Result screen ▲

Operating panel that is read at a glance

Supports 16 languages

Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch

Analysis type

Selection buttons provide access to a wide variety of analysis types

Switching screen modes

Switch the display at the touch of a button, providing access to the [Calibration], [Centering and Leveling], [Measurement], and [Result] screens.

Zero-setting button

No fine adjustment necessary for setting the measurement position

Simple setup

Apply the current measurement setup in one go
Simple operation helps prevent operational errors

Jog dial

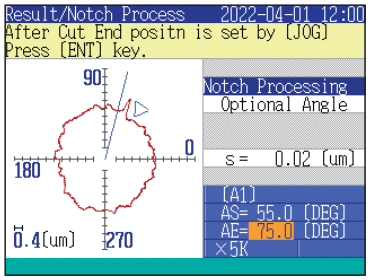
Make detailed changes to setup and other operations

Simplified communication program for ROUNDTEST RA-120

The Roundtest RA-120 has a USB interface, enabling data to be transferred to a spreadsheet or other software.

Notch processing

Unwanted data, such as that produced by notches or scratches, can be excluded from the analysis if desired. Select between [Automatic setting] and [Arbitrary setting].



File save

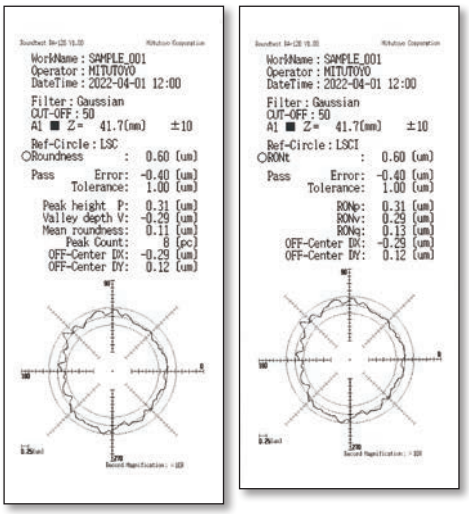
Save and access [Measurement files] and [Result files] in USB memory. Data can also be totaled using the data output function with commercial tabulation software.

[Measurement file] [Measurement data (Data output)]
[Result file] [Result data (Data output)]

High-grade thermal printer

Print measurement conditions, computation results, result graphs, comments, etc., to the thermal printer. Change development graphs and output items as desired.

■ Sample prints



Recording paper set (optional set of 10 rolls)

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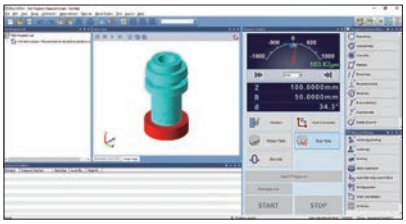
Roundtest RA-120P

This entry-level desktop tester incorporates the ROUNDPAK multi-analysis evaluation program, which provides it with analytical power close to that of more elaborate models. This is, therefore, a highly functional multi-analysis roundness measuring machine that is suitable for use not only in measurement rooms, but also in research and development sections.

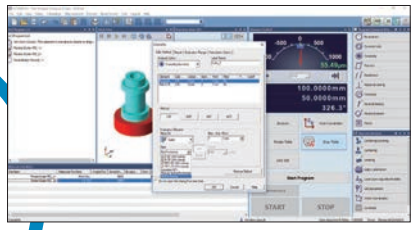
- **Best-in-class rotational accuracy in the Compact Type Roundness Measuring Instruments**
- **Fine adjustment on both X- and Z-axes**
- **Multiple analyses through simple operation**
- **D.A.T. function**
  ***except for Analog mic-head type centering/leveling device.**
- **Scaled Z-axis**
- **Continuous ID and OD measurement**
- **Display function for various graphs**
- **High-precision air bearing**
- **Wide-range detector**
- **Supports 18 languages**

Windows graphical interface

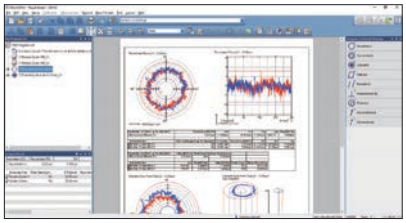
By using a mouse and buttons, identified by corresponding icons, to control the machine, the Roundtest RA-120P's interface provides excellent usability. Functions such as recalculation and graph reading are handled swiftly with easy-to-understand operations.



▲ Main screen



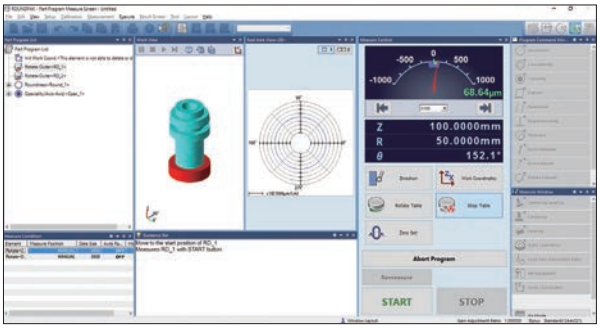
▲ Measurement setup screen



▲ Result screen

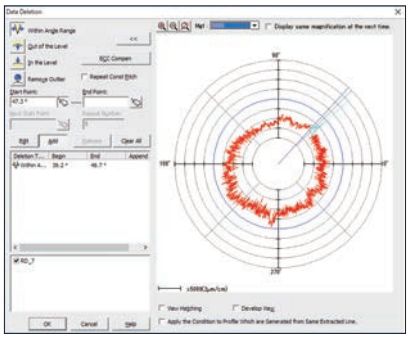
▲ Measurement in progress screen

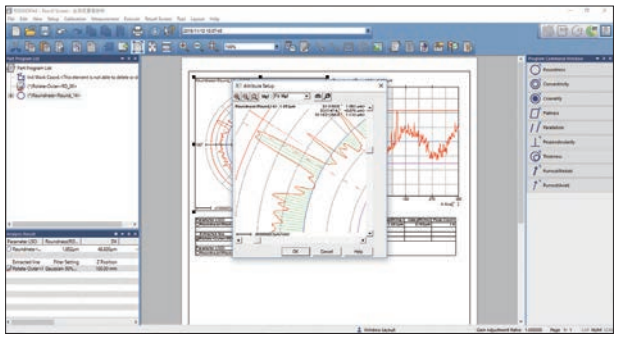
Measurement screen makes ample use of graphs



Multi-analysis function

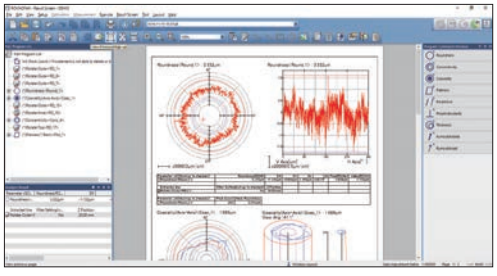
Complete with a wide range of functions including partial enlargement, auxiliary line setup, color change, displacement/angular difference of data between two points, and so on. Also equipped with notch processing and graph reading functions, which make the machine useful in research departments. Recalculation can also be performed with the filter and evaluation method changed.



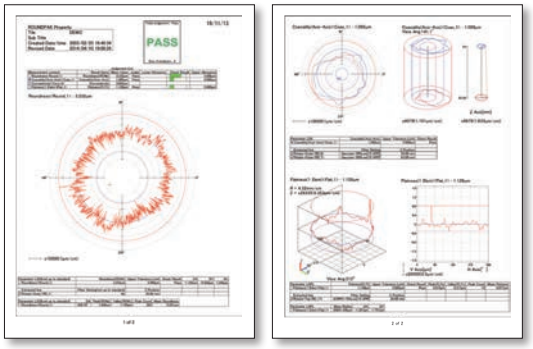


Simplified layout function

Computation results for multiple items can be laid out in multiple forms on a single sheet and printed.
This function also supports output to a color printer (optional).



■ Layout setting screen

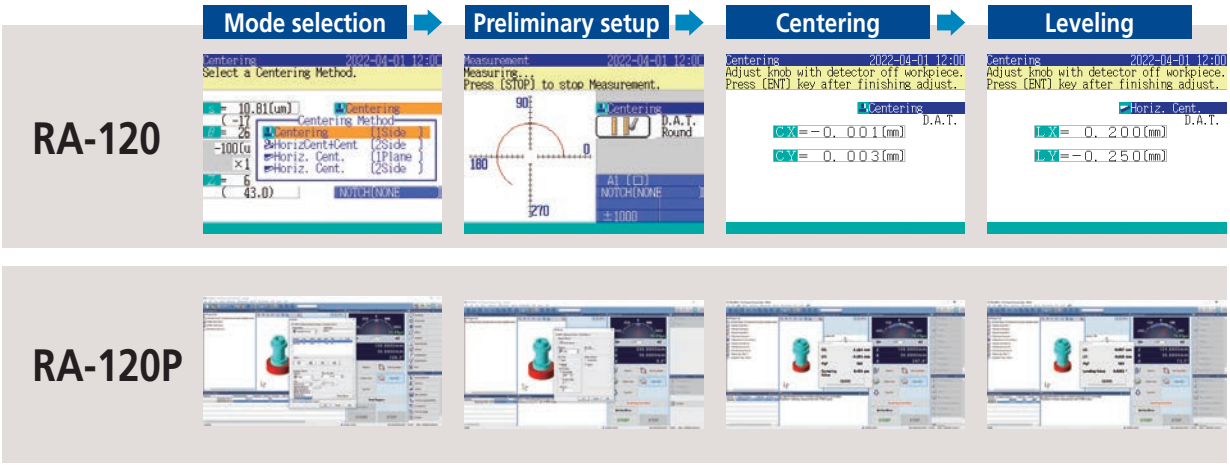


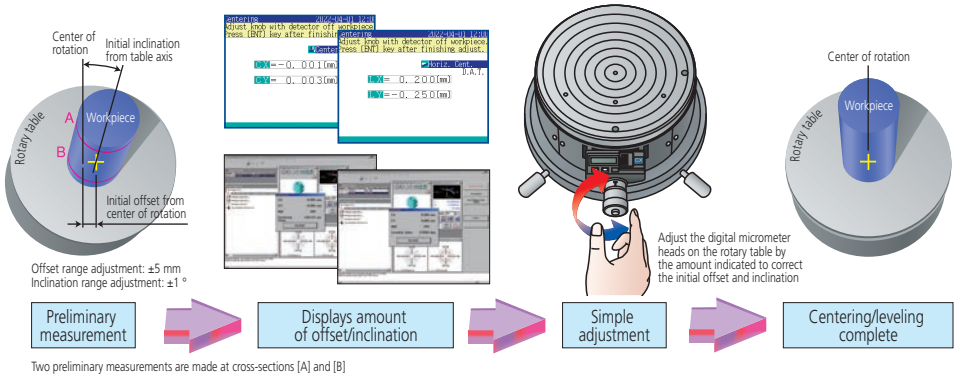
■ Sample print outputs

Functions that implement greater efficiency of measurement and range of analysis types

D.A.T. function *except for Analog mic-head type centering/leveling device.

This instrument uses the D.A.T. (Digital Adjustment Table) function available on higher-end models, and this provides powerful support for centering and leveling operations. To perform such operations, the user need only adjust the digital micrometer heads attached to the rotary table by the amounts indicated on the display. This function also supports measurement of notched workpieces.





Continuous ID and OD measuring function

This function comes in very handy when outside diameter and inside diameter surfaces need to be measured repeatedly, for example, with respect to coaxiality, deviation in wall thickness, etc. The inner surface can be measured and evaluated with the detector, maintaining the same measuring position for the outside diameter without changing its orientation, as illustrated on the right.
Inside diameters down to 50 mm can be measured.

Continuous inside and outside diameter function (inside dia. surface)

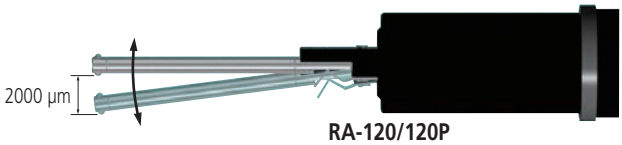
Continuous inside and outside diameter function (outside dia. surface)

Z-axis scale

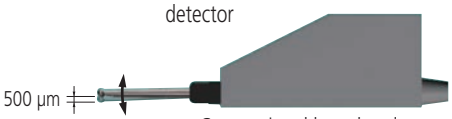
This scale is useful when the measuring height position needs to be entered, such as when measuring coaxiality, etc. The machine uses an ABS Digimatic scale unit to provide an effective means for repetitive measurement and position setting.

IN/OUT switchable wide-range detector

The range of this detector has been extended from that of a conventional lever head by as much as four times, and is now wider than ever before. The detector can provide sufficient margin for centering and leveling jobs, or when measuring large differences. Moreover, the measuring direction can be switched between inside and outside diameters with the rotary selector located on the top of the detector.

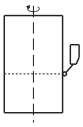
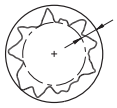
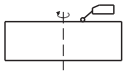
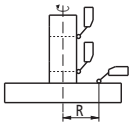
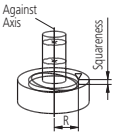
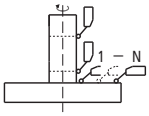
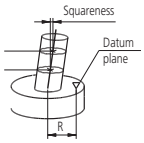
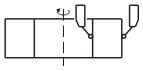
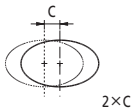
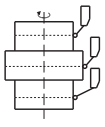
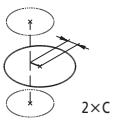
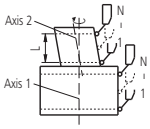
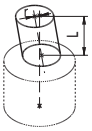


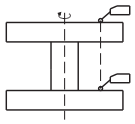
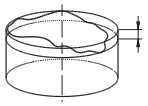
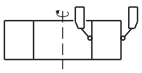
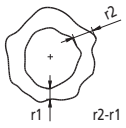
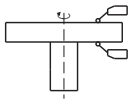
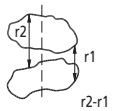
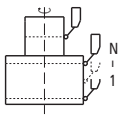
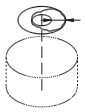
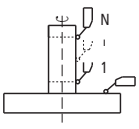
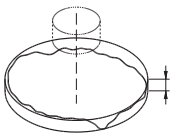
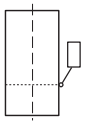
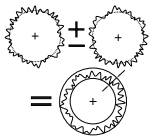
RA-120/120P
IN/OUT Switchable wide-range detector



Conventional lever head type

Types of Analysis

Type of Analysis		Measurement mode	Evaluation diagram	RA-120	RA-120P
Roundness				✔	✔
Flatness				✔	✔
Squareness	Relative to Axis			✔	✔
	Relative to Plane			✔	✔
Concentricity				✔	✔
Coaxality	Of section			✔	✔
	Of axis			—	✔

Type of Analysis		Measurement mode	Evaluation diagram	RA-120	RA-120P
Parallelism				✔	✔
Thickness variation	Radial			✔	✔
	Axial			✔	✔
Circular run-out	Radial			✔	✔
	Axial			✔	✔
Power spectrum				—	✔
Profile operation		—		—	✔

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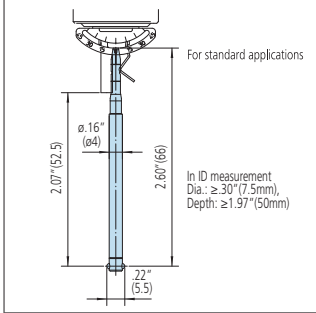
Optional Accessories

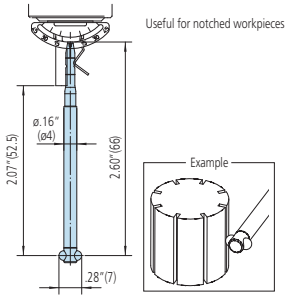
■ Interchangeable Styli

Unit: inch (mm)

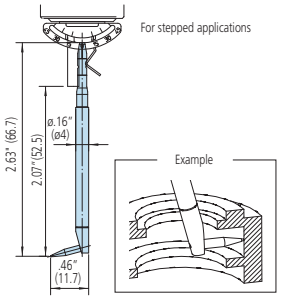
12AAL021 Standard stylus
*Standard accessory (stylus tip: ø.06"(ø1.6) carbide ball)



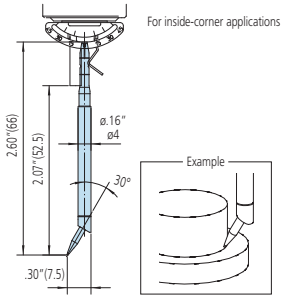
12AAL022
Stylus for notched workpieces (stylus tip: ø.12"(ø3) carbide ball)



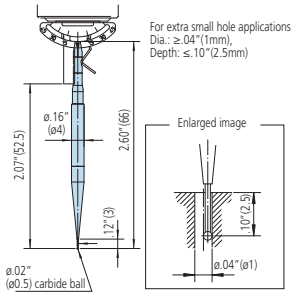
12AAL023
Stylus for deep groove (stylus tip: R0 .01"(.25) sapphire)



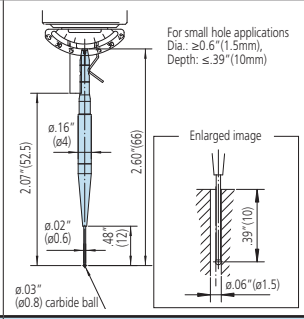
12AAL024
Stylus for corners (stylus tip: R0 .01"(.25) sapphire)



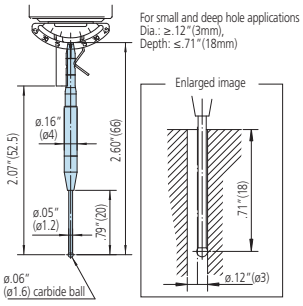
12AAL029
Stylus for extra small holes (stylus tip: ø.02"(ø0.5) carbide ball)



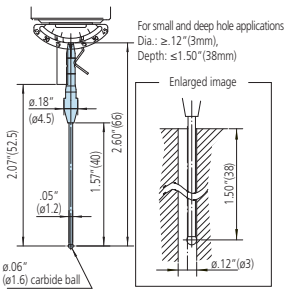
12AAL026
Stylus for small holes (stylus tip: ø.03"(ø0.8) carbide ball)



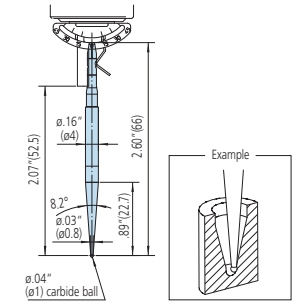
12AAL030
Stylus for small and deep holes (stylus tip: ø0.6"(ø1.6) carbide ball, L=20)



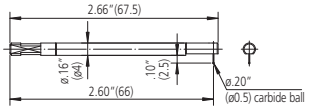
12AAL028
Stylus for small and deep holes (stylus tip: ø0.6"(ø1.6) carbide ball, L=40)



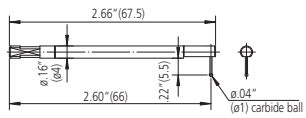
12AAL027 Stylus for small holes (stylus tip: ø.04"(ø1) carbide ball)

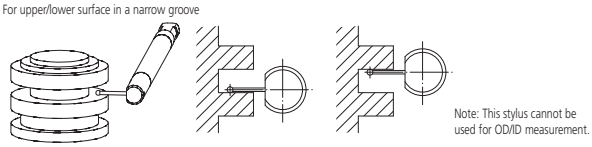


12AAL032 Crank stylus (stylus tip: ø.02"(ø0.5) carbide ball)

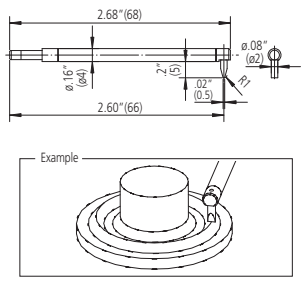


12AAL033 Crank stylus (stylus tip: ø.04"(ø1) carbide ball)

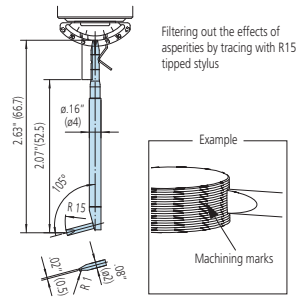




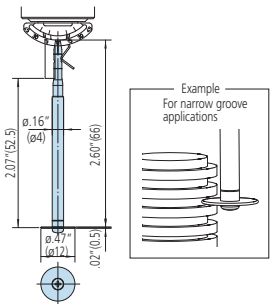
12AAL034
Stylus for flat surface



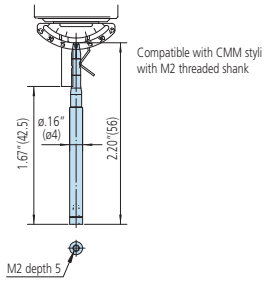
12AAL025
Stylus for removing asperities (machining marks)



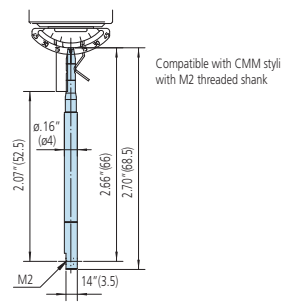
12AAL031
Disk stylus



12AAL043
M2 tapped stylus shank for CMM styli



12AAL044
M2 tapped stylus shank for CMM styli



*□ portion shows stylus except for the cranked stylus and stylus for flat surface.
*( ) dimension shows a distance from the tip end of stylus or the center of tip ball to the connecting surface of detector.
*Customized special interchangeable styli are available on request. Please contact any Mitutoyo office for more information.

■ Centering chuck (knurled ring operated)

Provides good operability when measuring a small-diameter workpiece. The knurled ring allows the workpiece to be clamped easily.

Order No.	211-032
Holding range	OD with internal jaws 1–36 mm ID with internal jaws 16–69 mm OD with external jaws 25–79 mm
External size (DxH)	ø 4.65"x 1.6" (118 x 41 mm)
Mass	2.6 lbs (1.2 kg)

■ Collet chuck

Provides high clamping repeatability due to the use of optional precision collets.
(See table at right.)

Order No.	211-051
Part holding range	ø0.5–10 mm*2
Centering error	Within 50 µm*3
Mass	3 lbs (1.4 kg)

*2: Collets to match the workpiece size range are required for use with this chuck.
*3: When measured with ø5 mm pin gauge at measuring height of 30 mm.

■ X-axis stop

Allows the user to return the detector rapidly and easily to a fixed position in the X axis.

Order No.	12AAH320
Mass	.14 lbs (65g)

■ Three-jaw chuck (key operated)

Useful where it is necessary to apply a higher clamping force to the workpiece than can be applied with the centering chuck.

Order No.	211-014
Holding range	OD with internal jaws 2.35–26 mm ID with internal jaws 25–68 mm OD with external jaws 35–78 mm
External size (DxH)	ø 6.18" x 2.78" (157 x 70.6 mm)
Mass	8.4 lbs (3.8 kg)

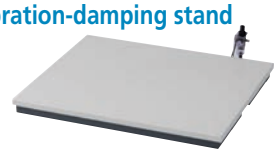
■ Individual collets*4

These collets are for use with the collet chuck shown at left and are acquired to match the workpiece diameter range required.

Order No.	Part Holding Range (O.D.)
12AAH402	ø0.02"– 0.04" (0.5–1.0mm)
12AAH403	ø0.04"– 0.06" (1.0–1.5mm)
12AAH404	ø0.06"– 0.08" (1.5–2.0mm)
12AAH405	ø0.08"– 0.1" (2.0–2.5mm)
12AAH406	ø0.1"– 0.12" (2.5–3.0mm)
12AAH407	ø0.12"– 0.138" (3.0–3.5mm)
12AAH408	ø0.0.138"– 0.157" (3.5–4.0mm)
12AAH409	ø0.157"– 0.197" (4.0–5.0mm)
12AAH410	ø0.197"– 0.236" (5.0–6.0mm)
12AAH411	ø0.236"– 0.275" (6.0–7.0mm)
12AAH412	ø0.275"– 0.315" (7.0–8.0mm)
12AAH413	ø0.315"– 0.354" (8.0–9.0mm)
12AAH414	ø0.354"– 0.394" (9.0–10.0mm)

*4: A collet cannot be mounted on the rotary table without a collet chuck.
*4: YCC10-** Class AA, made by Yukiwa Seiko Inc. or its equivalent.

■ Vibration-damping stand



Order No.	211-013
Vibration damping system	Diaphragm type air spring
External size	24 x 20 x 2" (615 x 515 x 51mm)
Max. loading mass	330 lbs (150kg)

■ Microchuck

For clamping a small workpiece, 1 mm or less in diameter, that cannot be held in the centering chuck.

Order No.	211-031
Holding range	OD: 0.1–1.5 mm
External size (DxH)	ø4.65" x 1.9" (118 x 48.5 mm)
Mass	1.32 lbs (0.6 kg)

■ Auxiliary stage for a short workpiece

Order No. **356038**

■ Reference hemisphere

Order No. **211-016**

■ Magnification checking gage

Order No. **211-045**

■ Gage block set for calibration

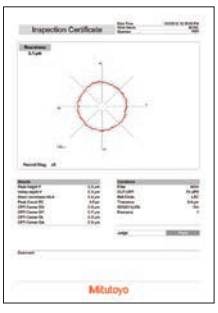
Order No. **997090**

■ Replacement elements for the air filter

Order No. **358592** (for filter)
358593 (filter regulator)

■ Simplified communication program for ROUNDTEST RA-120

The Roundtest RA-120 has a USB interface, enabling data to be transferred to a spreadsheet or other software.
We also provide a program that lets you create inspection record tables using a Microsoft Excel* macro.



Required environment:

- OS: Windows XP-SP3
  Windows VISTA
  Windows 7 (32bit/64bit)
  Windows 10
- Spreadsheet software: Microsoft Excel 2010
  Microsoft Excel 2016

*Windows OS and Microsoft Excel are products of Microsoft Corporation.

The optional USB cable is also required.

- USB cable for RA-120 series
  12AAH490

This program can be downloaded for FREE from the Mitutoyo website.
https://www.mitutoyo.co.jp/eng/

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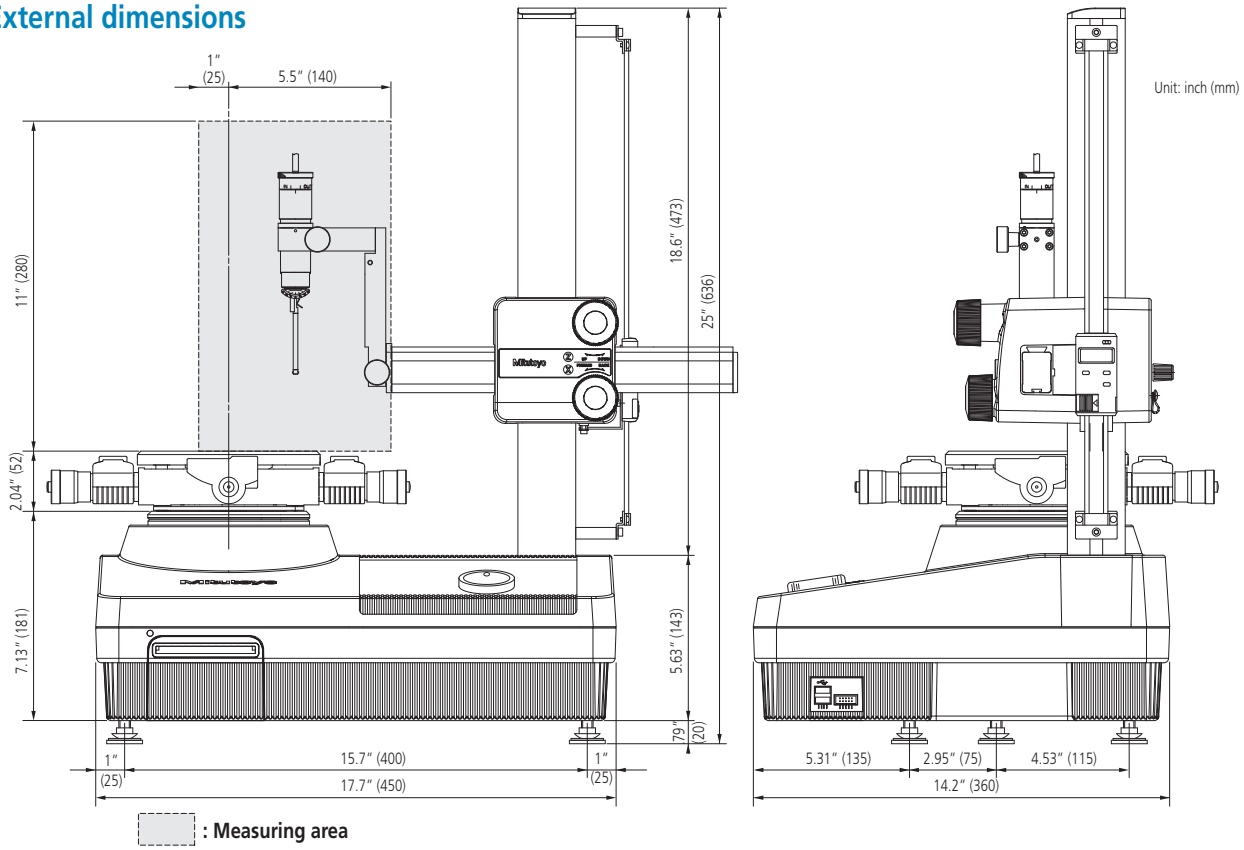
Specifications

■ Main unit

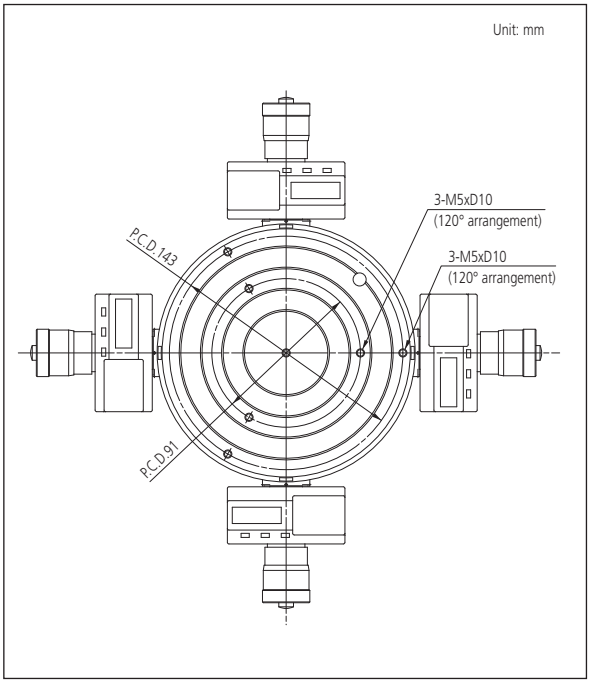
Model			RA-120		RA-120P	
Order No.*			**211-544-13**	**211-543-13**	**211-547-11**	**211-546-13**
Turntable	Rotational accuracy	Radial	(0.04+6H/10000)µm H: Probing height (mm) JIS B 7451-1997			
		Axial	(0.04+6X/10000)µm X: Probing radius (mm)			
	Rotation speed		6 rpm			
	Effective table diameter		ø6" (150mm)			
	Centering range adjustment		± .118" (3mm)			
	Leveling range adjustment		± 1°			
	Centering/leveling device (micrometer head)		Mechanical head	Digital head (inch/mm)	Mechanical head	Digital head (inch/mm)
	Maximum probing diameter		± 11" (280mm) [(± 15" (380mm) in a reverse and vertical detector position)]			
	Maximum workpiece diameter		17.32" (440mm)			
	Maximum turntable loading		55 lbs (25kg)			
Vertical column (Z-axis)	Vertical travel		11.02" (280mm) from the turntable top			
	Maximum probing height		280mm from the turntable top [(18.9" (480mm) in the reverse and vertical detector configuration)]			
	Maximum probing depth		3.94" (100mm) [(minimum ID: ø1.12"(30mm)]			
Horizontal arm (X-axis)	Horizontal travel		6.5" (165mm) [(Including a protrusion of 1" (25mm) from the turntable rotation center)]			
Detector	Measuring direction		Two directional (IN/OUT switchable)			
	Measuring range		± 1000µm			
	Measuring force		100mN (± 30%)			
	Standard stylus (**12AAL021**)		Carbide ball, .06" (ø1.6mm)			
Electronic unit	Measuring range		± 1000 ± 500 ± 200 ± 100 ± 50 ± 20 ± 10 ± 5µm (8 steps)			
	Magnification		X5 to X200,000		X1 to X500,000	
	Filter type		Phase corrected: Gaussian, 2CRPC75, 2CRPC50 Filter OFF		Not phase corrected: 2CR75, 2CR50	
	Cutoff value		15upr, 50upr, 150upr, 500upr 15-150upr, 15-500upr, 50-500upr		15upr, 50upr, 150upr, 500upr, Manual 15-150upr, 15-500upr, 50-500upr, Manual	
	Number of measuring sections		Maximum 5		Maximum 100	
	Evaluation type		Roundness, coaxality, concentricity, flatness, circular run-out (radial/axial), squareness (relative to axis/plane), thickness deviation, parallelism			
	Reference circle for evaluation		LSC, MZC, MIC, MCC			
	Adjusting centering/leveling		D.A.T. function (circular/multi-point switchable)			
	Functions		Notched measurement, re-calculation, limaçon error correction, continous ID and OD measurement		Notched measurement, re-calculation, limaçon error correction, remarkable point analysis (gear), harmonic analysis, continous ID and OD measurement	
	Printer		Thermal line printer (external printer port available)		Windows compatible ink-jet printer	
	Data output	USB stick memory	Calculation result, measurement data			
		RS-232C	Calculation result, measurement data			
		SPC	Calculation result			
Others	Power supply		AC 100 – 240V			
	Power consumption		40W		30W (excluding PC system)	
	Air pressure		390kPa			
	Air consumption		30L/min (minimum)			
	Mass		Main unit: 70.5 lbs (32kg) Air filter: 4.4 lbs (2kg)			

Dimensions

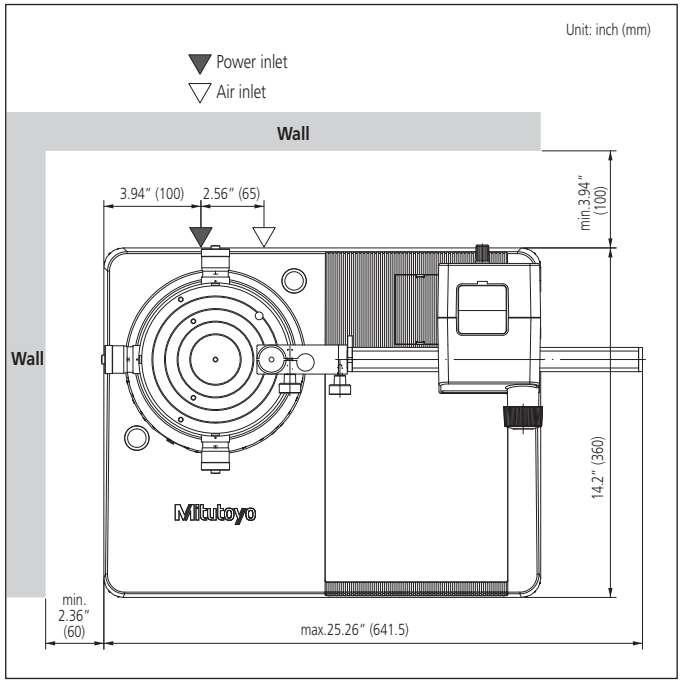
External dimensions



Turntable top view

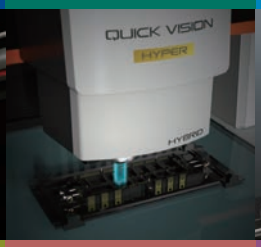


Installation floor plan



Coordinate Measuring Machines

Vision Measuring Systems



Form Measurement

Optical Measuring

Sensor Systems

Test Equipment

Digital Scale and DRO Systems

Small Tool Instruments and Data Management

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 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.

Find additional product literature and our product catalog

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