Mitutoyo

ROUNDTEST RA-120/RA-120P

COMPACT ROUNDNESS MEASUREMENT

Mitutoyo

Roundtest RA-120

- Highest 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 centering/leveling device: Analog head type)
- Scaled Z-axis
- Continuous ID and OD measurement
- High-precision air bearing
- Wide-range detector
- Straightforward 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 ▲

This compact roundness measuring machine is provided with numerous user-friendly features aimed at prioritising usability, such as a wider range for the detector, an easy-to-understand operation panel with large LCD, a D.A.T. function that powerfully supports centering and leveling adjustments, and so on.

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

USB 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.

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
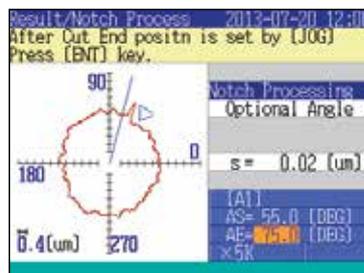
File save

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.
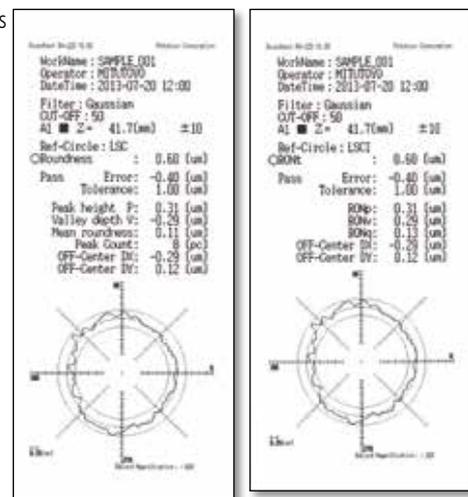
Recording paper set (optional set of 10 rolls)

Mitutoyo

Roundtest RA-120P

- Highest rotational accuracy
- Fine adjustment on both X- and Z-axes
- Multiple analyses through simple operation
- D.A.T. function
  (except for centering/leveling device: Analog head type)
- Scaled Z-axis
- Continuous ID and OD measurement
- Display function for various graphs
- High-precision air bearing
- Wide-range detector
- Supports 16 languages
- ROUNDPAK software

## ROUNDPAK software – powerful and easy to use

By using a mouse and buttons, identified by corresponding icons, to control the machine, the software ROUNDPAK interface provides excellent usability. Functions such as recalculation and graph reading are handled swiftly with easy-to-understand operations.
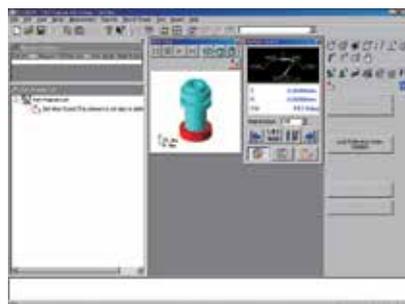
▲ Main screen

▲ Measurement setup screen
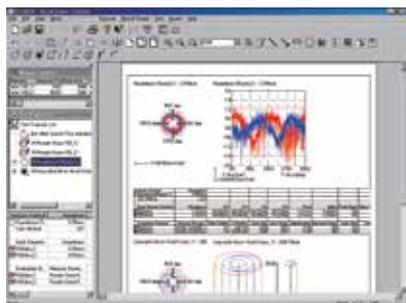
▲ Result screen
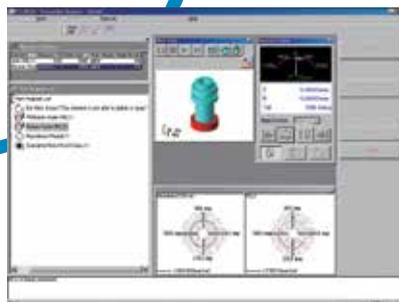
▲ Measurement in progress screen

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.

## Measurement screen make sample use of graphs
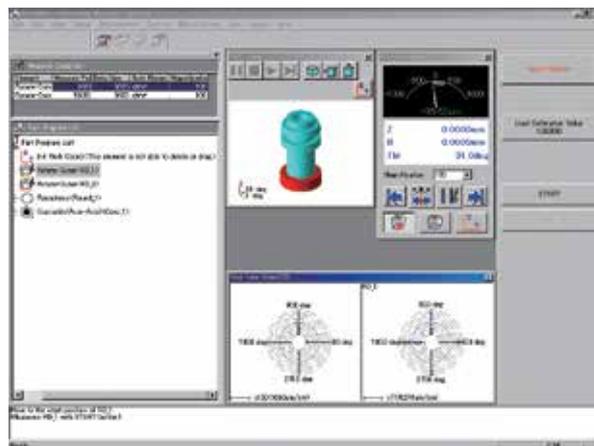
Multi-analysis function

Complete with a wide range of functions including partial enlargement, auxiliary line setup, colour 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.
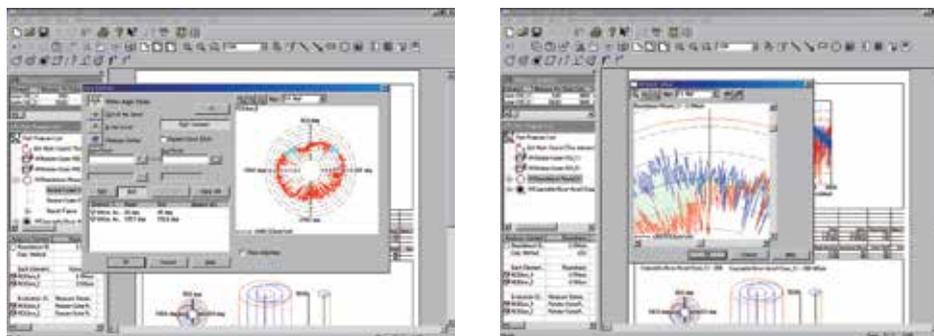
## Simplified layout function

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 colour printer (optional).
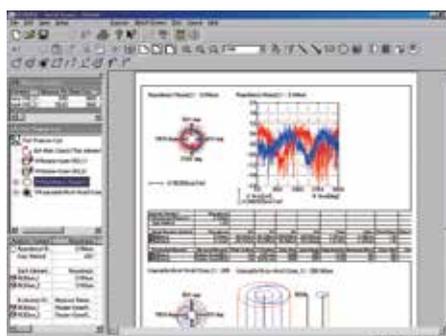
Layout setting screen
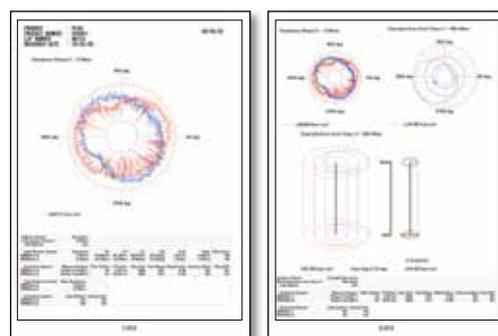
Sample print outputs

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

D.A.T. function (except for centering/leveling device with analog micrometer heads)

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

	Mode selection	Preliminary setup	Centering	Leveling
RA-120				
RA-120P				

Offset range adjustment: ±5mm
Inclination range adjustment: ±1°

Two preliminary measurements are made at cross-sections [A] and [B]

Center of rotation
Initial inclination from table axis
Workpiece
Initial offset from center of rotation
Rotary table

Adjust the digital micrometer heads on the rotary table by the amount indicated to correct the initial offset and inclination

Center of rotation
Workpiece
Rotary table

Preliminary measurement	Displays amount of offset/inclination	Simple adjustment	Centering/leveling complete

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)
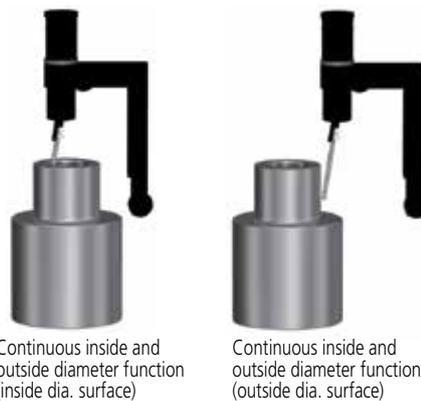
Z-axis scale

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 a single touch of a button.

2000 µm

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

500 µm

Conventional lever head type

Types of Analysis

Type of analysis		Measurement mode	Evaluation diagram	RA-120	RA-120P
Roundness				O	O
Flatness				O	O
Perpendicularity	Relative to Axis		Against Axis / Squareness / R	O	O
	Relative to Plane		Squareness / Datum plane / R	O	O
Concentricity			C / 2×C	O	O
Coaxality	Of section		2×C	O	O
	Of axis	Axis 2 / Axis 1		—	O

Type of Analysis		Measurement mode	Evaluation diagram	RA-120	RA-120P
Parallelism				O	O
Thickness variation	Radial		r2 / r1 / r2-r1	O	O
	Axial		r2 / r1 / r2-r1	O	O
Circular run-out	Radial			O	O
	Axial			O	O
Power spectrum				—	O
Profile operation		—		—	O

7

Optional Accessories

Interchangeable Styli

Unit: mm

12AAL021 Standard stylus	Standard accessory (stylus tip: ø1.6 carbide ball)	12AAL022 Stylus for notched workpieces (stylus tip: ø3 carbide ball)	12AAL023 Stylus for grooves (stylus tip: R0.25 sapphire)	12AAL024 Stylus for corners (stylus tip: R0.25 sapphire)

For standard applications
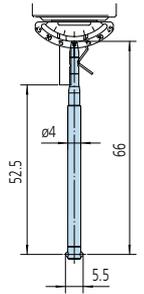
In ID measurement
Dia.: ≥7.5mm, Depth: ≤50mm

ø4 — 66 — 52.5 — 5.5

Useful for notched workpieces

Example

ø4 — 66 — 52.5 — 7
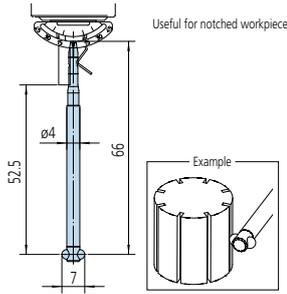
For stepped applications

Example

ø4 — 66 — 52.5 — 11.7
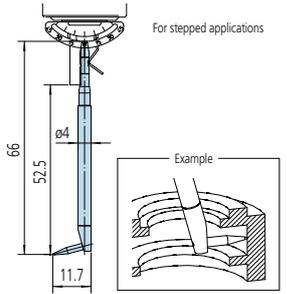
For inside-corner applications

Example
30°

ø4 — 66 — 52.5 — 7.5
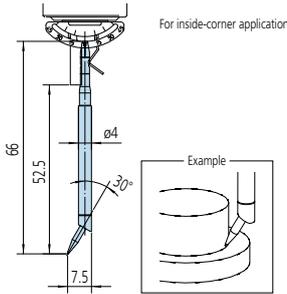
12AAL029 Stylus for extra small holes (stylus tip: ø0.5 carbide ball)	12AAL026 Stylus for small holes (stylus tip: ø0.8 carbide ball)	12AAL030 Stylus for small and deep holes (stylus tip: ø1.6 carbide ball)	12AAL028 Stylus for small and deep holes (stylus tip: ø1.6 carbide ball, L=40)

For extra small hole applications
Dia.: ≥1mm, Depth: ≤2.5mm

Enlarged image
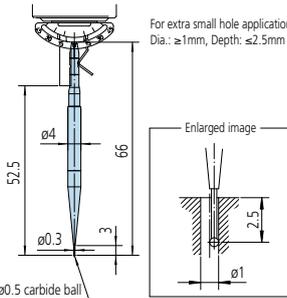
ø4 — 66 — 52.5 — ø0.3 — 3 — 2.5 — ø1
ø0.5 carbide ball

For small hole applications
Dia.: ≥1.5mm, Depth: ≤10mm

Enlarged image
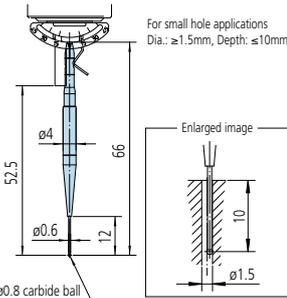
ø4 — 66 — 52.5 — ø0.6 — 12 — 10 — ø1.5
ø0.8 carbide ball

For small and deep hole applications
Dia.: ≥3mm, Depth: ≤18mm

Enlarged image
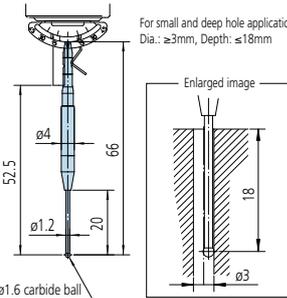
ø4 — 66 — 52.5 — ø1.2 — 20 — 18 — ø3
ø1.6 carbide ball

For small and deep hole applications
Dia.: ≥3mm, Depth: ≤38mm

Enlarged image
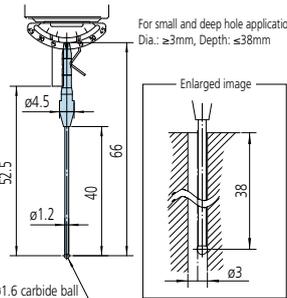
ø4.5 — 66 — 52.5 — ø1.2 — 40 — 38 — ø3
ø1.6 carbide ball

12AAL027 Stylus for small holes (stylus tip: ø1 carbide ball)	12AAL032 Cranked stylus (stylus tip: ø0.5 carbide ball)	12AAL033 Cranked stylus (stylus tip: ø1 carbide ball)	12AAL034 Stylus for flat surface

For small hole applications

Example

ø4 — 66 — 52.5 — 8.2° — ø0.8 — 22.7
ø1 carbide ball

67.5 — ø4 — 66 — 2.5 — ø0.5 carbide ball

For upper/lower surface in a narrow groove
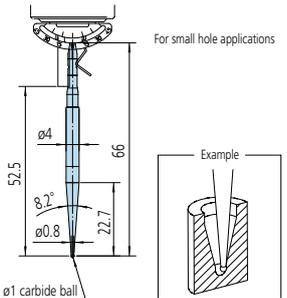
67.5 — ø4 — 66 — 5.5 — ø1 carbide ball

For upper/lower surface in a narrow groove
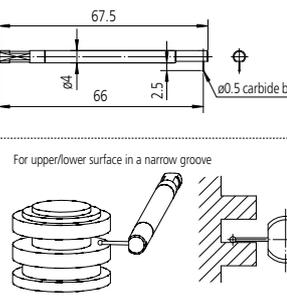
Note: This stylus cannot be used for OD/ID measurement.

68 — ø2 — ø4 — 5 — R1 — 0.5 — 66

Example
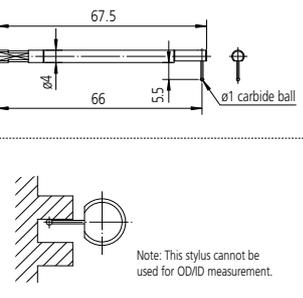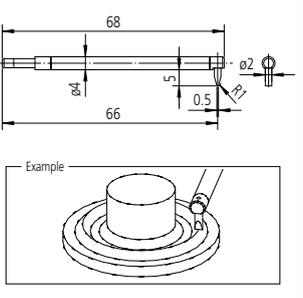
12AAL025 Stylus for filtering asperities (machining marks)	12AAL031 Disk stylus	12AAL043 M2 tapped shank for CMM styli	12AAL044 M2 tapped shank for CMM styli

Filtering out the effects of asperities by tracing with R15 tipped stylus
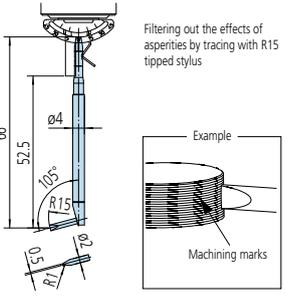
Example

Machining marks

ø4 — 66 — 52.5 — 105° — R15 — R1 — 2.0 — 1.0

For narrow groove applications

Example

ø4 — 66 — 52.5 — ø12 — 0.5

Compatible with CMM styli with M2 threaded shank
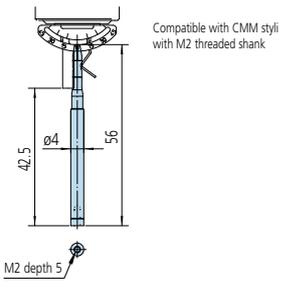
ø4 — 56 — 42.5
M2 depth 5

Compatible with CMM styli with M2 threaded shank
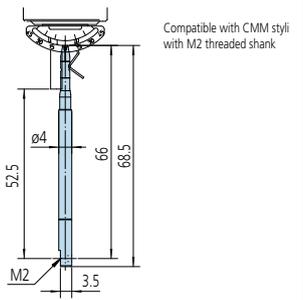
ø4 — 66 — 68.5 — 52.5
M2 — 3.5

Customised 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 internal jaws 25–79 mm
External size (D x H)	ø118 x 41 mm
Mass	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	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	65 g

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 2–26 mm ID with internal jaws 25–68 mm OD with internal jaws 35–78 mm
External size (D x H)	ø157 x 70.6 mm
Mass	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
12AAH402	ø0.5–1.0 mm
12AAH403	ø1.0–1.5 mm
12AAH404	ø1.5–2.0 mm
12AAH405	ø2.0–2.5 mm
12AAH406	ø2.5–3.0 mm
12AAH407	ø3.0–3.5 mm
12AAH408	ø3.5–4.0 mm
12AAH409	ø4.0–5.0 mm
12AAH410	ø5.0–6.0 mm
12AAH411	ø6.0–7.0 mm
12AAH412	ø7.0–8.0 mm
12AAH413	ø8.0–9.0 mm
12AAH414	ø9.0–10.0 mm

*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	615 x 515 x 51 mm
Max. loading mass	150 kg

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: up to 1.5 mm
External size (D x H)	ø118 x 48.5 mm
Mass	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)

USB 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 macro in Microsoft® Excel®.
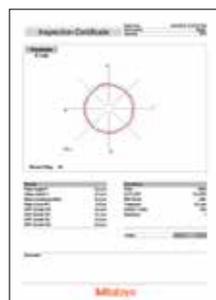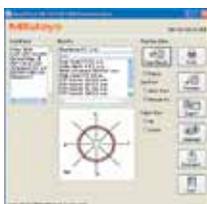
Required environment:
- OS: Windows® XP-SP3
  Windows® Vista
  Windows® 7 (32/64bit)
  Windows® 10
- Spreadsheet software: Microsoft®Excel® 2010/2016

The optional USB cable is also required.
- USB cable for RA-120 series
  Order No. **12AAH490**

USB Communication Program as a free download on www.mitutoyo.eu!

Specifications

Main unit

Model			RA-120			RA-120P		
			Dedicated electronic analysis type			Data analysis by PC		
Turntable	Rotational accuracy	Radial	$(0.04+0.0006H)$ µm H: Probing height (mm) JISB7451-1997					
		Axial	$(0.04+0.0006X)$ µm X: Probing radius (mm)					
	Rotational speed		6rpm					
	Effective table diameter		150 mm					
	Centering range adjustment		±3 mm					
	Leveling range adjustment		±1°					
	Centering/leveling device (micrometer head)		Analog head	Digital head (mm)	Digital head (inch/mm)	Analog head	Digital head (mm)	Digital head (inch/ mm)
	Maximum probing diameter		280 mm (380 mm in a reverse and vertical detector position)					
	Maximum workpiece diameter		440 mm					
	Maximum turntable loading		25 kg					
Vertical column (Z-axis)	Vertical travel		280 mm from the turntable top					
	Maximum probing height		280 mm from the turntable top (480 mm in the reverse and vertical detector configuration)					
	Maximum probing depth		100 mm (minimum ID: 30 mm)					
Horizontal arm (X-axis)	Horizontal travel		165 mm (Including a protrusion of 25mm from the turntable rotation center)					
Detector	Measuring direction		Two directional (IN/OUT switchable)					
	Measuring range		±1000 µm					
	Measuring force		70 to 100mN (±30%)					
	Standard stylus (**12AAL021**)		Carbide ball, **ø1.6 mm** (.06")					
Electronic unit	Measuring range		8 steps: ±(1.000, 500, 200, 100, 50, 20, 10, 5) µm					
	Magnification		X5 to X200.000			X1 to X500.000		
	Filter type		Phase corrected: Gaussian, 2CRPC75, 2CRPC50			Not phase corrected: 2CR75, 2CR50 Filter OFF		
	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), Perpendicularity (relative to axis/plane), Thickness deviation, Parallelism					
	Reference circle for evaluation		LSCI, MZCI, MICI, MCCI					
	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			Ink-jet printer compatible with Windows®		
	Display languages		Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch			Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Russian		
	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		32 – 36W			21 – 24W (excluding PC system)		
	Air pressure		0.39MPa					
	Air consumption		30L/min (minimum)					
	Mass		Main unit: 32 kg Air filter: 2 kg					

Dimensions

External dimensions

Unit: mm

: Measuring area

Turntable top view

Unit: mm

3-M5xD10
(120° arrangement)

3-M5xD10
(120° arrangement)

P.C.D 143

P.C.D 91
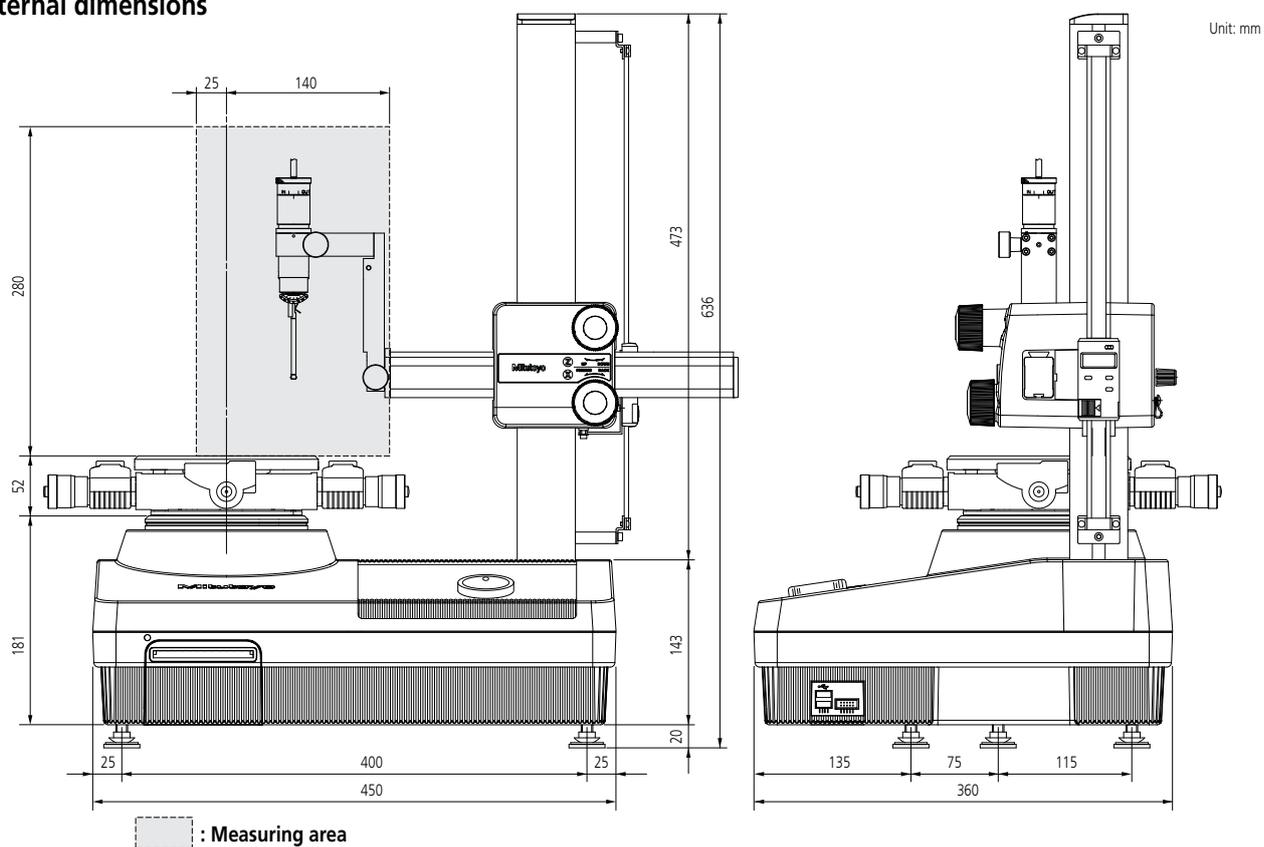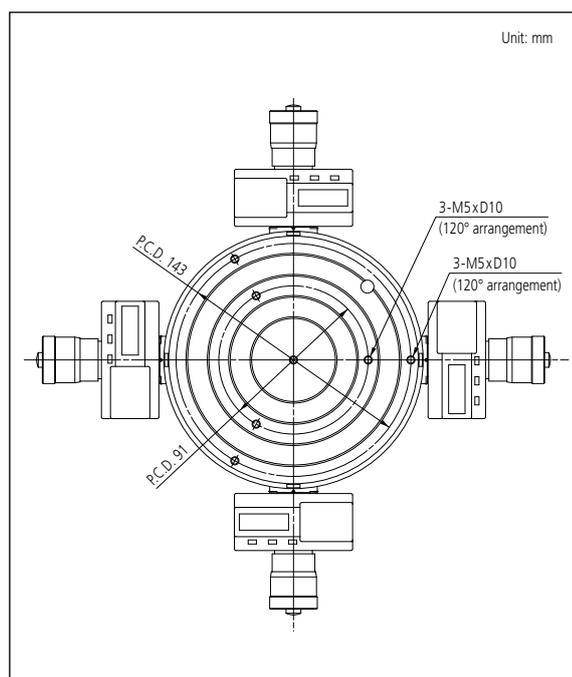
Installation floor plan

Unit: mm

▼ Power inlet
▽ Air inlet

Wall

Wall

min. 100

100   65

360

min. 60   max. 641.5

Coordinate Measuring Machines	Vision Measuring Systems	Form Measurement	Optical Measuring

Sensor Systems	Test Equipment and Seismometers	Digital Scale and DRO Systems	Small Tool Instruments and Data Management
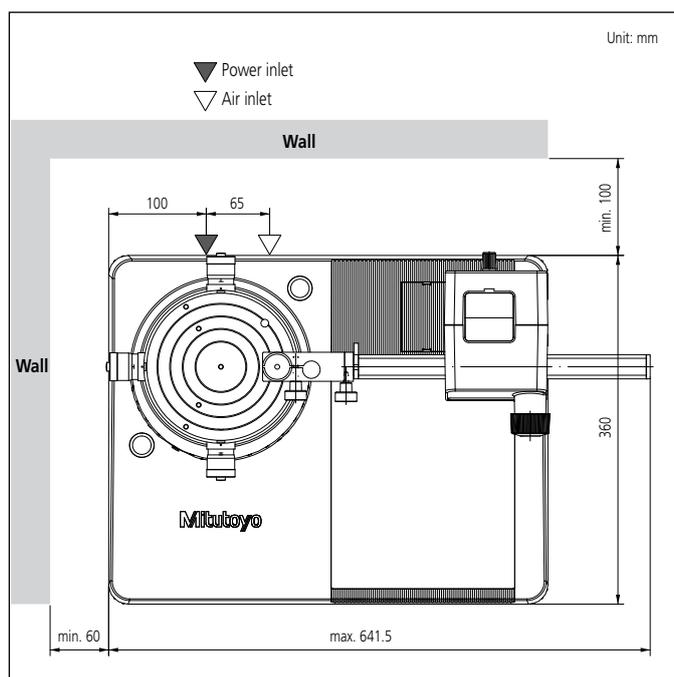
**Whatever your challenges are,
Mitutoyo supports you from start to finish.**

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 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 bespoke 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 catalogue**

www.mitutoyo.eu

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