Mitutoyo

ROUNDTEST RA-2200 SERIES

ROUNDNESS/CYLINDRICITY MEASURING SYSTEM

OFFERING HIGHEST PRECISION LEVEL IN ITS CLASS

FORM MEASUREMENT

PRE1361

ROUNDTEST RA-2200AS/DS/AH/DH

All models are equipped with a highly accurate turntable that enables simple and accurate centering and leveling of the workpiece, which account for the majority of the essential setup work for measuring roundness/cylindricity.

Wide variety of models available to suit any application

RA-2200AS/AH
The models are supplied as standard with an automatic centering and leveling turntable, freeing the operator from the centering and leveling task.

RA-2200DS/DH
The models are supplied as standard with a navigation function that quickly and simply guides the operator through the centering and leveling task, as though the task were being performed by an expert.

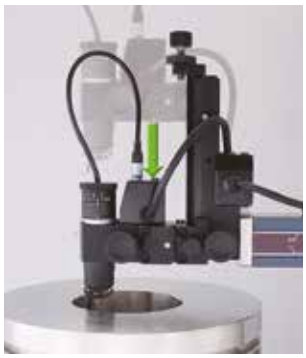
Both types have a column drive height of 300 mm (type S) or 500 mm (type H) for handling taller workpieces.
All models can be combined with the basic, side-table system vibration-damping platform or the monitor-arm system vibrationdamping platform.

Space-saving design

Integrating the system vibration-damping platform (see figure page 6) has reduced the installation space by approximately 20-40% compared to Mitutoyo's earlier installation platforms. Additionally, a design with increased layout freedom greatly improves the measurement room utilization rate and measurement efficiency.

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

The detector-unit holder can be stopped at a position sufficiently higher than the workpiece along the Z-axis, and then lowered and positioned to make measurements. Furthermore, internal/external diameters can be easily measured with the continuous internal/external diameter measurement function
(for details see page 3).

Safety mechanism provided as a standard feature

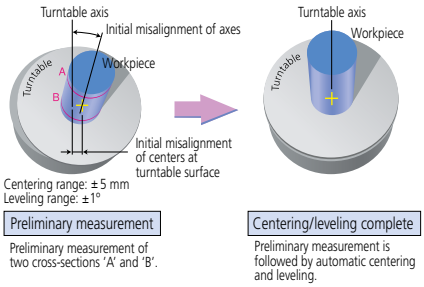
A safety mechanism is incorporated into the detector unit area. A collision-sensing function has been added to the detector unit (when it is in the vertical orientation) to prevent collision in the Z-axis direction. Additionally, an accidental collision prevention function, which stops the system when 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.

Equipped with a highly accurate turntable that enables simple and accurate centering and leveling of the workpiece

The table provides high rotational accuracy (radial 0.02+3.5H/10000 µm; axial 0.02+3.5X/10000 µm), enabling the system to measure flatness and other characteristics, in addition to roundness/cylindricity, at a level that suits any application.
For centering and leveling support, you can select either the A.A.T. (Automatic Adjustment Table) or D.A.T. (Digimatic Adjustment Table).

A.A.T. (Automatic Adjustment Table)

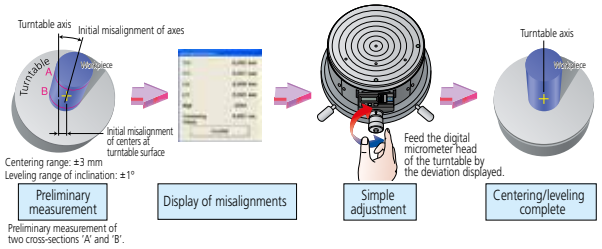
RA-2200 AS/AH



D.A.T. (Digimatic Adjustment Table)

RA-2200 DS/DH

Patent registered in Japan, USA
Patent pending in Germany



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. 50 mm/s
- Radial direction: Max. 30 mm/s

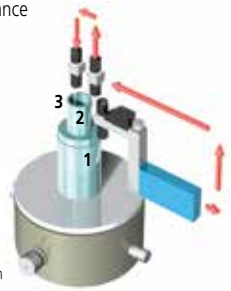
Highly accurate repeat measurements

Mitutoyo's linear scales are incorporated into the X-axis positioning sensor, directly sensing the displacement of the drive unit to achieve highly accurate positioning, which is essential for repeat measurements.

Continuous OD/ID measurement function

Patent registered in Japan, USA, Germany, UK, France

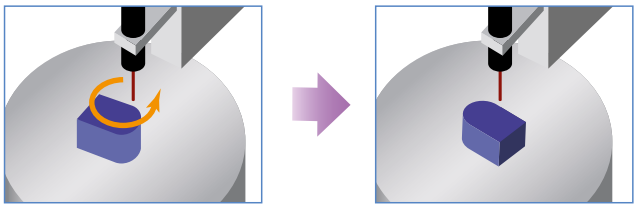
Continuous internal/external diameter measurement is possible without changing the detector position.



1), 2) : External diameter measurement
3) : Internal diameter measurement
: Displacement
3) = inner diameter: Up to ø50 mm

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.

Spiral-mode cylinder measurement

Measurement through X-axis tracking

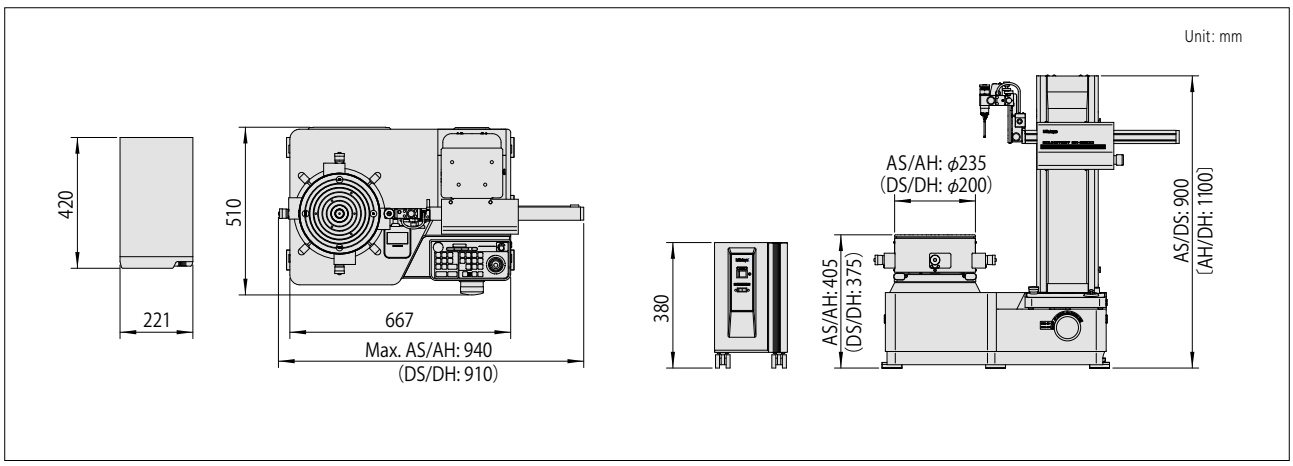
Measurement while tracing is possible through a built-in linear scale in the X-axis. This type of measurement is useful when displacement due to form variation exceeds the measuring range of the sensor, and X-axis motion is necessary to maintain contact with the workpiece surface.

Mitutoyo

Specifications RA-2200 AS/DS/AH/DH

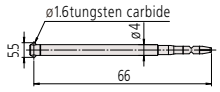
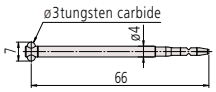
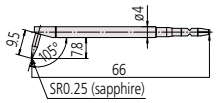
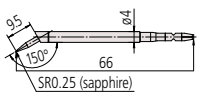
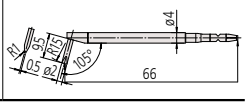
Model No.			RA-2200AS	RA-2200DS	RA-2200AH	RA-2200DH
Turntable unit	Rotational accuracy	Radial direction	(0.02+3.5H/10000) µm H: probing height (mm)			
		Axial direction	(0.02+3.5X/10000) µm X: distance from rotational center (mm)			
	Rotating speed		2, 4, 6, 10 rpm			
	Table effective diameter		ø235 mm	ø200 mm	ø235 mm	ø200 mm
	Centering/leveling adjustment		A.A.T	D.A.T	A.A.T	D.A.T
	Centering adjustment range		±3 mm	±5 mm	±3 mm	±5 mm
	Leveling adjustment range		±1°			
	Max. loading weight		30 kg			
	Max. probing diameter		ø300 mm			
	Max. loading diameter		ø580 mm			
Vertical drive unit (Z-axis)	Straightness accuracy		0.10 µm/100 mm (λc 2.5)	0.15 µm/300 mm (λc 2.5)	0.10 µm/100 mm (λc 2.5)	0.25 µm/500 mm (λc 2.5)
	Parallelism to rotation center		0.7 µm/300 mm (Referential generatrix line)		1.2 µm/500 mm (Referential generatrix line)	
	Traverse speed		Max. 50 mm/s (Measurement: 0.5 / 1.0 / 2.0 / 5.0 mm/s)			
	Max. probing height	OD	300 mm		500 mm	
		ID	300 mm		500 mm	
	Max. probing depth		85 mm for ø32 mm or more (with standard stylus)			
Radial drive unit (X-axis)	Straightness accuracy		0.7 µm/150 mm (λc 2.5)			
	Horizontal to rotation center		1.0 µm/150 mm (Referential generatrix line)			
	Travel amount		175 mm (from rotation center -25 mm~+150 mm)			
	Travel speed		Max. 30 mm/s (Measurement: 0.5/1.0/2.0/5.0 mm/s)			
Detector	Measuring force		10 ~ 50 mN (switching 5 levels) (ID/OD measurement style with standard stylus)			
	Stylus design, material		ø1.6 mm tungsten carbide ball			
	Measuring range	Standard	±400 µm/±4 µm/±4 µm			
		Follow	±5 mm			
	Other		2 direction one-touch switching type, Stylus angle scale markings (±45°), Contention detection function for Z-axis direction, Sliding detector holder (3 position)			
Other	Power supply		100 V ~ 240 V			
	Air pressure		0.39 MPa			
	Air consumption		30 L/min (standard state)			
	Weight (measurement main unit)		180 kg		200 kg	

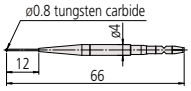
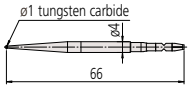
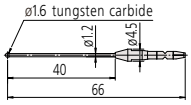
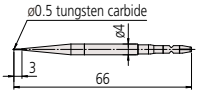
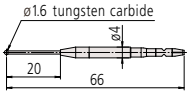
Dimensions

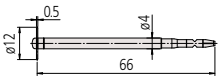
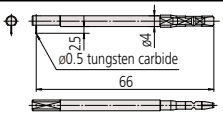
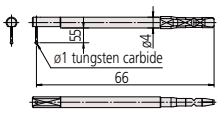
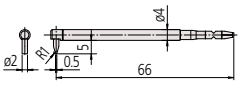
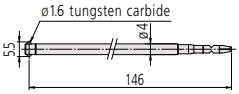


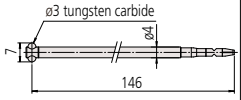
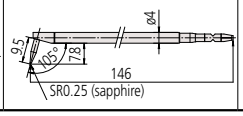
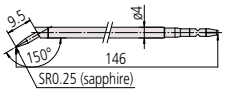
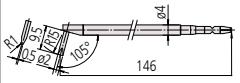
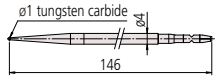
Optional Accessories

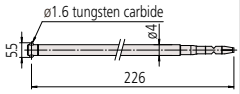
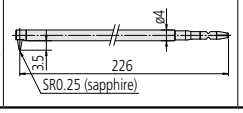
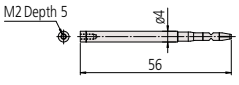
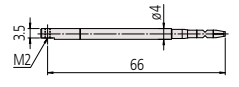
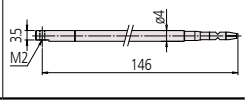
Styli for RA-2200 (Option)

Type	Standard (Standard accessory)	Notch *2	Deep groove *2	Corner	Cutter mark
Order No.	**12AAL021**	**12AAL022**	**12AAL023**	**12AAL024**	**12AAL025**
Stylus tip	ø1.6 mm tungsten carbide	ø3 mm tungsten carbide	SR0.25 mm sapphire	SR0.25 mm sapphire	tungsten carbide
Dimensions (mm)					

Type	Small hole (ø0.8)	Small hole (ø1.0) *2	Small hole (ø1.6)	Extra small hole (Depth 3 mm)	ø1.6 mm ball *2
Order No.	**12AAL026**	**12AAL027**	**12AAL028**	**12AAL029**	**12AAL030**
Stylus tip	ø0.8 mm tungsten ca rbide	ø1 mm tungsten carbide	ø1.6 mm tungsten carbide	ø0.5 mm tungsten carbide	ø1.6 mm tungsten carbide
Dimensions (mm)					

Type	Disk	Crank (ø0.5)	Crank (ø1.0)	Flat surface	2X-long type *1 *2
Order No.	**12AAL031**	**12AAL032**	**12AAL033**	**12AAL034**	**12AAL035**
Stylus tip	ø12 mm tungsten carbide	ø0.5 mm tungsten carbide (Depth 2.5 mm)	ø1 mm tungsten carbide (Depth 5.5 mm)	tungsten carbide	ø1.6 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	ø3 mm tungsten carbide	SR0.25 mm sapphire	SR0.25 mm sapphire	tungsten carbide	ø1 mm tungsten carbide
Dimensions (mm)					

Type	3X-long type *3	3X-long type deep groove *3	Stylus shank	Stylus shank(standard groove)	Stylus shank(2X-long groove)*1
Order No.	**12AAL041**	**12AAL042**	**12AAL043**	**12AAL044**	**12AAL045**
Stylus tip	ø1.6 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 in the horizontal direction with detector 12AAF203.
*2: Part of the 5-piece styli set 12AAL020.
*3: Measuring is only possible in the vertical direction.

ROUNDTEST EXTREME RA-2200CNC

RA-2200CNC+vibration isolator with side table

Highly accurate turntable

The table provides high rotational accuracy (radial 0.02+3.5H/10000 µm; axial 0.02+3.5X/10000 µm), enabling the system to measure flatness and other characteristics, in addition to roundness/cylindricity, at a level that suits any application.

Space-saving design

Integrating the system vibration-damping platform has significantly reduced the installation space requirements. Additionally, any layout can be achieved by combining the system with a PC table.

Highly accurate positioning sensor

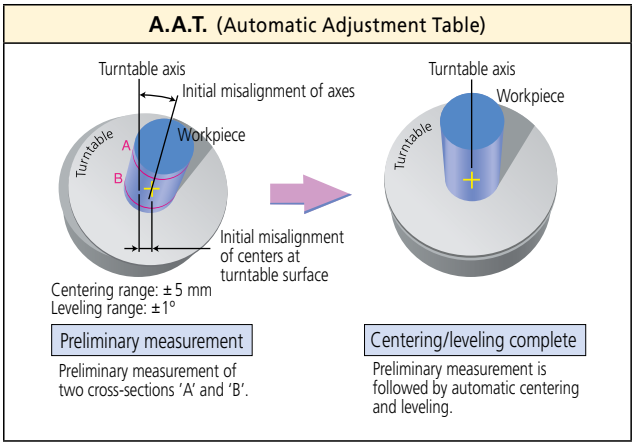
A Mitutoyo linear scale is incorporated into the X-axis positioning sensor, directly sensing the displacement of the drive unit to achieve highly accurate positioning, which is essential for repeat measurements. Furthermore, continual development has resulted in the highest drive speed within the class while achieving high accuracy even at high positioning speeds.

Detector unit orientation programmable for CNC measurement

This function controls the orientation of the arm holding the detector unit (between vertical and horizontal) and the detector unit rotation mechanism (between 0 and 270 degrees in 1-degree increments), making it possible to continuously and automatically measure internal/external diameters as well as top/bottom surfaces. Additionally, a full-featured offline teaching function simplifies the creation of part programs.

Simple and accurate centering and leveling of the workpiece

The system comes standard with the A.A.T. (Automatic Adjustment Table) positioning and leveling function, freeing the operator from the task of centering and leveling the workpiece.



Roughness detector unit support

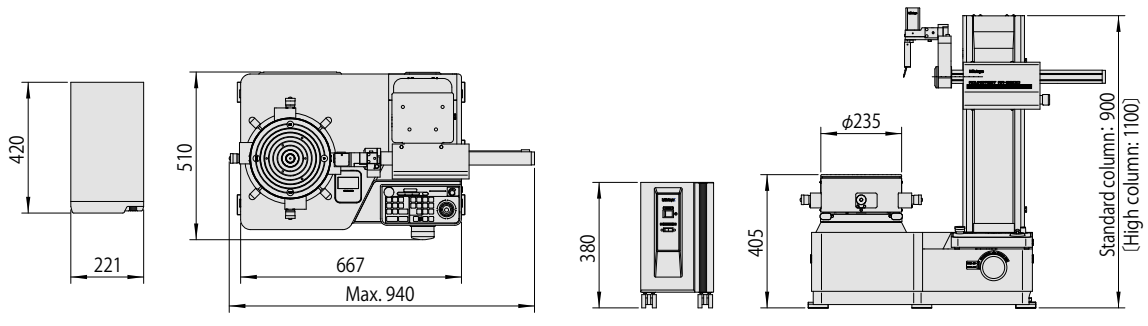
When an optional roughness detector unit is incorporated into the system it can measure workpiece surface roughness in the circumferential direction around the axis of rotation, as well as roughness in the direct-drive directions along the X- and Z-axes with the table stopped.

Specifications RA-2200CNC

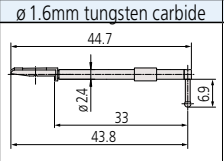
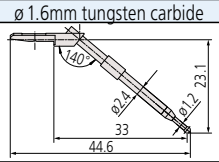
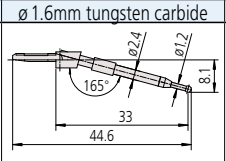
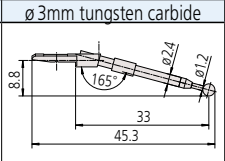
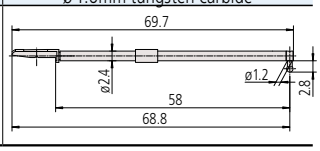
Model No.			RA-2200 CNC	
Z-axis			Standard column	High column
Turntable unit	Rotational accuracy	Radial direction	(0.02+3.5H/10000) µm H: probing height (mm)	
		Axial direction	(0.02+3.5X/10000) µm X: distance from rotational center (mm)	
	Rotating speed		2, 4, 6, 10 rpm	
	Table effective diameter		ø 235 mm	
	Centering/leveling adjustment		A.A.T	
	Centering adjustment range		±3 mm	
	Leveling adjustment range		±1°	
	Max. loading weight		30 kg	
	Max. probing diameter		ø 256 mm	
	Max. loading diameter		ø 580 mm	
Vertical drive unit (Z-axis)	Straightness accuracy		0.10 µm/100 mm (λc2.5) 0.15 µm/300 mm (λc2.5)	0.10 µm/100 mm (λc2.5) 0.25 µm/500 mm (λc2.5)
	Parallelism to rotation center		0.7 µm/300 mm (Referential generatrix line)	1.2 µm/500mm (Referential generatrix line)
	Traverse speed		Max. 50 mm/s (Measurement: 0.5 / 1.0 / 2.0 / 5.0 mm/s)	
	Max. probing height	OD	300 mm	500 mm
		ID	300 mm	500 mm
	Max. probing depth		26 mm for ø12.7 mm or more, 104 mm for ø32 mm or more (with standard stylus)	
Radial drive unit (X-axis)	Straightness accuracy		0.7 µm/150 mm (λc2.5)	
	Horizontal to rotation center		1.0 µm/150 mm (Referential generatrix line)	
	Travel amount		175 mm (from rotation center -25 mm~+150 mm)	
	Travel speed		Max. 30 mm/s (Measurement: 0.5/1.0/2.0/5.0 mm/s)	
Detector	Measuring force		40 mN	
	Stylus design, material		ø 1.6 mm tungsten carbide	
	Measuring range	Standard	±400 µm / ± 40 µm / ± 4 µm	
		Follow	±5 mm	
	Other		Rotating mechanism (within the range 0° to 270°, in increments of 1°)	
Other	Power supply		100 V ~ 240 V	
	Air pressure		0.39 MPa	
	Air consumption		30 L/min (standard state)	
	Weight (measurement main unit)		180 kg	200 kg

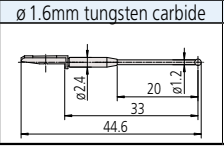
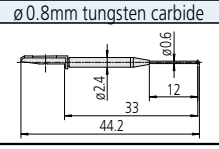
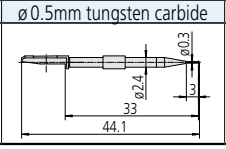
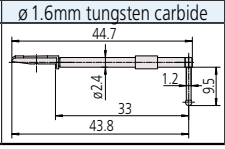
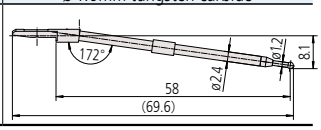
Dimensions

Unit: mm



Styli for RA-2200CNC (Option)

Type	Deep groove	Flat surface	Standard	Notch	Deep hole A
Order No.	**12AAE310**	**12AAE302**	**12AAE301**	**12AAE309**	**12AAE306**
Stylus tip	ø1.6mm tungsten carbide	ø1.6mm tungsten carbide	ø1.6mm tungsten carbide	ø3mm tungsten carbide	ø1.6mm tungsten carbide
Dimensions (mm)					

Type	ø1.6 mm ball	ø0.8 mm ball	ø0.5 mm ball	Deep groove	Deep hole B
Order No.	**12AAE303**	**12AAE304**	**12AAE305**	**12AAE308**	**12AAE307**
Stylus tip	ø1.6mm tungsten carbide	ø0.8mm tungsten carbide	ø0.5mm tungsten carbide	ø1.6mm tungsten carbide	ø1.6mm tungsten carbide
Dimensions (mm)					

Options common to the RA-2200AS/DS/AH/DH, RA-2200CNC

Centering chuck (key operated)

211-014

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

- Holding capacity:
  Internal jaws: OD = ø2 - ø35 mm,
  ID = ø25 - ø68 mm
  External 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 capacity:
  Internal jaws: OD = ø1 - ø36 mm,
  ID = ø16 - ø69 mm
  External jaws: OD = ø25 - ø79 mm
- External dimensions: 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 capacity: ø 0.1 - ø1.5 mm
- External dimensions: ø 107 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: 400µm
- Graduation: 0.2µm
- External dimensions:
  235 (max) x 185 x 70mm
- Mass: 4 kg

Cylindrical square

350850

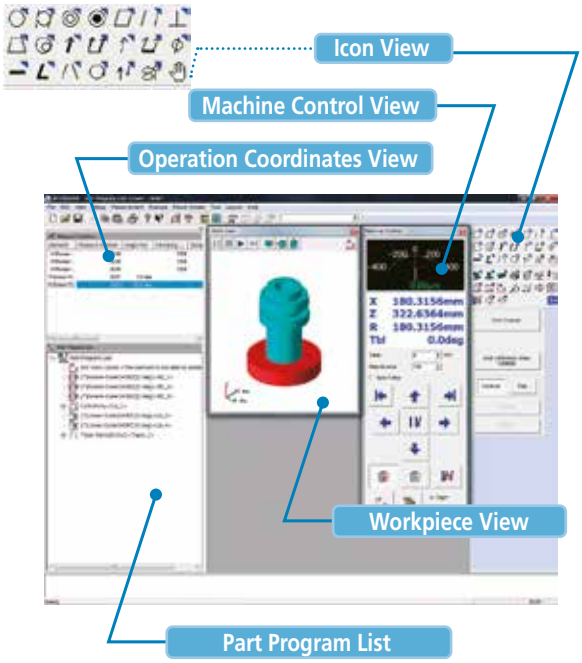
- Straightness: 0.5 µm
- Cylindricity: 2 µm
- External dimensions: ø70 x 250 mm
- Mass: 7.5 kg

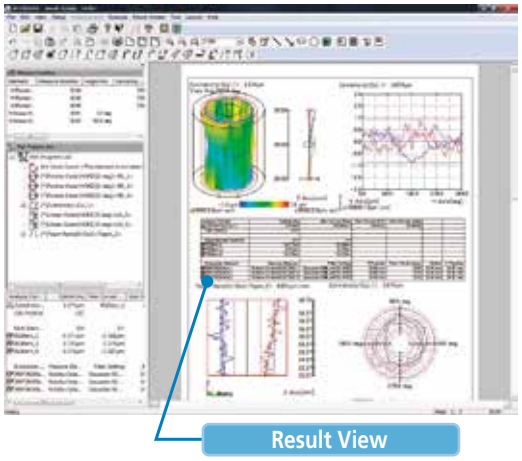
Monitor arm

ROUNDPAK
Analysis software provides user-friendly operations.

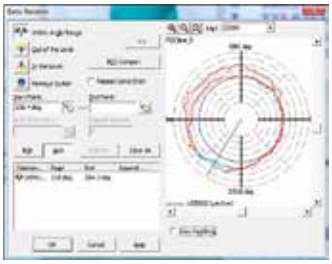
Simple operations even with a full set of parameters and analysis functions

A wide variety of parameters including those for roundness/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 functions, such as the design value best-fit analysis function, the harmonic analysis function, and a function for recording the peak or trough points on a circumference. Data that has already been collected can be easily used for re-calculation, or deleted.



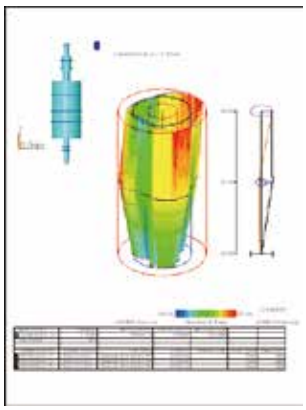


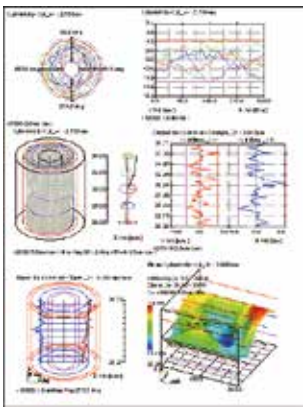

Recalculation


Data deletion

Freedom in laying out the graphics and data obtained from measurements

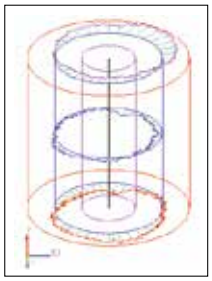
The customer can create reports in custom formats by specifying how the analysis results will be displayed, as well as the sizes and positions of graphics. The analysis result window can be directly utilized as a layout window. Since the measurement procedure, including the layout information, is saved,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



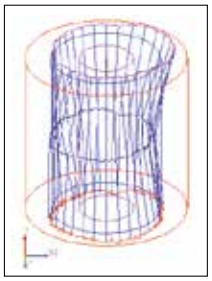


A wide variety of graphics functions

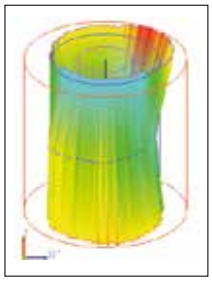
Analysis results such as cylindricity and coaxiality can be visually expressed in 3D graphics.



Normal display



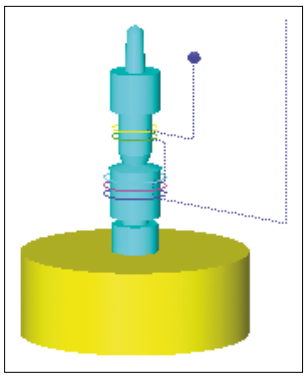
Wire-frame display



Surface-map display

Shading display

Off-line measurement procedure programming function



Patent registered in Japan, USA
Patent pending in Europe

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.

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

Mitutoyo

Mitutoyo Europe GmbH

Borsigstraße 8-10
41469 Neuss

Tel. +49 (0) 2137-102-0

info@mitutoyo.eu
www.mitutoyo.eu