

ROUNDTTEST RA-1600

A NEW PC-COMPLIANT ROUNDNESS AND
CYLINDRICITY-FORM MEASURING INSTRUMENT

FORM MEASUREMENT



Powerful analysis performance in a compact shape ROUNDTEST RA-1600

Can measure a wide variety of workpieces

Realizes a wide measuring range in a compact shape

- Max. probing diameter: 280 mm
- Vertical travel: 300 mm
- Max. table loading: 25 kg

Multi-functional analysis system

Incorporates flexible data analysis software ROUNDPAK

- Measurement results displayed in a graphics window
- Easy to operate thanks to a simplified measurement mode
- Simulation of part programs

High accuracy

Compact with top-end precision

- Rotational accuracy (Radial): $(0.02+6H/10000) \mu\text{m}$
- Rotational accuracy (Axial): $(0.02+6X/10000) \mu\text{m}$
- Accuracy assurance: Z axis (Straightness, Parallelism), X axis (Straightness, Perpendicularity)

High Functionality

- Includes a detector to prevent damaging collisions in the Z axis
- High-precision power column unit can evaluate straightness as well as cylindricity
- Equipped with D.A.T. mechanism to boost measurement efficiency
- Includes a remote control box for easy operation



High-level functions promote greater efficiency

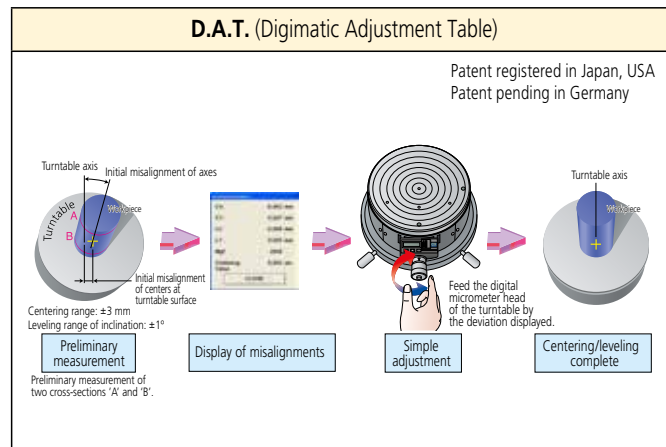
Equipped with a highly accurate turntable that enables simple and accurate centering and leveling of the workpiece

The table provides high rotational accuracy (radial 0.02+6H / 10000 μm; axial 0.02+6X/10000 μm), enabling the system to measure flatness and other characteristics, in addition to roundness/cylindricity, at a level that suits any application.

The RA-1600 has also inherited the D.A.T. (Digital Adjustment Table) mechanism used in top-end devices to make workpiece centering and leveling quick and easy. The operator simply has to manipulate the digital micrometer heads of the turntable to match the adjustment values displayed on the monitor. Even notched workpieces can be measured accurately.

Centering and leveling operations carried out by using the D.A.T.* can also be incorporated into the measurement procedure (part program). This prevents human errors when performing centering and leveling, and helps standardize measurement operations executed by the part program.

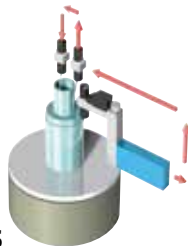
*Centering and leveling is a manual process guided by the display.



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.

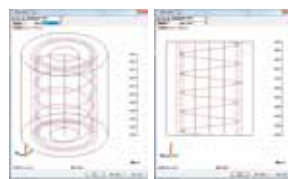


Spiral Measurement/Analysis

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

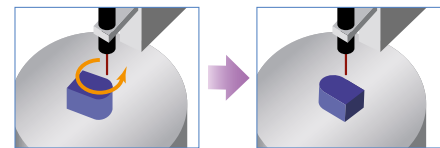


Spiral-mode cylinder measurement



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.



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 detector, and X-axis motion is necessary to maintain contact with the workpiece surface.



Safety mechanism provided as a standard feature



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 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.

Sliding detector-unit holder (Option)

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*.

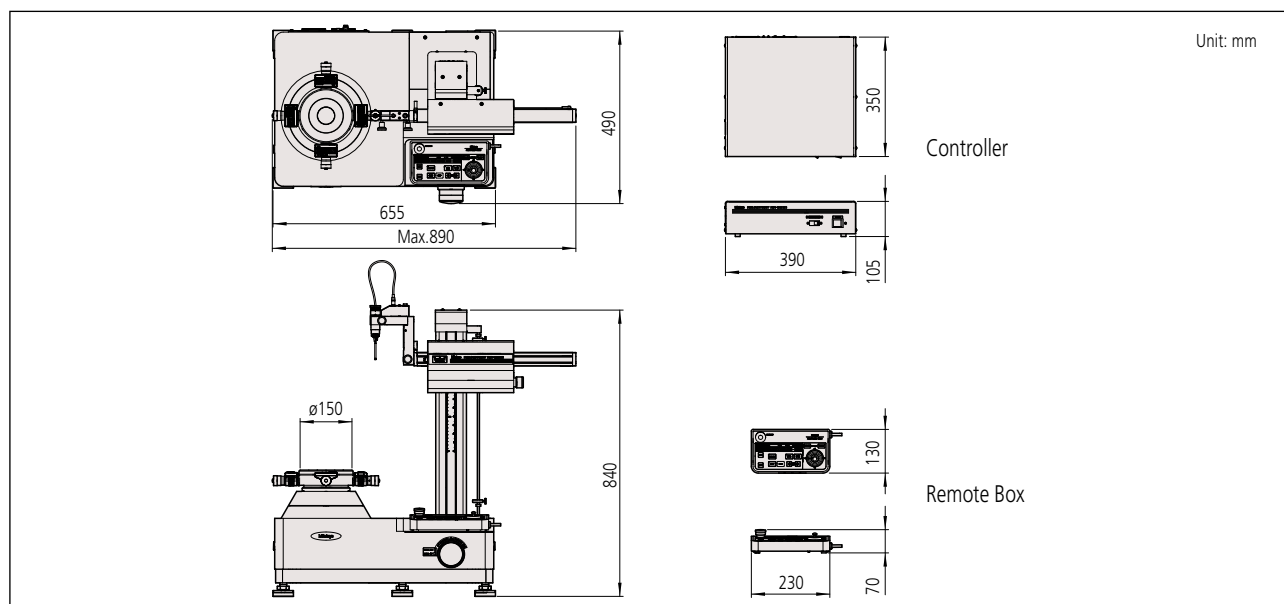
*: See this page for details about the continuous ID and OD measuring function.

Specifications

Model No.		RA-1600	
Order No.		211-723D	
Turntable unit	Rotational accuracy	Radial direction	(0.02+6H / 10000) μm H: Measuring height with reference to turntable surface (mm) JIS B7451-1997
		Axial direction	(0.02+6X / 10000) μm X: Radial distance with reference to turntable axis (mm)
	Rotational speed		4, 6, 10 rpm
	Effective table diameter		\varnothing 150 mm
	Centering / leveling adjustment		D.A.T.
	Centering adjustment range		\pm 3 mm
	Leveling adjustment range		\pm 1°
	Maximum loading		25 kg
	Maximum probing diameter		\varnothing 280 mm
Maximum workpiece diameter		\varnothing 560 mm	
Vertical drive unit (Z-axis column unit)	Straightness of drive	Narrow range	0.20 μm / 100 mm
		Wide range	0.30 μm / 300 mm
	Parallelism with turntable axis		1.5 μm / 300 mm
	Traverse speed		Max. 15 mm/s (Measurement: 0.5, 1, 2, 5 mm/s)
	Maximum probing height (ID / OD)		300 mm ^{*1}
Maximum probing depth	over \varnothing 32		91 mm (with standard stylus)
	over \varnothing 7		50 mm (with standard stylus)
Radial drive unit (X-axis arm unit)	Straightness of drive		2.7 μm / 140 mm
	Perpendicularity to turntable axis		1.6 μm / 140 mm
	Traverse range amount		165 mm (From table axis -25 mm ~ +140 mm)
	Traverse speed		Max. 8 mm/s (measurement: 0.5, 1, 2, 5 mm/s)
Detector	Measuring force		10 ~ 50 mN (5 level switching) (ID/OD measuring position with standard stylus)
	Measuring range	Standard	\pm 400 μm / \pm 40 μm / \pm 4 μm
		Tracking	\pm 5 mm
	Tip shape, material		\varnothing 1.6 mm tungsten carbide
	Other		IN/OUT one-touch switching, Stylus angle scale markings (\pm 45°), Z-axis collision detection function
Other	Power supply		100 V ~ 240 V
	Power consumption		80 W
	Air pressure		0.39 MPa
	Air consumption		22 L / min (standard state)
	Mass of main unit (NET)		170 kg

*1: Use an optional auxiliary stage for measuring a workpiece whose height is 20 mm or less.

Dimensions



Optional Accessories

Styli for RA-1600 (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 carbide	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)					

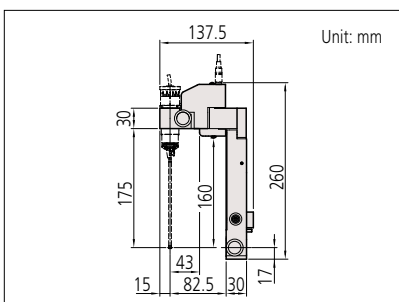
*1: Measuring in the horizontal direction with detector 12AAF203.

*2: Part of the 5-piece stylus set 12AAL020.

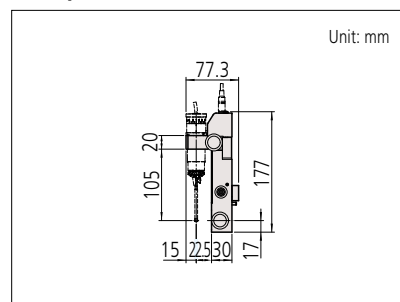
*3: Measuring is only possible in the vertical direction.

Detector holders

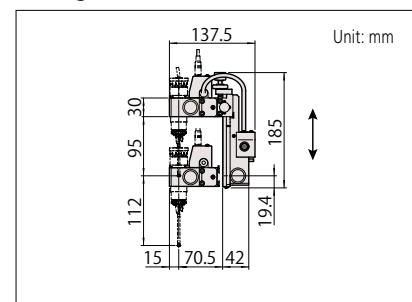
2X extension holder: 12AAF203



Auxiliary holder for large-diameter workpieces: 12AAF204



Sliding detector holder: 12AAL090



Optional Accessories



Centering chuck (key operated)

211-014

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

- Holding capacity:
Internal jaws: OD = \varnothing 2- \varnothing 35 mm,
ID = \varnothing 25- \varnothing 68 mm
External jaws: OD = \varnothing 35- \varnothing 78 mm
- External dimensions: \varnothing 157 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 = \varnothing 1- \varnothing 36 mm,
ID = \varnothing 16- \varnothing 69 mm
External jaws: OD = \varnothing 25- \varnothing 79 mm
- External dimensions: \varnothing 118 x 41 mm
- Mass: 1.2 kg



Micro-chuck

211-031

Used for clamping a workpiece (less than \varnothing 1 mm dia.) that the centering chuck cannot handle.

- Holding capacity: \varnothing 0.1- \varnothing 1.5 mm
- External dimensions: \varnothing 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: 400 μ m
- Graduation: 0.2 μ m
- External dimensions: 235 (max) x 185 x 70 mm
- Mass: 4 kg

Cylindrical square

350850

- Straightness: 0.5 μ m
- Cylindricity: 2 μ m
- External dimensions: \varnothing 70 x 250 mm
- Mass: 7.5 kg

Optical flat and gage block set

997090



Reference hemisphere

211-016



Auxiliary stage

356038



Vibration isolator

When using form measuring instruments, the measurement results can be significantly affected by environmental disturbances such as vibration. To prevent this, we invite you to choose from our selection of vibration isolators, which includes a table-type vibration isolator with an optional stand and two deluxe isolators (a monitor arm type and a side table type).

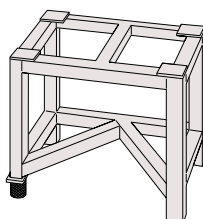
Desktop type*



*The vibration isolator does not include the measuring unit, controller or analysis system.

Order No.	178-025
Vibration damping system	Diaphragm type air spring
External size	765x565x51 mm

Stand for 178-025



Desk type*

Vibration isolator with monitor arm



Vibration isolator with side table



*The vibration isolator does not include the measuring unit, controller or analysis system.

ROUNDPAK

Analysis software provides user-friendly operations.

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

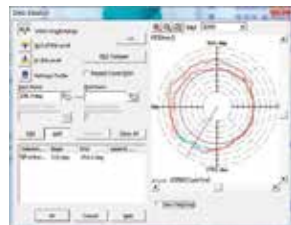
A wide variety of parameters including those for roundness/cylindricity, as well as flatness and parallelism, are provided as standard features. You can visually select these parameters using icons.



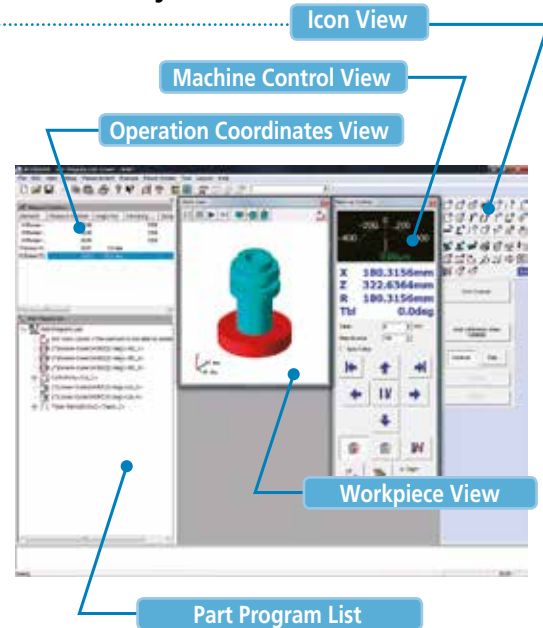
ROUNDPAK also comes with specialized functions, such as the design value best-fit analysis function, the harmonic analysis function, and a function for recording the peak or trough points on a circumference. Data that has already been collected can be easily used for re-calculation, or deleted.



Recalculation

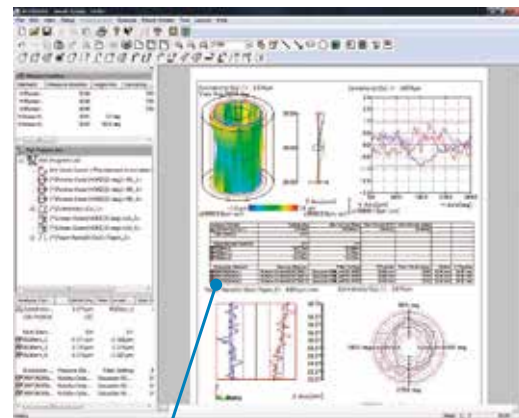
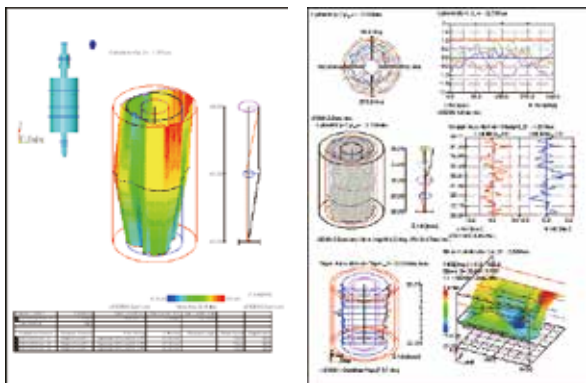


Data deletion



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.

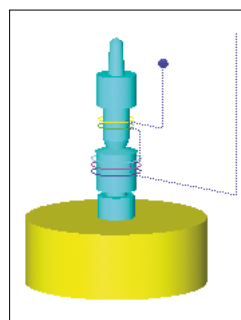


Result View

Off-line measurement procedure programming function

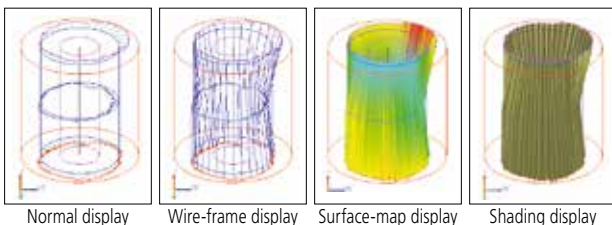
Patent registered in Japan, USA
Patent pending in Europe

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.



A wide variety of graphics functions

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

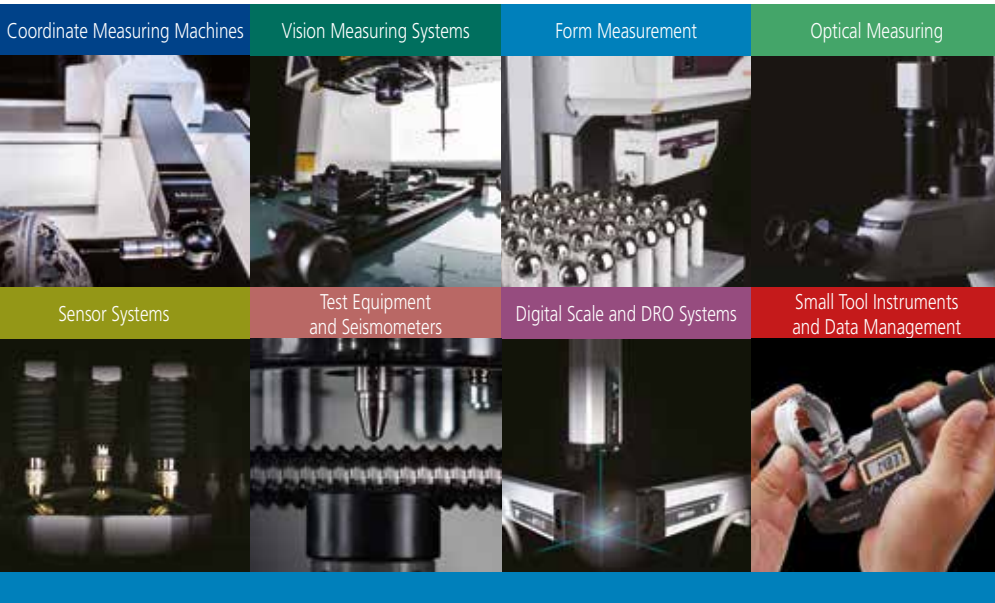


Normal display

Wire-frame display

Surface-map display

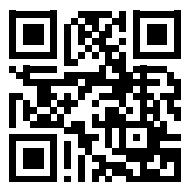
Shading display



**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.



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