

Mitutoyo

Roundtest RA-100

Roundness Measuring Instruments



**Compact!
Affordable!**

**Quick And Easy Roundness
Measurement on
Your Shop Floor!**

Roundness Measuring Instrument

ROUNDTTEST RA-114/116

The Roundtest RA-114/116 is an easy-to-operate instrument for measuring part geometry on the shop floor: it is compact, affordable, and simple to use. It also provides such superb data analysis capabilities as required with laboratory roundness measuring instruments on the shop floor and has a table rotational accuracy of $(0.07+6H/10000)\mu\text{m}$.

Two models are available: the RA-114/114D, a dedicated processor based model which controls all operations via the control panel incorporated in the main unit; the RA-116/116D, a PC based model which controls all operations via Roundpak100 software. The RA-114/114D has a built-in high speed thermal printer while the RA-116/116D can use a high-quality laser printer (optional) for print out of analysis results. The Roundpak100 software allows the analysis results to be printed out in an easy-to-understand layout.

Features

Wide range probe

The probe is capable of detecting as large as $\pm 1000\mu\text{m}$ ($\pm .04''$) displacement, permitting measurement of various types of workpieces with ease. The probe is also capable of measurement in either vertical or horizontal posture setup with the adjustable holder according to the part feature to be measured.



The DAT function aided simple and high-accuracy workpiece centering/leveling (RA-114D/116D)

The DAT (Digital Adjustment Table) function digitally displays the centering and leveling adjustments of the turntable, turning what used to be a difficult task into one that is simple enough for even untrained operators to perform. The deviation, which is digitally displayed on the back-lit LCD (RA-114D) or the CRT (RA-116D), is adjusted by micrometer heads. A preliminary measurement for centering/leveling the workpiece can be performed within a wide deviation range of $\pm 3\text{mm}/\pm 1^\circ$. This DAT function is even available when measuring a notched workpiece.



Easy and quick workpiece centering/leveling using the analog meters (RA-114/116)

Centering/leveling of a workpiece is now a matter of adjusting the micrometer heads of the turntable so that off center and inclination of the workpiece displayed in bar graphs (analog meters) become zero. This drastically reduces the time required for setting up a workpiece.



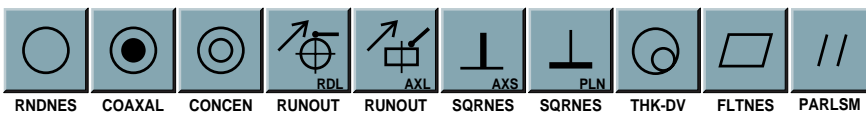
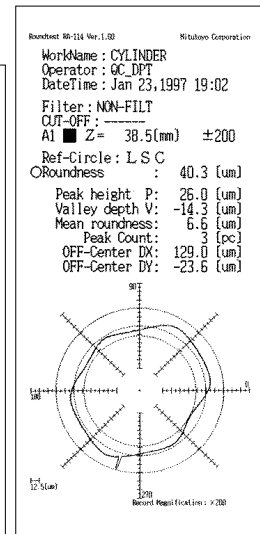
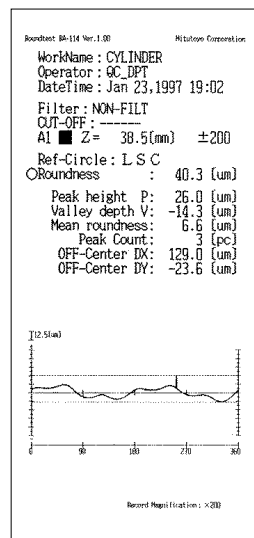
Shop-floor Roundness Measuring Instrument with Integrated Data Processing Unit

Roundtest RA-114D RA-114

- Integration of the measuring unit, display unit, and printer unit allows easier system installation and transport. This system is perfect for use at the shop floor.
- Measurement can be performed by simply selecting the desired analysis item icon and pressing the [START] key.
- In auto-measurement mode, entire procedures from measurement start to analysis result printout can be performed with a one key operation. This allows efficient repeat measurement.
- Interactive operation can even be performed by a novice.
- A high-speed graphic thermal printer is built in.
- A floppy disk drive unit is incorporated for measurement data storage (RA-114D only).
- A digital scale unit is equipped for the accurate setting of the probing height (RA-114D only).
- Many optional styli are available for a variety of applications depending on workpiece shape and measuring purpose.
- Data output is possible to an external PC or printer via the RS-232C interface.



RA-114D



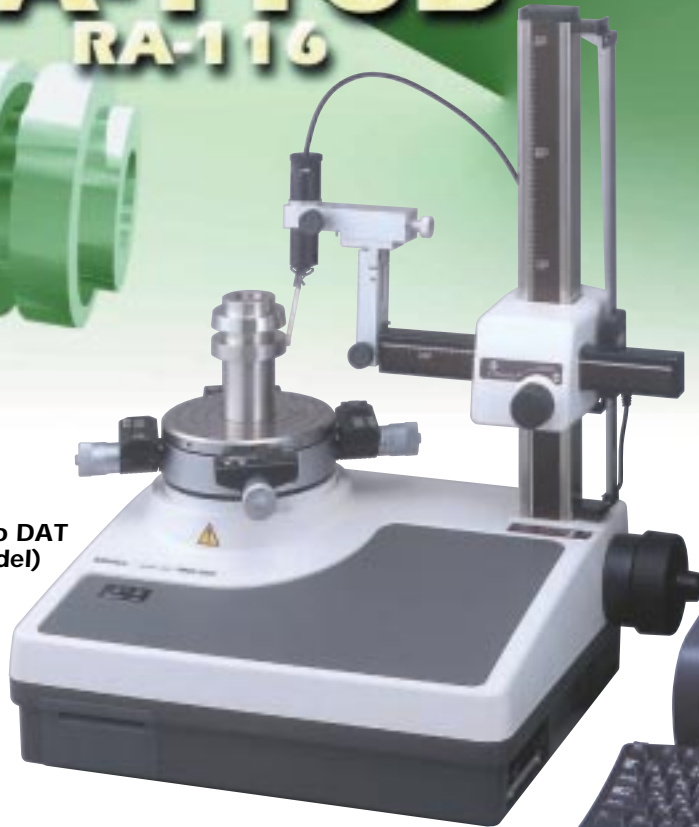
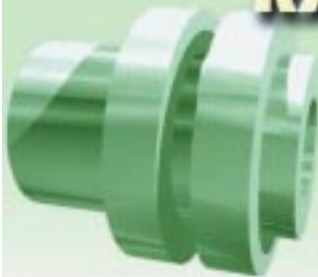
- All analysis items including roundness, coaxiality, concentricity, and squareness, etc. are displayed with clear icons.
- The recalculation function allows the measurement to be recalculated with different filter settings, reference circles or with reduced data.
- A spare printer paper set (order no. **998698**) is available with 10 rolls of printer paper for the Roundtest RA-114D/114.



RA-114
(w/o DAT function)

PC-based, Multi-purpose Roundness Measuring Instrument

Roundtest RA-116D RA-116

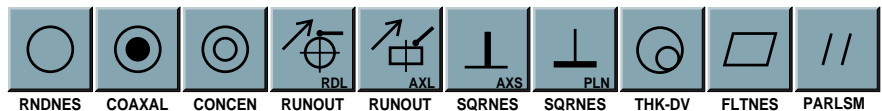


Personal computer is optional.



RA-116D
(RA-116: w/o DAT
function model)

- The Roundpak®100 data processing software combines the ease-of-operation required in the shop floor geometry measurement with the advanced laboratory analysis capabilities.
- The one-key measurement analysis function allows an occasional measurement to be performed mid-course in a routine job.
- Measured data can be saved on a floppy disk and on the hard disk.
- A part program can be easily created including the measurement, analysis, and printout procedure. The part programs including measurement conditions can be saved on a floppy disk and on the hard disk.
- Power spectrum analysis, harmonic analysis, and gear tooth analysis can be performed.
- Coaxiality can be evaluated between axes, in addition to that between an axis and a cross-sectional element.
- The RA-116D is provided with the innovative DAT (digital adjustment table) function for easier centering/leveling of a workpiece.
- Many optional styli are available for a variety of applications depending on workpiece shape and measuring purpose.



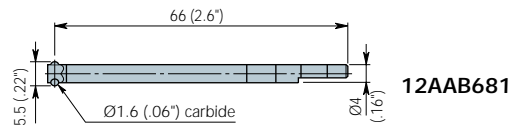
Air filter unit

- Used for removing micro dusts from the air supplied.
- **Consumable parts:**
Air filter element (358592)
Air regulator element (358593)



Standard stylus

- Stylus tip: $\varnothing 1.6$ mm carbide ball
- Minimum hole diameter: 7mm (.28")
- Maximum hole depth: 50mm (1.96")



12AAB681

ROUNDPAK® 100

ROUNDPAK® 100 is a Windows®-based software package for the analysis of roundness, requiring only simple manipulation using a mouse and icons. Graphs of multiple cross-sections can be displayed and printed on one sheet of paper.

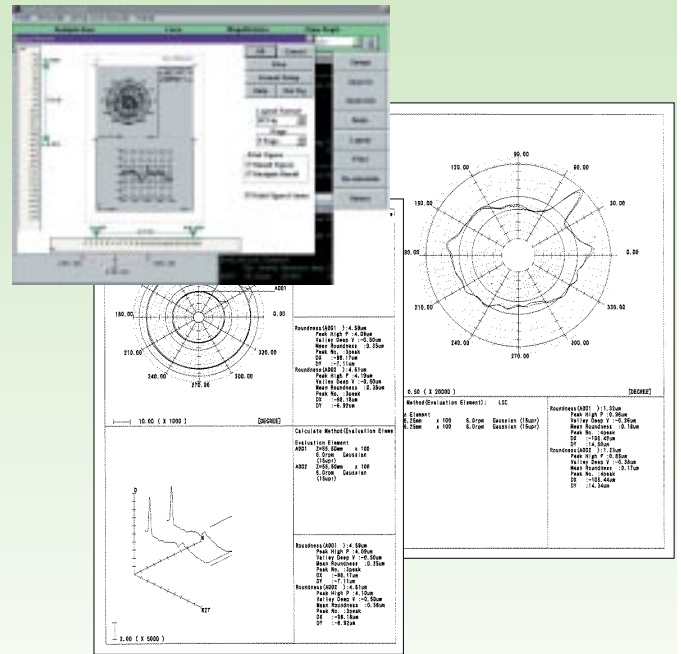
One key measurement analysis

The one key measurement analysis function is provided to allow easy manual measurement for a single cross-section. In addition, the measurement condition backup function allows measurement to start by simply calling a desired measurement condition.



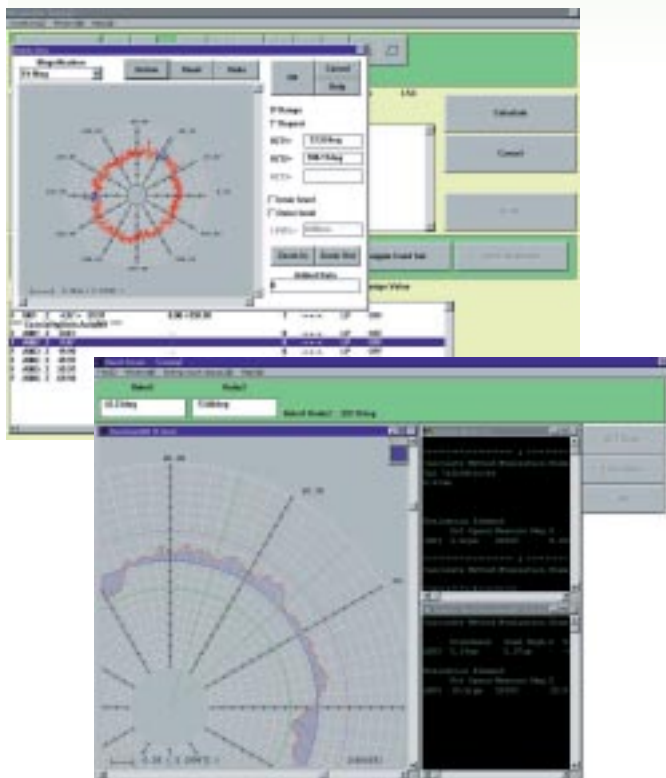
Data layout function

The data layout function eliminates tedious cutting and pasting operations when creating a report or an inspection certificate.



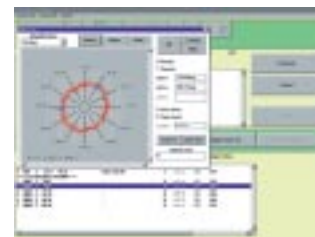
Multiple displays of analysis results

Graphics of multiple sections can be displayed on the monitor. The zoom function allows image expansion for easy viewing.



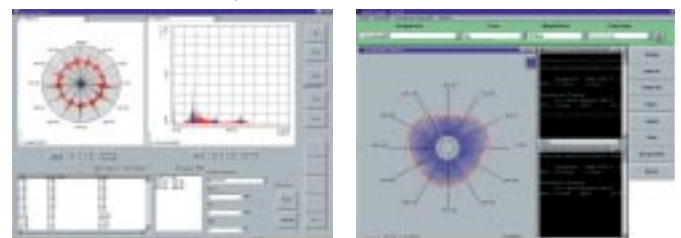
Multiple analysis/recalculation function

The element analysis function enables analysis of multiple parameters with a single measurement. The measurement can also be recalculated with different filter settings, reference circles or reduced data if it is needed.



Power spectrum-analysis/harmonic-analysis/gear tooth-analysis functions

The sophisticated analysis of inherent features included in the measurement data is possible.



OPTIONAL ACCESSORIES

Chucks

Quick chuck

- Reversible jaws for external and internal chucking.
- Easy clamping with a knurled clamp ring.
- External range: 1 to 75mm (.04" to 2.95")
- Internal range: 14 to 70mm (.55" to 2.75")
- Mounting flange: $\phi 118\text{mm}$ (4.65")
- Height: 34mm (1.34")
- Mass: 1.2kg (2.64 lbs.)



211-032

Three jaw chuck

- Reversible jaws for external and internal chucking.
- Heavy-duty type
- With a clamping wrench.
- External range: 1 to 85mm (.04" to 3.34")
- Internal range: 33 to 85mm (1.3" to 3.34")
- Mounting flange: $\phi 157\text{mm}$ (6.18")
- Height: 76mm (2.99")
- Mass: 3.8kg (8.36 lbs.)



211-014

Micro chuck

- Used for clamping extra-small diameter workpieces such as pins or wires.
- External range: Up to 1.5mm (.06")
- Mounting flange: $\phi 118\text{mm}$ (4.65")
- Height: 48.5mm (1.91")
- Mass: 620g (1.36 lbs.)

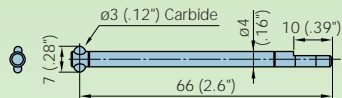


211-031

Interchangeable Styli

Stylus for notched workpiece

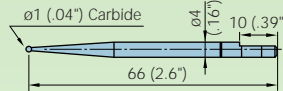
- Stylus tip: $\phi 3\text{mm}$ carbide ball
- Minimum hole diameter: 8mm (.32")
- Maximum hole depth: 50mm (1.96")



12AAB682

Stylus for small hole

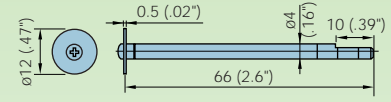
- Stylus tip: $\phi 1\text{mm}$ carbide ball
- Minimum hole diameter: 7mm (.28")
- Maximum hole depth: 10mm (.39")



12AAB686

Disk stylus

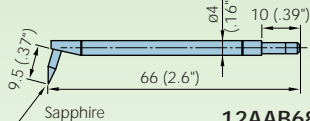
- Stylus tip: $\phi 12\text{mm}$ carbide disk
- Minimum hole diameter: 14mm (.55")
- Maximum hole depth: 50mm (1.96")



12AAB694

Stylus for groove

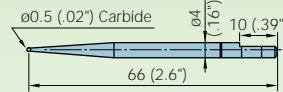
- Stylus tip: 0.25mm radius sapphire
- Minimum hole diameter: 13mm (.52")
- Maximum hole depth: 50mm (1.96")



12AAB683

Stylus for extra small hole

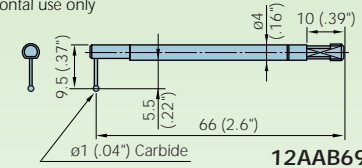
- Stylus tip: $\phi 0.5\text{mm}$ carbide ball
- Minimum hole diameter: 5mm (.2")
- Maximum hole depth: 5mm (.2")



12AAB687

Crank stylus ($\phi 1$)*

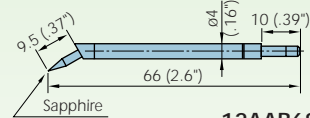
- Stylus tip: $\phi 1\text{mm}$ carbide ball
- *Horizontal use only



12AAB695

Stylus for corner

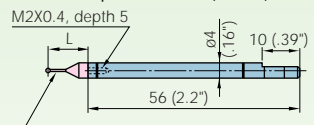
- Stylus tip: 0.25mm radius sapphire
- Minimum hole diameter: 9mm (.36")
- Maximum hole depth: 50mm (1.96")



12AAB684

M2 tapped shank for CMM stylus

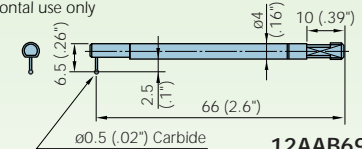
- Maximum hole depth: 50mm (1.96")



12AAB676

Crank stylus ($\phi 0.5$)*

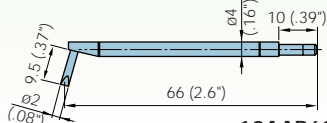
- Stylus tip: $\phi 0.5\text{mm}$ carbide ball
- *Horizontal use only



12AAB696

Stylus for removing asperity (cutter mark)

- Stylus tip: 15mm radius carbide blade
- Minimum hole diameter: 14mm (.56")
- Maximum hole depth: 50mm (1.96")

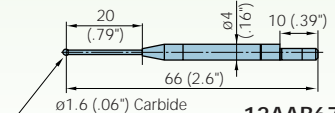


12AAB685

- Applicable ruby ball styli for CMM:
 - 163866 $\phi 0.5\text{mm}$ (.02"), L = 10mm (.39")
 - 153138 $\phi 1.0\text{mm}$ (.04"), L = 10mm (.39")
 - 160216 $\phi 2.0\text{mm}$ (.08"), L = 10mm (.39")
 - 153136 $\phi 3.0\text{mm}$ (.12"), L = 10mm (.39")
 - 160217 $\phi 4.0\text{mm}$ (.16"), L = 10mm (.39")
 - 160218 $\phi 5.0\text{mm}$ (.20"), L = 10mm (.39")
 - 160219 $\phi 6.0\text{mm}$ (.24"), L = 10mm (.39")
 - 160220 $\phi 8.0\text{mm}$ (.32"), L = 12mm (.47")
- The above ruby ball styli are optional.

$\phi 1.6$ ball stylus

- Stylus tip: $\phi 1.6\text{mm}$ carbide ball
- Minimum hole diameter: 2mm (.08")
- Maximum hole depth: 18mm (.70")



12AAB674

TECHNICAL DATA

Main unit specifications

Model	RA-114	RA-114D	RA-116	RA-116D
Type	inch/mm	inch/mm	inch/mm	inch/mm
Order No.	120V AC 211-713A	211-714A	211-717A	211-718A
Workpiece centering/leveling	Analog adjustment type	Digital adjustment type	Analog adjustment type	Digital adjustment type
Turntable	Rotational accuracy* ¹ (0.07+6H/10000)μm [(2.8+0.6H)μinch], H= Probing height (mm [inch])			
	Rotating speed 6rpm			
	Working diameter ø150mm (5.9")			
	Centering range ±3mm (.12")			
	Leveling range ±1°			
	Maximum probing diameter ø280mm (11.02")			
	Maximum workpiece diameter ø440mm (17.32")			
	Maximum workpiece weight 20kg (44 lbs.)			
Vertical column	Travel range 280mm (11.02") 280mm (11.02") with a digital scale unit			
	Coarse/fine feeding Coarse feed: Approx.30mm/rev. (1.2"/rev.) Fine feed: Approx.1mm/rev. (.4"/rev.)			
	Maximum probing height (OD) 280mm (11.02")			
	Maximum probing height (ID) 280mm (11.02")			
	Maximum probing depth 100mm (3.94")* ² when using a standard stylus (12AAB681)			
Horizontal arm	Travel range 165mm (6.5")* ³			
	Coarse/fine feeding Coarse feed: Approx.30mm/rev. (1.2"/rev.) Fine feed*: Approx.1mm/rev. (.4"/rev.) *±3mm (±.12") Stroke			
Air supply	Air pressure 390kPa (4kgf/cm ²)			
	Air consumption 45 liters per minute			
Probe and stylus	Measuring range ±1000μm (±.04")			
	Measuring force 70 to 100mN (7 to 10gf)			
	Measuring direction Switching stylus with dual direction			
	Standard stylus (12AAB681) Carbide ball, ø1.6mm (.06")			
Full scale range (Analog meter indication range)	±1000μm, ±500μm, ±200μm, ±100μm, ±50μm, ±20μm, ±10μm, 5μm (±.04", ±.02", ±.008", ±.004", ±.002", ±.0008", ±.0004", ±.0002")		— (Analog meter is not provided)	
Data sampling dots	1800 dots/revolution			
Number of measurable cross-sections	Up to 5		Up to 100	
Display unit	LCD (size: 120x90mm)		—	
Printer unit	Thermal line printer (built-in)			
Floppy disk drive unit	—	3.5" disk drive (built-in)	—	
Power supply	100V -240V AC, 50/60Hz			
Power consumption	40VA max (without personal computer)			
Dimensions (WxDxH)	Main unit 610x380x620mm (24.02"x14.96"x24.41")	660x415x620mm (25.98"x16.34"x24.41")	610x380x620mm (24.02"x14.96"x24.41")	660x415x620mm (25.98"x16.34"x24.41")
	Air filter unit 210x130x190mm (8.27"x5.12"x7.48")			
Mass	Main unit 40kg (88 lbs.)			
	Air filter unit 2kg (4.4 lbs.)			
Standard accessories	Reference hemisphere (211-016)* ⁴ , gain adjustment film/2 sheets (350365), standard stylus (12AAB681), auxiliary workpiece table (356038)* ⁴ , machine cover (382951), user's manual, screw driver, key wrench, spanner, power cord, grounding lead wire, fuse, hose band			

*¹According to JIS B7451-1997

*²ID ø30mm (ø1.2") or longer

*³Including a protrusion of 25mm (1") over the turntable rotation center.

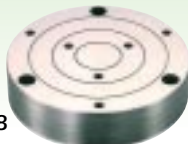
*⁴Optional accessories for RA-114/116

Note: Use an optional auxiliary workpiece stand (**356038**) for measuring a workpiece whose diameter is 20mm (.8") or shorter and whose height is 20mm (.8") or lower. Can not change the position of detector holder at 120mm or higher from the top of surface of the table.

Gages

Auxiliary workpiece table

- Used for measuring a workpiece whose diameter is 40mm (1.6") or shorter and whose height is 20mm (.8") or lower.



356038

Magnification checking gage

- Used for checking and adjusting the probe sensitivity.
- Range: 400μm
- Micrometer reading: 0.2μm
- Mass: 4kg (8.8 lbs.)



211-045

Optical flat and gauge block set

- Used for checking the probe sensitivity.
- Consists of 10.00mm and 10.02mm gauge blocks and an optical flat.



997090

Reference hemisphere

- Used for checking accuracy.
- Comes with the error compensation data
- Roundness: 0.08μm
- Mass: 720g (1.6 lbs.)



211-016

TECHNICAL DATA

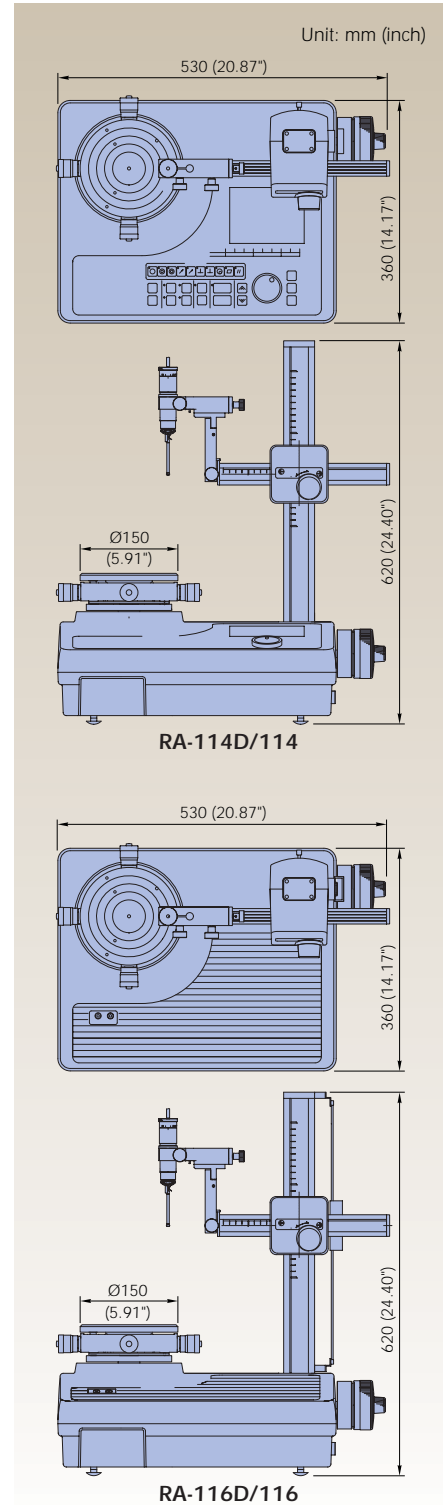
Data analysis capabilities

Model	RA-114 RA-114D	RA-116 RA-116D
Data processing unit	Built-in	Roundpak-100 PC software
Data analysis items	Roundness, coaxiality*, concentricity, circular run-out (radial), circular run-out (axial), squareness (against axis), squareness (against plane), thickness deviation, flatness, parallelism	
Reference circles for roundness evaluation	LSC, MZC, MIC, MCC	
Variation of analysis views	—	Top view, opened view, side view, inclined view, overlooked view
Recording device	Built-in thermal line printer	External printer (optional)
Recording magnification	X5 to X50000 auto (Can be specified manually in X5, X10, X20, X50, X100, X200, X500, X1000, X2000, X5000, X10000, X20000, X50000)	X100 to X200000 auto (Can be specified manually)
Roughness component reduction	Low pass filter, band pass filter	
Filter type	2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian, filter OFF	
Cutoff value	15upr, 50upr, 150upr, 500upr, 15-150upr, 15-500upr, 50-500upr	15upr, 50upr, 150upr, 500upr, 15-150upr, 15-500upr, 50-500upr (Desired value can be specified)
Functions	<ul style="list-style-type: none"> • Total analysis of multiple items • Recalculation of datum/measured data • Tolerancing (GO/NG judgment) 	<ul style="list-style-type: none"> • Total analysis of multiple items • Recalculation of datum/measured data • Tolerancing (GO/NG judgment) • Rotation of 3D display • Real-time display • Simplified layout (divided layout) • Hair line, auxiliary line, hidden line, fill line • Color setting of measured data • Offsetting of recorded profile generation • Zooming of recorded profile • Data deletion • Graph analysis (displacement/angle between measured points) • Power spectrum analysis • Gear tooth analysis • Harmonic analysis • Text data output (via CSV format)
Hardware requirements	—	<ul style="list-style-type: none"> • Computer: IBM PC compatible • Processor: Intel Pentium 100MHz or faster • Harddisk: 1GB or more • Memory: 16MB or more • OS: Windows®95 • Data I/O port: GP-IB (National Instruments) • Monitor: Color SVGA

*RA-116D/116 can evaluate the coaxiality between axes, in addition to that between an axis and a cross-sectional element.

Windows is a registered trademark of Microsoft Corporation. Specifications are subject to change without notice.

Dimensions



Mitutoyo

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