Roundtest RA-100

Roundness Measuring Instruments

Bulletin No. 1827

Compact, affordable, fast-and-easy roundness measurement right on the shop floor!

Mitutoyo

Roundness Measuring Instrument

ROUNDTEST 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 superb data analysis capabilities as required with laboratory roundness measuring instruments on the shop floor with a table rotational accuracy of (0.07+6H/10000)μm.

Two models are available: the RA-114/114D, a dedicated processor based model which controls all operations via a control panel incorporated in the main unit; the RA-116/116D, a PC based model which controls all operations via Roundpak® V5.0 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 Roundpak® V5.0 software allows the analysis results to be printed out in an easy-to-understand format.

Features

Wide range probe

The probe is capable of detecting as large as ±1000μm (±.04") displacement, permitting measurement of various types of workpieces with ease. The probe is also capable of measuring in either vertical or horizontal setups using an adjustable holder to accommodate the part feature being measured.

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

Centering/leveling of a workpiece is just a matter of adjusting the micrometer heads on 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.

The DAT function facilitates 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 novice 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 ±3mm/±1°. This DAT function is even available when measuring a notched workpiece.

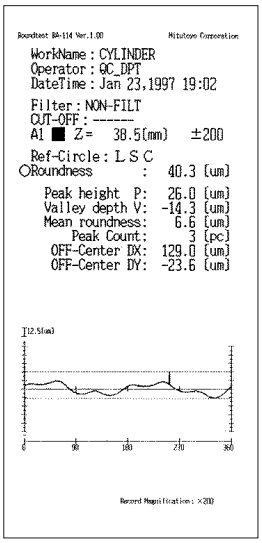
Shop-floor Roundness Measuring Instrument with Integrated Data Processing Unit

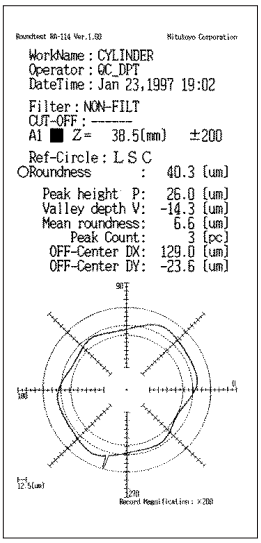
Roundtest RA-114D

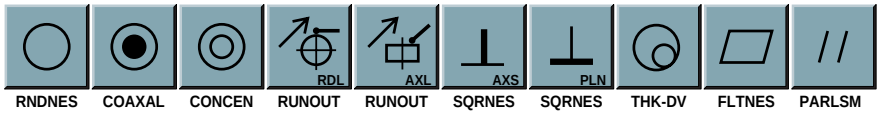
RA-114

- Total integration of the measuring unit, display unit, and printer unit allows easier system installation and transport. This system is perfect for use on the shop floor.
- Measurement can be performed by simply selecting the desired analysis icon and pressing the [START] key.
- In auto-measurement mode, entire procedures from measurement start to analysis result printout can be performed with one key operation. This allows efficient repeat measurements.
- Interactive operation can even be performed by new users.
- 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 probe 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 descriptive 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)

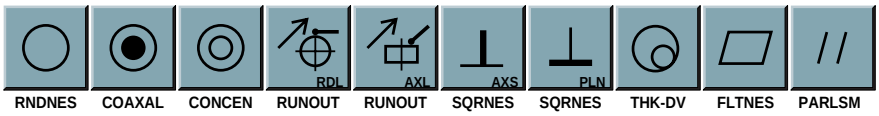
PC-based, Multi-purpose Roundness Measuring Instrument

Roundtest
RA-116D
RA-116

Personal computer is optional.

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

- The Roundpak® V5.0 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 drive.
- 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 drive.
- Power spectrum analysis, harmonic analysis, and gear tooth analysis can be performed.
- Coaxiality can be evaluated between axes and 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.

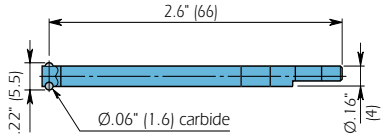


Air filter unit

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

Standard stylus

- Stylus tip: Ø.06" (Ø1.6mm) carbide ball
- Minimum hole diameter: .28" (7mm)
- Maximum hole depth: 1.96" (50mm)



12AAB681

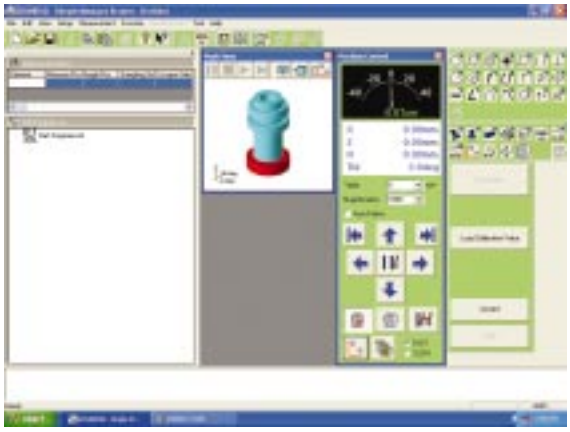
ROUNDPAK® V5.0

Roundness measurement/analysis program

ROUNDPAK® V5.0 offers simple operation through icon and mouse operation. It allows geometric variation analyses by providing a large number of calculation functions, such as simultaneous analysis of multiple items; and for data that has already been measured once, changing the filter cutoff value, deleting unneccesary parts, and using this data for different analyses.

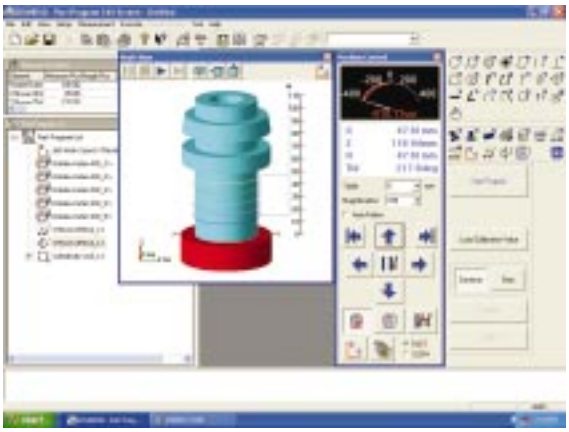
Simplified Measurement Mode

Simplified measurement mode allowing easy measurement of single items.



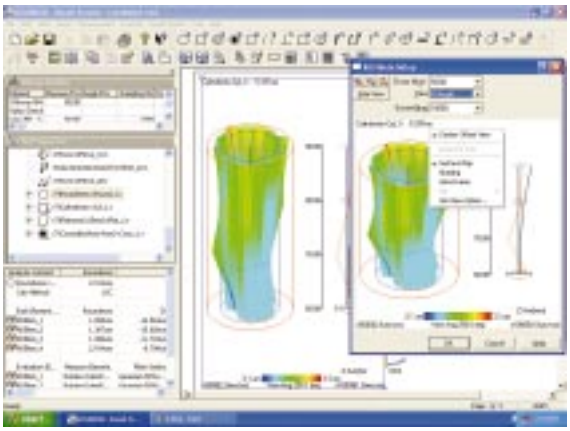
Part Program

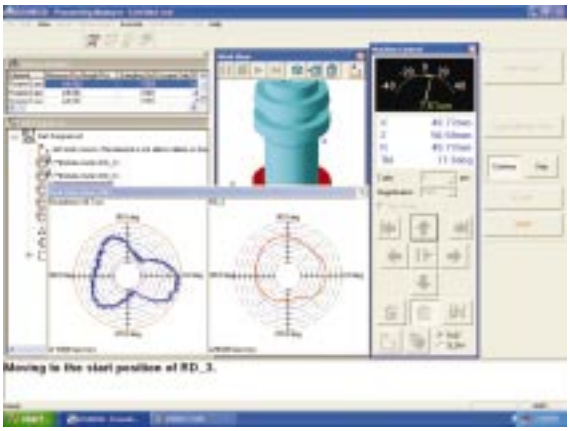
Easy editing and creation of part programs



Easy Layout of Measured Forms and Results

Measured forms and results can be graphically processed for 3D display, exploded display, etc., to allow easy evaluation.





OPTIONAL ACCESSORIES

Chucks

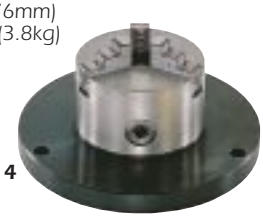
Quick chuck

- Reversible jaws for external and internal chucking.
- Easy clamping with a knurled clamp ring.
- External range: .04" to 2.95" (1 to 75mm)
- Internal range: .55" to 2.75" (14 to 70mm)
- Mounting flange: ø4.65" (118mm)
- Height: 1.34" (34mm)
- Mass: 2.64 lbs. (1.2kg)

211-032

Three jaw chuck

- Reversible jaws for external and internal chucking.
- Heavy-duty type
- With a clamping wrench.
- External range: .04" to 3.34" (1 to 85mm)
- Internal range: 1.3" to 3.34" (33 to 85mm)
- Mounting flange: ø6.18" (157mm)
- Height: 2.99" (76mm)
- Mass: 8.36 lbs. (3.8kg)



211-014

Micro chuck

- Used for clamping extra-small diameter workpieces such as pins or wires.
- External range: Up to .06" (1.5mm)
- Mounting flange: ø4.65" (118mm)
- Height: 1.91" (48.5mm)
- Mass: 1.36 lbs. (620g)

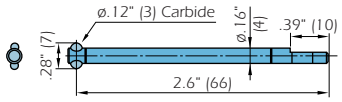
211-031

Interchangeable Styli

Unit: inch (mm)

Stylus for notched workpiece

- Stylus tip: ø3mm carbide ball
- Minimum hole diameter: .32" (8mm)
- Maximum hole depth: 1.96" (50mm)



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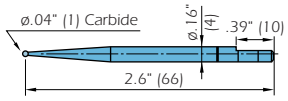
Stylus for small hole

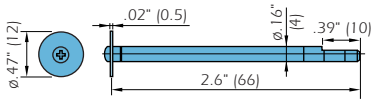
- Stylus tip: ø1mm carbide ball
- Minimum hole diameter: .28" (7mm)
- Maximum hole depth: .39" (10mm)



12AAB686

Disk stylus

- Stylus tip: ø12mm carbide disk
- Minimum hole diameter: .55" (14mm)
- Maximum hole depth: 1.96" (50mm)



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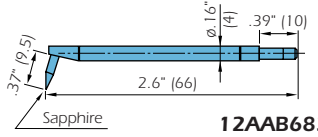
Stylus for groove

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



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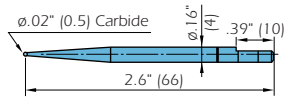
Stylus for extra small hole

- Stylus tip: ø0.5mm carbide ball
- Minimum hole diameter: .2" (5mm)
- Maximum hole depth: .2" (5mm)



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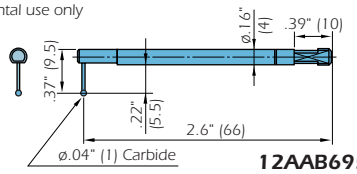
Crank stylus (ø1)*

- Stylus tip: ø1mm carbide ball

*Horizontal use only



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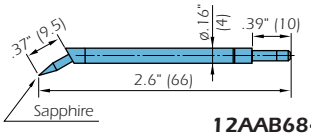
Stylus for corner

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



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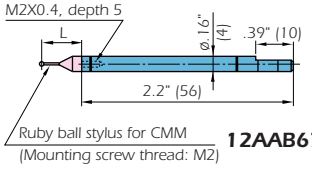
M2 tapped shank for CMM stylus

- Maximum hole depth: 1.96" (50mm)



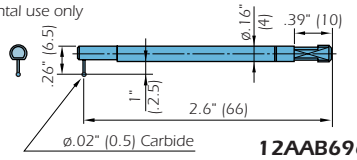
12AAB676

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

Crank stylus (ø0.5)*

- Stylus tip: ø0.5mm carbide ball

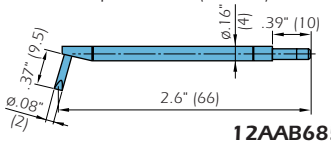
*Horizontal use only



12AAB696

Stylus for removing asperity (cutter mark)

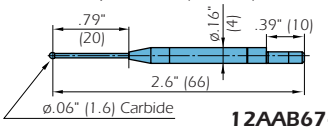
- Stylus tip: 15mm radius carbide blade
- Minimum hole diameter: .56" (14mm)
- Maximum hole depth: 1.96" (50mm)



12AAB685

ø1.6 ball stylus

- Stylus tip: ø1.6mm carbide ball
- Minimum hole diameter: .08" (2mm)
- Maximum hole depth: .70" (18mm)



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	(2.8+0.6H)µinch [(0.07+6H/10000)µm], H= Probing height (inch [mm])			
	Rotating speed	6rpm			
	Working diameter	ø5.9" (150mm)			
	Centering range	±.12" (3mm)			
	Leveling range	±1°			
	Maximum probing diameter	ø11.02" (280mm)			
	Maximum workpiece diameter	ø17.32" (440mm)			
	Maximum workpiece weight	44 lbs. (20kg)			
Vertical column	Travel range	11.02" (280mm)	11.02" (280mm) with a digital scale unit		
	Coarse/fine feeding	Coarse feed: Approx.1.2"/rev. (30mm/rev.) Fine feed: Approx..4"/rev. (1mm/rev.)			
	Maximum probing height (OD)	11.02" (280mm)			
	Maximum probing height (ID)	11.02" (280mm)			
	Maximum probing depth	3.94" (100mm)*2 when using a standard stylus (**12AAB681**)			
Horizontal arm	Travel range	6.5" (165mm)*3			
	Coarse/fine feeding	Coarse feed: Approx. 1.2"/rev. (30mm/rev.) Fine feed*: Approx..4"/rev. (1mm/rev.) *±.12" (±3mm) Stroke			
Air supply	Air pressure	390kPa (4kgf/cm²)			
	Air consumption	45 liters per minute			
Probe and stylus	Measuring range	±.04" (±1000µm)			
	Measuring force	70 to 100mN (7 to 10gf)			
	Measuring direction	Switching stylus with dual direction			
	Standard stylus (**12AAB681**)	Carbide ball, ø.06" (1.6mm)			
Full scale range (Analog meter indication range)		±.04", ±.02", ±.008", ±.004", ±.002", ±.0008", ±.0004", ±.0002" (±1000µm, ±500µm, ±200µm, ±100µm, ±50µm, ±20µm, ±10µm, 5µm)		— (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	24.02"x14.96"x24.41" (610x380x620mm)	25.98"x16.34"x24.41" (660x415x620mm)	24.02"x14.96"x24.41" (610x380x620mm)	25.98"x16.34"x24.41" (660x415x620mm)
	Air filter unit	8.27"x5.12"x7.48" (210x130x190mm)			
Mass	Main unit	88 lbs. (40kg)			
	Air filter unit	4.4 lbs. (2kg)			
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	

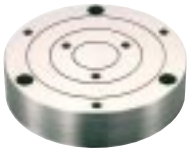
*1According to JIS B7451-1997 *2ID ø1.2" (ø30mm) or longer *3Including a protrusion of 1" (25mm) over the turntable rotation center. *4Optional accessories for RA-114/116
Note: Use an optional auxiliary workpiece stand (**356038**) for measuring a workpiece whose diameter is .8" (20mm) or shorter and whose height is .8" (20mm) 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 1.6" (40mm) or shorter and whose height is .8" (20mm) or lower.

356038



Magnification checking gage

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

211-045

Optical flat and gage block set

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

997090

Reference hemisphere

- Used for checking accuracy.
- Roundness: 0.08µm
- Mass: 1.6 lbs. (720g)

211-016

Data analysis capabilities

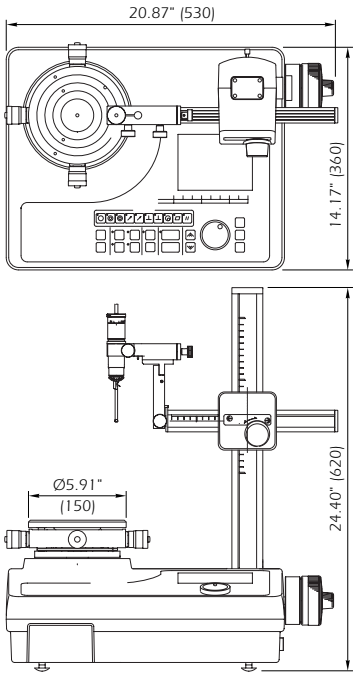
Model	RA-114 RA-114D	RA-116 RA-116D
Data processing unit	Built-in	Roundpak® V5.0 PC software
Data analysis items	Roundness, coaxiality*, concentricity, circular run-out (radial), circular run-out (axial), squareness (against axis), squareness (against plane), thickness deviation, flatness, parallelism	
Reference circles for roundness evaluation	LSC, MZC, MIC, MCC	
Variation of analysis views	Top view, opened view	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	▪ Total analysis of multiple items ▪ Recalculation of datum/measured data ▪ Tolerancing (GO/NG judgment)	▪ 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	—	▪ Computer: IBM PC compatible ▪ Processor: Intel Pentium 100MHz or faster ▪ Hard drive: 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.

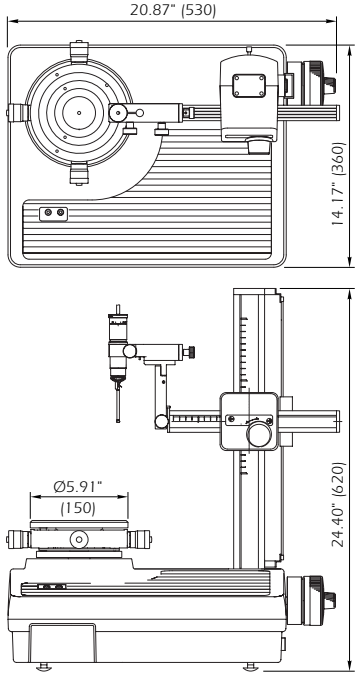
Windows is a registered trademark of Microsoft Corporation.
Specifications are subject to change without notice.

Dimensions

Unit: inch (mm)



RA-114D/114



RA-116D/116

JSAQ-052
ISO 9001

Note:
All our product details, in particular the illustrations, drawings, dimension and performance details and other technical specifications contained in this publication are to be considered to be approximate average values. To this extent, we reserve the right to make changes in design, technical data, dimensions and weight. Our specified standards, similar technical rules and technical specifications, descriptions and illustrations of the products are correct at the time of printing. The current version of our general terms and conditions also apply. Only offers which we have submitted can be considered to be definitive.

- Coordinate Measuring Machines
- Vision Measuring Systems
- Surface, Form and Contour Measurement
- Optical Measuring
- Sensor Systems
- Hardness Measuring
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

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