Form measuring systems

ZEISS

We make it visible.

Inspection equipment from Carl Zeiss for the production floor.

Carl Zeiss offers a complete product line for industrial metrology. From the small "handy surf" for surface measurements up to the large systems used for measuring large vehicles – whatever your application, Carl Zeiss has the right metrology equipment.
Our product line also offers highly accurate measuring machines for form, contour and surface measurements.

Maximum quality – from production to service

The finishing of vital machine components is performed by specialists. Quality control of our products follows the most stringent internal testing procedures which are more exacting than the specified standards.

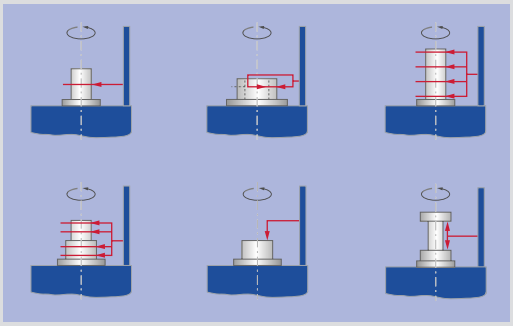
Furthermore, Carl Zeiss also delivers first class service whether it concerns a metrology question, maintenance or repair. Thanks to our network of regional offices, you receive the expert help you need within a short time.

Machine concept

The right system for every requirement

- **Rondcom 41:** The compact form measuring station with manual and software alignment of the workpiece.
- **Rondcom 44/45:** The highly accurate system with a broad range of applications. Easy upgrade to a full CNC form measuring station.
- **Rondcom 47/55:** The highly accurate form measuring systems with manual or complete CNC-controlled rotary table for large workpieces.
- **Rondcom 60:** The reference form measuring machine for maximum accuracy through design quality.
- **Rondcom 72/75:** The highly accurate spindle form testers for oversized workpieces in the automotive industry.

Measuring range



The Rondcom form measuring line from Carl Zeiss allows you to properly meet the requirements of the various measuring areas. The Rondcom 41, 44 and 54 table instruments for highly accurate workpieces are ideal up to a measuring height of 500 mm max. (optional).

The Rondcom 47, 55 and 60 systems can accommodate workpieces up to 800 mm (optional) and 60 kg (100 kg optional).

The Rondcom 72 and 75 spindle form testers from Carl Zeiss are designed for oversized workpieces in the automotive industry. Cylinder heads, crankshafts and engine blocks are just a few of the typical applications.

Flexibility

The entire line of ZEISS form measuring machines features a flexible design: Carl Zeiss measuring machines can be equipped either with a manual or fully CNC capable rotary table. A special feature: the manual Rondcom 44 can also be upgraded onsite to a form tester with fully automatic CNC alignment.

Furthermore, the Rondcom 54, 55 and 60 can be equipped with a CNC detector-and-stylus system to enable complete CNC runs for volume measurement.

In order to properly meet the different requirements, the machines can be delivered with varying column heights or increased load depending on the application.

Operation

The basic design of ZEISS form measuring machines consists of a base, Z column, R axis and detector-and-stylus system.

The systems are equipped with a controller and Windows-based computer workstations. The system is operated via the control panel or directly with support from the software.

Customer-specific system furniture, also with an optional anti-vibration table, can be integrated with an instrument to create a workstation that incorporates ergonomic features.

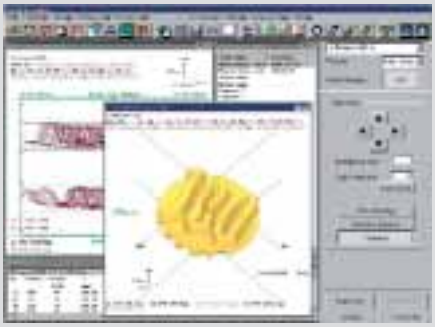
Software

TIMS – the intelligent and future-oriented software strategy

The integrated software for form, contour and surfaces facilitates the exchange of measurement data, e.g. from form or roughness analyses directly to contour analysis, in order to permit the evaluation of micro-contours according to specific requirements, for example.

Polar and linear form tolerances as per DIN ISO 1101, such as the calculation of roundness, flatness, cylinder form, coaxiality, radial runout, axial runout, straightness, and perpendicularity, are typical features.

Furthermore, TIMS form analysis permits special analyses of gear and piston evaluations, statistic calculations, Fourier analyses, etc.



Precision

The quality of the construction of ZEISS form measuring systems makes it possible to achieve maximum accuracy.

The key element in each form tester is the rotary table which is the primary component for precision. The rotary tables for the ZEISS Rondcom line are equipped with air bearings and achieve radial accuracies of up to 0.02 µm on the reference point.

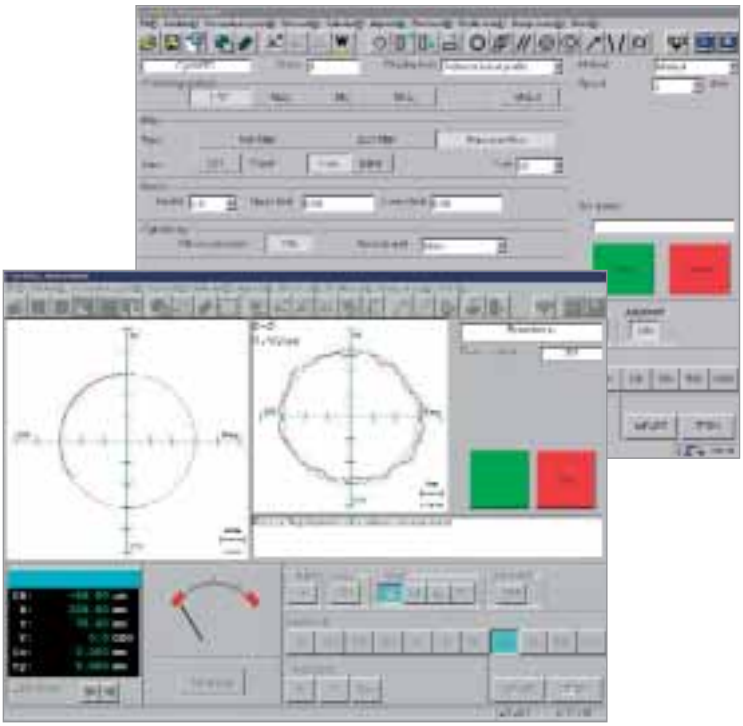
The combination of a rotary table and the precise guideway axes is ideal for the highest demands on accuracy in form metrology.

TIMS – the intelligent and future-oriented software strategy.

Measurement

The "measurement window" offers easy access to all relevant functions, such as:

- Control of all motorized axes
- Computer-supported calibration
- Enter workpiece data
- Specification of measuring requirements
- Measure polar and linear parameters
- Set automatic functions



Automatic fast tilting, leveling and centering

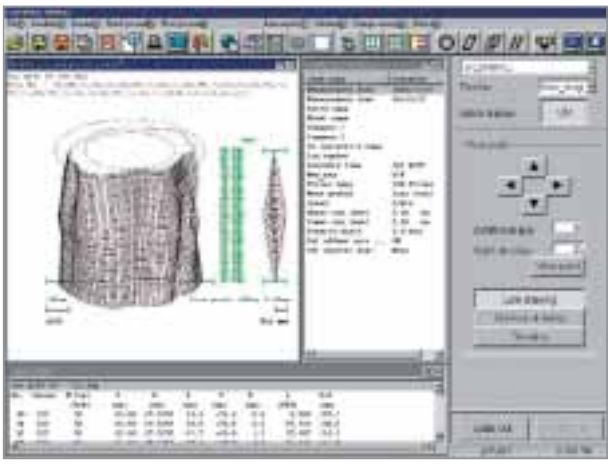
... in accordance with optimum customer criteria such as:

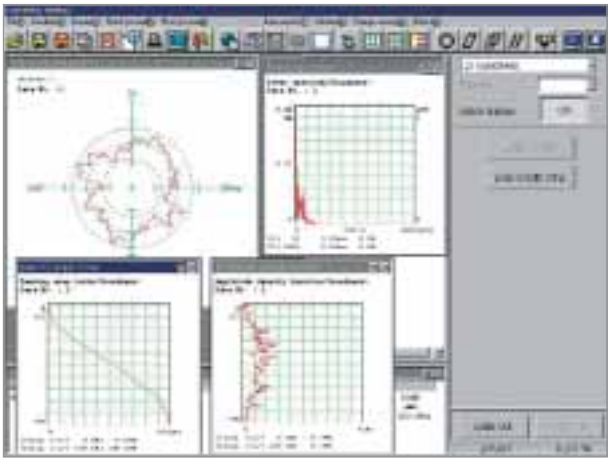
- Centering according to roundness
- Tilting/centering according to roundness
- Tilting according to straightness
- Leveling according to flatness

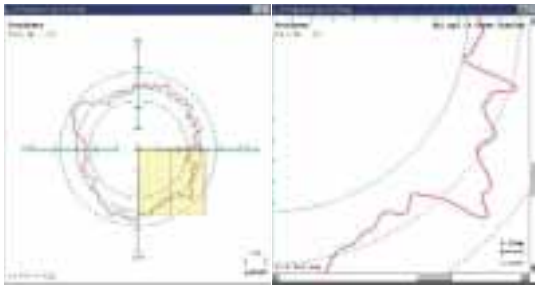
Analysis

The profile is available in an analysis window with a wide range of evaluations immediately after the measurement.

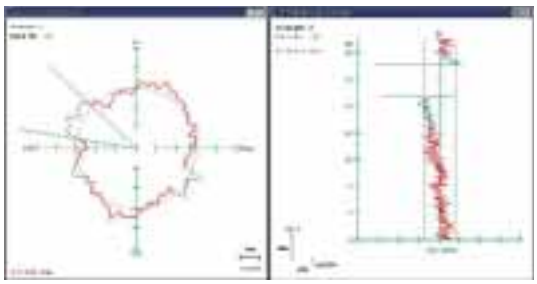
- Perfect profile processing and post-measurement calculation with other filter settings, analysis methods, etc.
- Different display possibilities: 2D, 3D, linear, material percent, amplitude density, Fourier analysis
- Clear display of selected windows
- Up to 10 profiles can be edited simultaneously
- Gear tooth tip analysis function
- QS-STAT output







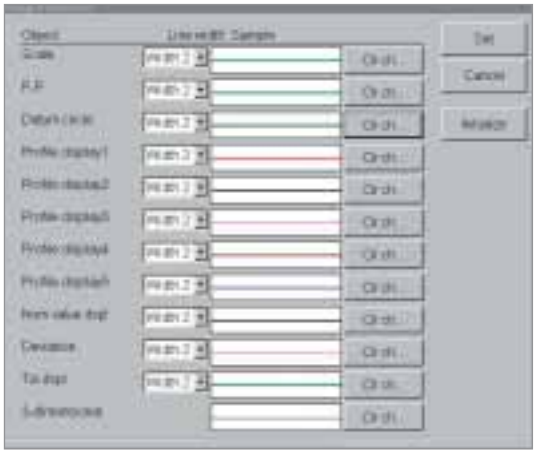
100,000x magnification and detail zoom



Data fadeout for the analysis of segments, broken surfaces, gear wheels

Customer-specific displays

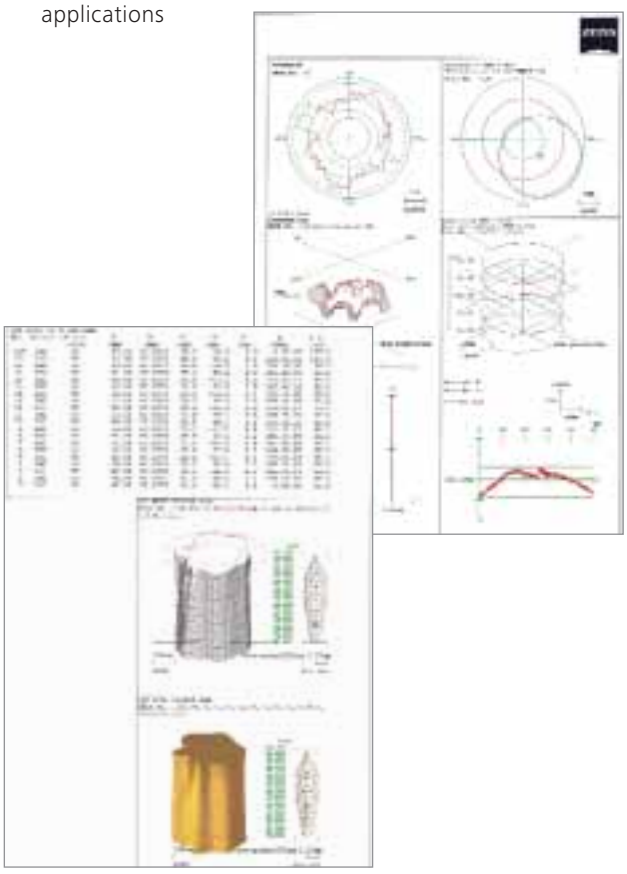
Change the scales, line colors and thickness, zoom etc.



Print

Extensive measurement logs can be printed in color using the print layout and designed according to your own needs.

- All profiles and detail sections
- Result lists, measurement conditions, comments
- Add your company's logo, workpiece drawings and pictures
- Export protocol elements for other software applications



Data processing

Roundness evaluation		LSC Gaussian compensating circle (Least Square Circle Method) MZC (Minimum Zone Circle Method) MIC (Maximum Inscribed Circle Method) MCC (Minimum Circumscribed Circle Method) NC (No Correction)
Tested features	polar	Roundness, flatness, concentricity, parallelism, coaxiality, cylindricity, squareness, total run, radial runout, axial runout, diameter and height deviation
	linear	Straightness, tapering (cylindricity), squareness, parallelism
Display unit		Color monitor
Printer		Color inkjet printer or laser printer
Displayable values		Measuring conditions, measuring parameters, graphic display, Fourier analysis, Abbott curve, ADC
Measuring units		mm, inch (selectable)
Filter type		Gaussian, 2 RC (Digital)
Filter setting	Low pass filter	15, 50, 150, 500 / revolution, or without limitation
for roundness and straightness	High pass filter	15–150, 15–500 / revolution, 50–500 / revolution
	Critical wavelength	0.25; 0.8; 2.5; 8 mm
Magnfication		50, 100, 200, 500, 1,000, 2,000, 5,000, 10,000, 20,000, 50,000, 100,000 x, Auto
Broken surface	angular range	0,1°–8° (in 1° increments)
	Limit	Each value in 0.1 mm icrements
Data interface		RS-232C

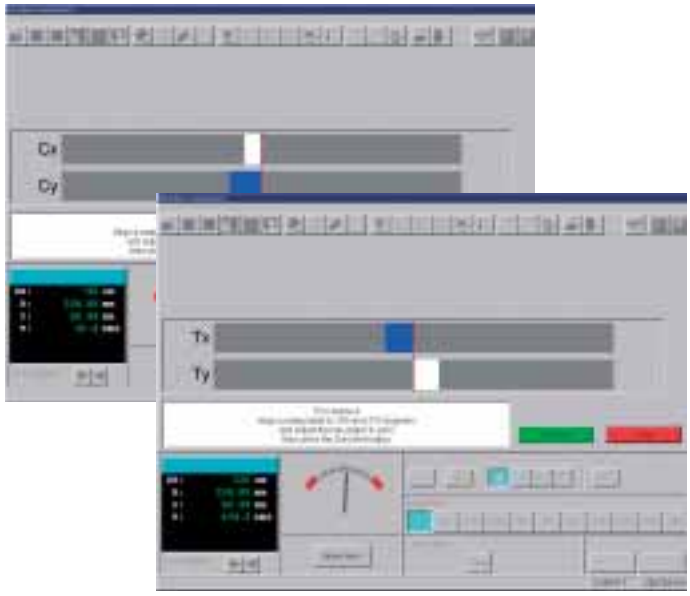
Rondcom 41

The compact form measuring station with manual, software-supported alignment of the workpiece.

- Designed for fast, easy and precise completion of form measuring tasks
- Measure polar and linear parameters, e.g. cylinders, straightness and concentricity, etc.
- High-quality axes with rotary table on air bearings, optional 500 mm Z column
- Variable measuring range and probing force
- Easy to use
- Semi-automatic processes
- CNC analysis with printout
- TIMS measuring software with assistant function for centering and leveling
- Workpieces up to 25 kg max.
- Extensive accessories permit flexible use

Accuracy through mechanical precision

Menu-guided, fast tilting and centering
For perfect cooperation with the user when preparing the measurement.



Rondcom 44/54

The highly accurate system with a broad range of applications. Easy upgrade to a full CNC form measuring station.

- Maximum accuracy and high flexibility through newly developed detector-and-stylus system
- New: easy on-site upgrade to full CNC capable form measuring system
- High productivity resulting from time savings during set up: rough alignment – maximum measuring accuracy
- Compact table form measuring station
- Highly accurate rotary table with air bearings for wear-free radial runout
- Additional linear scale in the R-axis in the R44 and R54 standard systems
- TIMS software with assistant function for centering and leveling
- Rondcom 44 with manual rotary table, Rondcom 54 with fully automatic workpiece alignment
- Different variations with the manual or CNC detector and stylus systems, Z = 300 mm or 500 mm

Rondcom 44

Rondcom 54 with integrated furniture design

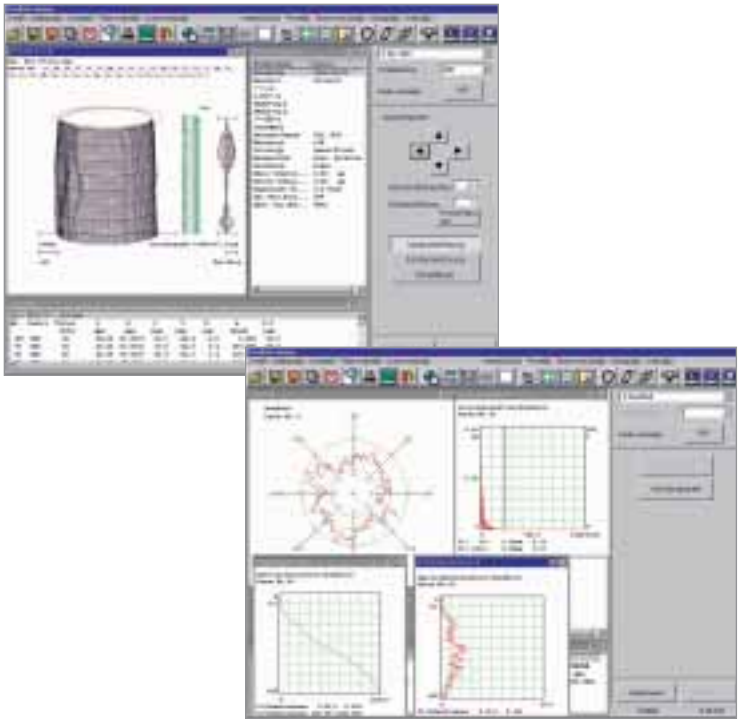
Rondcom 44 and Rondcom 54 are equipped with a new type of correction software which permits maximum measuring accuracies with a rough alignment of the workpiece.

Rondcom 47/55

The higly accurate form measuring systems with manual or complete CNC-controlled rotary table for large workpieces.

- Fast, easy and precise completion of form measuring tasks
- Very high accuracies resulting from rotary table on air bearings
- TIMS measuring software with assistant function for centering and leveling with Rondcom 47
- Automated fast tilting and centering of the workpiece with Rondcom 55
- CNC programming from measurement to evaluation to printout, easy with teach-in
- Optional manual or CNC-controlled detector-and-stylus system
- Optional with incremental glass scale also in the R axis
- Standard machine with Z = 350 mm and 60 kg max. load
- Variable measuring range and probing force
- Numerous possible variations

Rondcom 47 with manual rotary table



Rondcom 55 with fully-automatic rotary table

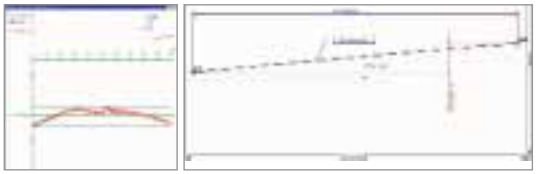
Rondcom 60

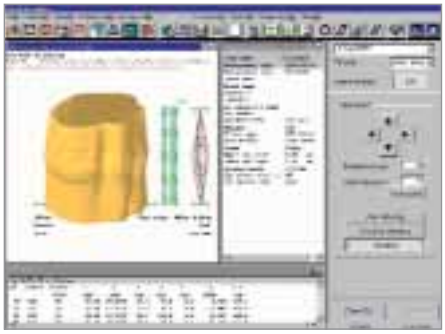
The reference form measuring machine for maximum accuracy through design quality.

- High-end CNC form measuring machine for highest precision completion of form measuring tasks
- Most accurate form measuring station in its class
- Design quality resulting from distortion-free granite base and air bearings in all axes
- Automated fast tilting and centering of the workpiece with CNC measurements
- Programming from measurement to evaluation to printout, easy with teach-in
- Optional manual or CNC-controlled detector-and-stylus system
- Incremental glass scale also in the R axis
- Standard machine with Z = 500 mm and 60 kg max. load
- Variable measuring range and probing force
- Numerous possible variations

Data transmission for contour
The profiles can be optionally transmitted to the contour evaluation module for processing, e.g. for analysis of angles and gaps.

...easy to use, both manual and automatic!
Different 3D profile displays with choice of viewing angle via tilting and rotating.



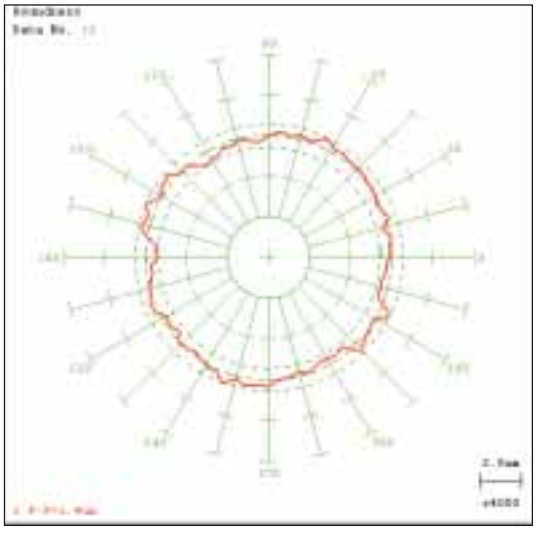


Rondcom 72/75

The highly accurate spindle form testers for oversized workpieces in the automotive industry.

- Highest accuracy form measuring on over-sized workpieces
- Typical applications: cylinder heads, engine blocks, crank shafts
- Manual or CNC controlled Rondcom 72
- Rondcom 75 with granite base and air bearings, completely CNC controlled
- Max. load up to 1000 kg with Rondcom 75
- Extensive accessories permit versatile use
- Windows-based TIMS software with teach-in programming

◀ Rondcom 72



Examples of typical applications for Rondcom 72/75:
measurement of cylinder heads, engine blocks and crankshafts

Rondcom 75

Technical data

	Rondcom 41	Rondcom 44/54
Measuring range		
Max. measuring diameter	250 mm	300 mm
Max. workpiece diameter	400 mm	580 mm
Max. load capacity	25 kg	30 kg
Rotational axis (C axis)		
Faceplate diameter	148 mm	220 mm
Radial accuracy	0.040 + 6H/10,000 µm (bandwidth) 0.020 + 3H/10,000 µm (tolerance)	0.020 + 4H/10,000 µm
Axial runout		0.020 + 4R/10,000 µm
Measuring speed	6 u/min	2–10 u/min
Centering range	± 2 mm	± 2 mm
Leveling range	± 1°	± 1°
Automatic Alignment	No	Rondcom 44 no/ Rondcom 54 yes
Automatic speed adjustment		6/10/20 u/min
Resolution	0.1°	0.025°
Vertical axis (Z axis)		
Measuring path	300 mm	300 mm (500 mm)
Straightness accuracy	0.5 µm/100 mm, 1.5 µm/300 mm	0.12 µm/100 mm, 0.2 µm/300 mm
Parallelism deviation from rotational axis	3 µm/300 mm	0.8 µm/300 mm
Measuring speed	0.6–6 mm/s	0.5–6 mm/s
Travel speed	max. 15 mm/s	max. 50 mm/s
Horizontal axis (R axis)		
Measuring path	125 mm	170 mm
Straightness accuracy		0.8 µm/150 mm
Linear scale	No	Yes
Parallelism deviation from rotational axis		1 µm/150 mm
Measuring speed		0.5–6 mm/s
Travel speed	5 mm/s	max. 25 mm/s
Accuracy of the linear scale		(2+L/170) µm
detector-and-stylus system		
CNC swivel probe system	No	R 54 optional
Measuring force	30–100 mN (adjustable)	30–100 mN (adjustable)
Collision protection	Mechanical/electronical	Mechanical/electronical
Measuring range	max. ± 1000 µm (adjustable)	max. ± 1000 µm (adjustable)
Resolution	max. 0.001 µm	max. 0.001 µm
Stylus, standard	L=54 mm, D=1.6 mm hard metal	L=54 mm, D=1.6 mm hard metal
Other Information		
Power supply	100–240 V AC 50/60 Hz	100–240 V AC 50/60 Hz
Power consumption	approx. 600 VA	approx. 600 VA
Compressed air supply	0.3–0.7 MPa	0.3–0.7 MPa
Total weight	approx. 120 kg	approx. 170 kg

	Rondcom 72	Rondcom 75
Measuring range		
Max. measuring diameter	2–450 mm	2–450 mm
Max. workpiece size	X=600 mm/Y=550 mm/Z=760 mm	X=800 mm/Y=680 mm/Z=760 mm
Max. load capacity	200 kg	200 kg (1000 kg)
X measuring range	600 mm	700 mm (1200 mm)
Y measuring range	50 mm	200 mm
Z measuring range	1000 mm	1000 mm (1500 mm, 2000 mm)
Accuracy tolerances		
Radial runout tolerance	0.03 µm standard detector-and-stylus system L=235 mm 0.3 µm detector-and-stylus system L=620 mm	0.1 µm standard detector-and-stylus system L=76 mm 0.2 µm detector-and-stylus system L=700 mm
Axial runout tolerance	0.1 µm/R 50 mm standard detector-and-stylus system L=235 mm 0.2 µm/R 50 mm detector-and-stylus system L=620 mm	0.1 µm/R 50 mm standard detector-and-stylus system L=76 mm 0.2 µm/R 50 mm detector-and-stylus system L=700 mm
Straightness	2 µm/200 mm standard detector-and-stylus system L=235 mm 5 µm/600 mm detector-and-stylus system L = 620 mm	0.3 µm/50 mm, 0.5 µm/100 mm standard detector-and-stylus system L=76 mm 1.5 µm/700 mm detector-and-stylus system L=700 mm
Parallelism	2 µm/100 mm	1.5 µm/100 mm
Positioning accuracy	± 50 µm	± 50 µm
Speed		
Rotation speed	2 u/min (measuring), 10 u/min (centering)	2 u/min (measuring), 10 u/min (centering)
Linear speed	0.6 mm/s–6 mm/s	0.6 mm/s–6 mm/s
Detector-and-stylus system		
Stylus tip	D=1.6 mm hard metal standard	D = 0.5 mm sapphire
Stylus lenght	Standard L=24 mm (1:1)	Type A L=76 mm (1:1) Type B L=201 mm (2:1)
Measuring force	0.07 N Standard	Type A 0.17 N Type B 0.085 N

Technical data

	Rondcom 47/55	Rondcom 60
Measuring range		
Max. measuring diameter	350 mm	420 mm
Max. workpiece diameter	600 mm	680 mm
Max. load capacity	60 kg	60 kg
Rotational axis (C axis)		
Faceplate diameter	290 mm	290 mm
Radial accuracy	0.020 + 6H/10,000 µm (bandwidth) 0.010 + 3H/10,000 µm (tolerance)	0.020 + 6H/10,000 µm (bandwidth) 0.010 + 3H/10,000 µm (tolerance)
Measuring speed	2–10 u/min	2–10 u/min
Centering range	± 5 mm	± 5 mm
Leveling range	± 1°	± 1°
Automatic Alignment	Rondcom 47: no/Rondcom 55: yes	Yes
Automatic speed adjustment	6/10/20 u/min	6/10/20 u/min
Resolution	0.1°	0.1°
Vertical axis (Z axis)		
Measuring path	350 mm (500 mm)	500 mm (800 mm)
Straightness accuracy	0.15 µm/100 mm, 0.3 µm/300 mm	0.10 µm/100 mm, 0.25 µm/500 mm
Parallelism deviation from rotational axis	1.5 µm/350 mm	1.5 µm/500 mm
Measuring speed	0.6–6 mm/s	0.6–6 mm/s
Travel speed	max. 30 mm/s	max. 30 mm/s
Horizontal axis (R axis)		
Measuring path	187 mm	220 mm
Straightness accuracy	1 µm/100 mm	0.5 µm/200 mm
Linear scale	R 55 optional	Yes
Parallelism deviation from rotational axis	2 µm/100 mm	0.5 µm/200 mm
Measuring speed	0.6–6 mm/s	0.6–6 mm/s
Travel speed	max. 16 mm/s	max. 20 mm/s
Accuracy of the linear scale	(2+L/220) µm	(2+L/220) µm
Detector and stylus system		
CNC swivel probe system	R 55 optional	optional
Measuring force	30–100 mN (adjustable)	30–100 mN (adjustable)
Collision protection	Mechanical/electronical	Mechanical/electronical
Measuring range	Max. ± 1000 µm (adjustable)	Max. ± 1000 µm (adjustable)
Resolution	Max. 0.001 µm	Max. 0.001 µm
Stylus, standard	L=54 mm, D=1.6 mm hard metal	L=54 mm, D=1.6 mm hard metal
Other Information		
Power Supply	100–240 V AC 50/60 Hz	100–240 V AC 50/60 Hz
Power consumption	appox. 800 VA	appox. 800 VA
Compressed air supply	Supply pressure 0.5–0.7 MPa	Supply pressure 0.5–0.7 MPa
Total weight	appox. 480 kg	appox. 600 kg

Accuracy information based on environmental temperature of 20 °C ± 2 °C.

Subject to change as a result of technical modifications and required export licenses.

R = Radius in mm
H = Measuring height in mm

60-22-732-e Printed in Germany DBD-TS-IVI/2005 Poo Printed on environmentally-friendly, chlorine-free bleached paper

Carl Zeiss
Industrial Metrology
73446 Oberkochen/Germany
Sales: +49 1803 336 336
Service: +49 1803 336 337
Fax: +49 7364 203 870
E-Mail: imt@zeiss.de
Internet: www.zeiss.de/imt