

# MarShaft MAN. Annual Tactile Shaft Measuring Machine

**MarShaft MAN** is a universal, modular shaft measuring instrument for the fast and flexible measurement of shaft-type testpieces.

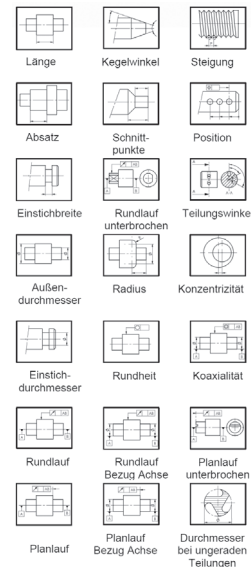
Precision workpieces can be produced cost-effectively and to a high level of quality across all manufacturing stages — from cutting to length through to hard finishing — if the individual process steps are kept consistently stable. That is exactly where production-floor characteristics testing with MarShaft MAN comes in. Short feedback times on reaching the tolerance limits and seamless documentation of all functional data relating to the component soon pay off.

The MarShaft MAN shaft measuring center is the right solution for your quality control.

The MarShaft MAN shaft measuring center is available in a number of different instrument sizes (workpiece lengths up to 400 mm / 800 mm / 1200 mm / 1600 mm / 2000 mm / 2400 mm, diameters from 120 mm to 220 mm) and its modular design allows it to be adapted to individual measuring tasks. The measuring modules (e.g. diameter, length, roundness module) can be arranged in any order or can easily be added at a later date.

## Advantages at a glance:

- No operator influence
- Highly accurate measuring results
- Excellent repeatability
- Measuring system for all typical measuring tasks, including: Length, diameter, radial run-out, axial run-out, recess width, cone angle, roundness, coaxiality, concentricity and much more
- Automatic measuring force application to avoid operator influence
- Good workshop compatibility for direct use in production
- User-friendly MarCheck evaluation computer (2 models)



## Technical Data

### MarShaft MAN, length and diameter measurement, MarCheck II measuring computer

Measuring range length (Z) (mm)	400 / 800 / 1200 / 1600 / 2000 / 2400
Measuring range diameter (X) (mm)	120 or 220
Workpiece weight (max.) in kg	20 / 60
Length/diameter resolution (mm)	0,0001
Angle resolution (°)	0,001
Length error limit (Z) (µm)	(3 + L/100) µm, L (length) in mm
Diameter error limit (X) (µm)	(0.8 + L/100) µm, L (length) in mm
Drive	manual
Lens	Optical measuring system (OMS) with matrix camera and software

## Applications

### Typical workpieces:

Crankshaft, camshaft, gear shaft, rack, axle journal, hollow shaft, drive shaft, piston

### Typical measuring tasks:

Length, diameter, radial run-out/axial run-out

### Other measuring tasks:

Distance, recess width, depth, increment, recess diameter, roundness, taper, angle, radius, intersection point, position of cross-holes, and much more

For more information, please visit our website: [www.mahr.com](http://www.mahr.com)

# MarShaft MAN with MarCheck. Measuring Value Display for MAN Shaft Measuring Machines



MarCheck is a new compact measuring and evaluating unit for the manual measuring machine MarShaft MAN and is characterized by its ease of handling and high performance scope. The user requires only very little training, thus the unit can be immediately implemented, saving time and costs.

The large, clear, LCD monochrome display (240 x 160 dots) can display up to three measuring channels simultaneously. Activation of the individual measuring channels on the display takes place automatically when measuring with the corresponding measuring axis. The measuring direction is shown. The MarCheck has three measuring channels for two linear measuring axes (Z and X) and one rotary measuring axis (R), which can be reconfigured to a linear measuring axis (C) if needed. For runout and roundness measurements, the precision measuring spindle (C axis) is controlled by MarCheck and automatically switched on or off.

## Technical Data

MarShaft MAN with MarCheck, measured value display for MAN shaft measuring instruments	
Resolution per measuring channel can be independently set	0.0001 mm; 0.001 mm; 0.01 mm 0.00001 inch; 0.0001 inch; 0.001 inch 0.001° decimal; ° min, sec
Incremental inputs	T1; T2; T3 (sin/cos 1 Vss) 15 pin. Sub D
Interface data	1x RS 232; 1x USB 2.0 type A, 1x USB 2.0 type B
Grating constant	selectable; 2 µm; 4 µm; 10 µm; 20 µm; 40 µm
Max. permissible travel speed	0.2 m/s when G = 2 µm 0.4 m/s when G = 4 µm 1 m/s when G = 10 µm 2 m/s when G = 20 µm for MarShaft MAN 4 m/s when G = 40 µm
Input signal - cutoff frequency	<100 kHz at sin/cos 1 Vss
Frequency check response threshold	100
Measuring units	mm / inch selectable in MENU
Standard languages	German; English; French Additional languages can be installed via USB interface and an external PC

## Performance features

- Large, clear, backlit LCD monochrome display (240 x 160 points)
- 3 measuring channels (Z axis, X axis, and C/R axis)
- Digit size approx. 13 mm
- 1 USB interface max. 3GB USB stick
- 1 USB interface for PC (selectable RS232 interface, evaluation of data in Excel or MarCom software) or software installation (update)
- Connection of a ink jet printer possible
- Measurement of roundness and runout takes place with the DMS 120, no additional R axis required
- Automatic acquisition of measuring values after having reach the measuring force the user has set
- Automatic acquisition of the calibration values from the individual measuring modules

## Measuring and programming functions

- Evaluation of diameter, length dimensions, distances, taper, symmetry, distance between centers, roundness, axial runout, radial runout, concentricity, workpiece axis reference calculation, maximum/minimum function, preset function for reference points outside of the workpiece.
- Teach-in programming, data can be saved in MarCheck, external PC or USB stick, printing with external printer, up to 40 measuring programs can be saved.
- Q-DAS interface for the evaluation of machine capability testing in Q-DAS Software®

For more information, please visit our website: [www.mahr.com](http://www.mahr.com)



# MarShaft MAN Shaft Measuring Instruments. OMS 120 Optical Measuring System

In conjunction with the evaluation software, the optical measuring system OMS 120 can be used to measure geometry elements which cannot be contacted or evaluated with the available contacting measuring probes of MarShaft MAN. The operating concept is optimized for use directly on the production line and can be used without any knowledge of metrology whatsoever. The testpiece contour is mapped on the camera chip using the shadow image method and displayed on the monitor. High-quality, telecentric optical components are used for precision mapping. To this end the corresponding testpiece contour is positioned only roughly in the camera's image field. There is no need for precision adjustment in the Z or X direction. The software has quick measuring functions which automatically evaluate the relevant feature results for the current measuring task.



## Quick measuring functions

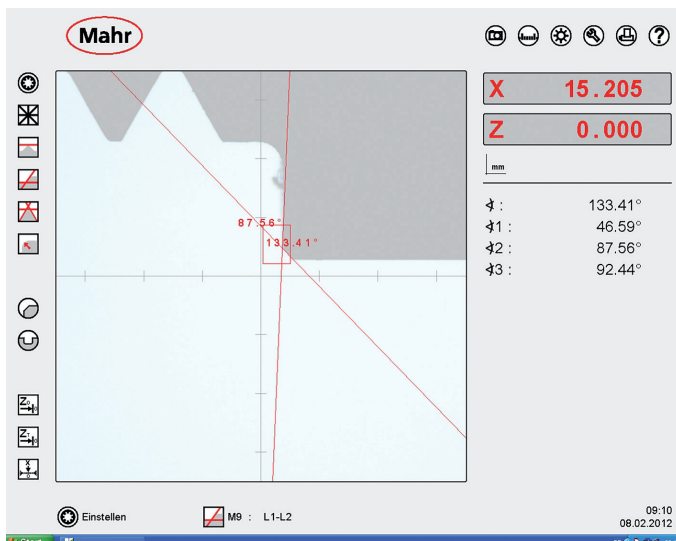
- Recess
- Chamfer
- Radius
- Straight line
- Intersection point line-line A quick measuring function analyses multiple feature results at the same time. The relevant results can be selected for recording or for data transfer. Most shaft measuring tasks can be performed in a quick and user-friendly manner using these functions.



A whole range of manual analysis functions are available for measuring tasks which are not covered by the quick measuring functions.

## Technical data

Traverse path in X-direction: 120 mm  
Measurement resolution: 0.001 mm



For more information, please visit our website: [www.mahr.com](http://www.mahr.com)

# MarShaft SCOPE 350 / 700 / 1000 plus



Tactile measuring unit with y-measuring axis 60 mm

The MarShaft SCOPE plus is a universal, fully automatic optical shaft measuring system for testing rotationally symmetrical workpieces.

The MarShaft SCOPE plus has a highly accurate roundness measuring axis (C), a vertical measuring axis (Z) and a horizontal measuring axis (X).

A tactile measuring system with an inductive measuring probe is available as an option, for measuring radial and axial run-out or straightness, for example. The measuring device is calibrated to the optical measuring system, so it can perform tactile and optical measuring tasks in combination.

The new MarWin EasyShaft software provides a high level of flexibility and exceptionally user-friendly operation.

The measuring sequences are carried out fully automatically, free from operator influences.

The MarShaft SCOPE plus is suitable for use in both the harsh workshop environment and in the inspection room. Zoom functions allow the smallest details to be measured, which with conventional measuring methods are difficult if not impossible to test.

## Technical Data

Freestanding model	
Measuring range length (Z) (mm)	350 / 750 / 1000
Measuring range diameter (X) (mm)	80 or 120
Workpiece weight (max.) in kg	15 (optional 30)
Length/diameter resolution (mm)	0.01 to 0.0001
Angle resolution (°)	0.01 to 0.0001
Length error limit (Z) (µm)	(2 + L/125) L in mm (2 σ at 20 °C ± 1 °C on reference standard)
Diameter error limit (X) (µm)	(1,0 + L/125) L in mm (2 σ at 20 °C ± 1 °C on reference standard)
Drive	Servo motors
Lens	Telecentric precision lens High-resolution CCD array

- Automatic measuring procedure
- Matrix camera, 1280 x 1024 pixels
- User-friendly touchscreen operation
- One measuring instrument for multiple measuring tasks
- Good workshop compatibility
- MarWin EasyShaft software provides a high level of flexibility and user-friendly operation

### Options:

- Tactile measuring unit for measuring radial run-out and axial run-out
- Temperature compensation
- Thread measurement
- Turbocharger shaft measurement
- Camshaft measurement
- Piston measurement
- Manual control panel
- MarWin Professional Shaft - software

## Applications

### Typical workpieces

- Turned parts
- Tripods
- Transmission shaft
- Rack
- Axle journal
- Hollow shaft
- Drive shaft
- Piston
- Camshaft
- Turbocharger shafts
- Bone screws
- Worm gears
- Balance shafts
- Hydraulic parts
- Valves (diesel engine)
- Injection valves and much more

For more information, please visit our website: [www.mahr.com](http://www.mahr.com)

## MarShaft. Scope 600 plus 3D

Mahr is pleased to provide a new measurement method for the special camshaft application using the new MarShaft SCOPE 600 plus 3D: A combination of optical and touch sensors allow for a first ever functionally complete 3D Inspection of the workpiece. Due to this market need Mahr further developed our highly anticipated and received MarShaft SCOPE 750 plus System. The advanced System now utilizes a new 2D Touch Probe, a motorized tailstock and a calibration for the linear axes. A Matrix camera optically measures characteristics such as diameters, lengths, radii, geometries, location characteristics, cam angle or cam lift in seconds. The additional 2D Sensor detects features that are not optically measurable: concave cam shapes, axial run out on large shoulders, reference elements in the axial direction such as blind holes. For this system, the tactile and optical systems are aligned/adjusted to exist within one measuring coordinate system. This unit operates in conjunction with the MarWin software platform, thus providing full 3D functionality. Features:

- Complete measuring of camshafts, including cam angle and all cam profiles
- Measurement of contours
- No use of radial drivers
- Direct measurement of reference (2 flat, blind borehole or keyway)
- Measurement of keyway grooves
- Measurement of blind boreholes
- 100% 3D function with the new 2D probesystem 1320-2
- Additional Y- measuring axis
- Special calibration of the linear axis (Z-X-Y)
- MarShaf Professional Software
- Manual panel

### Options:

- Barcode-Scanner
- Signal light (red, yellow, green)
- Coated tip (no driver required)
- Vibration isolation system
- Temperature compensation
- Thread Measurement
- Turbocharger shaft measurement



### Technical Data

MarShaft SCOPE 600 plus 3D	
Measuring range length (Z) (mm)	600
Measuring range diameter (X) (mm)	120
Workpiece weight (max.) in kg	15
Length/diameter resolution (mm)	0.01 to 0.0001
Angle resolution (°)	0.01 to 0.0001
Length error limit (Z) (µm)	(2,0 + L/125) L in mm (at 20 °C ± 1 °C on reference standard)
Diameter error limit (X) (µm)	(1,0 + L/125) L in mm (at 20 °C ± 1 °C on reference standard)
Drive	Servo motors
Lens	Telecentric precision lens High-resolution CCD array

### Applications

- Complete measurement of camshafts

### Typical workpieces

- Camshaft
- Eccentric shafts
- Shafts with keyways or blind boreholes

For more information, please visit our website: [www.mahr.com](http://www.mahr.com)

# MarShaft SCOPE 250 plus



The role of dimensional metrology is expanding at a dramatic rate, in parallel with innovations in manufacturing processes. Given the ever more stringent accuracy requirements and falling cycle times in production (turning, milling, grinding, etc.), rapid measurement directly at the manufacturing machine is absolutely essential. Measurement at the point of origin of the product, with rapid feedback to the manufacturing process to avoid waste. Mahr's flexible MarShaft SCOPE 250 plus shaft measuring machine offers the right measuring solution for the fast, precise and fully automatic measurement of rotationally symmetrical workpieces in production.

The MarShaft SCOPE 250 plus has a high precision roundness measuring axis (C) and a vertical measuring axis (Z) with a measuring range of 250 mm. At its heart is the state-of-the-art, high-resolution CMOS matrix camera (live image) with an image field of 1088 x 2048 mm. The extremely high image acquisition rate of over 120 images per second keeps measuring times to a minimum. Zoom functions allow the smallest details to be measured, which with conventional measuring methods are difficult if not impossible to test.

## Technical Data

MarShaft SCOPE 250 plus	
Measuring range length (Z) (mm)	250
Measuring range diameter (X) (mm)	40
Length/diameter resolution (mm)	0.01...0.0001
Angle resolution (°)	0.01...0.0001
Length error limit (Z) (µm)	$\leq (3.0+I/125) I$ in mm
Diameter error limit (X) (µm)	$\leq (1.5+I/40) I$ in mm
Lens	Telecentric precision optics High-resolution CMOS camera

## Applications

### Typical workpieces

- Turned parts
- Journals
- Hollow shafts
- Drive shafts
- Turbocharger shafts
- Bone screws
- Balance shafts
- Hydraulic parts
- Valves (gasoline engine)
- Injection valves and many more

### Performance features at a glance:

- New, high-resolution CMOS matrix camera with a 40 mm live image field allows fast scanning with over 120 images per second
- High accuracy for diameter and length measurement
- Extremely fast measuring times thanks to high measuring speeds of up to 200 mm/s
- By using Mahr's MarWin software platform, you can benefit from our decades of experience in length, shape, position and contour measurement
- Affordable entry-level price into the small optical shaft measuring machine segment

For more information, please visit our website: [www.mahr.com](http://www.mahr.com)