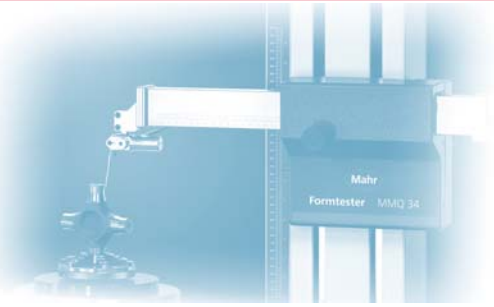
MARFORM I MMQ SERIES

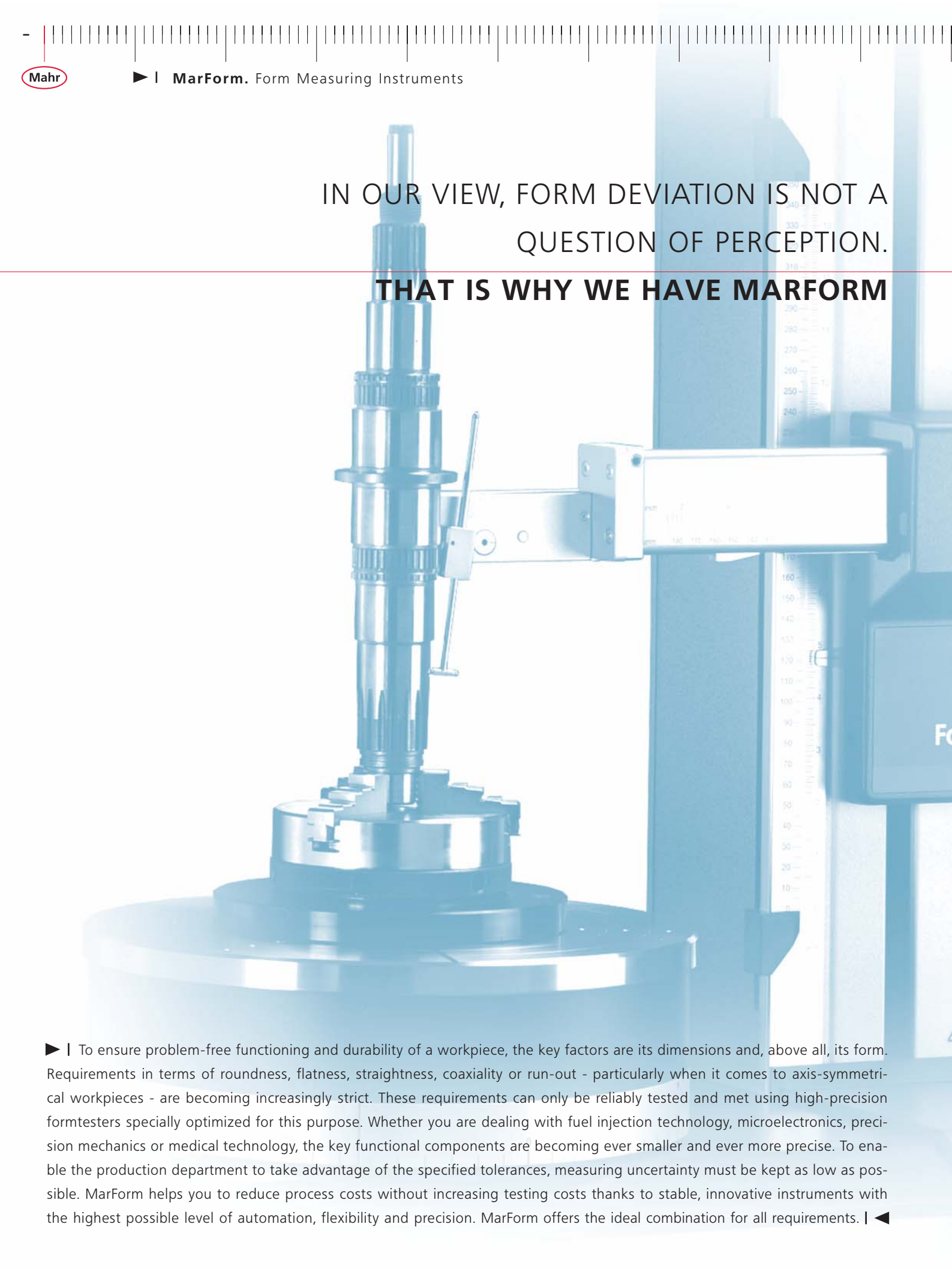


FORM MEASURING INSTRUMENTS

- 0 +

Mahr

EXACTLY



IN OUR VIEW, FORM DEVIATION IS NOT A QUESTION OF PERCEPTION.

THAT IS WHY WE HAVE MARFORM

► | To ensure problem-free functioning and durability of a workpiece, the key factors are its dimensions and, above all, its form. Requirements in terms of roundness, flatness, straightness, coaxiality or run-out - particularly when it comes to axis-symmetrical workpieces - are becoming increasingly strict. These requirements can only be reliably tested and met using high-precision formtesters specially optimized for this purpose. Whether you are dealing with fuel injection technology, microelectronics, precision mechanics or medical technology, the key functional components are becoming ever smaller and ever more precise. To enable the production department to take advantage of the specified tolerances, measuring uncertainty must be kept as low as possible. MarForm helps you to reduce process costs without increasing testing costs thanks to stable, innovative instruments with the highest possible level of automation, flexibility and precision. MarForm offers the ideal combination for all requirements. | ◄

MarForm. Form Measuring Instruments

MarForm. Formtesters for a Wide Range of Applications

FORM MEASURING INSTRUMENTS FOR THE WORKBENCH OR INSPECTION ROOM

► | The demands placed on a form measuring instrument are as varied as the workpieces and measuring tasks themselves. There are several things that have to be taken into consideration when selecting the right instrument: Which measuring axes are required and in what length and precision? Are there particular requirements in terms of positioning accuracy, e.g. for particularly small workpieces, or in terms of the workpiece mount and probe arm geometry? Does the measuring instrument need to minimize the influence of the operator through a high level of automation? Ultimately, the key criterion is that all measurements can be performed and documented simply, cost-effectively and reproducibly. The ideal MMQ is available for every task! | ◄

MarForm MMQ 100/MMQ 10

The easy-to-use Formtester

Formtester MarForm MMQ 100

Formtester MarForm MMQ 10

Features

The MarForm MMQ 100 Formtester offers outstanding accuracy in a robust package designed for use in production environments. Used in combination with the EasyForm software, it represents the perfect solution for simple, yet powerful measuring tasks.

- Precise and fast measuring results
- Reliable thanks to mechanical bearings
- Large measuring volume
- Mobile thanks to low weight and convenient size
- Fast workpiece alignment thanks to computer support
- Centering and tilting screws for rough and fine adjustment
- Universal and reliable
- Suitable for use in workshops as no compressed air connection is required
- No keyboard or mouse required
- Digital transmitters in Z and X transmit the measuring position directly to the software

The **MMQ 100** can also be operated from a laptop, thus enabling mobile use. All you need is a power outlet!

Optimized for frequent form measuring tasks

- Roundness (also in a sector)
- Flatness (from a circle)
- Concentricity
- Coaxiality
- Radial run-out
- Axial run-out
- Plane parallelism from opposite circles
- Fourier/waviness analysis

Versions

MMQ 10 with integrated form computer to evaluate form and positional tolerances (DIN ISO 1101) for roundness, radial run-out, concentricity and coaxiality.

MMQ 100 with EasyForm as a powerful, PC-based evaluation system running on Windows® XP offers informative color records with easy-to-use software for evaluation of form and positional tolerances (DIN ISO 1101) for roundness, roundness in a sector, radial run-out, axial run-out, concentricity, coaxiality, flatness(1), straightness(1), parallelism(1) and perpendicularity(1).

The **MMQ 10 measuring station**, consisting of an **MMQ 10 Formtester** with integrated computer and printer and a **T2W** probe, is available under **order No. 5440088**.

The **MMQ 100 EasyForm measuring station** is available in two versions:

MMQ 100 form measuring station	**Order No. 9999115**
Consisting of:	
MarForm MMQ 100 with T2W probe	Order No. 5440690
EasyForm PC	Order No. 5450180
WIN XP country package	Order No. 62682xx
17" TFT monitor	Order No. 5460041
Printer	Order No. 5460030

MMQ 100 Plus form measuring station	**Order No. 9999116**
Consisting of:	
MarForm MMQ 100 Plus with digital transmitters in X/Z and T2W probe	Order No. 5440691
EasyForm PC	Order No. 5450180
WIN XP country package	Order No. 62682xx
17" TFT monitor	Order No. 5460041
Printer	Order No. 546003

Options: Fourier analysis to expand the evaluation capabilities for the roller bearing sector. Mahr Data Transfer Tools for simple transfer of measuring results into statistical evaluations such as QS-STAT or MS Excel.

(1) from a polar trace

MarForm MMQ 34

The MMQ 34 is the standard form measuring instrument for all your production needs

Features

The **MMQ 34** comes with a high-precision motor-driven Z column, opening up a whole new dimension in form metrology compared to roundness measuring instruments.

In addition to
- Roundness (also in a sector)
- Flatness(1)
- Concentricity
- Coaxiality
- Radial run-out
- Axial run-out

the **MMQ 34** can also evaluate

- Cylindricity
- Straightness (from linear or circular profiles)
- Total radial run-out
- Parallelism (from linear or circular profiles)
- Perpendicularity (from linear or circular profiles)
- Angularity (vertical)
- Conicity (vertical)
- Taper

The **MMQ 34** Formtester offers an unbeatable volume with a small footprint.

Versions

The **MarForm MMQ 34** is available in two versions:
In addition to the C-axis, both versions offer a Z-axis length of 350 mm or 500 mm (13.8 in or 19.7 in) and a motor-driven 180 mm (7.1 in) positioning axis as the X-axis.

The **MMQ 34** is operated using the **MarWin EasyForm** software. It utilizes touchscreen technology and requires no keyboard or mouse. Creating powerful measuring runs for all manner of work-pieces is child's play thanks to the interactive wizards.

MMQ 34 form measuring station with motor-driven X-axis
Order No. 9999482

Consisting of:

MarForm MMQ 34	
Z=350 mm (13.8 in), X=180 mm (7.1 in) pos. axis	5440667
With **MarWin** and **EasyForm 2.0 software**	5450185
With 17" TFT monitor	5460041
With T2W probe	5400015
With 100 mm (3.9 in) dia. rim chuck	6710612
With HP Color inkjet printer	5460030
With WIN 2000 or WIN XP country package	62682XX

MMQ 34 form measuring station with motor-driven X-axis
Order No. 9999483

Consisting of:

MarForm MMQ 34	
Z=500 mm (19.7 in), X=180 mm (7.1 in) pos. axis	5440668
With **MarWin** and **EasyForm 2.0 software**	5450185
With 17" TFT monitor	5460041
With T2W probe	5400015
With 100 mm (3.9 in) dia. rim chuck	6710612
With HP Color inkjet printer	5460030
With WIN 2000 or WIN XP country package	62682XX

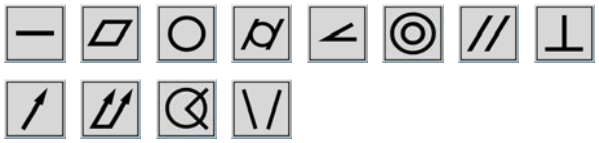
Option for **MMQ 34 measuring stations**:

15" touchscreen TFT monitor 3017725 instead of 17" standard TFT monitor 5460041	9999540

(1)) from a polar trace

MarForm MMQ 44

Modular and flexible - this instrument can be used in all applications for comprehensive workpiece evaluation to DIN ISO 1101



Description

The modular design equipped with all the required components enables you to configure the optimum solution for a wide range of tasks. The fact that all of the available modules were developed and manufactured in Germany with hallmark Mahr quality guarantees the legendary precision and stability of the MarForm measuring instruments. This ensures the reliability of each and every measurement for years to come.
Due to its workshop-compatible design, the **MarForm MMQ 44** Formtester can be used both in production environments and in precision inspection rooms. The high-precision rotary stroke and sliding bearings used as guide elements combine low outlay in terms of installation, maintenance and operating costs with reliable measuring results, even when used in production environments.

Features

The **MMQ 44** can be used in all circumstances for comprehensive workpiece evaluation to DIN ISO 1101. High-precision Z and X measuring axes make it possible to perform any form measuring task.
The MarForm MMQ 44 has versions for
- High-precision workpieces
- Unusually long workpieces
- Large and heavy workpieces
- Use in production environments or the precision inspection room

You can choose from a variety of modules which can be used to customize the **MarForm MMQ 44** to suit your precise requirements:
- Motor-driven or manual centering and tilting table
- Vertical axis (Z) with measuring length of 500 mm (19.7 in) or 350 mm (13.8 in)
- Horizontal axis (X) with length of 180 mm (7.1 in) or 280 mm (11.0 in)

- With digital rotary encoders or linear scales in X and Z axes

This means that your **MarForm MMQ 44** is available as a *semi-automatic measuring station* with a manual centering and tilting table or as a *fully automatic measuring station* which is conveniently fitted with a motor-driven centering and tilting table and the **T7W** probe and makes it possible to test parts with high precision without operator intervention.
The **Marform MMQ 44 Formtester** can be used in all applications for comprehensive workpiece evaluation to DIN ISO 1101. Optional Fourier analysis and synthesis expand the evaluation possibilities to satisfy the demands of the roller bearing sector.

The **Piston option** takes into account the specific requirements when measuring pistons.

Mahr Data Transfer Tools make it easy to transfer measuring results into statistical evaluations such as **QS-STAT** or **MS Excel**.

Overview of MMQ 44 Modules and Probes

Further Benefits of MMQ

- Fast and accurate individual measurements
- Measuring program run with high level of automation
- Simple program changes, even with complex measuring programs
- User-friendly measuring program administration
- Concise measuring records - black and white or color - on all Windows® printers and electronically by e-mail or simply documented in paperless form
- High-quality branded PC hardware
- Safe investment for the future

High-performance add-on modules extend the FORM-PC software's range of functions.

- Fourier analysis option with RTA evaluation and tolerance band monitoring plus Fourier synthesis for waviness analyses
- Data export to statistics programs option
- Piston-specific evaluations option (ovality, position of large/small piston axis, tolerance band function for circular and meridian piston profiles)

MMQ Modules

C-axis modules
- Manual centering and tilting table, dia. 220 mm (8.7 in)
- Automatic centering and tilting table, dia. 285 mm (11.2 in)

Z-axis modules
- Motor-driven measuring axis, 350 mm (13.8 in)
- Motor-driven measuring axis, 500 mm (19.7 in)

X-axis modules
- Motor-driven positioning axis, 180 mm (7.1 in) (MMQ 34)
- Motor-driven measuring axis, 180 mm (7.1 in)
- Motor-driven measuring axis, 280 mm (11.0 in)

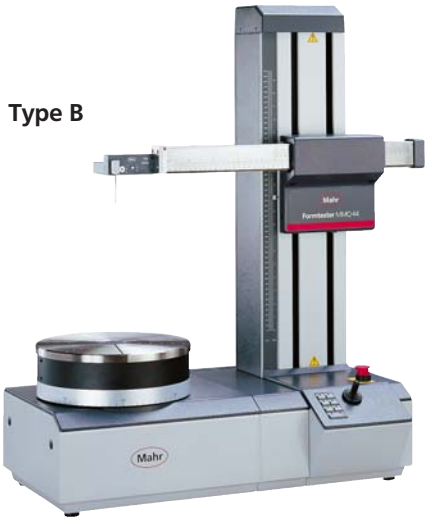
Spacer
- 100 mm (3.9 in) spacer, required and included for 280 mm (11.0 in) X-axis length
- 45 mm (1.8 in) spacer for special applications

Probes for the MMQ 44
- T2W length measuring probe as the standard probe
- T7W motor-driven length measuring probe for fully automatic measuring runs

Overview of MMQ 34 and MMQ 44 Versions

Type A

Type B



Measuring station Order No.	Instrument	Order No.	Manual centering and tilting table, dia. 220 mm (8.7 in)	Motor-driven centering and tilting table, dia. 285 mm (11.2 in)	X-axis with motor-driven positioning	Motor-driven measuring X-axis	Rotary encoders in Z and X	Linear scale in Z and X	Z-axis, high-precision	FORM-PC evaluation	EasyForm evaluation	Advanced Form evaluation	Professional Form evaluation	T7W probe
MarForm MMQ 34 measuring station with Z=350 mm (13.8 in) and X=180 mm (7.1 in)														
9999482	MMQ 34	5440667	x		x		x		-		x	o	o	-
with Z=500 mm (19.7 in) and X=180 mm (7.1 in)														
9999483	MMQ 34	5440668	x		x		x		-		x	o	o	-
MarForm MMQ 44 measuring station with Z=350 mm (13.8 in) and X=180 mm (7.1 in) Type A														
9999433	MMQ 44	5440633	x			x	x		x	x	o	o	o	o
9999449	MMQ 44 CNC	5440649		x		x	x		x	x	o	o	o	o
9999450	MMQ 44 CNC	5440650		x		x		x	x	x	o	o	o	o
MarForm MMQ 44 measuring station with Z=500 mm (19.7 in) and X=280 mm (11.0 in) and 100 mm (3.9 in) spacer Type B														
9999445	MMQ 44	5440645	x			x	x		x	x	o	o	o	o
9999461	MMQ 44 CNC	5440661		x		x	x		x	x	o	o	o	o
9999462	MMQ 44 CNC	5440662		x		x		x	x	x	o	o	o	o

o = optional
- = not provided

MMQ Technical Data, metric

Formtester	**MMQ 10** **MMQ 100**	**MMQ 34** **X** pos = 180 mm **T2W**	**MMQ 44 R** **Z** meas=350 mm **X** meas=180 mm **T2W/T7W**	**MMQ 44 R** **Z** meas=500 mm **X** meas=280 mm **T2W/T7W**
Order No.	**5440088** **5440690** **5440691**	**5440667** (Z=350 mm) **5440668** (Z=500 mm)	**5440633** man. C/T **5440649** autom. C/T **5440650** autom. C/T	**5440645** man. C/T **5440661** autom. C/T **5440662** autom. C/T
Roundness measuring device, C-axis				
Roundness deviation (µm+µm/mm meas. height)**	0.05 + 0.0006	0,02 + 0.0005	0.02 + 0.0005	0.02 + 0.0005
Roundness deviation (µm+µm/mm meas. height)*	0.025 + 0.0003	0,01 + 0.00025	0.01 + 0.00025	0.01 + 0.00025
Axial run-out deviation (µm+µm/mm meas. radius)**	0.04 + 0.0006	0,04 + 0.0002	0.04 + 0.0002	0.04 + 0.0002
Axial run-out deviation (µm+µm/mm meas. radius)*	0.020 + 0.0003	0,02 + 0.0001	0.02 + 0.0001	0.02 + 0.0001
Centering and tilting table	manual	manual	man./autom.	man./autom.
Table diameter (mm)	160	220	220/285/285	220/285/285
Table load capacity, centric (N)	200	600	600	600
Speed (rpm) 50 Hz/60 Hz	5/6	1.66 - 5 - 10	1.66 - 5 - 10	1.66 - 5 - 10
Vertical unit, Z-axis				
Positioning path (mm)	300			
Manual or motor-driven positioning	manual			
Motor-driven measuring path (mm)	-	350/500	350	500
Straightness deviation/100 mm meas. path (µm)**	-	0.25	0.15	0.15
Straightness deviation/total meas. path (µm)**	-	0.7/0.8	0.3	0.4
Parallelism deviation Z/C-axis in tracing direction (µm)	-	0.5/0.8	0.5	0.8
Measuring speed (mm/s)	-	0.5 - 1 - 5	0.5 - 1 - 5	0.5 - 1 - 5
Positioning speed (mm/s)	-	5 - 10 - 30	5 - 10 - 30	5 - 10 - 30
Accuracy of individual positioning (µm)		-	-/-/7 (5440650)	-/-/7 (5440662)
Horizontal unit, X-axis				
Positioning path (mm)	180	180		
Manual or motor-driven positioning	manual	motor-driven	motor-driven	motor-driven
Motor-driven measuring path (mm)	-	-	180	280
Straightness deviation/100 mm meas. path (µm)**	-	-	0.8	1.0
Straightness deviation/middle 100 mm of meas. path (µm)**	-	-	0.4	0.5
Straightness deviation/total meas. path (µm)**	-	-	0.8	1.5
Perpendicularity X/C-axis (µm)	-	-	1	2
Measuring speed (mm/s)	-	-	0.5 - 1 - 5	0.5 - 1 - 5
Positioning speed (mm/s)	-	5 - 10 - 30	5 - 10 - 30	5 - 10 - 30
Accuracy of individual positioning (µm)		-	-/-/7 (5440650)	-/-/7 (5440662)
Instrument volume				
Distance C/Z - max. interference radius (mm	190	220	220	320
Max. external test diameter (mm)	250 (375)	-45 to 135	-45 to 135	-45 to 235
Max. external meas. height with T2W (mm)	300	455 (685)	315 (535)	455 (685)
Max. external meas. height with T7W (mm)	-	-	350 (470)	500 (620)
Dimensions/connection data				
Height x width x depth (mm)	545 x 470 x 300	904 x 600 x 420	754 x 600 x 420	904 x 700 x 420
Weight (kg)	28	200	200	210
Power supply	230/115 V+6%-10% 50/60 Hz -- 60 VA	115-230 V+6%-10% 50/60 Hz -- 60 VA	115-230 V+6%-10% 50/60 Hz -- 60 VA	115-230 V+6%-10% 50/60 Hz -- 60 VA

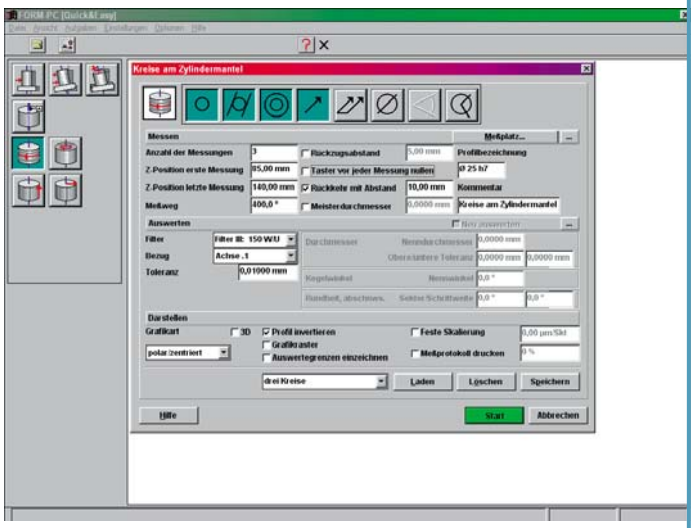
Subject to technical changes.

** All values to DIN ISO 1101 at 20 °C ± 1 °C in oscillation-neutral environment, filter 15 upr LSC or 2.5 mm LSS, 5 rpm or 5 mm/sec. and standard probe arm with ball dia. 3 mm.

* Values as maximum deviation from reference circle LSC, filter 15 upr.
Tested on standard, taking into account compensation algorithms.

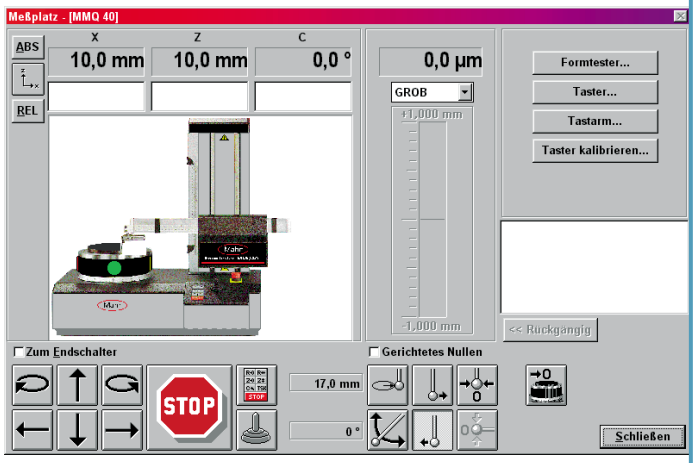
MarForm. FORM-PC Evaluation Software

The measurement, control and evaluation system for MarForm MMQ



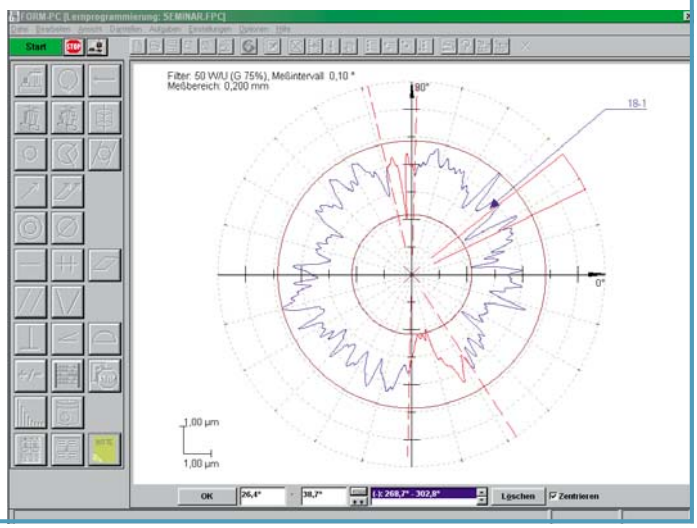
Description

The **FORM-PC** gives you total control over your form measuring station. It responds to a click of the mouse. The graphical user interface gives you a constant overview whether you are performing positioning, alignment, measurement or documentation tasks.
This means that you can not only measure the quality of your products in compliance with standards, but also depict it in a clear and informative manner. Naturally, the measuring records can be stored electronically, documented in paperless form and sent electronically, e.g. by e-mail. The versatile Windows® PC peripheral equipment with its high-resolution printers also enables perfect documentation of your measuring results in color or black and white.



Features

- The familiar Windows® user interface means that users get to grips with the new system very quickly
- Clear windows structure
- Easy operation using the mouse
- Many of the functions can be selected directly via informative icons
- Profile display during measurement, i.e. direct visual evaluation of profile during the measurement process
- Evaluation compliant with DIN ISO 1101
- For individual and series measurements
- Rapid results with Quick&Easy
- Teach-in programming for measurement and evaluation processes (no programming knowledge required)
- User-friendly measuring program administration



EasyForm Touchscreen Software

If you are using a form measuring instrument near the production line, you don't want to have the hassle of a keyboard or mouse.

Taking measurements is child's play with our **touchscreen operation**. All the necessary functions are literally at your fingertips. The number of steps required to produce a record is kept to a minimum, enabling you to reduce your personnel costs and the associated operating costs. You can perform a roundness measurement in as little as two simple steps. What's more, the software guides you through any settings you need to make.

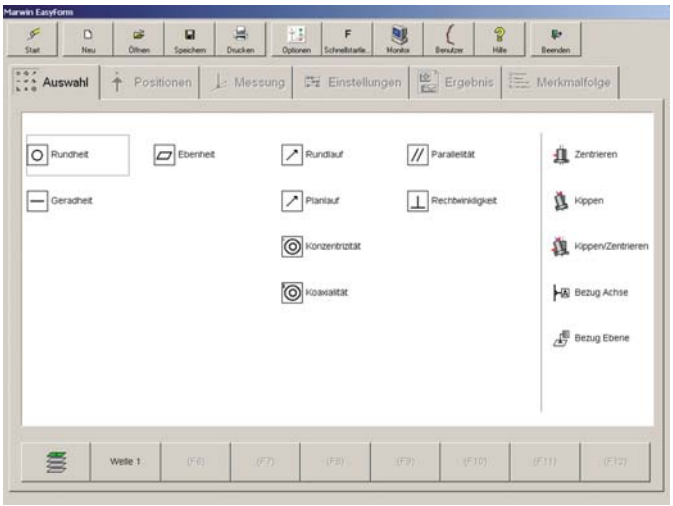
The **EasyForm software** records every step of your measurements. No matter whether you want to repeat the most recent measurements or decide to combine several measurements and evaluations on an item into a multifeature, **EasyForm teach-in mode** will show you how to perform the relevant steps.

You can save your measuring tasks using one of the programmable function keys.

EasyForm is based on highly optimized **MarWin** measurement and evaluation routines and can also be combined with other **MarWin** modules. It runs on Windows® operating systems, includes functions for user administration, network support and electronic storage of records, and can be expanded for future options.

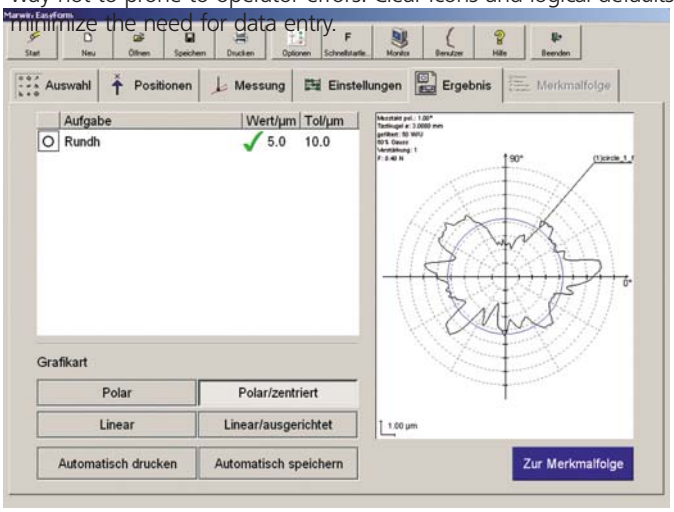
The easiest way of operating a Formtester.

- Intuitive user interface for immediate measurements
- Interactive, automatic program creation
- 3D representation of cylindricity, flatness and total run-out - in color or also with grid lines and an interactive graphic preview
- Immediate display of measuring results on screen
- Concise measuring records on screen, as a file (also in the network) or on paper (any Windows printer)
- Operating system: Windows® 2000 or Windows® XP

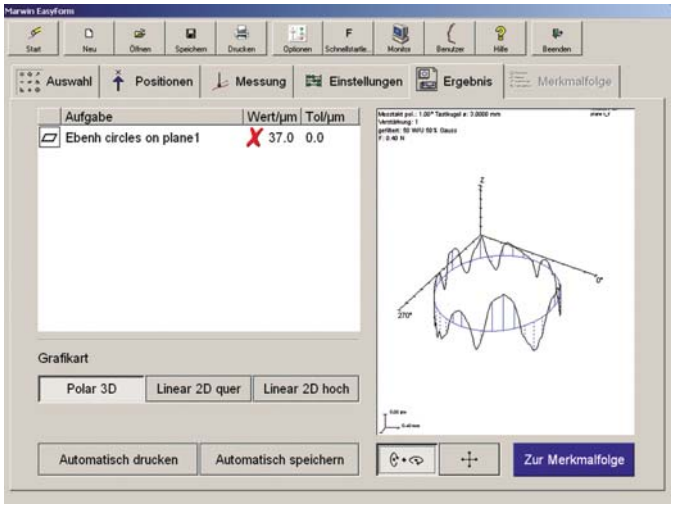


EasyForm Touchscreen Software

In order to be able to identify production errors immediately and eliminate them as quickly as possible, metrology is more important than ever for testing form and positional deviations. It helps you to minimize time-consuming and costly reworking and rejection rates. But these measurements must not put undue stress on your workforce. It must be possible to perform them quickly, easily and in a way not to prone to operator errors. Clear icons and logical defaults minimize the need for data entry.

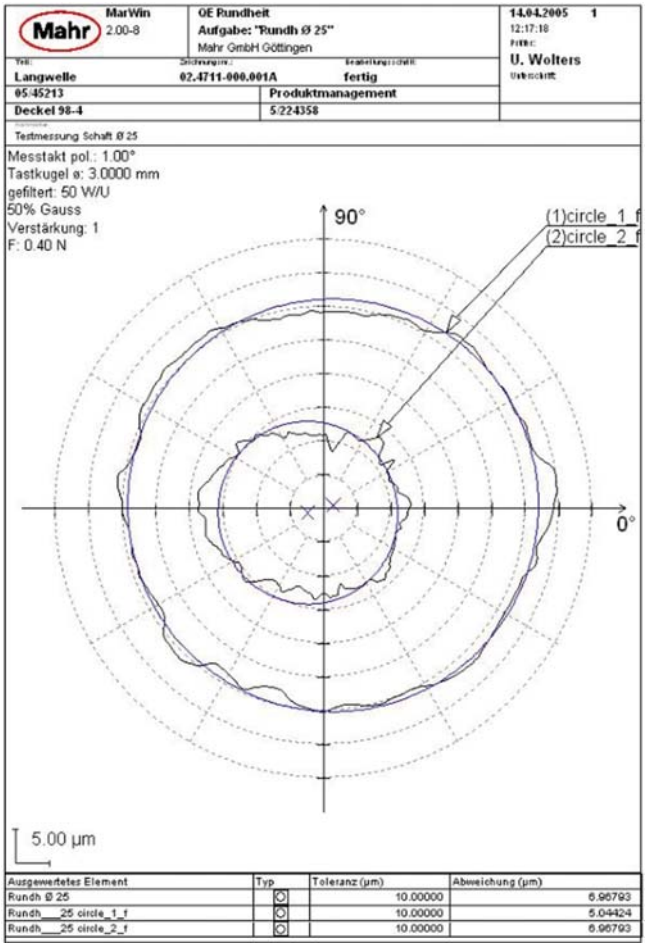


Workpieces are aligned using a computer. The measuring position is automatically recorded by the software. Detailed 3D graphics make your measuring results more informative. You can also interactively rotate the graphic as required for optimum presentation of the measuring result.

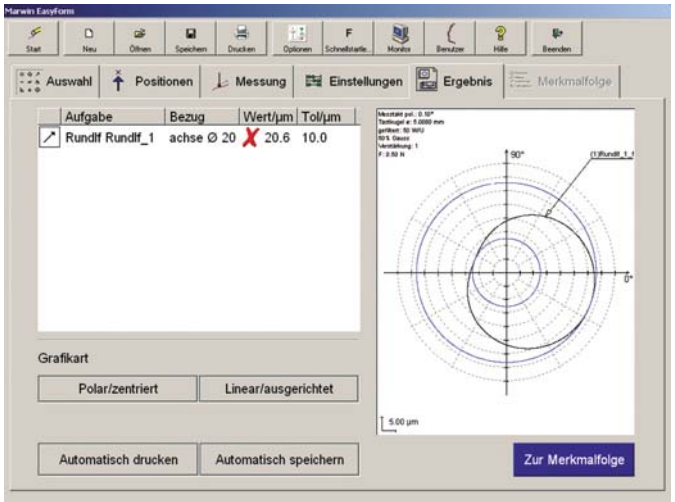


The touchscreen's 32 function keys can be labeled with images or drawings of your workpieces and the relevant measuring programs can be assigned to them. This means that only one touch is required to carry out the measurement in question. It is also possible to create a measuring run without any programming knowledge.
Furthermore, user administration protects the closed system against unintentional changes.

EasyForm Touchscreen Software



You can not only measure the quality of your products in compliance with standards, but also depict it in a clear and informative manner. Naturally, the measuring records can be stored electronically, documented in paperless form and sent electronically, e.g. by e-mail. The versatile Windows® PC peripheral equipment with its high-resolution printers also enables perfect documentation of your measuring results in color or black and white.



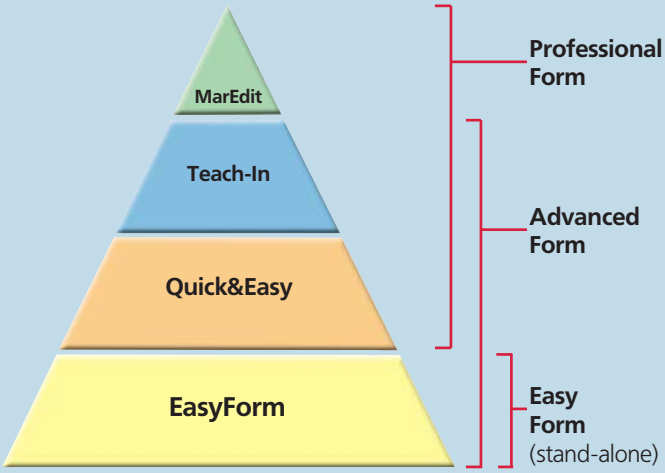
MarWin. Software Modules for MarForm

Advanced Form gives you total control over your form measuring station.
You can perform positioning, alignment, measurement or documentation tasks with a click of the mouse - and the graphical user interface gives you a constant overview.

As with other Windows® applications, functions can be selected from menu bars with pull-down menus using the mouse.
Many functions (e.g. printing results, loading measuring programs or changing a program step) can be activated simply by clicking the appropriate icons.

With **Advanced Form** you always have complete control over the form measuring station. For example, you can track the profile during measurement and intervene if necessary.
Operation can be adapted to suit individual requirements, regardless of whether you want to perform a quick individual measurement, conduct a program run on a series part or convert a complex measuring task into a measuring program. Advanced Form provides the ideal operating strategy whatever the task.

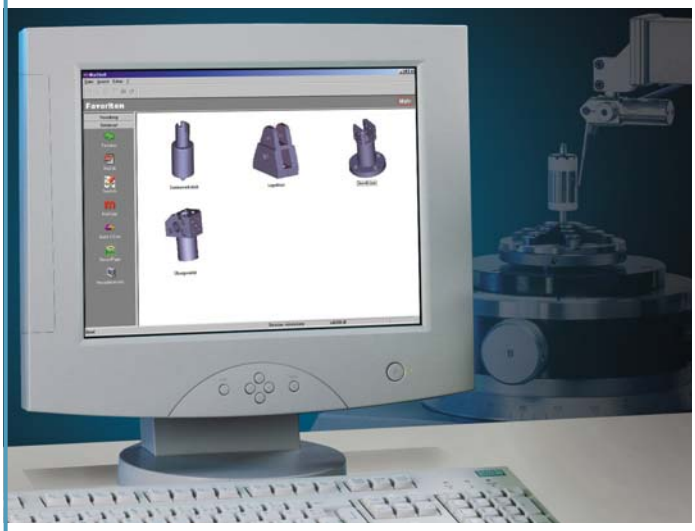
Given that tasks can vary a great deal, no operating strategy is exactly right for every application. Consequently, **Advanced Form** provides several different operating strategies:

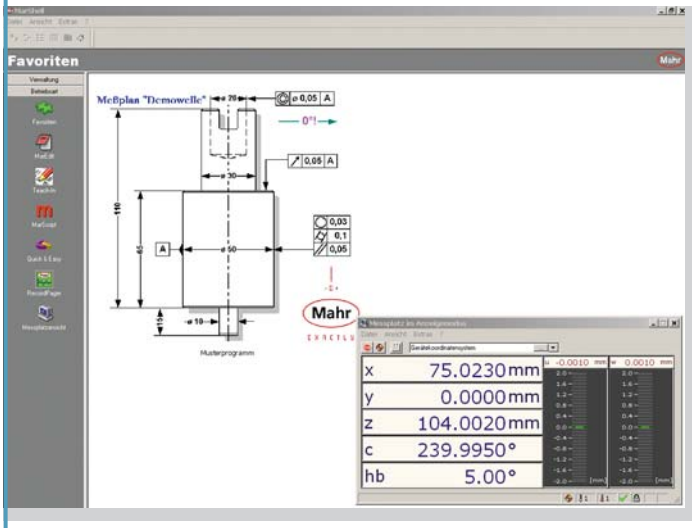


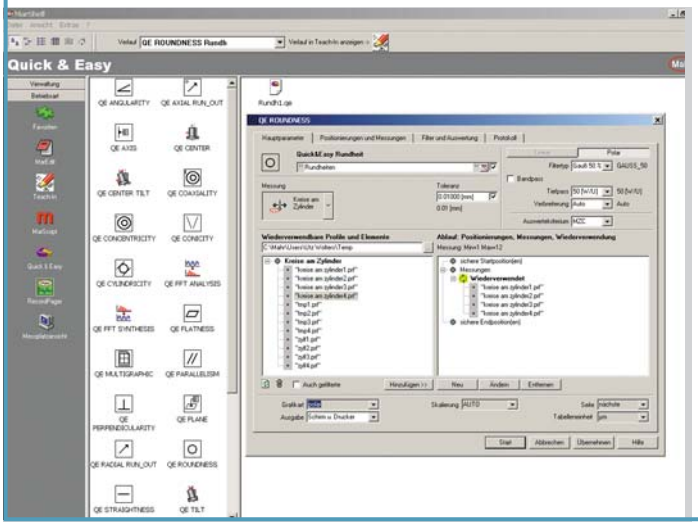
- **Measuring run preferences**
  for measurement with an existing measuring program
- **Quick&Easy**
  for rapid measurement, obtaining a measuring result quickly with the minimum of effort
- **Teach-in programming**
  to create, modify and run a measuring program with a large number of options
- **MarEdit (optional)**
  the operating level for applications engineers and trained specialists, to solve the most challenging and complex of tasks.

MarWin. Software Modules for MarForm

The new software platform for form and more..







Advanced Form provides a clear overview of all the required measuring and evaluation parameters. Many of these parameters have default settings which simply have to be confirmed for the majority of measuring tasks. It is, of course, also possible to adapt individual parameters to the relevant task.

Advanced Form has a powerful **teach-in programming** function to create measuring programs for workpieces to be measured repeatedly. It can also be used for measuring runs with special positionings, measurements, evaluations and forms of presentation.

With teach-in programming, as soon as you click the mouse on an icon - e.g. for a run-out measurement and evaluation - a window opens where you can describe the feature in more detail if necessary (e.g. radial or axial run-out, datum, brief designation, tolerance etc.). The number of measurements and their type (original measurement or new evaluation of profiles already measured) are also specified in this window. Separate windows can be opened to change measuring, evaluation and display parameters but in many cases this is not necessary because logical defaults that apply to a large number of measuring tasks have already been entered. If different settings are required for specific measuring tasks, the clear way the window is divided means that you can quickly find the correct location and optimize the settings in no time at all.

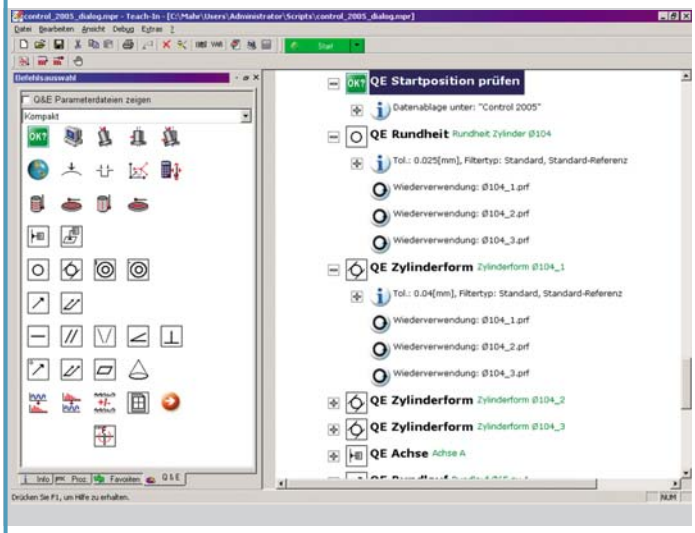
The layout of a measuring record, for example, can be modified right down to the finest detail. The color of the profile, reference and borders can be selected individually, and the scaling (in µm or µin per scale division), type of graph (polar or linear, centered or uncentered) and additional display parameters can be set in any combination you choose.

Measuring programs for series parts to be measured repeatedly can be saved and called up at any time to start a measuring run (see above).

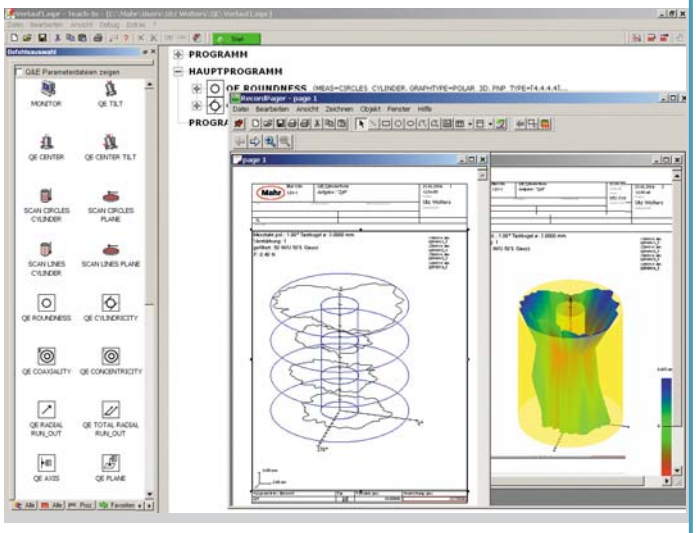
Informative profile graphs - if required with several profiles in a single graph, displayed in different colors and in different ways - are then immediately available on the large color screen. If you are looking for exact numerical values, you can opt to display the results in a table.

With the new **Advanced Form**, standard-compliant measurements and evaluations are displayed in a way which is both clear and representative. Even interactive layout options with a 3D preview in real time are possible.

MarForm. MarWin for MarForm

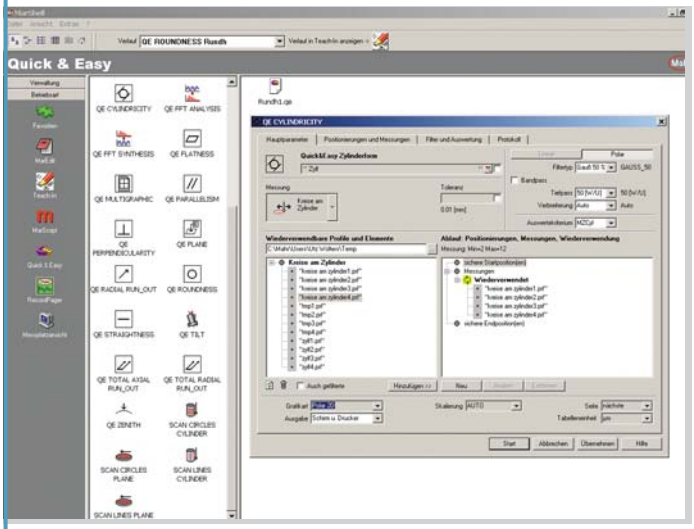


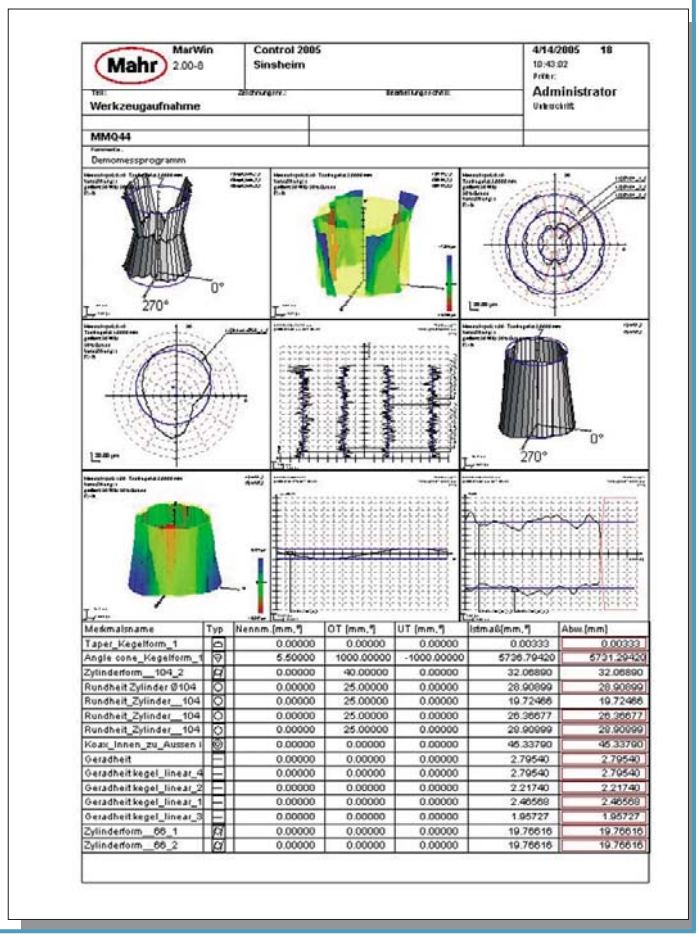
If you need to carry out form measurements, rather than creating long measuring programs you may prefer to gain direct access to a comprehensive and informative measuring program. In order to be able to do so, it is particularly important for the software to be transparent.



Quick&Easy wizards guide users through the various entries and simplify processes.

It goes without saying that there is also an informative graphic preview. And on completion of the measurements, of course, you have a comprehensive and informative measuring record.





Medmalsname	Typ	Nennm.[mm,°]	OT[mm,°]	UT[mm,°]	Istmaß[mm,°]	Abw.[mm]
Taper_Kegelform_1		0.00000	0.00000	0.00000	0.00333	0.00333
Angle cone_Kegelform_1		5.50000	1000.00000	-1000.00000	5736.79420	5731.29420
Zylinderform__104_2		0.00000	40.00000	0.00000	32.06890	32.06890
Rundheit Zylinder Ø104		0.00000	25.00000	0.00000	28.90899	28.90899
Rundheit_Zylinder__104		0.00000	25.00000	0.00000	19.72466	19.72466
Rundheit_Zylinder__104		0.00000	25.00000	0.00000	26.36677	26.36677
Rundheit_Zylinder__104		0.00000	25.00000	0.00000	29.90999	29.90999
Koax_Innen_zu_Aussen_1		0.00000	0.00000	0.00000	45.33790	45.33790
Geradheit		0.00000	0.00000	0.00000	2.79540	2.79540
Geradheitkegel_linear_4		0.00000	0.00000	0.00000	2.79540	2.79540
Geradheitkegel_linear_2		0.00000	0.00000	0.00000	2.21740	2.21740
Geradheitkegel_linear_1		0.00000	0.00000	0.00000	2.46568	2.46568
Geradheitkegel_linear_3		0.00000	0.00000	0.00000	1.95727	1.95727
Zylinderform__66_1		0.00000	0.00000	0.00000	19.76616	19.76616
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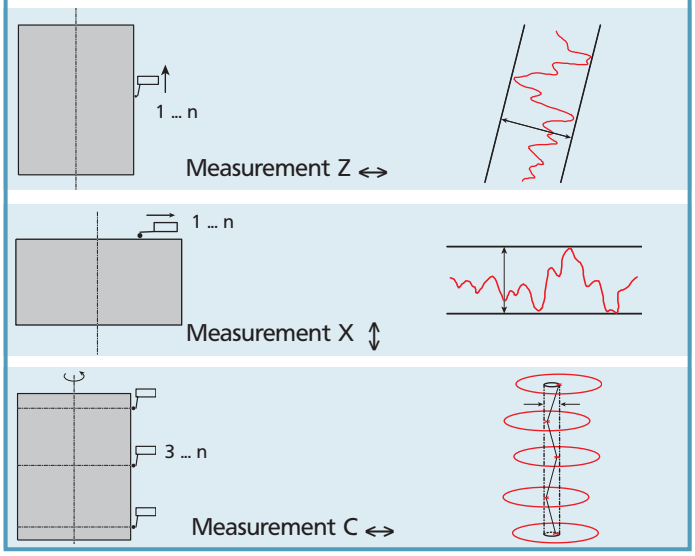
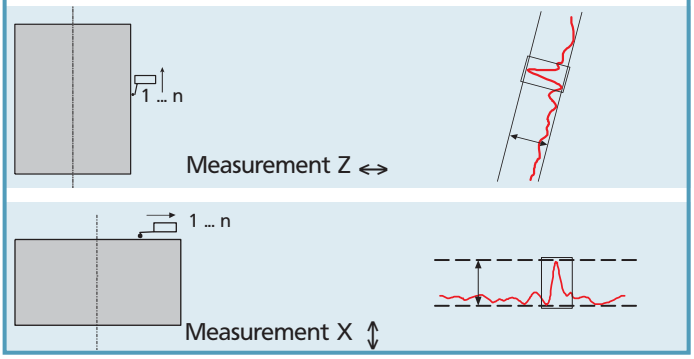
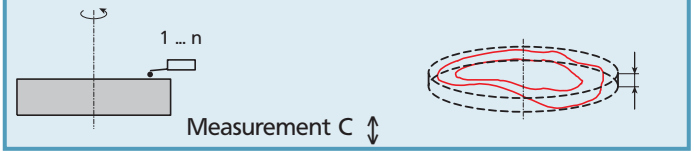
Straightness



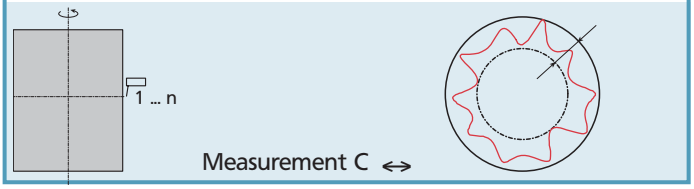
Straightness in sections



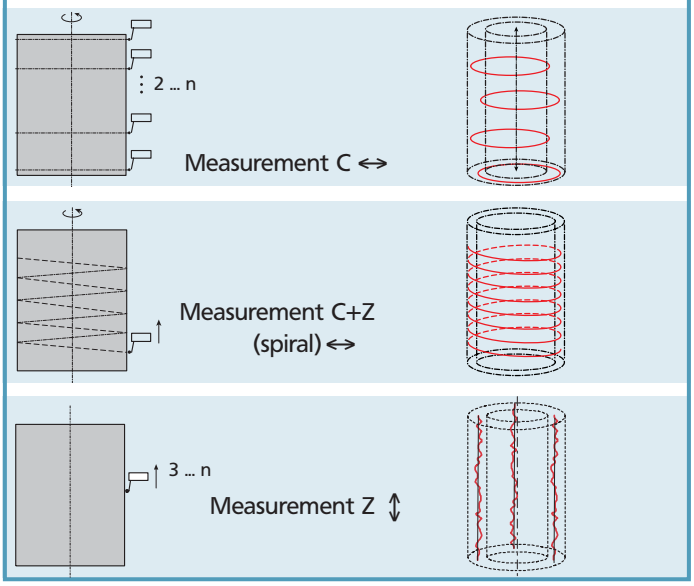
Flatness



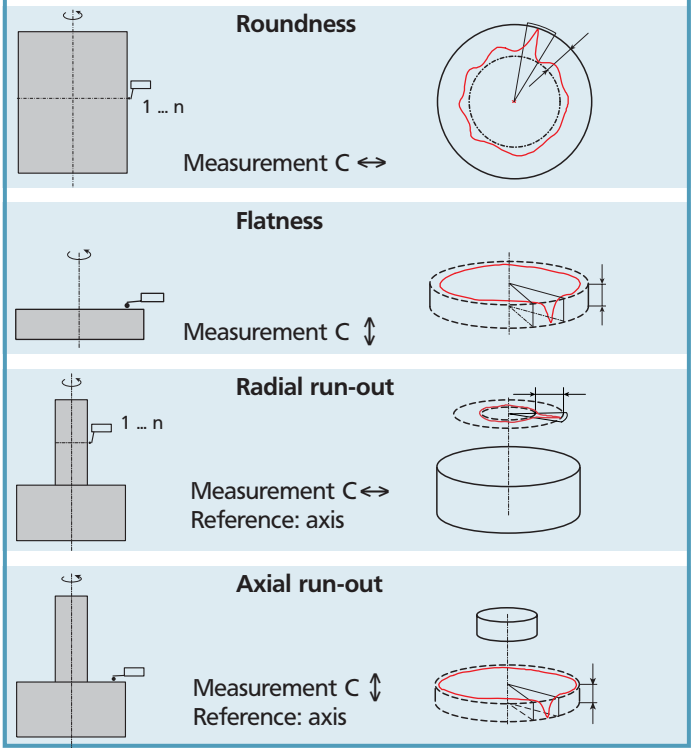
Roundness



Cylindricity



Angle sector



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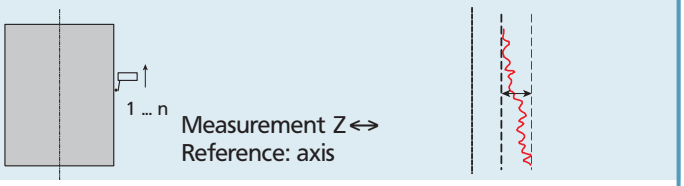
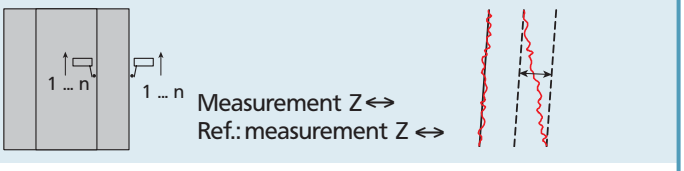
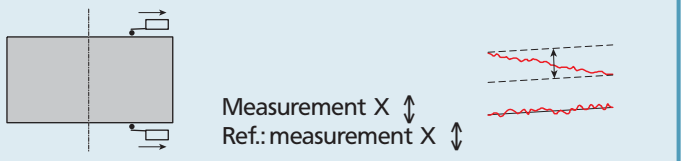
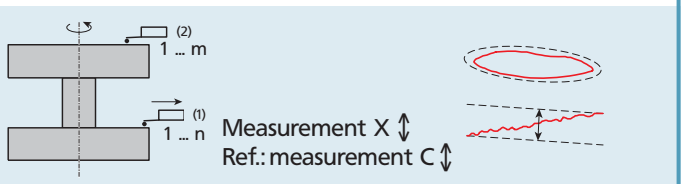
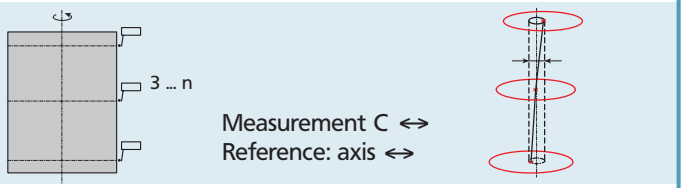
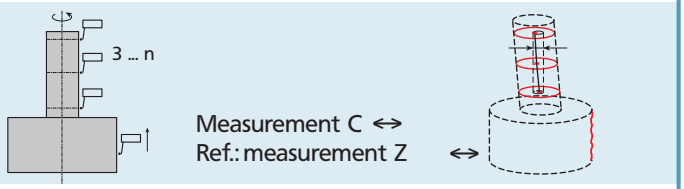


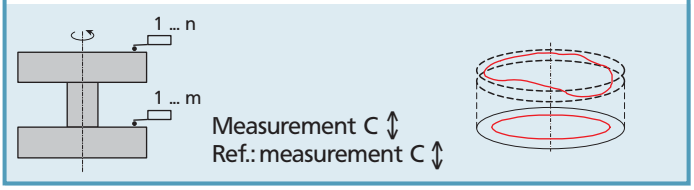




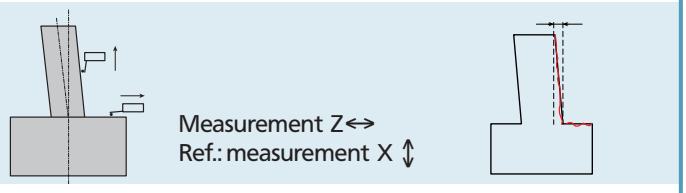


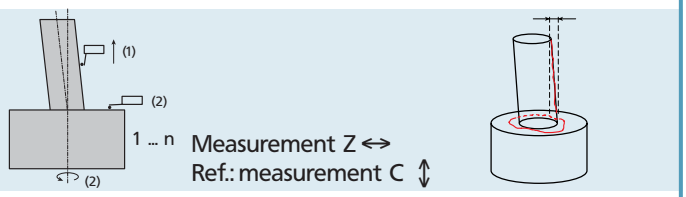


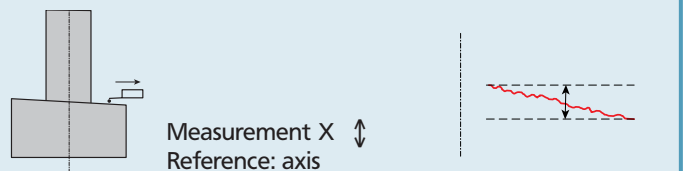


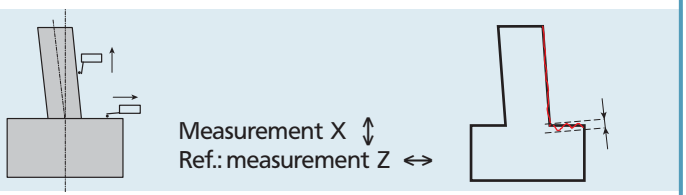


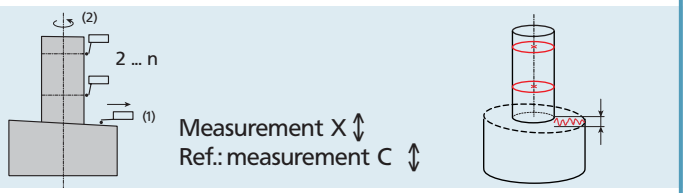
⊥ Perpendicularity

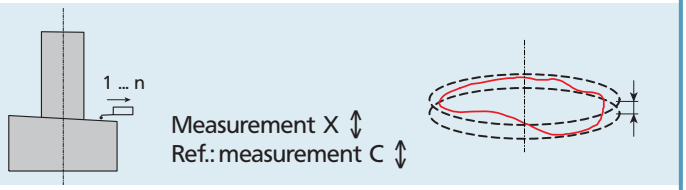


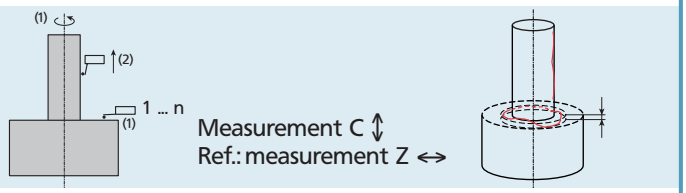


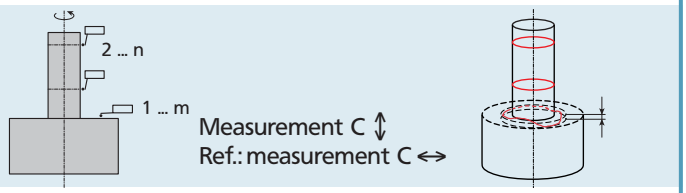


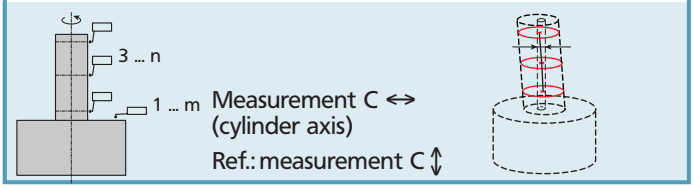




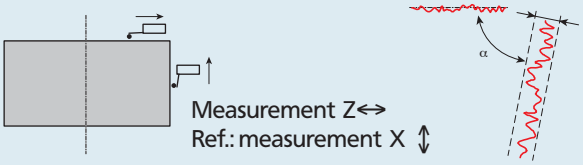


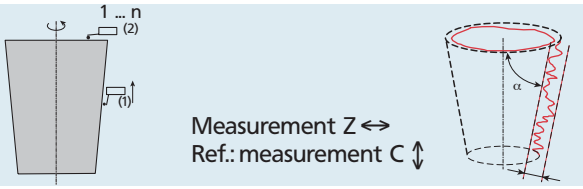


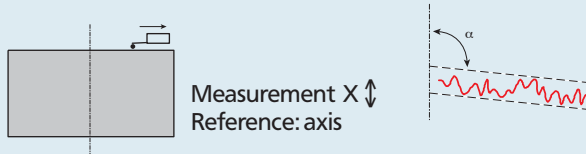


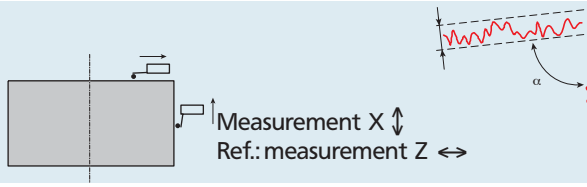


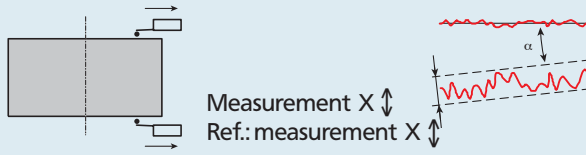
Angularity

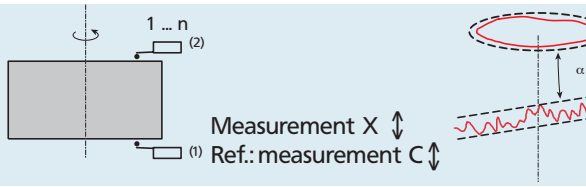


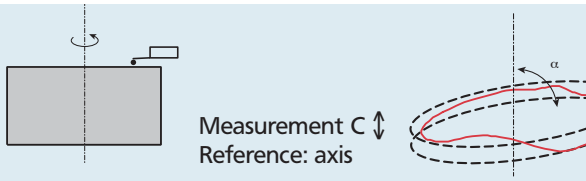


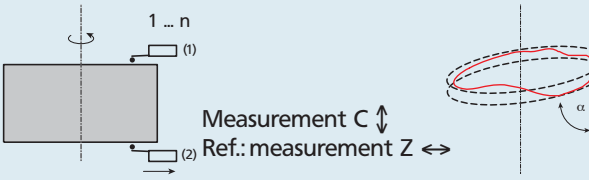


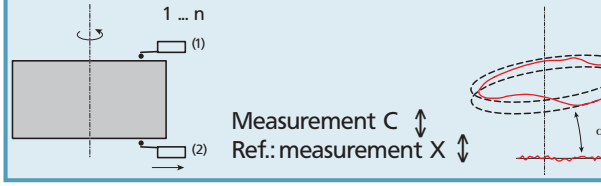




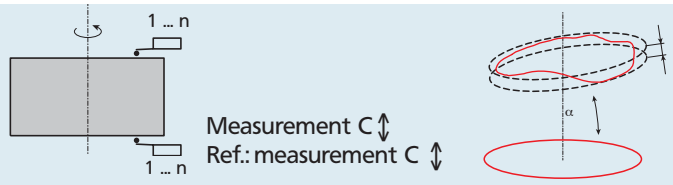


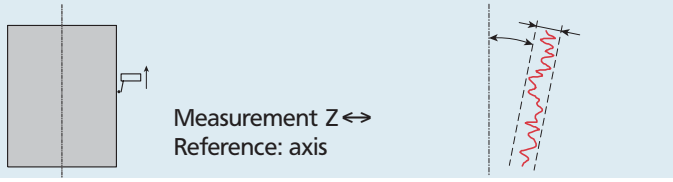


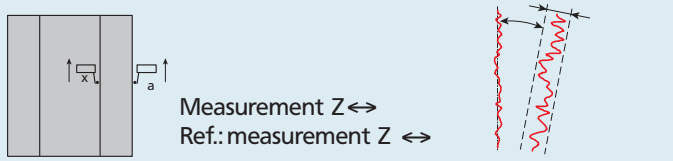




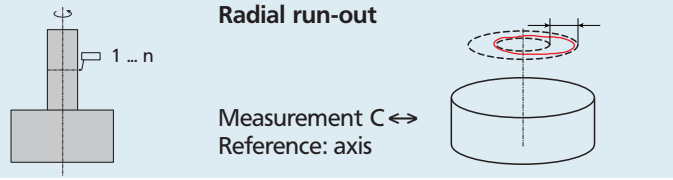
Angularity

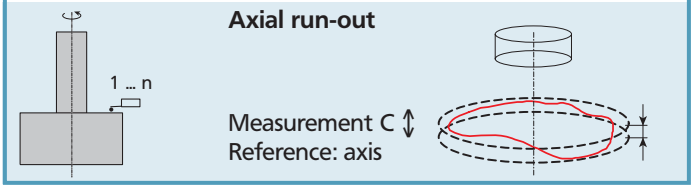




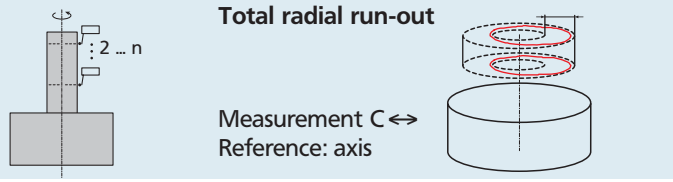


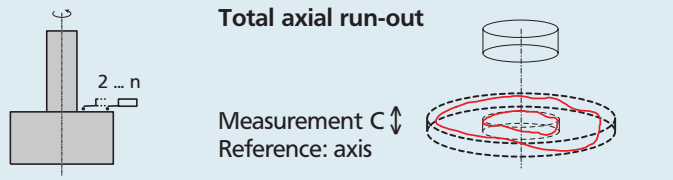
Run-out

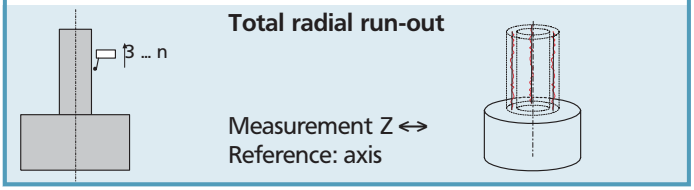




Total run-out

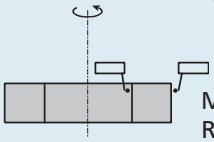




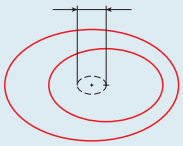


Concentricity and coaxiality

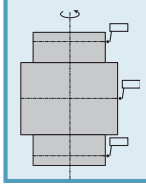
Concentricity



Measurement C ↔
Ref.: measurement C ↔



Coaxiality



Measurement C ↔
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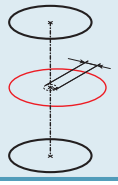
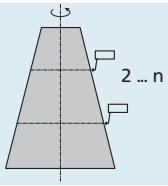
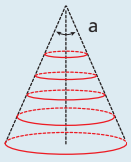
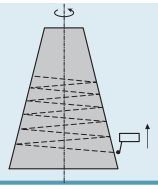


Cone form

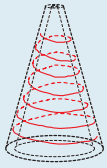


Measurement C ↔

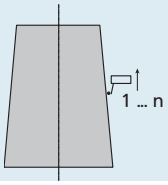




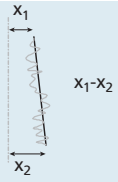
Measurement C+Z ↔
(spiral)

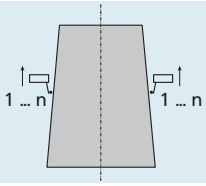


Conicity

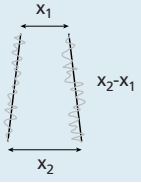


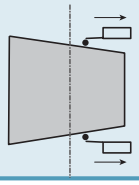
Measurement Z ↔
Reference: axis



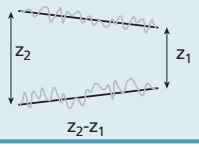


Measurement Z↔
Ref.: measurement Z↔





Measurement X ↕
Ref.: measurement X ↕

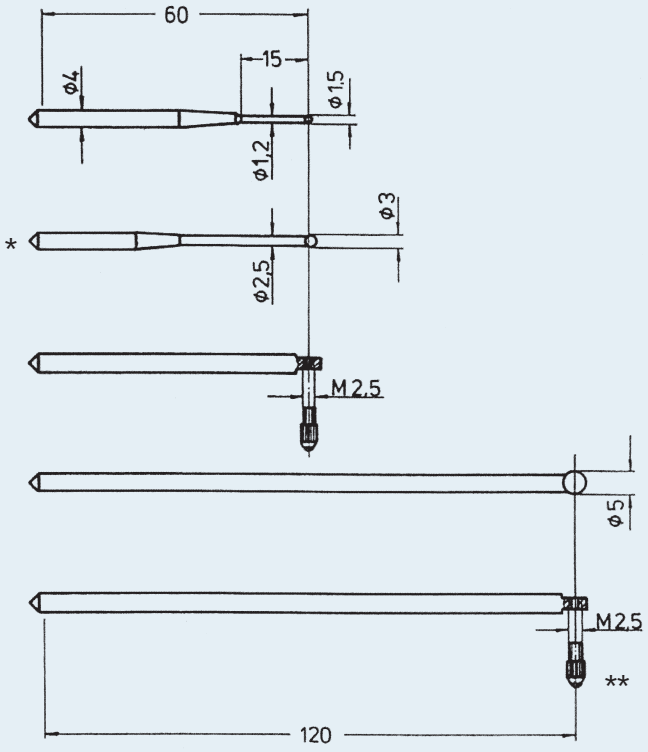


Note: The evaluation scope of form measuring instruments also depends on the design of the X-module. The maximum scope is provided in teach-in programming mode. Certain measuring evaluations are only available in Advanced Form. Wherever you see "Measurement X", an instrument with a motor-driven X measuring axis is used.

Accessories for MarForm

The optimum solution using accessories

Probe Arms for T2W Probe



* Supplied with the T2W probe.
** Comes with steel stylus 6 mm (0.236 in) long.

T2W Probe

The inductive **T2W probe** is a universal device. The fact that the probe arm can be moved in a range of 180° and that there are a variety of clamping options for the probe means that measurements can also be performed in areas that are difficult to access. You can combine easily exchangeable probe arms with a variety of styli in order to adapt the probe to the relevant measuring tasks or workpieces.

T2W probe with probe arm range of 180°

- Measuring range ± 1,000 µm (± 0.0394 in)
- Measuring force adjustable from 0.05 to 0.5 N
- Measuring direction switchable
- Exchangeable probe arm
- Free travel limitation can be adjusted in contacting direction
- Clamping shaft dia. 8 mm (0.315 in)

Order No. 5400015 for MMQ 34, MMQ 44
Order No. 5400215 for MMQ 100

Probe arms for T2W probe

Set of probe arms for T2W
Consisting of: One each of probe arms 5400019, 5400021, 5400022 and 5400023 **Order No. 5440100**

Probe arm 60 mm (2.4 in), Ball dia. 1.5 mm (0.06 in), steel **Order No. 5400019**

Probe arm 60 mm (2.4 in), Ball dia. 3 mm (0.12 in), steel **Order No. 5400020**

Probe arm 60 mm (2.4 in), Stylus M 2.5, steel **Order No. 5400021**

Probe arm 120 mm (4.7 in), Ball dia. 5 mm (0.20 in), steel **Order No. 5400022**

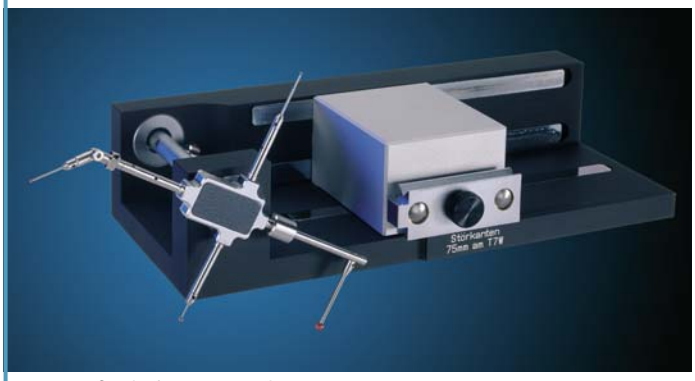
Probe arm 120 mm (4.7 in), Stylus M 2.5, steel **Order No. 5400023**

Probe arm 60 mm (2.4 in), Ball dia. 0.8 mm (0.03 in), steel **Order No. 5400052**

Probe arm 120 mm (4.7 in), Ball dia. 1.5 mm (0.06 in), asymmetrical, steel **Order No. 5400024**

Accessories for MarForm

The optimum solution using accessories



Device for balancing probe arms

Motor-driven T7W Probe

The **T7W probe** is fitted with a motor-driven rotational axis. This makes it possible to move the probe arm gradually to the required contacting position. As a result, measurements can be performed on cylindrical surfaces and end faces. As a zero position probe, the **T7W** can also switch automatically between internal and external measurements or between end face measurements from top to bottom without operator intervention. Fully automatic measurement runs on complex workpieces can be carried out without operator intervention. The probe arms of the **T7W** are exchangeable. Its motor-driven rotational axis enables the construction of "multi-point probe arms" - i.e. probe arms with a variety of contacting elements - making it possible to switch between different stylus ball geometries within a single measurement run.

Motor-driven T7W probe with probe arm range of 360° for MMQ 44, MMQ 44 CNC and MFU 100

- Total range of 2,000 µm (0.0788 in)
- Zero probe working range ± 500 µm (± 0.0197 in)
- Measuring force adjustable from 0.01 to 0.2 N
- Two-way measuring direction
- Contacting angle freely selectable in 1° steps
- 360° adjustable (motor-driven)
- Probe arms easily exchangeable (magnetic mount)
- Flexible multi-point probe possible
- Mechanical and electrical overload protection

Order No. 5400200

Accessories for Motor-driven T7W Probe

Probe arm module for T7W **Order No. 5400221**

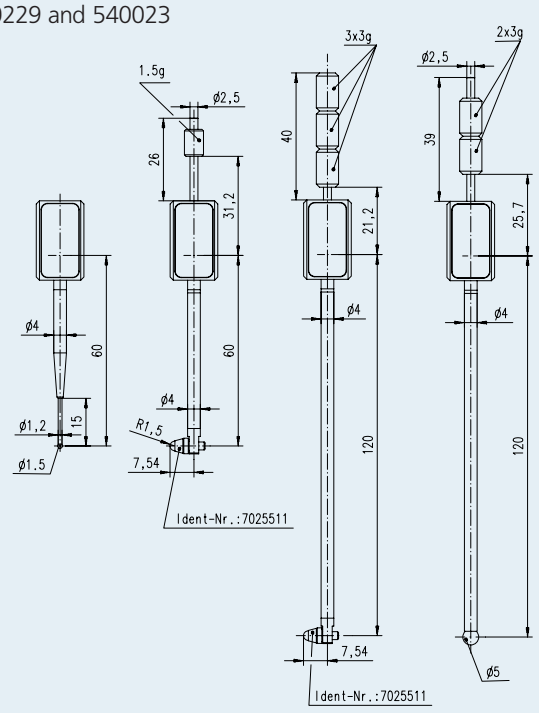
In storage case, consisting of

- Device for balancing probe arms
- Stylus arm dia. 0.5 mm (0.02 in), L=20 mm (0.79 in), M2 a
- Stylus arm dia. 1.0 mm (0.04 in), L=20 mm (0.79 in), M2 a
- Stylus arm dia. 1.0 mm (0.04 in), L=15 mm (0.59 in), M2 a
- Stylus arm dia. 1.5 mm (0.06 in), L=10 mm (0.39 in), M2 a
- Stylus arm dia. 3.0 mm (0.12 in), L=10 mm (0.39 in), M2 a
- Stylus arm dia. 3.0 mm (0.12 in), L=25 mm (0.98 in), M2 a
- Weight 1.5 g (0.053 oz)
- Weight 1.0 g (0.035 oz)
- Weight 2.0 g (0.071 oz)
- Weight 3.0 g (0.106 oz)
- Weight 0.5 g (0.018 oz)
- Weight 10.0 g (0.353 oz)
- Weight 5.0 g (0.176 oz)
- Probe arm L=15 mm (0.59 in) 2x M2
- Stylus arm extension 10 mm (0.39 in), M2
- Stylus arm extension 20 mm (0.79 in), M2
- Stylus arm extension 30 mm (1.18 in), M2
- Stylus arm extension 40 mm (1.57 in), M2
- Rotary swivel joint M2
- Hex head screwdriver A/F 1.5
- Hex head screwdriver A/F 0.9
- Rotary part M2, concentric
- Wrench 1.0
- Stylus arm holder M2i transverse
- Stylus arm holder M2i axial
- Stylus M2i transverse
- Mount 2x M2i transverse
- Guide
- Adjuster

MarForm. Probe Arms for T7W Probe

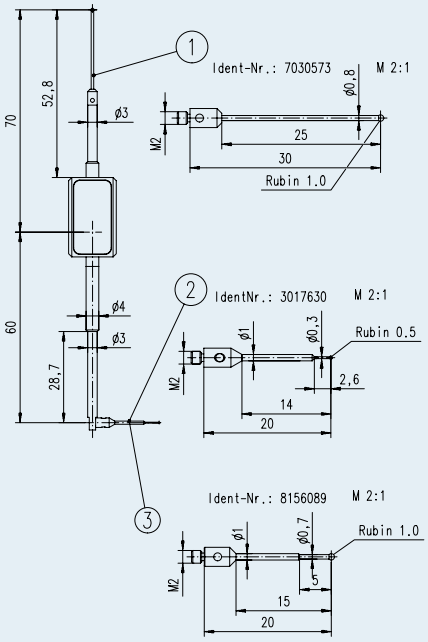
Probe arm set for T7W **Order No. 5400211**

Consisting of one each of probe arms 5400225, 5400226, 5400229 and 540023



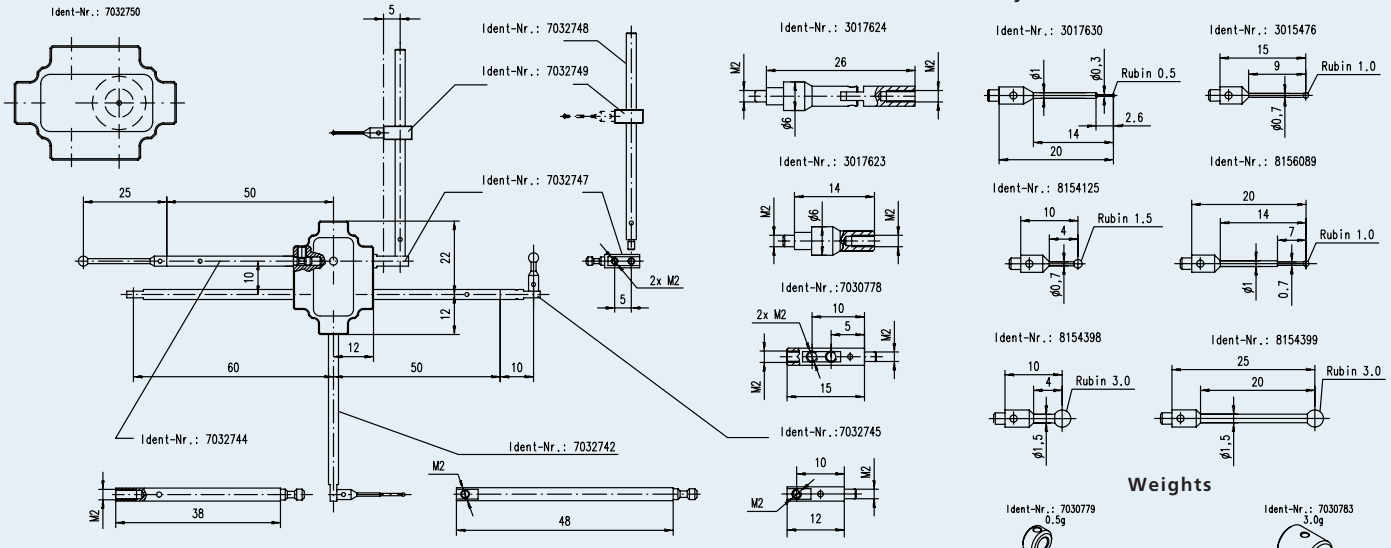
Probe arm set # 2 for T7W **Order No. 5400220**

for measuring smaller workpieces, consisting of a probe arm holder and three exchangeable M2 styli



Probe arm module for T7W **Order No. 5400221**

for universal measurement of various workpieces.



Accessories for MarForm

The optimum solution using accessories

Clamps

Rim chuck with 6 jaws, dia. 70 mm (2.76 in) with mounting flange dia. 124 mm (4.88 in), reversible jaws for external and internal clamping. External clamping range 1 to 73 mm (0.039 to 2.87 in), internal 16 to 62 mm (0.63 to 2.44 in). Total height with flange 42 mm (1.65 in).
Order No. 6710613

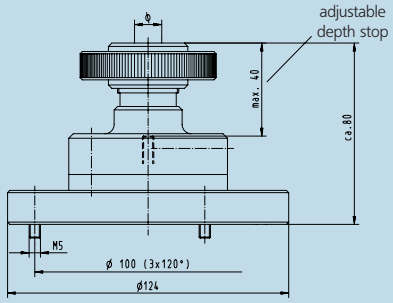
Rim chuck with 6 jaws, dia. 100 mm (3.94 in) with mounting flange dia. 164 mm (6.46 in), reversible jaws for external and internal clamping. External clamping range 1 to 99 mm (0.039 to 3.90 in), internal 29 to 95 mm (1.14 to 3.74 in). Total height with flange 47 mm (1.85 in).
Order No. 6710612

Rim chuck with 8 jaws, dia. 150 mm (5.91 in) with mounting flange dia. 198 mm (7.80 in), separate jaws for external and internal clamping. External clamping range 1 to 152 mm (0.039 to 5.98 in), internal 24 to 155 mm (0.95 to 6.10 in). Total height with flange 52 mm (2.05 in). Cannot be used with MMQ 10/MMQ 100 Formtester.
Order No. 6710617

Three-jaw chuck, dia. 110 mm (4.33 in) with mounting flange dia. 164 mm (6.46 in), external clamping range 3 to 100 mm (0.12 to 3.94 in), internal 27 to 100 mm (1.06 to 3.94 in). Total height with flange 73 mm (2.87 in).
Order No. 6710629

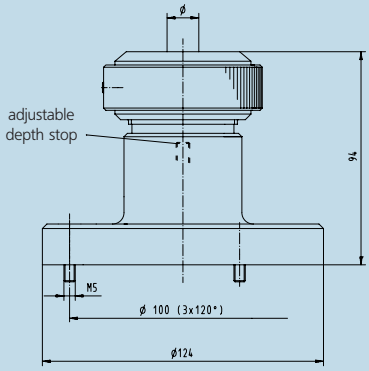
Three-jaw chuck, dia. 80 mm (3.15 in) with mounting flange dia. 124 mm (4.88 in), external clamping range up to 78 mm (3.07 in), internal 2 to 80 mm (0.080 to 3.15 in). Total height with flange 65.5 mm (2.58 in).
Order No. 9032206

For collet chucks: Type 407 E



Quick-clamping device (collet chuck)
Dia. 1 to 12 mm (0.039 to 0.47 in) with mounting flange dia. 124 mm (4.88 in), for external clamping. Supplied with collet chucks of dia. 1 mm (0.039 in) to 8 mm (0.31 in) in 0.5 mm (0.02 in) steps. Total height 80 mm (3.15 in). Further collet chuck devices are available on request.
Order No. 9010485

For collet chucks: Type 444 E



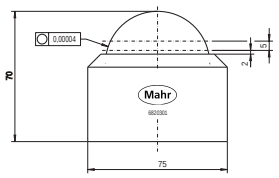
Quick-clamping device (collet chuck)
Dia. 2 to 25 mm (0.079 to 0.98 in) with mounting flange dia. 124 mm (4.88 in), for external clamping. Supplied with stand but no collet chucks. Total height 94 mm (3.70 in). Further collet chuck devices are available on request.
Order No. 9014431

Clamping disks/clamping jaws
Clamping disk set. Adjustable workpiece stop for pre-centering and clamping in series measurements. For clamping diameter 36 to 232 mm (1.42 to 9.13 in) depending on machine type. Comprises two stop disks with slot and an eccentric clamping disk.
Order No. 6710628

Clamping jaws (2). With M5 fastening thread. Clamping height 40 mm (1.57 in).
Order No. 6850808

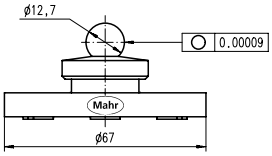
Further workpiece-specific clamps are available on request.

MarForm. Testing and Calibration Standards



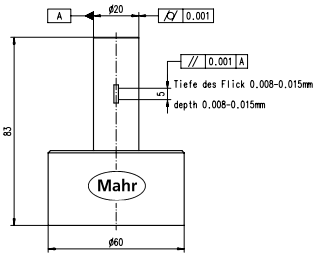
Roundness standard

incl. DKD* calibration certificate	**Order No. 6820302**
incl. Mahr calibration certificate	**Order No. 6820301**
incl. PTB** calibration certificate	**Order No. 9014439**



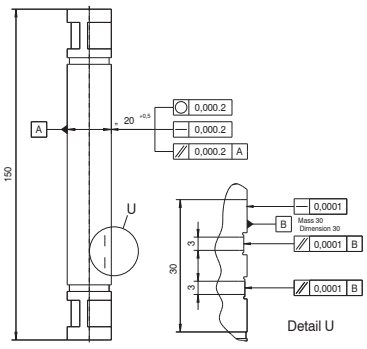
Metal roundness standard

without calibration certificate	**Order No. 5400145**
DKD calibration certificate for ...	**Order No. 9964115**
Mahr calibration certificate for ...	**Order No. 9964307**



Magnification standard

without calibration certificate	**Order No. 5400147**
DKD calibration certificate for ...	**Order No. 9964148**
Mahr calibration certificate for ...	**Order No. 9964311**



Universal cylinder square

incl. DKD calibration certificate	**Order No. 5400143**
incl. Mahr calibration certificate	**Order No. 5400140**
incl. PTB calibration certificate	**Order No. 9021605**

Roundness Standard

High-precision glass hemisphere
Testing of measuring spindle radial run-out accuracy.
Calibrating the sensitivity of the signal transmission chain.
For testing the radial deviation of the rotational guide. (C-axis)

Diameter	approx. 55 mm (2.165 in)
Roundness deviation	max. 0.04 µm (1.57 µin)
Weight	approx. 1.8 kg (3.968 lb)

Metal Roundness Standard

High-precision calibration ball
Testing of measuring spindle radial run-out accuracy.
Calibrating the sensitivity of the signal transmission chain.
For testing the radial deviation of the rotational guide. (C-axis)

Diameter approx.	13 mm (2.165 in)
Roundness deviation	max. 0.09 µm (3.54 µin)
Weight approx.	0.3 kg (.661 lb)

Magnification Standard for desktop Formtesters

With a magnification standard.
For checking the signal amplification on a cylinder with a flattened surface.

Diameter	20 mm (.787 in)
Length	50 mm (1.969 in)
Flattening approx.	10 µm (393.7 µin)
Cylindricity deviation	max. 1 µm (39.37 µin)
Weight approx.	0.4 kg (.882 lb)

Universal CylinderSquare

High-precision cylinder square
With two magnification standards. For checking the vertical guide.
Two surfaces for calibrating the signal transmission chain and testing the measuring constancy.
Calibrating the sensitivity of the signal transmission chain.
For testing the straightness and parallelism of the axes.

Diameter	20 mm (.787 in)
Length	150 mm (5.906 in)
Flattening approx.	4/12 µm (157.48/472.44 µin)
Roundness deviation (cyl.)	max. 0.2 µm (7.87 µin)
Straightness deviation (cyl.)	max. 0.2 µm (7.87 µin)
Parallelism deviation (cyl.)	max. 0.2 µm (7.87 µin)
Weight approx.	0.4 kg (.882 lb)

* German Calibration Service ** Physikalisch-Technische Bundesanstalt

MarForm. Testing and Calibration Standards

Flatness standard - optical flat

Testing and adjusting the horizontal measuring device.
Testing the axial deviation of the rotational guide.
Testing the straightness of the linear guide.

Diameter	150 mm (5.906 in)
Flatness deviation	0.2 µm (7.87 µin)
Weight approx.	2 kg (4.409 lb)

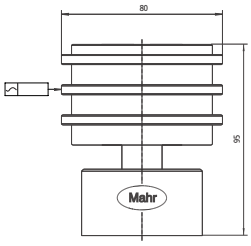
Optical flat

incl. Mahr calibration certificate	**Order No. 6820205**
incl. PTB** calibration certificate	**Order No. 9964113**

Multi-wave Standard

Dynamic testing of the signal amplification.
Calibrating the sensitivity of the signal transmission chain.
Calibrating the vertical and horizontal profile components.
Testing of filters / Fourier analysis.

Diameter	80 mm (3.150 in)
Sinusoidal waves on the outside diameter:	15, 50, 150, 500 upr



Multi-wave standard

without calibration certificate	**Order No. 5400142**
DKD calibration certificate for ...	**Order No. 9964149**
Mahr calibration certificate for ...	**Order No. 9964312**

Straightness Standards - Cylinder Squares

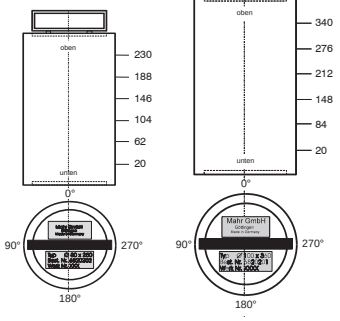
Testing and adjusting the vertical guide relative to the measuring spindle axis. For testing the straightness of the linear guides.
For testing the parallelism.

Type 1: 80 mm cylinder square

Diameter	80 mm (3.150 in)
Length	250 mm (9.843 in)
Cylindricity deviation	max. 1 µm (39.37 µin)
Roundness deviation	< 0.7 µm (27.56 µin)
Weight approx.	11.5 kg (25.353 lb)

Type 2: 100 mm cylinder square

Diameter	100 mm (3.937 in)
Length	360 mm (14.173 in)
Cylindricity deviation	max. 1 µm (39.37 µin)
Roundness deviation	< 0.7 µm (27.56 µin)
Weight approx.	13 kg (28.660 lb)



Cylinder square
Type 1: 80 mm

incl. DKD calibration certificate	**Order No. 6820204**
incl. Mahr calibration certificate	**Order No. 6820202**

Type 2: 100 mm

incl. DKD calibration certificate	**Order No. 6820206**
incl. Mahr calibration certificate	**Order No. 6820201**

Customer Master

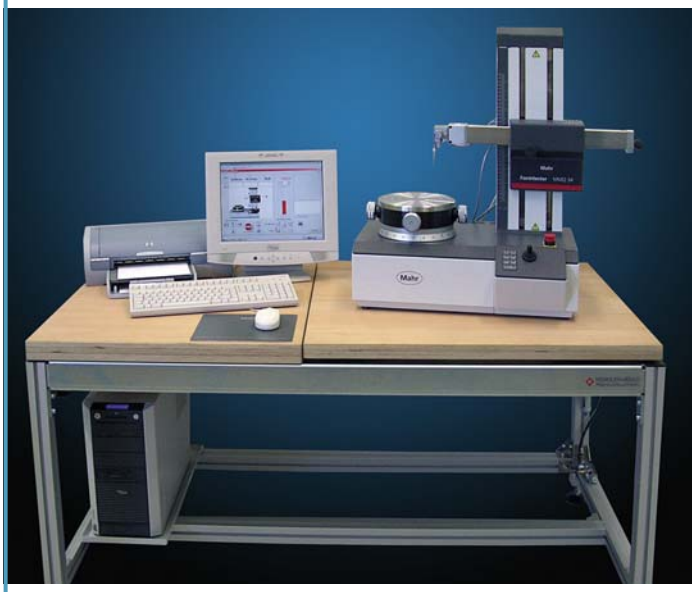
For testing, adjusting and calibrating the measuring device without conversion work, you can use your own test items/workpieces as the master/standard, provided these have been issued with a calibration certificate by the Mahr calibration laboratory.

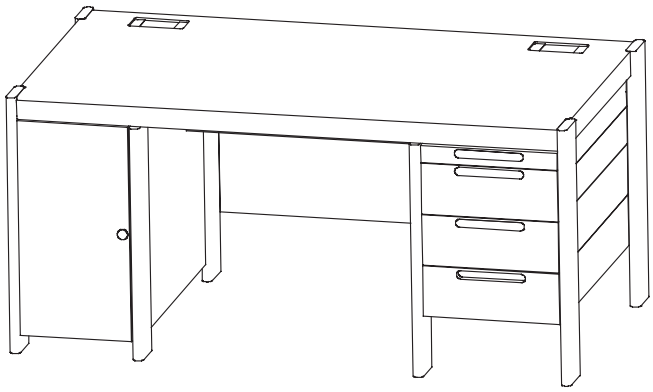
Customer master

DKD calibration certificate for ...	**Order No. 9964313**
Mahr calibration certificate for ...	**Order No. 9964314**

* German Calibration Service ** Physikalisch-Technische Bundesanstalt

Equipment Tables and Other Accessories





Equipment Table for MarForm MMQ

Oscillation-isolated equipment table

Order No. 9041124

Working surface 1,600 mm x 800 mm x 750 mm (63.0 in x 31.5 in x 29.5 in)
Table top divided into two:
700 mm x 750 mm (27.6 in x 29.5 in) fixed
900 mm x 750 mm (35.4 in x 29.5 in) with oscillation isolation for mounting the MMQ
Including left-mounted storage tray for PC
Including 4-socket outlet with circuit breaker
Including oscillation isolators (4) for MMQ
Including leveling feet, requires fixed compressed air connection, consumption approx. 100 l per day

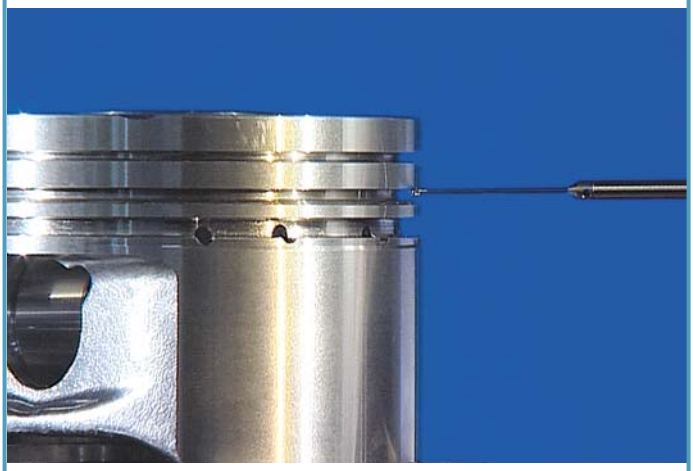
Equipment Table for MarForm MMQ

Equipment table for MMQ

Order No. 6830139

Working surface 1,700 mm x 870 mm x 750 mm (66.9 in x 34.3 in x 29.5 in) (LxWxH)
With continuous worktop
Max. load capacity 350 kg (772 lbs)
PC base unit on left and drawer unit on right

Piston Measurement Application



Piston measurement

With the **FORM-PC**, **MMQ 44** offers a **software option for testing engine pistons**. Because the tolerance bands can be freely defined if required, the Piston software option can also be used for measurements on other workpieces with a convex form. Applications over and above engine pistons include the tracks on the inner and outer rings of cylindrical roller bearings or the longitudinal profile of cylindrical roll bodies.

Swan-Neck Adapter

Measurement in deep bores

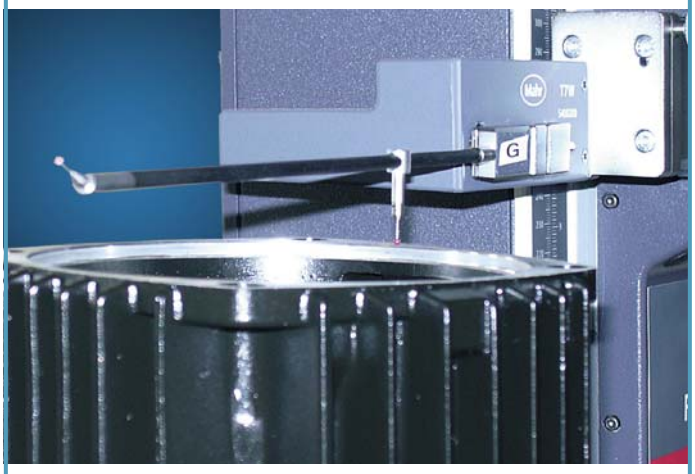
MarForm also provides a solution for measuring in deep bores. Using a "swan-neck adapter", the **T2W** probe is able to connect to the **MMQ 44** and is available for measurements, e.g. in cylindrical bushings over 300 mm (12 in) deep.

Crankshaft Application

Crankshaft measurement

With crankshafts, measurements are taken between the bearing cheek blocks. A swivel mount for the **T2W** probe is used for this so that measurement is in the horizontal position.

Special Probe Arms



Probe arms for special applications

The probe systems used by **Mahr** offer a large number of options for providing simple responses to customer-specific requirements and solving these tasks simply and efficiently.

Tell us about your task and **Mahr** will provide you with the best metrological solution.

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- 0 +

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EXACTLY

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