# Portfolio for
# **mobile surface analysis**

**Mahr**

**MarSurf** CM *mobile* | PS 10 | M 310 | M 410 | PocketSurf IV

**Precisely determine roughness and waviness**

Mahr's mobile measuring devices guarantee you precise measuring results with maximum mobility. The modern and easy way to measure – using tactile and optical metrology.

# Quality assurance
## simple and everywhere

In production things always have to move quickly: Cycle rates are tight and throughput is planned far in advance. Mahr's mobile metrology allows you to measure the surface finish directly on site, and not just with large or heavy components: Our tools always provide you with reliable results, even when the measurements are complicated and you have to measure the components laterally or above your head.

Mahr's handy, compact measuring instruments have all of the important functions of a stationary instrument, regardless of whether you are measuring the surface texture or you want to perform a static test of 2D parameters. Mahr's mobile metrology is easy to handle, allowing you to preprogram so that you can get started on the workpiece immediately.

**Advantages of Mahr mobile metrology:**

- location-independent
- flexible
- easy to handle
- complex measurements
- compact
- preprogrammable
- start on workpiece immediately

# Contents

**MarSurf CM *mobile***
Mobile 3D surface measurement for use anywhere

**MarSurf PS 10**
Mobile measuring made easy

**MarSurf M 310/ M 410 & MarWin**
Clever combination

# **Optical or tactile?** Selecting the right measuring equipment

When should you rely on tried and true tactile metrology and when does it make more sense to measure using established optical devices? As both methods are equally precise, delivering results with 99 percent accuracy, it always comes down to the surface structures you want to measure and which parameters are relevant for your production. Mahr offers you versatile solutions for both systems. The following criteria will help you make your selection:

## 1

**Process values in accordance with ISO 21920 and ISO 25178**

Tactile and optical devices identify the roughness and sometimes also the waviness of surfaces – all the while in compliance with the standards DIN EN ISO 21920 (formerly DIN EN ISO 4287 and DIN EN ISO 13565) and DIN EN ISO 25178, which allow for an extensive description of a surface.

| Tactile | Optical |
| --- | --- |
| ● | ● |
| ● | ● |
| ● | ● |
| ○ | ● |

## 2

**In no time with established process values**

Roughness, waviness and primary profiles describe the surface and its properties. The parameters derived from that provide information about the quality of the surface. This guarantees reliability in the production process and makes it possible to carry out incoming goods checks quickly.

| Tactile | Optical |
| --- | --- |
| ● | ● |
| ● | ● |
| ● | ● |
| ● | ● |

## 3

**Statistical testing**

When it comes to machined surfaces, structures are often no longer arranged in a certain direction but are distributed at random. A 2D section does not sufficiently describe them or, if it does, it is extremely time consuming. However, the extensive optical sampling of the surface provides more information and fast measuring results.

| Tactile | Optical |
| --- | --- |
| ● | ● |
| ○ | ● |
| ○ | ● |
| ○ | ● |

## 4 Measurement at the touch of a button

Simply place the probe arm on the surface, press the button and begin measurement – no need for complicated peripherals. Read the results directly on the display and print them out with the associated printer as desired. Enjoy all of this at an unbeatable price-performance ratio.

| Tactile | Optical |
|---------|---------|
| ● | ○ |
| ● | ○ |
| ● | ○ |
| ● | ○ |

## 5 Topological testing

When surfaces are extremely sensitive, soft, sticky or even discontinuous, non-contact and thus optical measurement is the method of choice. This applies equally to coated, inhomogeneous and complex surfaces as well as to surfaces without processing structures: It is best to scan and evaluate them optically.

| Tactile | Optical |
|---------|---------|
| ● | ● |
| ○ | ● |
| ○ | ● |
| ○ | ● |

## 6 Easy accessibility

Both optical and tactile mobile devices enable reliable surface testing directly on the workpiece in the production hall. To examine surfaces, small depressions or drill holes that are difficult to access, the removable drive units in tactile tools also present a particular advantage.

| Tactile | Optical |
|---------|---------|
| ● | ● |
| ● | ● |
| ● | ○ |
| ● | ○ |

# Non-contact measurement of surfaces

Do you want an exact understanding of the surface structure and a profile section is simply not adequate? Do you need statistical information? If so, optical measuring methods are what you need: A 3D picture of a surface shows a number of properties not displayed by only one single profile section. For this reason, this technology perfectly complements tactile metrology.You obtain additional information as well as a more detailed description of complex surfaces. You can also measure structures that cannot be measured using tactile metrology, such as coatings or sensitive surfaces.
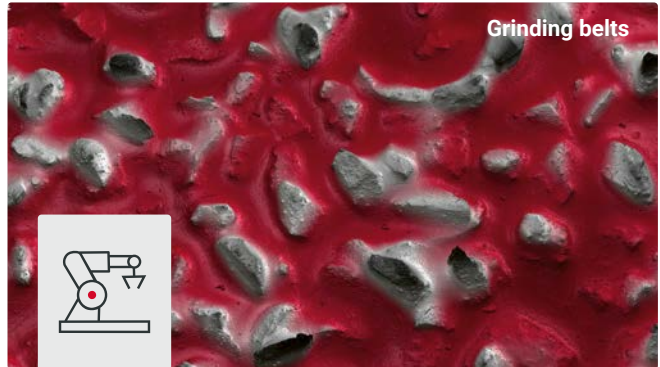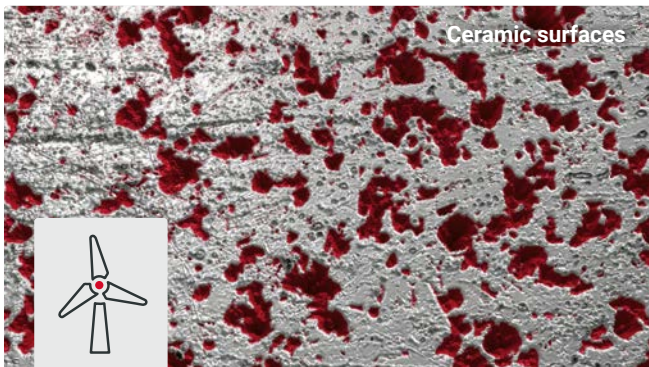
# Sectors & applications

Body panels
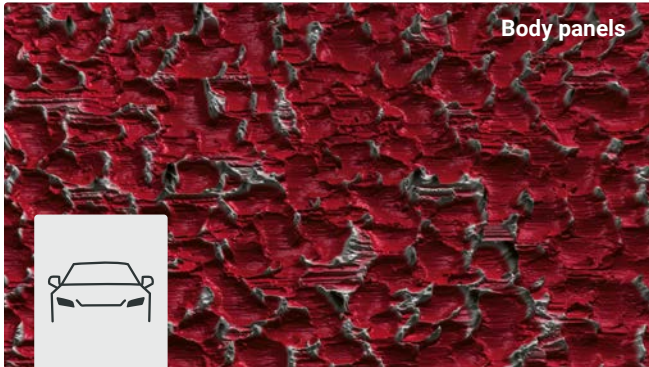
**Automotive industry**
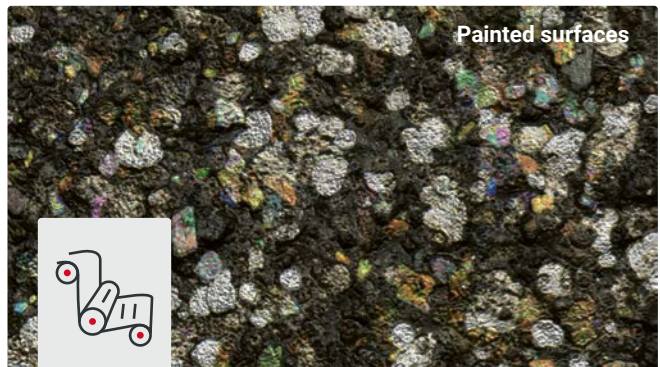Powertrains, batteries, car bodies, interiors, electronics and much more


Grinding belts

**Tool technology**
Cutting and milling tools, micro tools, coatings and much more


Ceramic surfaces

**Energy technology**
Batteries, solar and fuel cells, gears and turbines


Painted surfaces

**Printing industry & safety technology**
Pressure cylinder and plates, banknotes, chip cards and much more

**… as well as in other industries:**
Medical technology, electronics & semiconductor technology, materials science and microsystems technology

# Your surfaces
## in focus

For each component to exhibit maximum performance, its surfaces must increasingly have special characteristics. That applies to shape deviations and roughness as well as waviness or geometric features. Only then do components qualify for further processing – otherwise they are discarded immediately. Powerful Mahr metrology provides you with the entire portfolio of characterization options based on precise measuring data. The topographical analyses range from particle analysis to angles, right down to layer thicknesses. This allows you to detect potential errors and take countermeasures even during production.

### Visual observation

Microscope image or photo simulated depiction in the evaluations as well as 3D images

### 3D roughness (Sa, ...)

Extensive roughness evaluations as per ISO 25178

### 2D roughness (Rz, ...)

Profile roughness in accordance with ISO 21920, ISO 4287, ISO 13565, ASME B46.1, ISO 12085, VDA, SEP or MBN standards
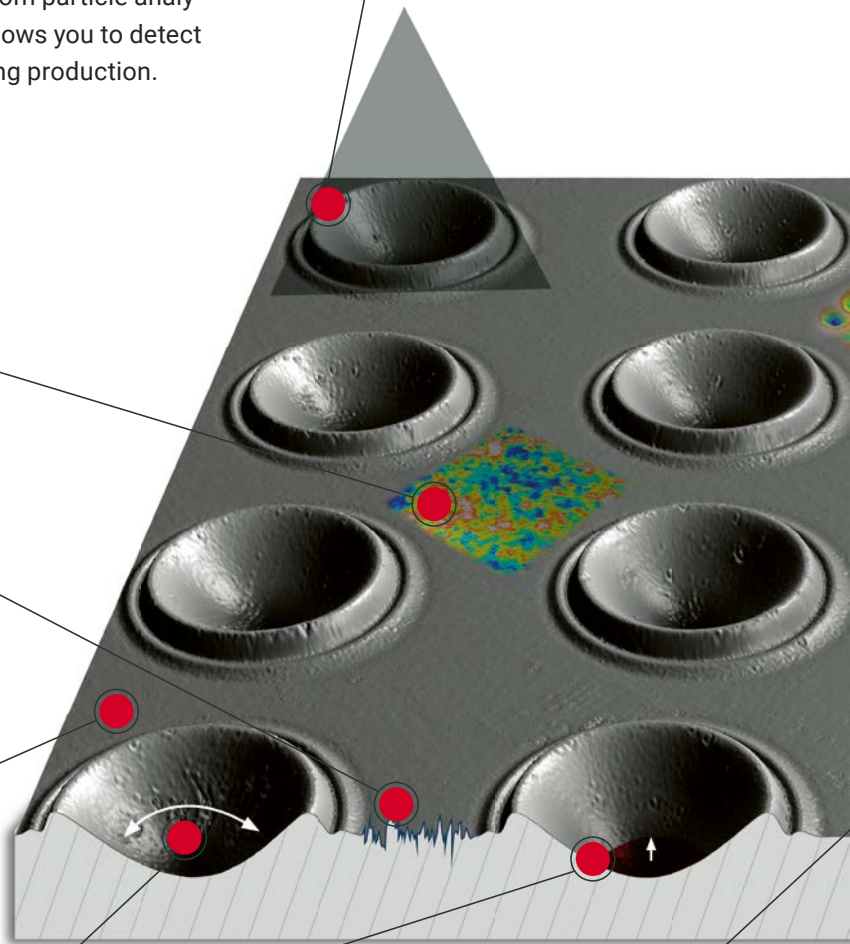
### Profile trace errors (⌒)

Linear errors compared to a target contour as well as straightness parameters as per ISO 12780

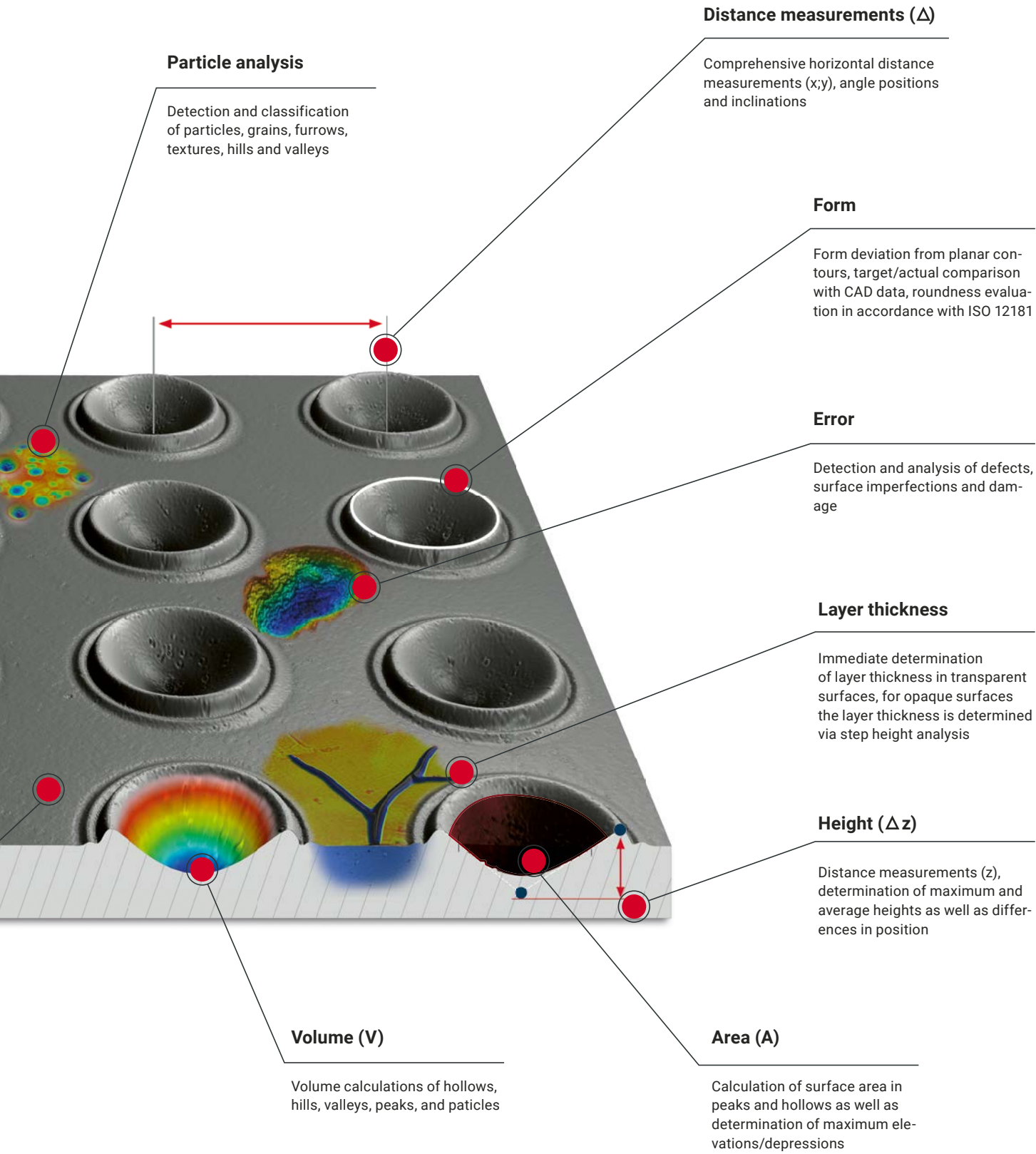### Contour analysis (∢,R)

Determining radii, circles, segments of a circle and angle determination including evaluation of half or full angles

### Flatness (▱)

Determining the flatness of a full or partial surface, e.g. in accordance with ISO 12781

**Particle analysis**

Detection and classification of particles, grains, furrows, textures, hills and valleys

**Distance measurements (△)**

Comprehensive horizontal distance measurements (x;y), angle positions and inclinations

**Form**

Form deviation from planar contours, target/actual comparison with CAD data, roundness evaluation in accordance with ISO 12181

**Error**

Detection and analysis of defects, surface imperfections and damage

**Layer thickness**

Immediate determination of layer thickness in transparent surfaces, for opaque surfaces the layer thickness is determined via step height analysis

**Height (△z)**

Distance measurements (z), determination of maximum and average heights as well as differences in position

**Volume (V)**

Volume calculations of hollows, hills, valleys, peaks, and paticles

**Area (A)**

Calculation of surface area in peaks and hollows as well as determination of maximum elevations/depressions

# Mobile 3D surface measurement
**for use anywhere**

Regardless of whether the surface is sensitive, very large or even shiny: The MarSurf CM *mobile* combines the unique properties of a portable and robust measuring system for production with the established functionality of a stationary system. The MarSurf CM *mobile* provides reliable and accurate measurements. Thanks to confocal 3D metrology, your measurements are quick, non-contact and material-independent.

In particular for measurements on large objects and specimens that are difficult to move, such as rollers and car bodies, the MarSurf CM *mobile* will impress you with its compact size, giving you the option to stitch larger measuring fields at a consistently high resolution thanks to the motorized axes. Featuring a lens revolver, the option of a color camera and application-specific software solutions, the measuring system fulfills the requirements of a wide range of measuring tasks and can be used wherever your work requires it.

**Mobile und non-contact**

Regardless of workpiece dimensions and surface properties

**HD stitching**

High resolution, even with large measuring surfaces, due to motorized axes

**Get to know
the entire MarSurf CM portfolio!**

Do you require a stationary measuring station or want an automated solution? Visit our website!

**Versatile**

Roughness and microgeometrical measurements in one system

**Portable**

Compact system
for quick use

**Robust**

Reliable results, even in the pro-
duction environment

**Unique specifications**

Roughness measurements in accord-
ance with ISO 21920, ISO 4287 and
ISO 25178

# 1,200 x 1,200 px

**camera resolution**

# 1.4 million

**measuring points**
per individual measurement

# 0.13 µm

**minimum measuring
point level**

up to
# 100 fps

even at
**maximum resolution**

# 16 bit

**high dynamic range camera**

# Powerful measuring software
## for any requirements

Controlling your measuring device is child's play with the intuitive measurement and control software from MarSurf Metrology. Innovative snapshot technology delivers results quickly and effectively: After you have arrived at the desired sample position, simply click for optimum measuring results. The software then automatically regulates all settings, including the focus range and brightness. In addition, the surface analysis software MarSurf Mountains for Mahr offers a comprehensive function package: Surface characteristics can be easily analyzed and processed.
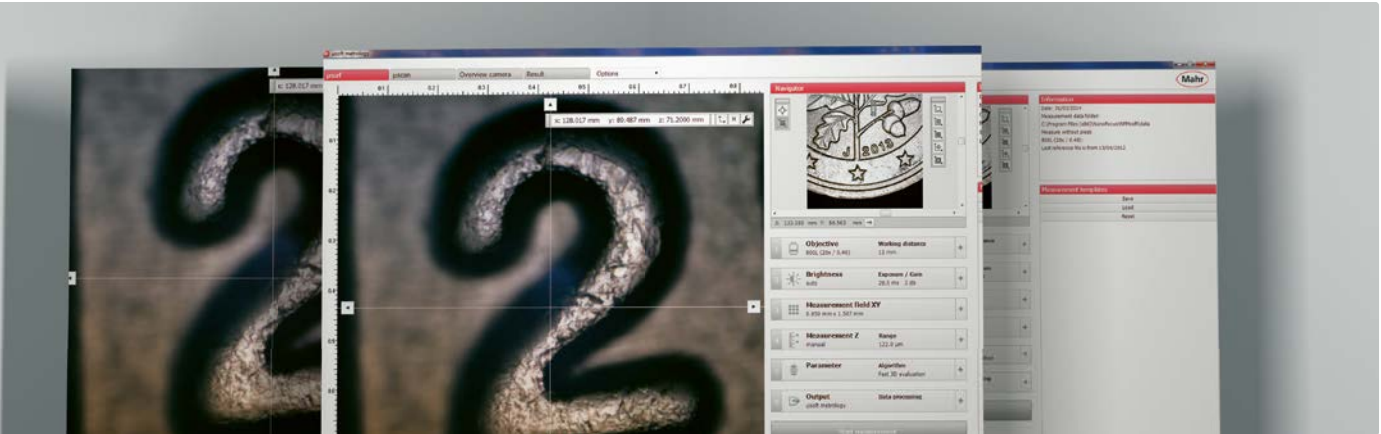


### MarSurf Metrology Software (MSW)

The intuitive measurement and control software MarSurf MSW is an essential part of your measurements, guaranteeing you a smooth measuring routine.

**Navigator function:** Create overview images and conveniently define the desired measuring range using the mouse.

**Template function:** Save measuring parameters and positions as templates and complete semi-automated measuring series easily and simply.

**Snapshot technology:** After you have arrived at the desired sample position, simply click for optimum measuring results. The MarSurf MSW automatically regulates all of the settings, including the focus range and brightness. At the same time there is enough space for individual settings
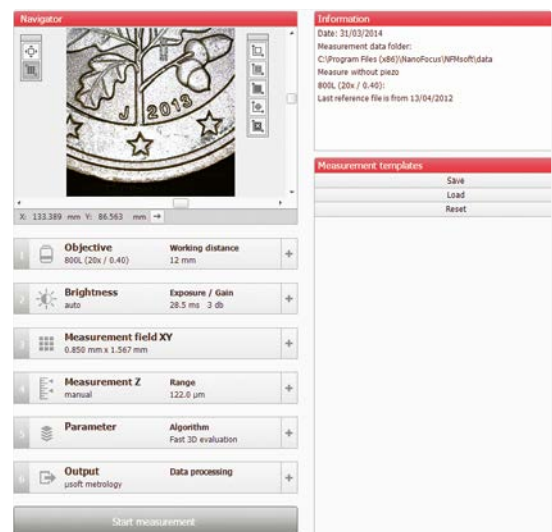
| Software packages | Scope |
|---|---|
| MarSurf MSW | Standard |
| MarSurf MfM | Optional |
| Export formats | FITS, NMS, OMS, X3P, ASCII, SDF, SUR, TIF, BMP, STL |
| Language packs MarSurf MSW | German, English, French, Italian, Spanish, Portuguese, Polish, Russian, Turkish, Japanese, Korean, Chinese |
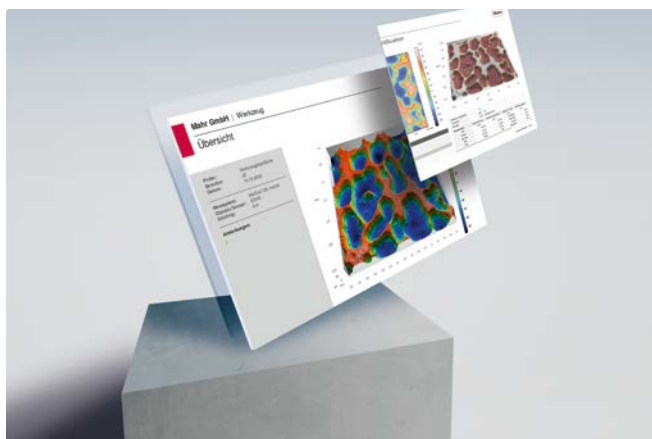


**MarSurf Mountains for Mahr Software (MfM)**

The surface analysis software MarSurf MfM offers a comprehensive function package, which is required to display and analyze structure, roughness, waviness, step height, contours and other surface characteristics. The intuitive multilingual user interface makes it possible to create complex analytical reports at the touch of a button. Editing and evaluating measuring data is child's play. A variety of display options such as profile view, 3D reconstruction and detailed microscopic images create informative measuring protocols. It is easy for users to create and implement individual evaluation formulae.

The software always contains the most up-to-date standard parameters and filter functions and is available in the standard, extended and premium versions. Special modules for statistical evaluation or particle analysis, for example, are also available.
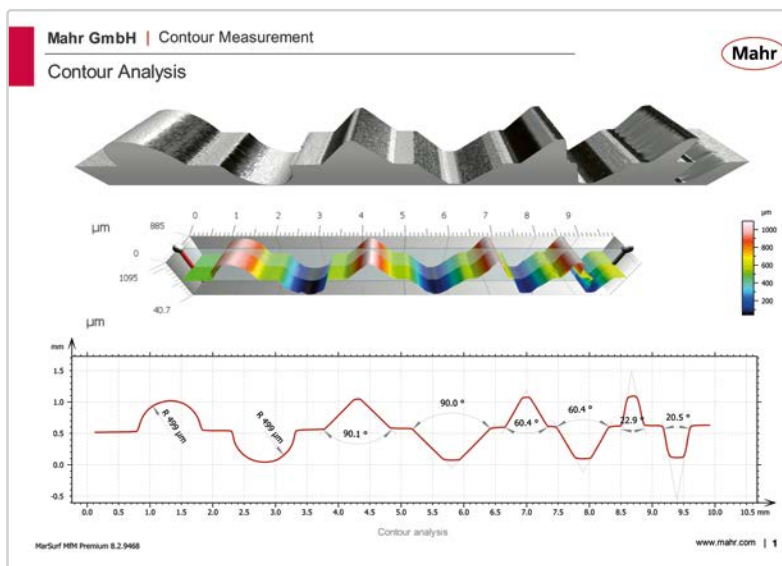


**Effective evaluation and documentation**

- Evaluation at the touch of a button

- Informative measuring reports

- Customer-specific adaptation and evaluation

- 3D analysis, ISO 25178, ISO 13565, ISO 12781

- 2D analysis, ISO 21920 as well as ISO 4287

- Geometry, volume, contour, CAD comparison

# MarSurf CM *mobile*
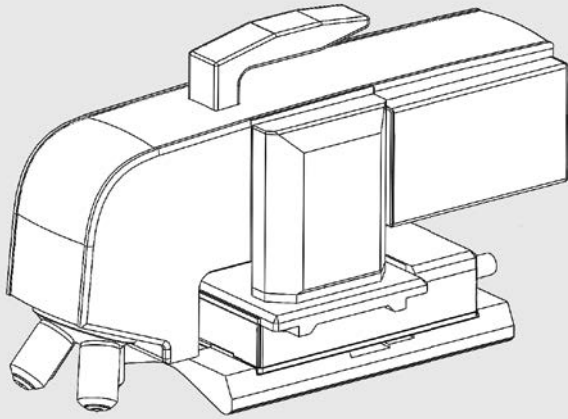
417 × 136 × 234 mm³

| General information | |
| --- | --- |
| Measuring principle | Patented CMP technology (Confocal Multi Pinhole) |
| Light source | High-performance LED (505/475 nm), MTBF: 50,000 hours (color camera with high-performance white light LED) |
| Typical measuring time | 2–8 s |
| Electrical power | Voltage: 100–240 V; frequency: 50–60 Hz, Power consumption: <50 W |
| Type of computer | Industrial PC/laptop |
| Cable length | Measuring instrument: 6 m |

| Configuration | |
| --- | --- |
| Tripod form | Mobile |
| Mass | 8.3 kg |
| Positioning volume | 50 × 50 × 35 mm³ |
| Path length measuring system x,y | Standard |
| System controller | Integrated |
| Active/passive vibration dampening | Optional |

| Sample properties | |
| --- | --- |
| Sample height (mm) | Flexible |
| Sample weight max. (kg) | Flexible |
| Sample surface | Reflectivity: 0.1–100%, coated, uncoated, reflective to diffuse |

| Measuring head | | |
| --- | --- | --- |
| Image acquisition module | max. number of measuring points in a single measurement x * y | 1200 x 1200 = 1.44 Mio. |
| | max. image data at full resolution (Hz)[1] | 25/100 |
| | HDR function (16 Bit) | Standard |
| | Color photo | Optional |
| Maximum number of measuring points[2] | | 1213 Mio. |
| Vertical measuring module | vertical adjustment range (motorized) | 35 mm |
| | fine adjuster (Piezoelectric module, vertical adjustment range) | 350 µm |
| Lens holder | 4x revolver | Standard |
| | no revolver | Optional |

| Objective lenses[3] | 3200S | 1600S | 800S | 800XS | 320S | 160S |
|---|---|---|---|---|---|---|
| Lens magnification | 5x | 10x | 20x | 20x | 50x | 100x |
| Lateral measuring range x, y | 3200 µm | 1600 µm | 800 µm | 800 µm | 320 µm | 160 µm |
| Lateral measuring range x × y | 10.24 mm² | 2.56 mm² | 0.64 mm² | 0.64 mm² | 0.1024 mm² | 0.0256 mm² |
| Extended lateral measuring range (stitching without data reduction) | | | | | | |
| x, y | 50 mm | 46.4 mm | 23.2 mm | 23.2 mm | 9.2 mm | 4.6 mm |
| x × y | 2500 mm² | 2152 mm² | 538 mm² | 538 mm² | 84.6 mm² | 21.1 mm² |
| Numerical aperture NA | 0.15 | 0.3 | 0.45 | 0.6 | 0.8 | 0.9 |
| Working distance | 20 mm | 11 mm | 3.1 mm | 1 mm | 1 mm | 1 mm |
| Computational critical angle[4] | 8.6 ° | 17.5 ° | 26.7 ° | 36.9 ° | 53.1 ° | 64.2 ° |
| Vertical measuring range | | | | | | |
| with motorized adjusting unit | 19.9 mm | 10.9 mm | 3 mm | 0.9 mm | 0.9 mm | 0.9 mm |
| with fine adjuster | – | 0.35 mm | 0.35 mm | 0.35 mm | 0.35 mm | 0.35 mm |
| Measuring noises | | | | | | |
| with motorized adjusting unit | 354 nm | 71 nm | 25 nm | 14 nm | 14 nm | 14 nm |
| with fine adjuster | – | 14 nm | 4 nm | 3 nm | 1 nm | 1 nm |
| Vertical resolution | | | | | | |
| with motorized adjusting unit | 1000 nm | 200 nm | 70 nm | 40 nm | 40 nm | 40 nm |
| with fine adjuster | – | 40 nm | 10 nm | 8 nm | 4 nm | 2 nm |
| Sampling rate 1200 × 1200 px | 2.67 µm | 1.33 µm | 0.67 µm | 0.67 µm | 0.27 µm | 0.13 µm |
| Computational lateral optical critical resolution[5] | 1.93 µm | 0.96 µm | 0.64 µm | 0.48 µm | 0.36 µm | 0.32 µm |

| Accuracy[6,7] | | Standard | Uncertainty |
|---|---|---|---|
| Measurement uncertainty based on the example of roughness measurement[,8, 9, 10, 11] | with objective lens 800XS | Ra = 1.63 µm | U = 0.040 µm, σ = 0.004 µm |
| | | Ra = 0.58 µm | U = 0.024 µm, σ = 0.0066 µm |
| | | Ra = 0.23 µm | U = 0.010 µm, σ = 0.0050 µm |
| | with objective lens 320S | Ra = 0.079 µm | U = 0.010 µm, σ = 0.0022 µm |

1. On request.
2. Maximum number of measuring points that can be recorded in a composite measurement.
3. Additional lenses available on request.
4. Theoretical critical angles on reflective surfaces, on real surfaces can achieve larger critical angles due to diffuse reflections.
5. Based on the example of 475 nm light source, calculated according to the Rayleigh criterion

6. VIM 2012
7. With fine adjuster
8. U as per ISO/IEC GUIDE 98-3:2008(E), GUM:1995, K=1.96 (level of confidence 95%)
9. σ determined for 25 measurements
10. Measured under the best possible conditions using PTB-certified standards. Results only valid for used standards
11. Evaluation according to ISO 4287

# Tactile measuring instruments for quality control

Tactile metrology is the standard measuring procedure used to determine the roughness and waviness of surfaces. It has been an essential part of quality assurance since the 1930s. It is based on precise sampling using a stylus tip whereby a 2D profile of the surface is created and then recorded point by point.

Tracing systems are extremely accurate: Results and measured values provide data in the range of micrometers and allow for very detailed conclusions to be drawn as to the quality of the processing of the workpiece analyzed. On top of that, Mahr mobile tactile devices are extremely handy, reliable and cover all of the common parameters of the most important standards.

# Sectors & applications

### Automotive industry
Steering, brake system, gearbox, crankshaft, camshaft, cylinder head, cylinder block, turbocharger

### Mechanical engineering
Bearings, shafts, racks, valves

### Steel industry
Sheet and roller surfaces

### Medical technology
Surface roughness measurement for hip and knee endoprostheses

### Aerospace
Turbines and wings

**MarSurf** mobile solutions

# Point by point,
## line by line

This overview illustrates which of the Mahr measuring instruments
best fits your individual measuring tasks.

| | MarSurf PS 10<br>Page 20 | MarSurf M 310<br>Page 24 |
|---|---|---|
| Probe system | Skidded probe system | |
| Parameter | Ra, Rq, Rz, Ry (JIS), Rz (JIS), Rmax, Rp, Rp (ASME), Rpm (ASME), Rv, R3z, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, RPc, Rmr, tp (JIS, ASME) equivalent to Rmr, RSm, Rsk, S, CR, CF, CL, R, AR, Rx, Rzx, Rvt, Rpt, Rvt, Rmrk1, Rmrk2, Rak1, Rak2, Rs | Ra, Rq, Rz, Ry (JIS), Rz (JIS), Rmax, Rp, Rp (ASME), Rpm (ASME), Rv, R3z, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, RPc, Rmr, tp (JIS, ASME) equivalent to Rmr, RSm, Rsk, S, CR, CF, CL, R, AR, Rx, Rzx, Rvt, Rpt, Rvt, Rmrk1, Rmrk2, Rak1, Rak2, Rs |
| Standards | x | x |
| Measuring range (µm) | 350 µm | 350 µm |
| Traversing length | 17.5 mm | 17.5 mm |
| Auto-cutoff | x | x |
| Memory | PDF protocol 1500, 10,000 results<br>(can be extended with 32 GB SD card) | |
| Measuring programs | – | x |
| Remote control/ASCII commands | – | x |
| Tolerance | x | x |
| Printer | – | x<br>(via thermal printer) |
| Scanner or keyboard | – | x<br>(via USB-A) |
| Ports | MarConnect, Micro-USB, microSD | USB-A for scanners, printers or wirelessly by dongle, MarConnect, micro USB and microSD card |
| Data transfer | Cable | Cable or wireless |

| | MarSurf M 410<br>Page 30 | MarSurf M 510<br>Page 38 | MarSurf PocketSurf<br>Page 44 |
|---|---|---|---|
| | Skidless probe system | Skidless probe system | Skidded probe system |
| | DIN/ISO: Ra, Rq, Rz, Rmax, Rp, Rv, Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, R3z, RPc, Rmr (3x), HSC, RSm, Rsk, Rdc, Rdq, Pa, Pt, PMr (3x), Pdc, Wa, Wt, WSm, Wsk, JIS: Ra, Rz, RzJIS94, Sm, S, ASME: RpA, Rpm, Rzx, Rvt, Rpt, Rvt, Rmrk1, Rmrk2, Rak1, Rak2, Rs MOTIF: R, Ar, Rx, W, Wx, Wte, CR, CL, CF, NR, NCRx, NW | Rt, Ra, Rq, Rz, Rp, Rv, Rsk, Rku, Rsm, Rc, Rpc, Rdq, Rmax, Rlq, Rda, Rla, Pt, Rk, Mr1, Mr2, Rpk, Rvk, Rpkx, Rvkx, a1, a2, Wt, Wa, Wca, Wq, Wz, Wp, Wv, Wsk, Wku, Wdq, Wmax, Wlq, Wda, Wla, Rmr30, Rmr60, Rmr90, sSt(g), sSt(f), Wsa(1-5), Wa0.8_O5, Wa0.8_O6, Wa0.8_O7, Wa0.8_O8, Wa0.8_O9, Rpq, Rmq, Rvq, Pmr60, Pc, Pv, Pa, Pp, Wc, Wsw, R3z, WDt, WDSm, WDc, Ry, Wy, Py, Rzx | Ra - 6.35 µm/250 Ry, Rmax, Rz - 25.3 µm/999 µin |
| | x | x | – |
| | 500 µm | 1000 µm | Ra - 6.35 µm/250 Ry, Rmax, Rz - 25.3 µm/999 µin |
| | 26 mm | 15 mm (M 510-15), 50 mm (M 510-50), 75 mm (M 510-75) | 15 mm |
| | x | – | – |
| | PDF protocol 1500, 10,000 results (can be extended with 32 GB SD card) | Configurable | – |
| | x | x | – |
| | x | – | – |
| | x | x | – |
| | x<br>(via thermal printer) | – | – |
| | x<br>(via USB-A) | x<br>(via PC) | – |
| | USB-A for scanners, printers or wirelessly by dongle, MarConnect, micro USB and microSD card | USB 2.0, USB 3.0, RS 232, QDAS, Excel PDF (fully configurable) | MarConnect, cable |
| | Cable or wireless | Cable | Cable |

# Mobile measuring
## made easy

The MarSurf PS 10 is the ideal entry level instrument for surface metrology: Its extraordinarily simple and intuitive operation along with numerous safety functions including the automatic cutoff make the device as easy to control as a cellphone. Due to its minimal size, it is also perfect for location-independent measurements – vertical, horizontal and even overhead if necessary. And thanks to the removable drive unit, the MarSurf PS 10 can be used flexibly in production.

The measuring instrument boasts three order options for increased flexibility: with stylus tip 2 µm, 5 µm and also a variant with a transverse drive unit (MarSurf PS 10 C2).

## 500 g
**lightweight**

● Intuitive operation: As easy as using a smartphone and with a display that can rotate

● Creates complete PDF measuring records right in the measuring instrument and data backup as TXT, X3P, CSV and PDF file.

● Customized comments for the PDF measuring record entered directly into the MarSurf PS 10

● Error-free operation thanks to an integrated, removable roughness standard

● Automatic cutoff selection, ensuring that even non-specialists get the correct measuring results

## 9
other, optional
**probes**

**Always at hand**

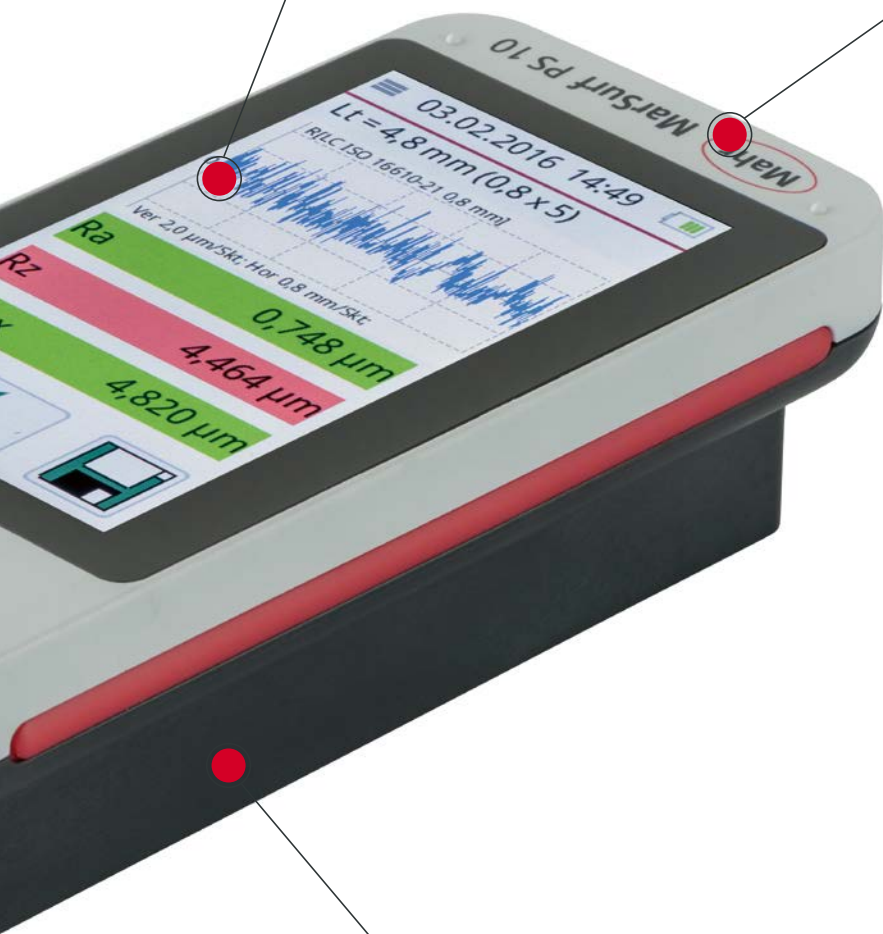The calibration standard stays in the instrument and can be checked at any time.

## Extremely easy to operate with detailed profile display

The large 4.3" high-resolution and backlit TFT touch display allows intuitive operation and precise representation of the measuring profile.

## Perfect evaluation and documentation

Measuring records are automatically created in the instrument without the need for additional software.

up to

# 500,000

**measurements**
can be stored in the instrument

# 41

**parameters**
Same range of functions
as a laboratory instrument

# 4,3"

**TFT touch display**
similar to a smartphone

at least

# 1,200

**measurements**
without power supply

## Flexible use

The removable drive unit, in conjunction with the optional handheld support, lends this instrument added versatility where space is limited, e.g. in holes or when measuring small parts.

# Important **additional functions**



1. Roughness measurement on shafts
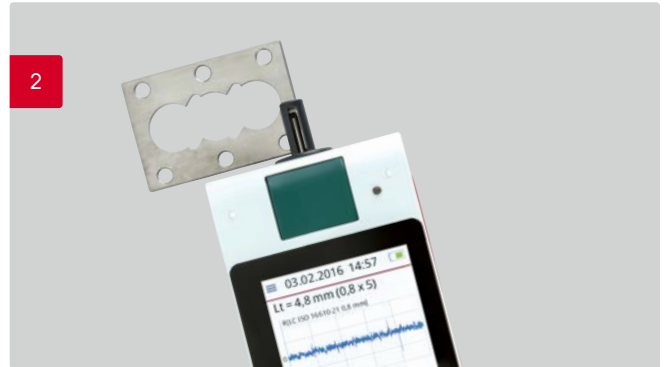


2. Roughness measurement on flat surfaces



3. Roughness measurement with measuring stand ST-D



4. Removable drive unit for measurement in small bores

**Scope of delivery**

- MarSurf PS 10 basic unit

- Drive unit (detachable)

- 1 standard probe conforming to standards

- Built-in rechargeable battery

- Roughness standard integrated into housing
  (detachable), including Mahr calibration certificate

- Probe protection/vee block holder

- Charger/3 mains adapter

- Operating instructions

- Carry case with shoulder strap

- USB cable

- Extension cable for drive unit (length 1.2 m)

- Height adjustment (integrated)

- Handheld support (only with item no. 6910235)

# **MarSurf** PS 10

Item no. 6910230 (2 µm stylus tip) | Item no. 6910232 (5 µm stylus tip) | Item no. 6910235 (C2 for transverse tracing)

| | |
|---|---|
| Measuring principle | Stylus method |
| Probe | Inductive skidded probe |
| Parameters | Ra, Rq, Rz, Ry (JIS), Rz (JIS), Rmax, Rp, Rp (ASME), Rpm (ASME), Rv, R3z, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, RPc, Rmr, tp (JIS, ASME) equivalent to Rmr, RSm, Rsk, S, CR, CF, CL, R, AR, Rx, Rzx, Rvt, Rpt, Rvt, Rmrk1, Rmrk2, Rak1, Rak2, Rs |
| Unit of measurement | metric/inches |
| Measuring range | 0.350 mm |
| Profile resolution | 8 nm |
| Filter as per ISO/JIS | Gaussian filter as per ISO 16610-21 (formerly ISO 11562), special filter as per DIN EN ISO 13565-1, Ls filter as per DIN EN ISO 3274 (can be switched off), DIN EN ISO 21920 |
| Cutoff lc as per ISO/JIS | 0.25 mm, 0.8 mm, 2.5 mm, automatic filter detection |
| Traversing length Lt as per ISO/JIS | 1.5 mm, 4.8 mm, 15 mm, N x Lc, variable, automatic |
| Traversing length as per ISO 12085 (MOTIF) | 1 mm, 2 mm, 4 mm, 8 mm, 12 mm, 16 mm |
| Total length ln as per ISO/JIS | 1.25 mm, 4.0 mm, 12.5 mm |
| Number n of sampling lengths as per ISO/JIS | selectable: 1 to 16 |
| Stylus tip | 2 µm (Item no. 6910230) |
| | 5 µm (Item no. 6910232) |
| Measuring force (N) | 0.00075 |
| Calibration function | dynamic; Ra, Rz, Rsm |
| Memory | max. 3,900 profiles, max. 500,000 results, max. 1,500 PDF measuring records, expandable to 32 GB with microSD card (320x memory capacity) |
| Languages | German, English, French, Italian, Spanish, Portuguese, Dutch, Swedish, Russian, Polish, Czech, Japanese, Chinese, Korean, Hungarian, Turkish, Romanian |
| Miscellaneous | Lock/password protected, date/time |
| Data interface | USB, MarConnect (bidirectional), microSD slot for SD/SDHC cards up to 32 GB |
| Protection rating | IP 40 |
| Battery | Lithium-ion battery, 3.7 V, at least 1200 measurements |
| Long-range AC adapter | 100 to 264 V |
| Dimensions | 160 x 77 x 50 mm |

# Adds value to **mobile roughness measurement**

Are you used to using your smartphone to access your data anytime, wherever you are? That is exactly what Mahr's new MarSurf M 310 provides you with: A flexible all-rounder for the mobile recording and evaluation of measuring data. Simple operation and a robust design make the new Mahr product perfectly suited for use in production, where dirt and dust can clog the instrument and it is often users with little prior knowledge performing the quality control.

# For all those who need more

The **MarSurf M 310** has the same functions as the PS 10 but has even more significant added benefits for you:

**1** **Print directly, document easily**
Measuring results on paper? Sometimes still the fastest way! The mobile printer allows you to save data on thermal paper, which can then be added directly to the workpiece.

**2** **Preprogrammed measuring functions for immediate measuring success**
A variety of measuring parameters can be defined, saved and then called up on the workpiece in the device settings. If you like, it even works using a barcode scanner, which simply connects to the MarSurf M 310. This allows even workers without expert knowledge or training to determine reliable roughness parameters.

**3** **Robot ready: Integrate instrument directly in the production line**
The MarSurf M 310 and its interfaces can be directly integrated into your production lines, such as for measuring tasks on the robot arm. They control the measuring instrument remotely – conveniently from your computer, for example.

**Status at a glance**

Instrument status at a glance thanks to two easily visible status LEDs. Depending on the signal color, a measurement is underway, data are being transferred or an error has been detected. Standby mode shows the charging status.

**Robust in every respect**

Equipped for virtually any environment: The robust skidded probe system means that the measuring instrument is less sensitive to vibrations. The PHT probe is easy to clean thanks to its open skid.

## Modern optics, perfect display

A high resolution, backlit 4.3" TFT display ensures precise display of your measuring results. It is operated directly via the touchscreen – just as you are used to with your smartphone.

## IATF compliant

The tried and true MarConnect duplex interface enables the transmission of a measuring equipment ID with each measurement. This makes measuring results traceable at any time.
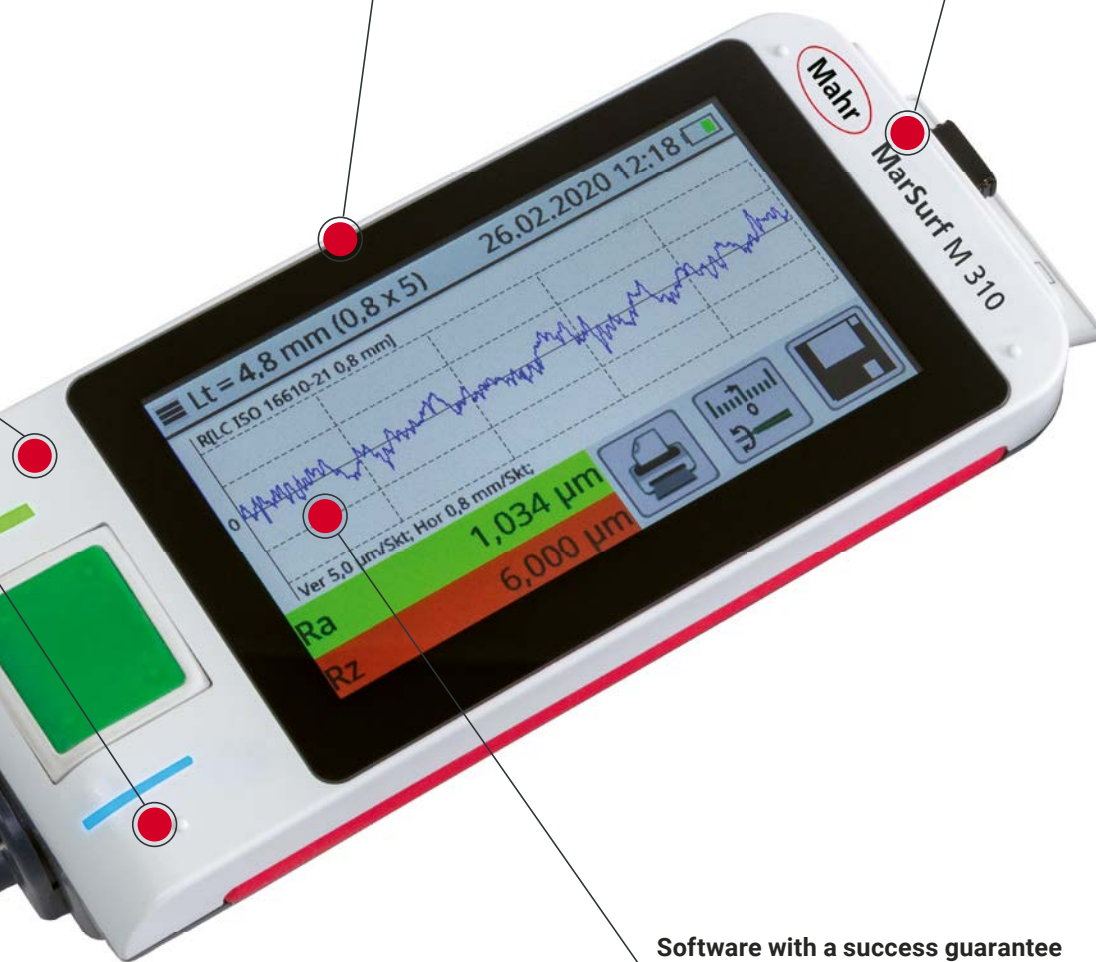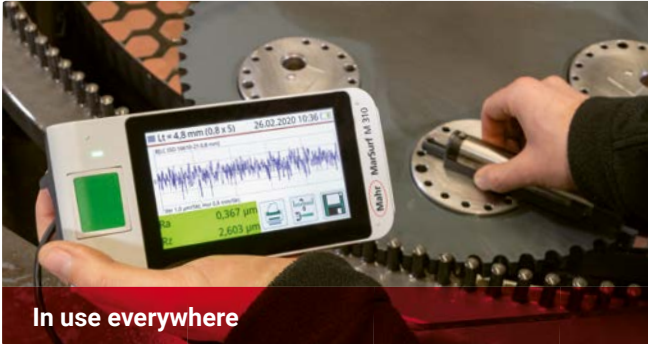
## Software with a success guarantee

With this measuring instrument, you can reliably determine roughness parameters even without expert knowledge or training – thanks to intuitive software, clear menu structures and preprogrammed measuring functions.

**MarSurf** mobile solutions

# Flexible all-rounder
## for your quality assurance



### In use everywhere

Thanks to its compact design, the MarSurf M 310 is the perfect companion for mobile measuring tasks. Whether horizontal, vertical or overhead, you benefit from the simple, network-independent handling. The removable drive unit allows you to take fl exible measurements with the MarSurf M 310 and the M 410, even in the tightest of spaces. Its large, bright, 4.33" display offers easy operation and a maximum overview while its operating concept enables intuitive handling without training. Despite its compact size, the M 310 boasts 41 parameters, offering the same range of functions as a laboratory instrument.



### QR/barcode scanner

A standard hand scanner can be easily connected by USB or wirelessly to control the measuring instrument. This allows you to simply scan data or codes instead of entering them manually.

**Options:**
• Scan a QR/barcode on the workpiece to start the assigned program

• Scan a QR/barcode on the workpiece to input work-piece information (drawing no. etc.) into profile infor-mation

## Precious **helpers**

The handheld support provides real added value for your work: The proven accessory considerably expands the field of application.
The hand-held support makes it possible to flexi-bly position the probe without a costly measuring tripod.



Simple overhead measurement of small parts



Measurements of end faces of workpieces

# **MarSurf** M 310

Item no. 6910260 (2 µm stylus tip) | Item no. 6910265 (5 µm stylus tip) | Item no. 6910264 (C2 for transverse tracing)

| | |
|---|---|
| Measuring principle | Stylus method |
| Probe | Inductive skidded probe |
| Parameters | Ra, Rq, Rz, Ry (JIS), Rz (JIS), Rmax, Rp, Rp (ASME), Rpm (ASME), Rv, R3z, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, RPc, Rmr, tp (JIS, ASME) equivalent to Rmr, RSm, Rsk, S, CR, CF, CL, R, AR, Rx, Rzx, Rvt, Rpt, Rvt, Rmrk1, Rmrk2, Rak1, Rak2, Rs |
| Unit of measurement | metric/inches |
| Measuring range | 0.350 mm |
| Profile resolution | 8 nm |
| Filter as per ISO/JIS | Gaussian filter as per ISO 16610-21 (formerly ISO 11562), special filter as per DIN EN ISO 13565-1, Ls filter as per DIN EN ISO 3274 (can be switched off), DIN EN ISO 21920 |
| Cutoff lc as per ISO/JIS | 0.25 mm, 0.8 mm, 2.5 mm, automatic filter detection, variable |
| Shorter cutoff as per ISO/JIS | selectable |
| Traversing length Lt as per ISO/JIS | 1.5 mm, 4.8 mm, 15 mm, N x Lc, variable, automatic |
| Traversing length as per ISO 12085 (MOTIF) | 1 mm, 2 mm, 4 mm, 8 mm, 12 mm, 16 mm |
| Total length ln as per ISO/JIS | 1.25 mm, 4.0 mm, 12.5 mm |
| Number n of sampling lengths as per ISO/JIS | selectable: 1 to 16 |
| Stylus tip | 2 µm (Item no: 6910260), 2 µm with printer (Item no: 6910267) |
| | 5 µm (Item no: 6910265), 5 µm with printer (Item no: 6910268) |
| Measuring force (N) | 0.00075 |
| Calibration function | dynamic; Ra, Rz, Rsm |
| Memory | min. 3900 profiles, min. 500,000 results, min. 1500 PDF measuring records, expandable to 32 GB with microSD card (320x memory capacity) |
| Languages | German, English, French, Italian, Spanish, Portuguese, Dutch, Swedish, Russian, Polish, Czech, Japanese, Chinese, Korean, Hungarian, Turkish, Romanian |
| Miscellaneous | Lock/password protected, date/time |
| Data interface | USB A, USB B, MarConnect (bidirectional), microSD slot for SD/SDHC cards up to 32 GB |
| Protection rating | IP 40 |
| Battery | Lithium-ion battery, 3.7 V, at least 1200 measurements |
| Long-range AC adapter | 100 to 264 V |
| Dimensions | 160 x 77 x 50 mm |

# Best connections
for secure data

To save your measuring data, the MarSurf M 310 and M 410 instruments have a variety of interfaces available: Data can be transferred wirelessly or by USB, micro USB or the proven MarConnect duplex interface. The latter also transmits a measuring equipment ID, ensuring that your measuring results are traceable.

Simply choose between complete measuring records in PDF format, individual measuring values or a CSV file.

**MarConnect duplex interface**
for the MarCom Professional data transmission software

Equipped with the proven MarConnect duplex interface, the MarSurf M 310 and M 410 make it possible to transmit a measuring equipment ID with each measurement. This makes it possible to reliably record which measuring instrument performed a certain check in order to guarantee the traceability of your measuring results.

**SD slot**
for a microSD or MicroSDHC card up to 32 GB, to which the profiles, profiles with results, results and/or measuring records can be saved.

If necessary, a software update can be carried out using a microSD card.
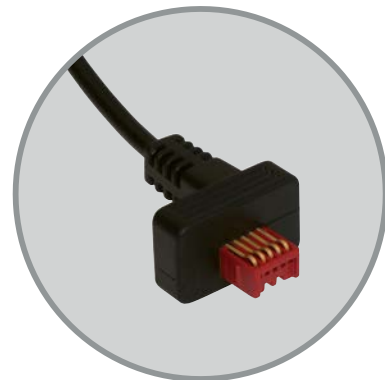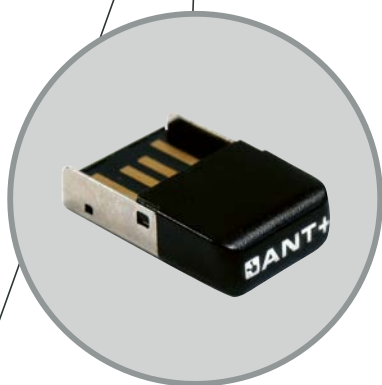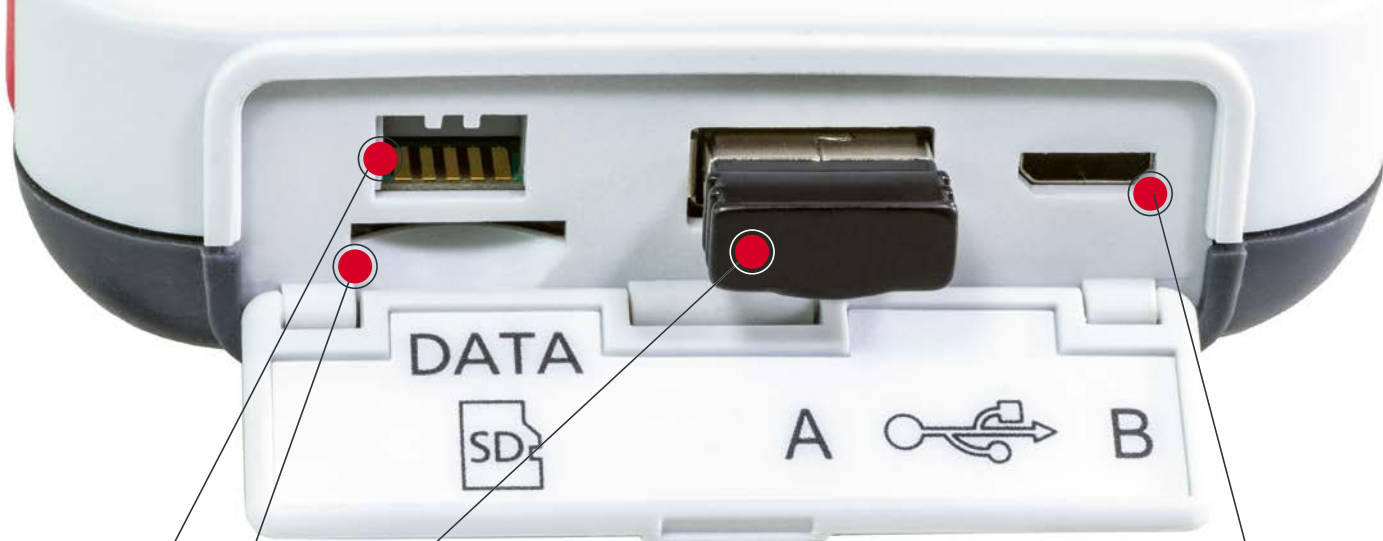
### USB-A interface

for connecting, for example, a USB wireless adapter, USB or wireless printer, barcode scanner, a mouse or keyboard

- Printing results and profiles
- Wireless data transmission to MarCom software to save the results, e.g. in Excel or a virtual interface box
- Use the M 310/M 410 as a drive unit with the MarWin Easy Roughness software. The mobile measuring instruments are controlled directly by the software.

### Micro USB interface

to connect to the PC

The MarSurf M 310 and M 410 can be integrated into the production process via the micro USB interface and can be controlled remotely via ASCII commands – for example using software for statistical process control. A computer monitors measuring series over longer periods of time or statistically evaluates them according to superordinate aspects.

- Starts a measurement with the current measuring conditions.
- Calculates the parameters selected on the MarSurf M 310/M 410 with the set evaluation conditions.
- Transfers all calculated parameter results in one string that ends with <CR>.

# Simple, innovative, flexible –
## modern surface metrology to be used by hand

Mobile recording and evaluation of measuring data has never been this easy. The MarSurf M 410 is convenient and flexible to use – just a like a modern smartphone. It has a handy touch display, an integrated PDF memory, innovative accessories, and can transfer data wirelessly – all of which effectively simplifies your workload.

Benefit from functions that only Mahr can offer you. In addition to the practical and efficient design and the flexibility this offers, the MarSurf M 410 also has an automatic filter setting by detecting the surface structure. This automatic contacting also guarantees the unmatched reliability of your measurements. The magnetic 3-point holder for the probe arm and the freely combinable accessories offer additional process security.

- Increased efficiency thanks to large integrated memory: More than 500,000 measuring programs and 1500 PDF reports, can be expanded by 32 GB (microSD)

- Skidless probes ensure that the roughness and waviness can be measured without an additional measuring station being required – determination of R-, W-, and P-parameters

- Safe measuring results thanks to automated cutoff option

- Automatic zeroing ensures process and material safety

- IATF ready – simply activate/deactivate in the menu by automatically transferring the item and serial number of the measuring instrument

- Free MarCom software to transfer data

**Possible to separate the display and probe system**

Optionally, you can use the measuring instrument as a mini mobile measuring station, for example by simply attaching the display to the wall using the supplied pivoted docking station

**Magnetic probe holder**

Probe arms can be changed quickly without tools and with additional protection: The magnetic 3-point holder ensures that the probe will not be broken in the event of a collision; it will simply be released by the magnetic holder.

## Intuitive operation via touch display

Easy to operate just like a smartphone so that no training or introduction to the operating functions is required – you can just get started.

## Simple alignment of the probe system

The inclination is easy to correct via the menu-driven, graphic instructions.

## Creation of PDFs directly on the device

Practical: The device creates a complete PDF file without the need for additional software or transfer to a computer. Information can be added to the PDF files directly on the device.

## Wireless data transmission

Connect your measuring instrument wirelessly e.g. to a PC and transfer your data to Microsoft Excel or other evaluation software.

## Importing information using a scanner

Simply start your measuring program by scanning a QR or barcode. You do not need to enter any profile information as your saved measuring programs are linked with a corresponding code.

**MarSurf** mobile solutions

Surface metrology | **31**

# Flexible all-rounders **with a wide range of accessories**



### Print directly, document easily

Measuring results on paper? Despite sounding a little outdated, even in the digital age it is sometimes the fastest way to simply share data or documents. In this case, the mobile Star Micronics SM-L200 Bluetooth® printer is the perfect addition to your MarSurf M 410: It will enable you to save your work results directly on thermal paper.



### Scan measuring programs quickly and reliably

Save measuring programs and link them directly with a QR or barcode. Or scan additional profi le information into your program. The barcodes or QR codes for this can be easily displayed on a drawing or workpiece. This saves time and avoids errors in measuring – a real boost for your quality assurance.

### Scope of delivery

Remain flexible, especially when taking measure-ments. In addition to various practical accessories, the MarSurf M 410 already comes with a comprehensive scope of delivery that is tailored to your requirements.

- Docking station
- Probe protection
- Thermal paper
- Sturdy hard case
- Mains adapter with three adapters

- MarSurf M 410 measuring instrument
- BFW A 10-45-2/90° stan-dard probe arm
- USB cable
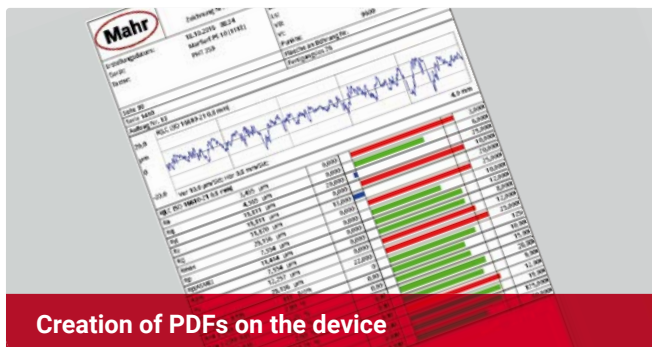
### Creation of PDFs on the device

Avoid additional work steps. The practical PDF function enables the device to create a complete PDF file directly without the need for additional software or transfer to a computer. Information can be added to the PDF fi les directly on the device. This will not only save you time but will also eliminate any potential error sources (e.g., due to incorrect assignment).



### External control via mini USB port

In production lines the M 410 can, for example, by controlled remotely by ASCII commands via the mini USB port. This ensures that the quality can be checked on a continuous basis by the external software, which in addition to increasing the fl exibility also guarantees an increased level of process safety.



Hard case including thermal paper



MarSurf M 410 with ST-G measuring stand

# Fexible all-rounder **with a wide range of accessories**
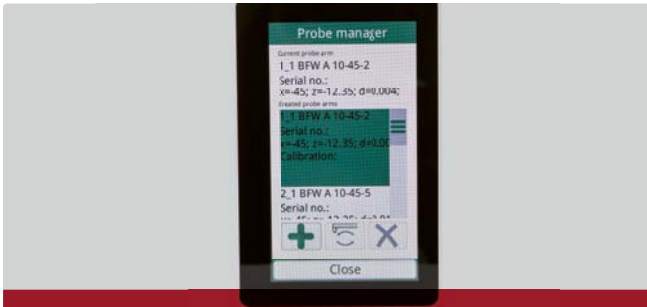
### 1. Probe arm management

The MarSurf M 410 offers unique probe arm management for creating, changing and deleting probe arms. The MarSurf M 410 comes with the default probe arm BFW A 10-45-2/90° (6852403) included in the set already created. The calibration data for a calibrated probe arm is saved.

### 2. Inclination correction wizard

The rotary knob for inclination correction can be used to align the datum plane of the MarSurf MD 26 drive unit ±1.0° to the surface of the measuring object. This wizard facilitates manual inclination setting of the datum plane on the drive unit.

### 3. Calibration function for new probes

Besides the calibration function for calibrating new probe arms, the instrument offers surface compensation for radii and inclinations (ARC-), a statistic function and also allows fast toggling between various profi les (P-, W-, roughness profile).

### 4. Hardware/docking station

The MarSurf M 410 set consists of the MarSurf M 410 control panel and the MarSurf MD 26 drive unit. Both instruments can be disconnected from each other and connected using the USB cable provided. The control panel can also be combined with the metal docking station, which features various inclination levels – for installing at the workstation, on the wall etc.

## 5. Automatic probe positioning

Contacting by motorized height drive up to 7.5 mm is already integrated in the instrument. The probe moves towards the surface and stops as soon as the surface is detected, and starts measuring. After the measurement, the probe is lifted off again and returns to the start position.



## 6. Intersection line C in % of Rz

Specifi cation of the intersection line C in µm or in % of Rz for the parameters Rmr and tp.
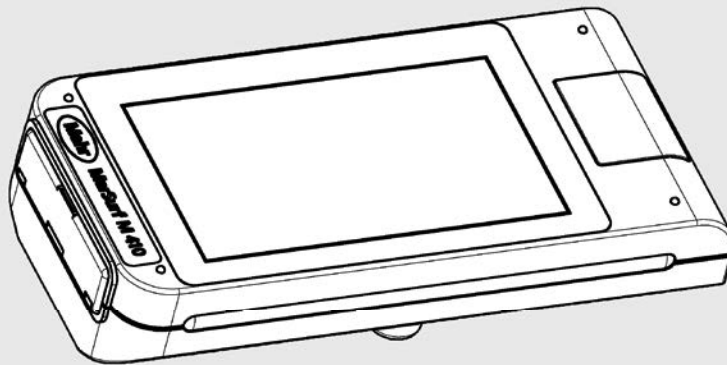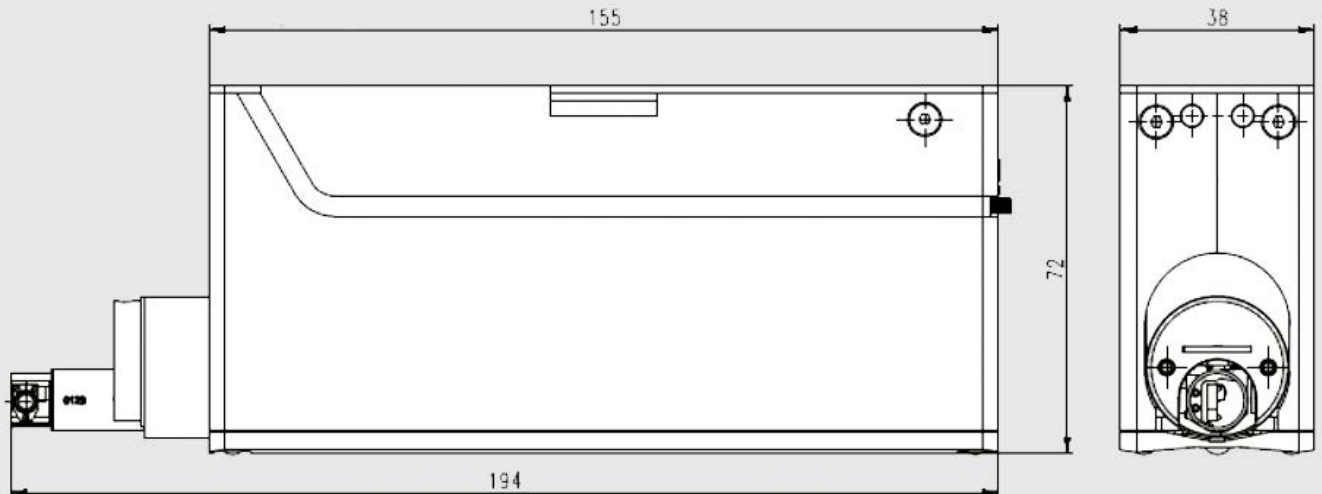


## 7. Software update

The instrument can be updated as soon as a new software version is available.



## 8. Simple wireless pairing

The M 410 can transmit data wirelessly via a wireless adapter, for example to the MarCom software. The values can be sent directly to Excel or other software. There are no annoying cables.

# **MarSurf** M 410



| General information | |
| --- | --- |
| Unit of measurement | metric/inch |
| Functional principle | datum plane drive unit for skidless probe system and integrated measuring channel |
| Profile determination | primary, waviness and roughness profile |
| Probe | inductive probe with interchangeable probe arms (magnetic), 2 µm stylus tip, measuring force 0.75 mN (standard) |
| Filter (as per DIN/JIS) | Gaussian filter as per DIN EN ISO 16610-21, sturdy Gaussian filter as per DIN EN ISO 16610-31, special filter as per DIN EN ISO 13565-1, Ls filter as per DIN EN ISO 3274 (can be switched off) |
| Standards | DIN/ISO/JIS/ASME/MOTIF |
| Parameters | DIN/ISO: Ra, Rq, Rz, Rmax, Rp, Rv, Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, R3z, RPc, Rmr (3x), HSC, RSm, Rsk, Rzx, Rak1, Rak2, Rdc, Rdq, Pa, Pt, PMr (3x), Pdc, Wa, Wt, WSm, Wsk, <br> JIS: Ra, Rz, RzJIS94, Sm, S, ASME: RpA, Rpm, <br> DIN/ISO: Ra, Rq, Rz, Rmax, Rp, Rv, Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, R3z, RPc, Rmr (3x), HSC, RSm, Rsk, Rdc, Rdq, Pa, Pt, PMr (3x), Pdc, Wa, Wt, WSm, Wsk, <br> JIS: Ra, Rz, RzJIS94, Sm, S, ASME: RpA, Rpm <br> MOTIF: R, Ar, Rx, W, Wx, Wte, CR, CL, CF, NR, NCRx, NW |

| | |
|---|---|
| Cutoff Lc (as per ISO/JIS): | 0.25 mm (0.010 in), 0.8 mm (0.03 in), 2.5 mm (0.1 in); freely adjustable between 0.08 mm (0.003 in) and 2.5 mm and (0.1 in); automatic |
| Traversing length Lt for standard sets (as per ISO/JIS) | 0.48 mm (0.019 in), 1.5 mm (0.06 in), 4.8 mm (0.192 in), 15 mm, (0.6 in) with half pre-/post travel, 0.4 mm (0.016 in), 1.25 mm (0.05 in), 4.0 mm (0.16 in), 12.5 mm (0.5 in) without pre/post travel, freely adjustable between 0.1 mm and 26 mm (0.004 in and 1.04 in); automatic |
| Evaluation length le | 0.4 mm (0.016 in), 1.25 mm (0.05 in), 4.0 mm (0.16 in), 12.5 mm (0.5 in) |
| Number n of sampling lengths (as per ISO/JIS): | selectable: 1 to 16 |
| Shorter cutoff (as per ISO/JIS) | selectable |
| Measuring range<br>Profile resolution | 500 µm (±250 µm), 50 µm (±25 µm)<br>7.6 nm,            0.76 nm |
| Calibration function | Dynamic, Ra, Rz |
| Languages | 17, three of which Asian languages, German, English, French, Italian, Spanish, Portuguese, Dutch, Swedish, Russian, Polish, Czech, Japanese, Chinese, Korean, Hungarian, Turkish, Romanian |
| Saving options | TXT, X3P, CSV, PDF file, memory can be expanded with microSD card (up to 32 GB)<br>Results as txt file:           max. 500,000 (in CSV format)<br>PDF measuring records:    max. 1500<br>Profiles in X3P:           max. 3900<br>Profiles as txt file:        max. 1200 with 32 GB microSD card › x320 |
| Miscellaneous | detachable MD26 drive unit, lock/password protection, tolerance monitoring highlighted in color, connection to MarCom software via data cable (duplex – USB), connection to PLC, connection to wireless Star Micronics SM-L200 Bluetooth® printer, save measuring programs |
| Dimensions (L x W x H, excluding probe arm) | Control panel and drive unit connected: 198 mm x 77 mm x 97 mm |
| Battery charging time | approx. 2 hours |
| Interfaces/long-range AC adapter | USB-A, micro USB, MarConnect (USB, RS232), microSD slot for SD/SDHC<br>up to 32 GB/100 – 264 V |
| Protection class as per IEC 529/EN 60529 | IP 40 |
| Weight | M 410: approx. 0.3 kg<br>MD 26: approx. 1.120 kg |
| Battery | lithium ion battery, 3.7 V, nominal capacity 11.6 Wh, for up to 500 measurements |
| Traversing length (Lt) | 0.1 mm to 26 mm (0.004 in and 1.04 in) |
| Contacting speed | 0.1 mm/s; 0.5 mm/s, 1.0 mm/s |
| Positioning speed X | 3 mm/s |
| Travel path Z | 7.5 mm, motorized |
| Positioning speed Z | 1 mm/s |
| Zeroing the probe system | automatically to zero or specified in probe measuring range |
| Inclination correction | ±1°, manual |
| Temperature (storage) | -15 °C to +60 °C |
| Temperature (operation) | +10 °C to +45 °C |
| Rel. humidity | 30% to 85%, non-condensing |
| AC adapter | 90 – 264 V with connection adapter for Europe, UK, US and Australia |
| Printer | Star Micronics SM-L200 Bluetooth® thermal printer, connection: Micro USB, wireless, paper width: 57.5 mm weight: 220 g including rechargeable battery 3.7 V |

# Small measuring instrument for a **wide range of applications**

**With the MarSurf M 510-15/510-50/510-75, Mahr presents a new mobile surface measuring instrument that impresses with its lightness and maneuverability. The compact all-rounder, which features a tactile skidless probe system, is available in three measuring lengths. So you can be sure that you will always find the right measuring instrument for your individual applications.**



MarSurf M 510-15

The MarSurf M 510-15/510-50/510-75 offers a measuring range of 1 mm with three variants in measuring lengths of 15 mm, 50 mm and 75 mm. You can use it to reliably and precisely determine the roughness and waviness of technical surfaces of all types of workpiece, such as shafts, camshafts, vent sealing lips, cylinder bores and metal sheets. You can easily install and set up the device yourself, as Mahr delivers it fully configured.

### Measuring in accordance with standards

The MarSurf M 510-15/510- 50/ 510-75 is used to determine roughness parameters and apply filters in accordance with standards.

### Advantages

- ⬤ Smallest skidless probe system on the market

- ⬤ Measure waviness and large roughness values over a measuring length of up to 75 mm in accordance with standards

- ⬤ Mobile and convenient testing of P, R and W parameters with just one instrument

- ⬤ Highly versatile thanks to more than 1,000 measuring programs

- ⬤ Software can be flexibly controlled with a PC, as it is Windows-compatible

- ⬤ Extensive range of accessories for even more versatility

## Low-maintenance stylus tip

The stylus tip is raised and lowered by motor control.

## Powerful skidless probe system

This allows you to easily reach any measuring point on your workpiece.

## Compact design

Due to its small size and weight, the MarSurf M 510-15/ 510-50/ 510-75 is handy and convenient to use.

## Flexible USB port

You can connect either a PC or laptop via cable, depending on your requirements and existing equipment.

| Version | ID no. | Measuring length | Dimensions L × W × H | Weight |
|---|---|---|---|---|
| **MarSurf** M 510-15 | 6910310 | 15 mm | 52 × 28 × 40 mm | 150 g |
| **MarSurf** M 510-50 | 6910311 | 50 mm | 158 × 40 × 46 mm | 200 g |
| **MarSurf** M 510-75 | 6910312 | 75 mm | 158 × 40 × 46 mm | 200 g |

**MarSurf** mobile solutions

# Reliable fast check for
# **roughness and waviness**

Other features of the MarSurf M 510 make it extremely versatile: Thanks to its vibration resistance, for example, you can use the device in production environments or in machining centers without any problems. The motorized lifting and lowering of the stylus tip makes it a reliable and flexible companion for measuring surfaces.





### MarSurf M 510-50 / M 510-75

- 50 and 75 mm versions also available for major roughness (Rz > 50 μm, λc = 8 mm)
- Vibration-resistant › Possible applications in the production environment and machining centers
- Only instrument for the sheet metal industry with skidless probe system as per SEP 1941 (waviness parameter measurement WSA (1-5) on cold-rolled flats)
- Motorized lifting/lowering of the stylus tip› The stylus tip is the only wear part and is always protected in the housing.
- Easy installation and setup by the customer
- Measuring lengths 50 mm and 75 mm
- Weight: 200 g
- Use: steel sheet industry, metal sheets

### MarSurf M 510-15

- Compact size › flexible and mobile
- The vibration resistance means it can be used directly in production and machining centers.
- Motorized lifting/lowering of the stylus tip
- The stylus tip is the only wear part and is always protected in the housing.
- Easy installation and setup by the customer
- Measuring length 15 mm
- Weight: 150 g

# Intuitive software,
# **wide range of evaluations**

The accompanying software is easy to use: Simply choose the features
for the selected parameters and activate other measuring parameters
and roughness filters from the settings. The measuring record editor can
be used to directly convert the measured parameters to graphs. Result:
A glance at the evaluation is enough to accept the quality testing.

**MarSurf** mobile solutions
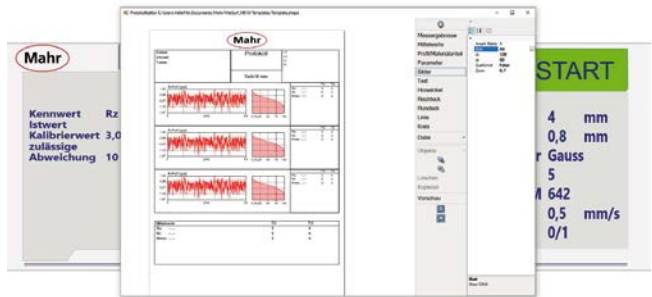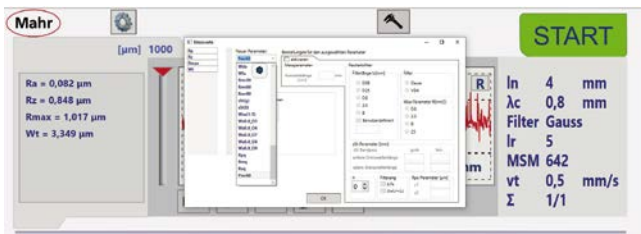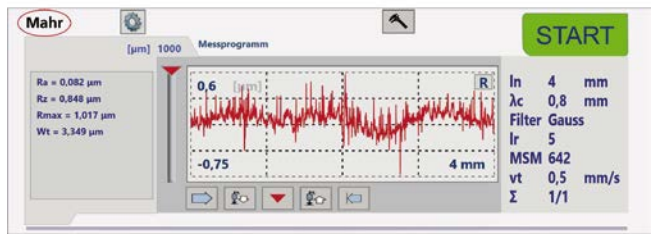
# Accessories
# that guarantee progress



### Measuring stand holder

Item number: 6910315

Compatible with MarSurf M 510-15
Ø 8 mm



### Handheld support holder

Item number: 6910316

Compatible with MarSurf M 510-15
Ø 24 mm



### **Adapter** for PGK/GD 26 holder

Item number: 6910317

Compatible with MarSurf M 510-50/75
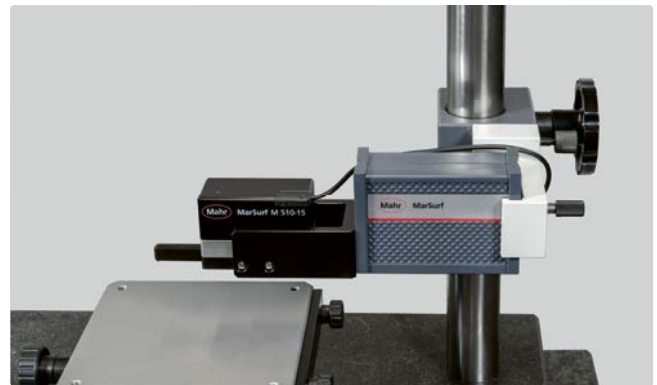


### **Adapter** for MD 26 holder

Item number: 6910318

Compatible with MarSurf M 510-50/75

# **MarSurf** M 510

6910310 – MarSurf M 510-15 | 6910311 – MarSurf M 510-50 | 6910312 – MarSurf M 510-75

| | |
|---|---|
| Measuring range | 1.000 µm |
| Tip radius | 2 µm |
| Stylus tip angle | 90° |
| Remainder Rz0<br>when measuring on optical flat | where vt = 0.1 mm/s Rz0 ≤ 20 nm, where vt = 0.5 mm/s Rz0 ≤ 30 nm<br>where vt = 1.0 mm/s Rz0 ≤ 80 nm |
| Measuring length | 15 mm (M 510-15), 50 mm (M 510-50), 75 mm (M 510-75) |
| Travel speed | 0.1 – 2 mm/s |
| Stylus tip guard | Electric lifter |
| Number of measuring programs | > 1.000 |
| Filter | Gaussian, DIN EN ISO 16610-21, ISO 13565-1, VDA 2008, DIN EN ISO 16610-31 |
| ISO standards | DIN EN ISO 4287, DIN EN ISO 13565 (part 1 and 2), DIN EN ISO 21920-2 : 2021 |
| Other standards | Daimler MBN 31007, SEP 1941, JIS 0610 |
| Parameters | Rt, Ra, Rq, Rz, Rp, Rv, Rsk, Rku, Rsm, Rc, Rpc, Rdq, Rmax, Rlq, Rda, Rla, Pt, Rk, Mr1, Mr2, Rpk, Rvk, Rpkx, Rvkx, a1, a2, Wt, Wa, Wca, Wq, Wz, Wp, Wv, Wsk, Wku, Wdq, Wmax, Wlq, Wda, Wla, Rmr30, Rmr60, Rmr90, sSt(g), sSt(f), Wsa(1-5), Wa0.8_O5, Wa0.8_O6, Wa0.8_O7, Wa0.8_O8, Wa0.8_O9, Rpq, Rmq, Rvq, Pmr60, Pc, Pv, Pa, Pp, Wc, Wsw, R3z, WDt, WDSm, WDc, Ry, Wy, Py, Rzx |
| Data interfaces | USB 2.0, USB 3.0, RS 232, QDAS, Excel PDF (fully configurable) |
| Measurements | 52 x 28 x 40 mm (M 510-15), 158 x 40 x 46 mm (M 510-50, M 510-75) |
| Weight | 150 g (M 510-15), 200 g (M 510-50, M 510-75) |

**Scope of delivery**

- MiniProfiler MarSurf M 510-15, M 510-50 or M 510-75 and 3 m cable

- BMT evaluation software

- Case

- Calibration certificate

# **Compact skidded probe system** for straightforward roughness measurement

Horizontal, vertical or overhead – the PocketSurf allows you to easily measure in any position depending on your purpose. Even difficult to reach surfaces e.g. on the inner and outer diameters are accessible. Select one of the two device options with either a stylus tip of 5 µm /.0002" or 10 µm/.0004" for even more flexibility.

- ● Measured path corresponding to 1, 3 or 5 times the cutoff wavelength
- ● 0.8 mm/0.030" adjustable
- ● Four locking probe positions – axial or at angles of 90°, 180° or 270°
- ● MarConnect data output for simple data transmission, compatible with common data recording systems
- ● Messages indicating when ranges exceeded or undershot
- ● Sturdy housing made of cast aluminum for accurate and reliable measurement operation over many years
- ● Reading of all the parameters after the measurement is completed

## 5 µm
___
## 10 µm
**stylus tip**
(Variant selectable)

## 4
**selectable parameters:**
Ra, Rmax/Ry, Rz

## 9 V
**battery**
for improved service life


PocketSurf IV
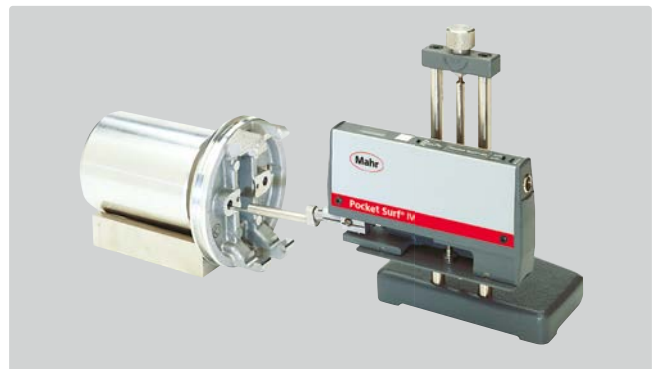

Roughness measurement with measuring tripod

# **MarSurf** PocketSurf IV

Item no. 2191802 (5 µm stylus tip) | Item no. 2191800 (10 µm stylus tip)
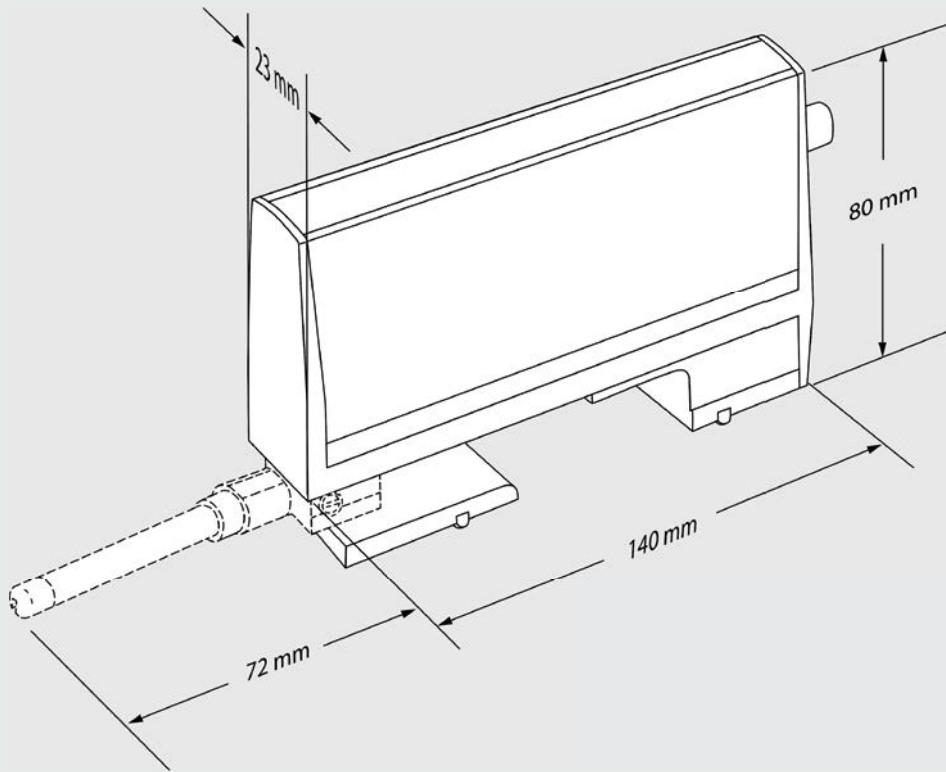


| | |
|---|---|
| Measuring principle | Stylus method |
| Probe | Piezoelectric skidded probe |
| Parameters | Ra, Ry, Rmax, Rz |
| Unit of measurement | metric/inches |
| Measuring range | Ra - 6.35 µm/250 Ry, Rmax, Rz - 25.3 µm/999 µin |
| Profile resolution | 0.01 µm/1 µin |
| Number n of sampling lengths as per ISO/JIS | selectable: 1 to 5 |
| Stylus tip | 5 µm/.0002" (item no. 2191802) |
| | 10 µm/.0004" (item no.2191800) |
| Measuring force (N) | 15 |
| Data interface | RS-232C, USB |
| Battery | Battery, 9 V |
| Dimensions | 140 x 76 x 6.35 mm |

# Valuable additions
## for your measuring tasks

Equally as important as the quality of a measuring instrument is the software with which the recorded data is processed. With MarProfessional and MarWin Easy Roughness, Mahr offers you intuitive user guidance, numerous options for data analysis as well as subsequent further processing.

Even the accessories of a piece of measuring equipment often not only consist of replacement parts but rather expand your room for maneuver thanks to additional or more accurate measuring options for your device.

| Messen | Messassistent | Quick&Easy | Öffnen | Speichern | Drucken | Einstellungen | ? Hilfe | X Beenden |

wertung Protokoll Protokollvorschau Export

ADK

MRK

0.77 mm

11 %

100%
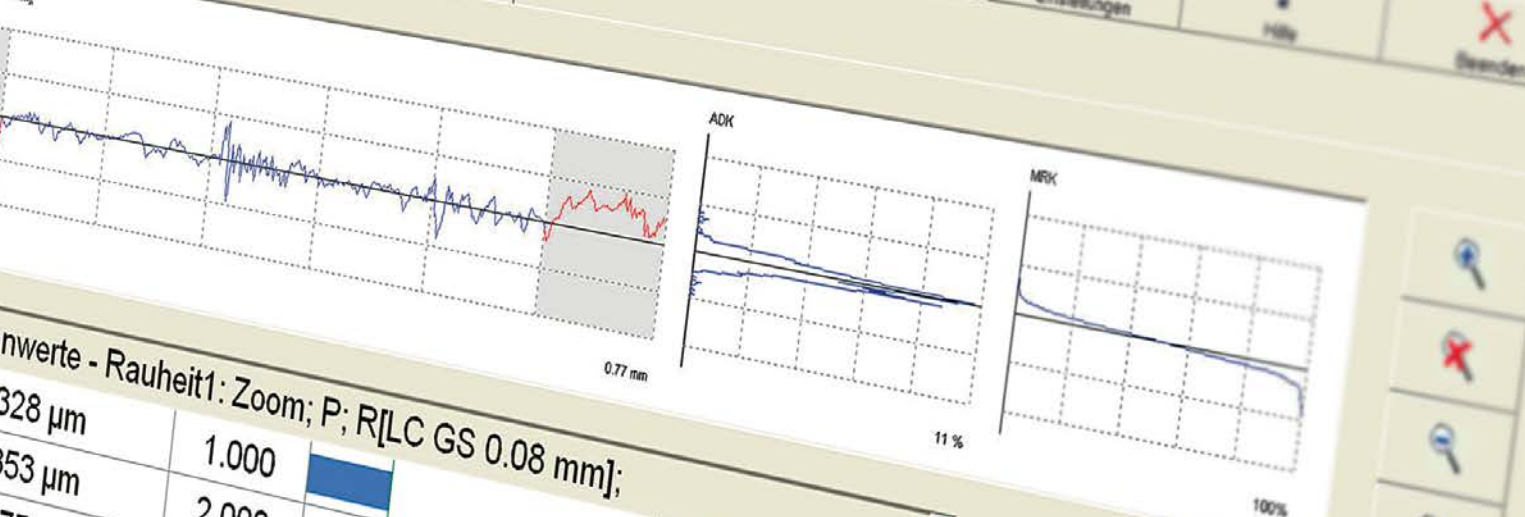
| nwerte - Rauheit1: Zoom; P; R[LC GS 0.08 mm]; | | | | |
|---|---|---|---|---|
| 328 µm | | | | |
| 353 µm | 1.000 | | | |
| 75 µm | 2.000 | | | |
| 75 µm | 5.000 | | 3.000 | |
| 3 µm | 0.000 | | 7.000 | |
| | 0.000 | | 10.000 | |
| | 0.000 | | 7.000 | |

nwerte - Rauheit1: Zoom; P; R[LC ISO 13565 0.08 mm];

| µm | | | 0.000 | |
| | 0.000 | | 0.000 | |
| | 0.00 | | | |
| | | | 0.000 | |
| | | | 0.00 | |

Messung:

Vorschubgerät:
SD26
Taster:

Lt:
  1.07 mm
Ls:
  2.50 µm
VB:
  +/-250.0 µm
Vt:
  1.00 mm/s
Punkte:
716

(F6)

(F7)

(F8)

(F9)

BFW A 10-45-2/90 0815

(F10)

Toleranzüberschreitung

(F11)

Benutzer: Administrator

(F12)
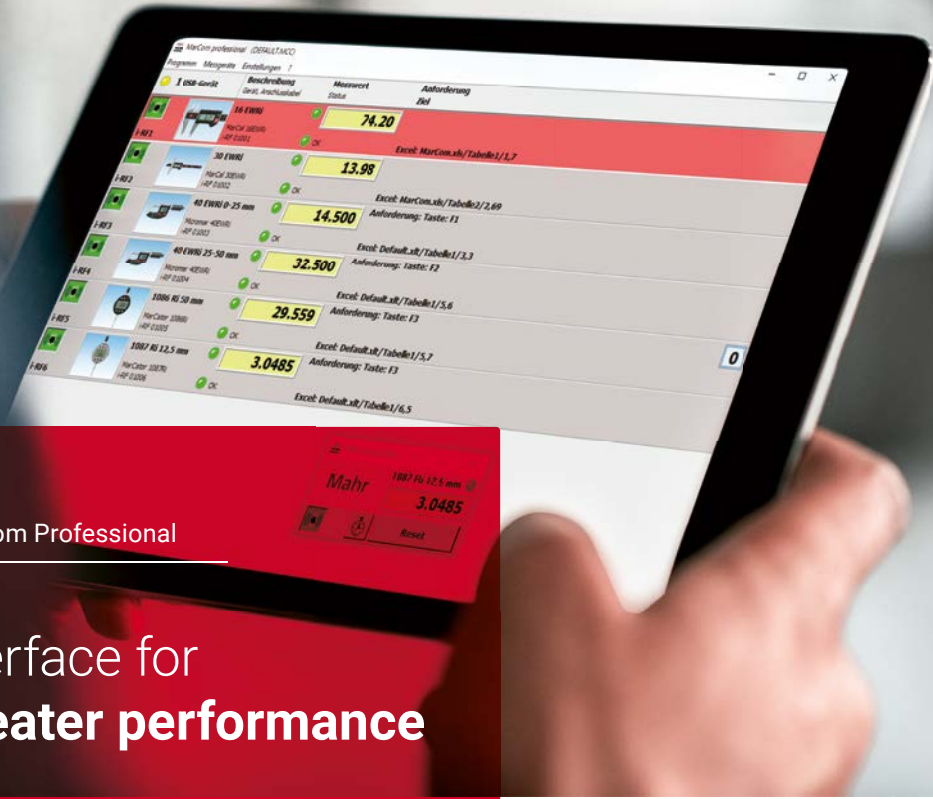
# Your interface for
## even greater performance

Two steps to the goal: Combine your measuring instruments with the multifunctional MarCom Professional software. This versatile interface tool combines data acquisition and data transfer with your data processing in a straightforward way. How you process the collected data is entirely up to you:

Choose your output medium and vary it between four output formats:

◉ Virtual interface box: CAQ/SPC software

◉ Intelligent Excel interface: Microsoft Excel

◉ Emulation keyboard: any Windows software

◉ ext file: flexible data processing

### Powerful and user-friendly

Perfectly coordinated: MarCom Professional is the ideal data transfer software for your quality assurance and manufacturing needs. A number of useful functions offer users maximum convenience when recording and transferring measurements.

Advantages:

• IATF ready: Transfers and displays the measuring equipment ID as well as item and serial number to clearly allocate the measuring equipment to the measurements

• Tab settings in up to 3 areas: settings, device parameters and goal

• Scalable measurement value display

• Manual drag and drop sorting of device overview

• Additional values are transferred to supplementary columns

• Device parameters can be preset: Reference values as well as function locks can be queried and changed on the instrument

# Established software
## for any situation

The MarWin software platform from Mahr has established itself as a measuring and evaluation software package in over sixty countries and is used by many Mahr reference customers. It is the overarching software base for numerous Mahr product families (MarSurf, MarForm and MarOpto). MarWin Easy Roughness is your first choice for all MarSurf applications thanks to its versatile customization and configuration options and comprehensive functions.

Compatible with
all PC-based MarSurf
applications



"Evaluation" screen: Result with profile, AD curve,
Mr curve and tolerance monitoring



Section from the "RoughnessPlus" section. Virtual rulers to interactively set distances in X and Z direction in the profile field

**Advantages:**

- Easy to operate with many measuring and evaluation criteria

- Predefined, standardized thread parameters and curves for quick and reliable operation

- Detailed result records with profile, AD curve, Mr curve and tolerance monitoring

- Integrated measuring assistant: strategic setting of measuring conditions for certain measuring tasks including instructions to guide the user

- Select from over 80 parameters for R, P and W profiles according to current ISO/JIS or MOTIF standards (ISO 12085)

- Automatic functions for choosing cut-off and traversing length in accordance with standards (patented)

MarSurf mobile solutions

# Clever combination:
## High performer for surface measurements

Combine the new MarSurf M 310/M 410 with the tried and tested MarWin EasyRoughness software and use it as a drive unit for your surface measurements. This adds many parameters to the measuring spectrum, enabling you to complete even more comprehensive evaluations, combining the handiness of the MarSurf M 310/M 410 with the advanced range of software functions.

Simply connect the measuring instrument to the computer by cable or wireless technology. Roughness software is your first choice for all MarSurf applications thanks to its versatile customization and configuration options and comprehensive functions, such as cutting profiles, exporting data, multiple measurements, and much more.

- ⬤ Numerous functions already included in the software, such as cutting profiles, exporting data, and completing multiple measurements

- ⬤ Software can be upgraded to include a variety of options, such as "OS-STAT" "Digital I/0" or "Profile processing"

- ⬤ User administration for logging on and administering users with different rights

- ⬤ Automatic export of profile files, results files, and records in PDF format

- ⬤ Interactive zoom to specify a profile section to be evaluated and recalculate selected parameters
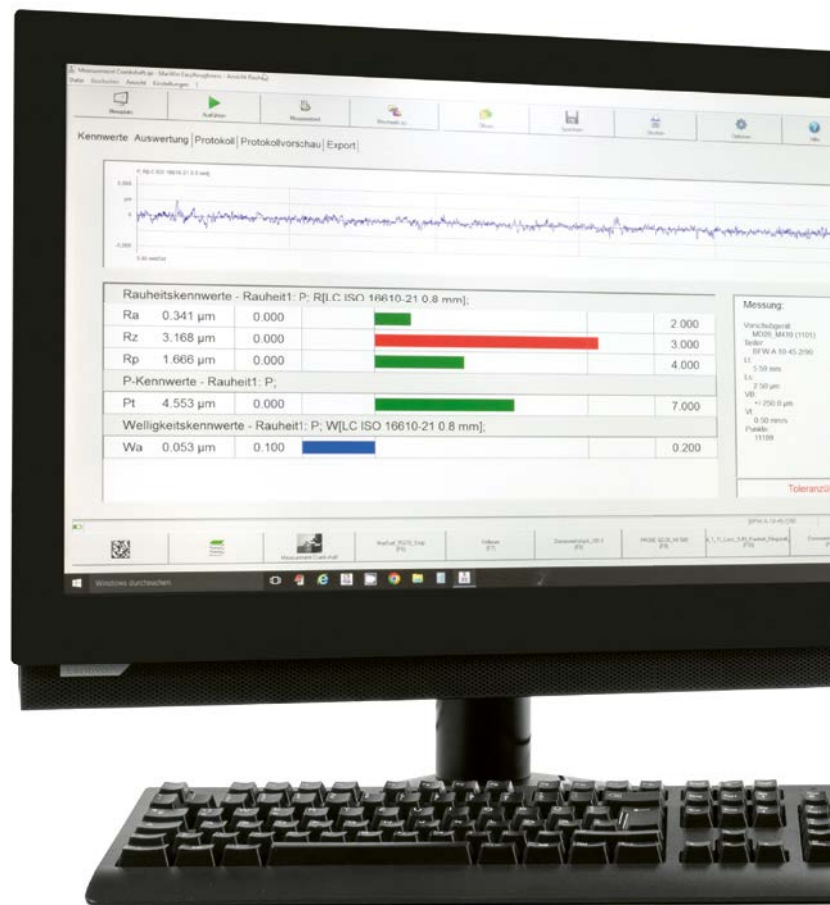
# Highlights
at a glance

## Multiple measurement

Twin contour and multiple measurements can be carried out with segmentations. Depending on the drive unit selected and the measuring stand, it is possible to perform an automatic zenith search, implement absolute and relative positioning, and program automatic processes. The software provides a measuring station view with operating messages and sometimes photos between measurements.

## Profile processing

This function makes it possible to process profiles, such as cutting out valleys or peaks, simulating spheres, mirroring profiles, rotating profiles, integrating additional ranges, or merging two or more profiles into a new one. In addition, edge filters hide topics that should not be evaluated.

## Virtual rulers

Interactive setting of distances in X and Z direction in the profile field make it possible to view defined profile sections.

## Start program sequences using function keys

A user-friendly click is all it takes to activate results, profiles, globally standardized parameters and characteristic curves. They can then simply be output in the record. The entries can be selected directly from the "Surface parameters", "Evaluation", "Measuring record", and "Record preview" tabs, making the system quick and simple to use.

# **MarSurf** MD 26 with EasyRoughness mobile software

**MarWin**
Easy Roughness mobile
Item no. 6299436

MarSurf MD 26 Set
Item no. 6910292

## Accessories

Probe arms, measuring stands, holder, XY-table,
vise, calibration masters, etc.

Add multiple MarSurf MD 26
drive units to a software con-
nection by cable

# **MarSurf** M 410 with
# EasyRoughness mobile software

MarSurf M 410 Set

Item no. 6910290

**MarWin**
Easy Roughness mobile
Item no. 6299436

## Accessories
Probe arms, measuring stands, holder, XY-table,
vise, calibration masters, etc.

An M 410 can be connected
to the software wirelessly
or with a cable.

# One software,
## many possibilities

### Option
### "Digital I/0"

Item number: 6268392

For all MarWin software, digital I/O box with 8 inputs/8 outputs, "Digital I/O" license and remote control functionality e.g. via PLC to integrate the MarWin measuring station into a production process.

### Option
### "Profile processing"

Item number: 6292269

With the three functional areas: edge filters to hide areas, profile processing (e.g. cutting out valleys or peaks, simulating spheres, mirroring profiles, rotating profiles, adding additional areas etc.) as well as profile processing (merging two or more profiles into a new one).

### Option
### "User-defined parameters"

Item number: 6292270

To integrate customer-specific parameters programmed by Mahr application engineering.

### Option
### "QS-STAT Plus"

Item number: 6292271

For exporting features as per Q-DAS including manual and the possibility of changing the type, length and description, for example, as well as incorporating customer requirements and/or measuring programs.

### Option
### "QS-STAT"

Item number: 6292268

For easy export of features as per Q-DAS including manual support of 31 AutoKeys.

### Option
### "Dominant waviness"

Item number: 6292203

As per VDA 2007: 2007-02 with calculable thread parameters WDSm, WDc and WDt.

# Valuable additions
## Spare parts and accessories

Spare part components of a piece of measuring equipment are often not simply spare parts when it comes to a defect. Much more than that, they expand your room to maneuver as a metrologist by offering you additional or more accurate measuring options for your instrument.

### PHT3-350

Item number: 6111521

Compatible with MarSurf PS 10 and M 310

- System: Single-skid probe
- Skid radius: in tracing direction 25 mm, perpendicular 1.45 mm
- Floating point: 0.9 mm in front of the stylus
- Measuring range: 350 µm
- Specifications: for holes starting at 3 mm Ø, to 17 mm depth, min. workpiece length = traversing length + 1 mm



### PHT11-100

Item number: 6111524

Compatible with MarSurf PS 10 and M 310

- System: Single-skid probe
- Skid radius: in tracing direction 25 mm, perpendicular 2.9 mm
- Floating point: 0.8 mm in front of the stylus
- Measuring range: 100 µm
- Specifications: for flat surfaces, bores starting at 11 mm Ø to 14 mm depth, grooves from 2.5 mm width and up to 7.5 mm depth



### PHTF 0.5-100

Item number: 6111522

Compatible with MarSurf PS 10 and M 310

- Caibration using PGN geometry standard
- System: Single-skid probe
- Skid radius: in tracing direction 25 mm, perpendicular 1.45 mm
- Floating point: 0.6 mm next to the stylus
- Measuring range: 100 µm
- Specifications: e.g. for tooth flanks starting from module 0.8

## PHTR-100

Item number: 6111525

Compatible with MarSurf PS 10 and M 310

- System: Single-skid probe with side skid
- Skid radius: 0.3 mm in tracing direction
- Stylus: 2 µm, 90 °
- Specifications: For measurements on concave and convex surfaces
- Calibration: using PGN geometry standard
- Measuring range 100 µm



## PT150

Item number: 6111523

Compatible with MarSurf PS 10 and M 310

- System: Dual-skid probe
- Skid radius: in tracing direction 50 mm, perpendicular 3 mm
- Floating point: 4.5 mm in front of the stylus
- Measuring range: 150 µm
- Specifications: for sheets and roller surfaces

    Note: Important – probe extension required!
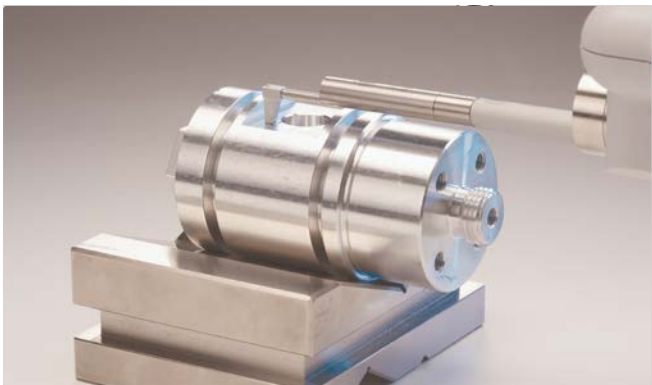


## Probe extension PHT

Item number: 6850540

Compatible with MarSurf PS 10 and M 310

Probe extension PHT (80 mm) for P probes, e.g. for measuring points located deep inside cylinders



## Magnetic fixture

Item number: 6850500

Compatible with MarSurf PS 10 and M 310

Magnetic fixture to directly attach the MarSurf M 310 to magnetic measuring objects (e.g. sheets and rollers)
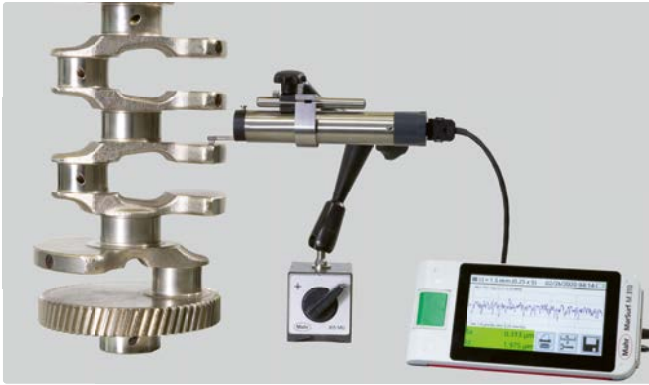
## Measuring stand 815 MA

Item number: 4416000

Compatible with MarSurf PS 10 and M 310

- Support arm with two joints
- Powerful ON/OFF magnet
- Magnetic force transferred via flat and prismatic base and front of the machine base
- Stainless steel column and support arm
- Fine adjustment at support arm

## Measuring stand ST-D

Item number: 6710803

Compatible with MarSurf PS 10 and M 310

- Height adjustment of holder using handwheel 0 up to 300 mm
- Dimensions: 175 x 190 x 385 mm
- Weight: approx. 3 kg





## Measuring stand ST-G

Item number: 6710807

Compatible with PS 10, M 310, M 410

- Granite base plate with a 10 mm T-groove for clamping workpiece holders.
- Height adjusted with handwheel for easy and accurate setup of the relevant measuring height.
- Dimensions: 500 x 300 x 415 mm (L x W x H)
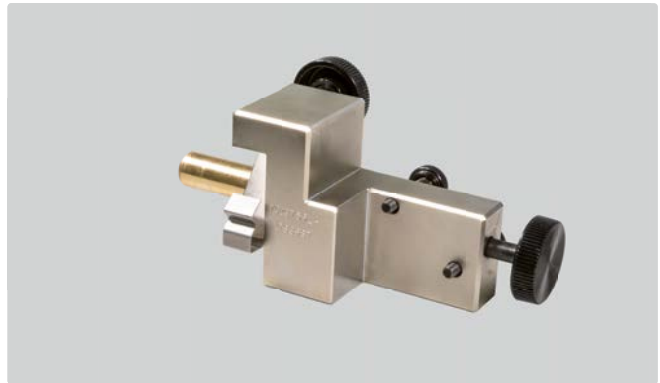
## Holder on measuring stand ST-D / F / G

Item number: 6910294

Compatible with MarSurf M 410/MD 26

For attaching the entire M 410 or the MD 26 drive unit to a measuring stand.
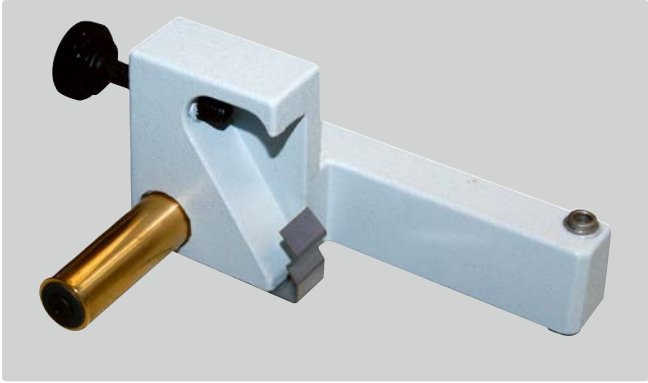
## PS10/M 310 holder

Item number: 6910209

Compatible with PS 10, M 310

MarSurf PS 10/M3 10 holder for attaching the PS 10/M 310 to an ST-D, F, G measuring stand



## RD 18 C/PHT drive measuring tripod holder

Item number: 6910435

Compatible with PS 10, M 310

For attaching the cylindrical drive unit to a measuring tripod with holes of 8 mm diameter



## Handheld support

Item number: 6910434

Compatible with MarSurf PS 10 and M 310

Handheld support for manual use with prismatic contact surfaces for versatile options

**Extra: Height adjustment for handheld support (pair)**

Item number: 6850720



## Case PS 10/M 310

Item number: 7012054 for MarSurf M 310, 6910252 for MarSurf PS 10

Compatible with MarSurf PS 10 and M 310

Case for transportation and storage
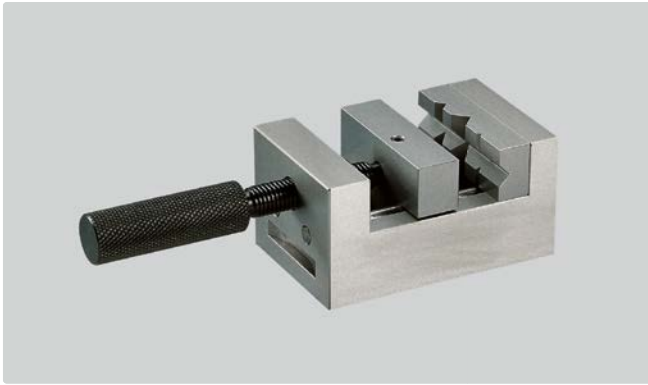
**PPS parallel vise**
for clamping measuring objects

Item number: 6710604

Compatible with MarSurf PS 10, M 310 and M 410

• Jaw width: 70 mm
• Jaw height: 25 mm
• Span width: 40 mm
• Total height: 58 mm
• Weight: 2 kg



**Collet chuck** for perpendicular measurements

Item number: 6850738

Compatible with MarSurf PS 10 and M 310

Collet chuck for MarSurf PHT drive C2, for precise measurements in transverse direction in the production process for Ø 5 mm to 80 mm (with probe protection 6850724 for Ø 100 mm)



**Probe protection,** steel

Item number: 6850716

Compatible with MarSurf PS 10 and M 310

**Other probe protection:**
With V-block attachment, steel
Item number: 6850715
Plastic
Item number: 7028532
With V-block attachment, plastic
Item number: 7028530



**PHT Drive C2 Set**

Item number: 6910426

Compatible with MarSurf PS 10 and M 310
PHT drive C2 set MarSurf for transverse tracing

• Traversing length: 5.6 mm
• Including probe protection and V-block attachment
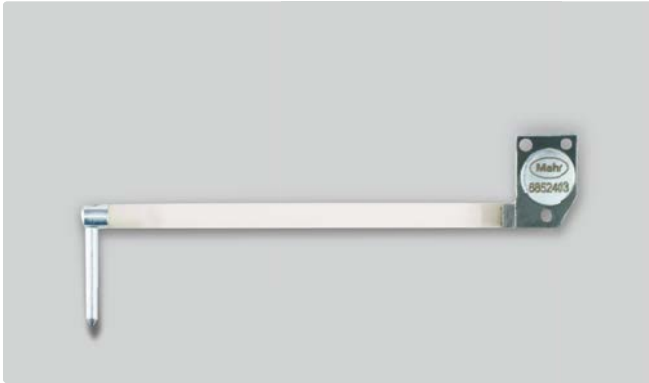
**BFW probe arm** A 10-45-2/90°

Item number: 6852403

Compatible with MarSurf M 410

- For bores from Ø 11 mm
- Probe included in standard set
- Stylus tip radius/material: 2 µm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ±250 µm
- Length A (Length beneath probe arm): 8.0 mm
- Length B (length to center of holder): 36.5 mm
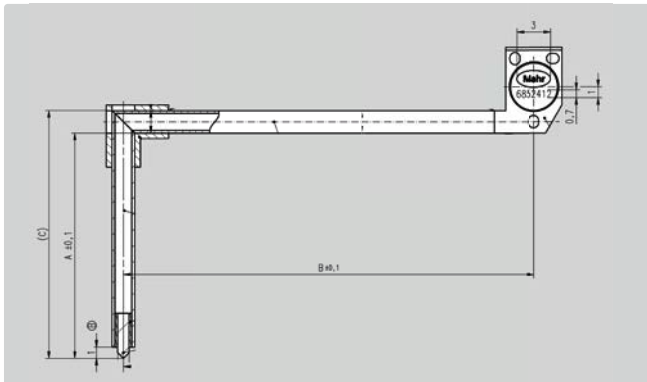- Can be used for holes from Ø 11 mm: approx. 30.0 mm
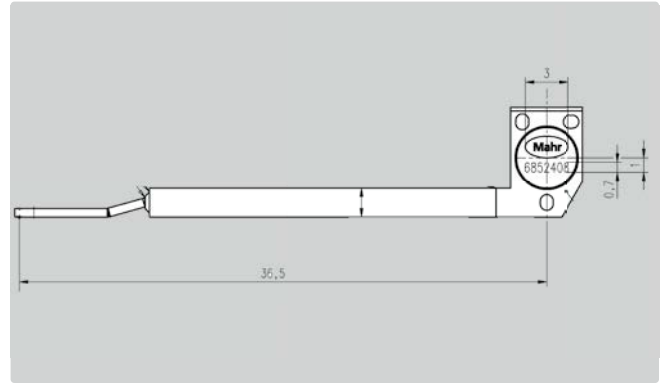


**BFW probe arm** A 0,7-45-2/90°

Item number: 6852408

Compatible with MarSurf M 410

- For holes from Ø 0.9 mm
- Stylus tip radius/material: 2 µm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ±250 µm
- Length beneath probe arm: 0.1 mm
- Length to center of holder: 36.5 mm
- Can be used for bores from Ø 0.9 mm: approx. 10.0 mm
- Bores from Ø 2.5 mm: approx. 30.0 mm
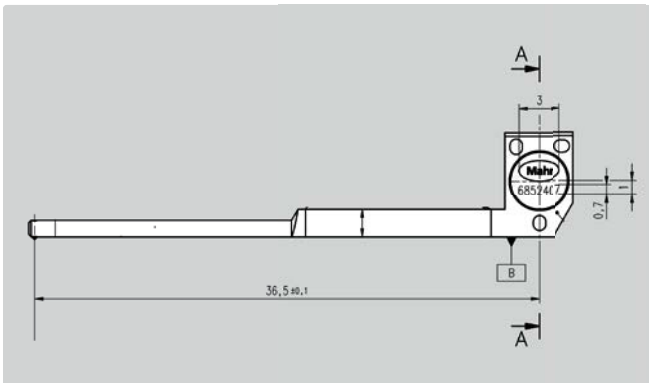


**BFW probe arm** A 1.4-45-2/90°

Item number: 6852407

Compatible with MarSurf M 410

- For bores from Ø 1.5 mm
- Stylus tip radius/material: 2 µm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ± 250 µm
- Length A (length beneath probe arm): 0.2 mm
- Length B (length to center of holder): 36.5 mm
- Can be used for bores from Ø 1.5 mm: approx. 30.0 mm
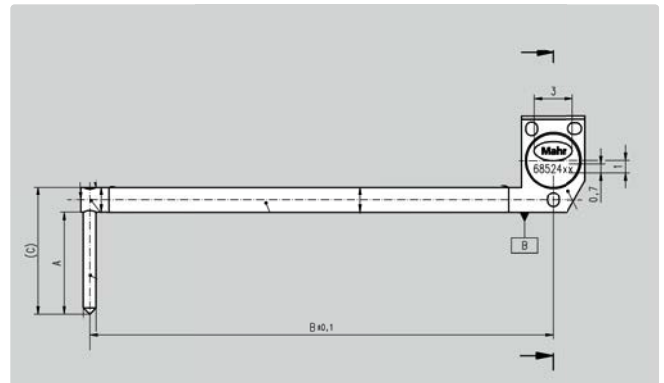


**BFW probe arm** A 4-45-2/90°

Item number: 6852404

Compatible with MarSurf M 410

- For bores from Ø 4.5 mm
- Stylus tip radius/material: 2 µm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ±250 µm
- Length A (length beneath probe arm): 2.0 mm
- Length B (length to center of holder): 36.5 mm
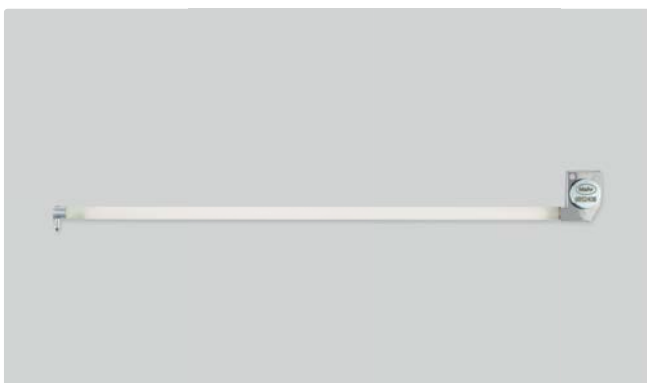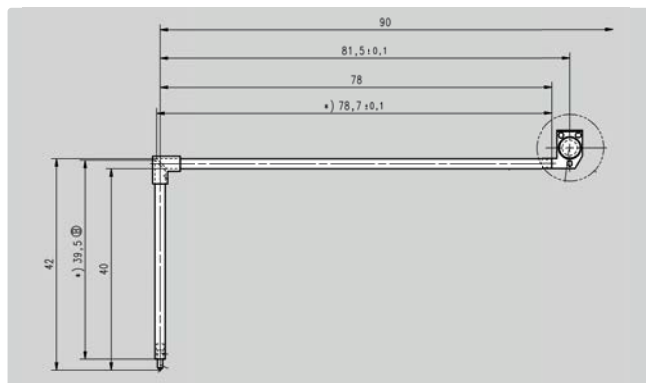- Can be used for bores from Ø 4.5 mm: approx. 30.0 mm

### BFW probe arm A 22-45-2/90°

Item number: 6852412

Compatible with MarSurf M 410

- For depressions up to approx. 20 mm
- Stylus tip radius/material: 2 μm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ±250 μm
- Length A (length beneath probe arm): 20.0 mm
- Length B (length to center of holder): 36.5 mm
- Can be used for holes from Ø 23 mm: approx. 30.0 mm
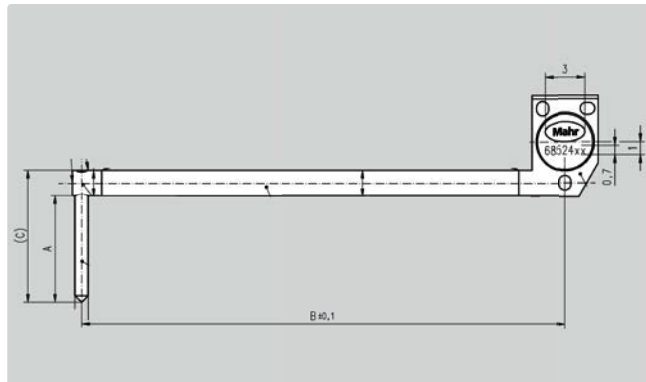
### BFW probe arm A 10-135-2/90°

Item number: 6852411

Compatible with MarSurf M 410

- For measuring range ± 750 μm
- For bores from Ø 11 mm
- Stylus tip radius/material: 2 μm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ±750 μm
- Length A (length beneath probe arm): 8.0 mm
- Length B (length to center of holder): 126.5 mm
- Can be used for holes from Ø 11 mm: approx. 123 mm





### BFW probe arm A 4-90-2/90°

Item number: 6852406

Compatible with MarSurf M 410

- For measuring range ± 500 μm, for bores from Ø 4.5 mm
- Stylus tip radius/material: 2 μm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ±500 μm
- Length A (length beneath probe arm): 2.0 mm
- Length B (length to center of holder): 81.5 mm
- Can be used for bores from Ø 4.6 mm: approx. 75.0 mm

### BFW probe arm A 42-90-2/90°

Item number: 9048671

Compatible with MarSurf M 410

- For depressions up to approx. 40 mm
- Stylus tip radius/material: 2 μm/diamond
- Cone angle of stylus tip: 90 °
- Measuring range: ±500 μm
- Length A (length beneath probe arm): 40.0 mm
- Length B (length to center of holder): 81.5 mm
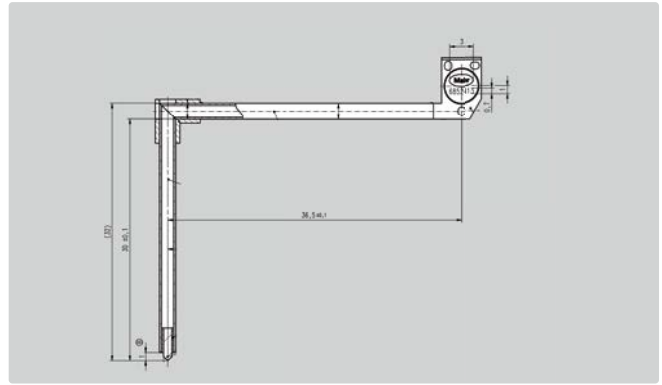- Can be used for bores from Ø 43 mm approx. 78.0 mm
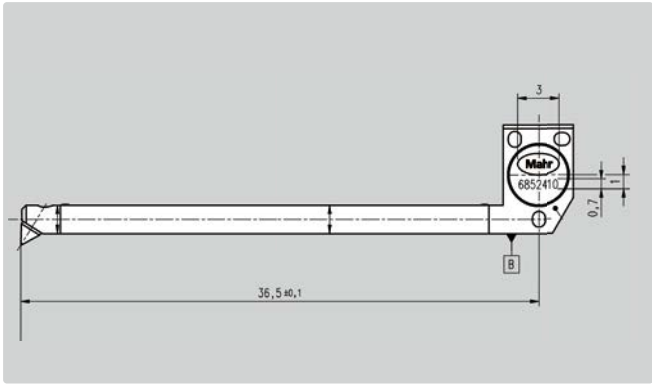
**Probe arm** BFW A 2,8-45-2/60°

Item number: 6852410

Compatible with MarSurf M 410

- Probe arm with tip at 32° angle
- Stylus tip radius: 2 µm
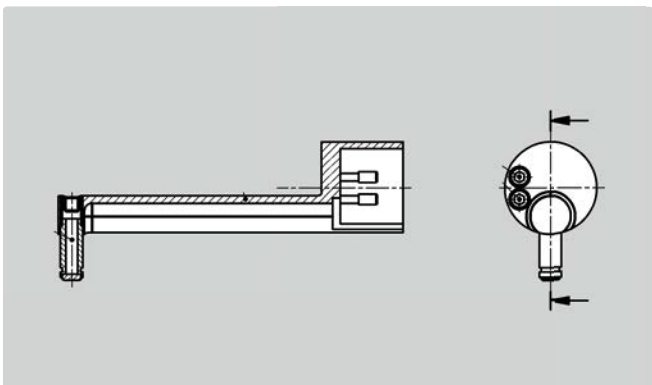- Cone angle of stylus tip: 60°
- Measuring range +/-250 µm



**Probe arm** BFW A 32-45-2/90°

Item number 6852413

Compatible with MarSurf M 410

- Probe arm for depressions up to approx. 30 mm
- Stylus tip radius: 2 µm
- Cone angle of stylus tip: 90°
- Measuring range +/-250 µm



**Skid** for BFW probe arms

Item number: 6852402

Compatible with MarSurf M 410
Only for default probe arm

Total length 46.4 mm



**USB-Scanner** Xenon 1900 Honeywell

Item number: 3028620 (cable version),), 3028820 (wireless version)

Compatible with MarSurf M 310

Area imaging scanner to record barcodes/QR codes
in conjunction with the MarWin EasyRoughness software

## PP **vee-block**

Item number: 6710401

Compatible with MarSurf PS 10, M 310 and M 410

- Vee-block PP with four different vee-blocks to hold turned parts for testing diameters from 1 mm to 160 mm
- Dimensions (mm): 80 x 100 x 40
- Weight: 1.5 kg
- Includes tension springs to clamp light measuring objects in the vee-block



## **XY table** CT 120

Item number: 6710529

To hold and align measuring objects Compatible with MarSurf PS 10, M 310 and M 410

- Can be moved 15 mm in two coordinates.
- Table surface (mm): 120 x 120 with two quick clamping shoes in the vee-block



## **Testing and geometry standard**
(ISO 5436-1, C3) including DAkkS/ DKD calibration certificate

Item number: 6820520

Compatible with MarSurf PS 10 and M 310

- Rz, Rmax 9.5 µm, Ra 3.0 µm
- RSm 100 µm
- Large measuring surface



## **Precision vises 109 PS,** set

Item number: 4246819

Compatible with MarSurf PS 10, M 310 and M 410

- With mini precision vise sets, V-blocks, carrier plates, tripods and mini indexing heads in the plastic case
- Jaw width: 15/25/35 mm

**Roughness standard** PRN 10

Item number: 6820420

Compatible with MarSurf PS 10, M 310 and M 410

- Including Mahr calibration certificate
- Surface standard with turned profile, chrome-plated, profile approx. 10 µm
- For testing the roughness measuring station



**MSS 3 Mahr surfaces combi standard**
ISO 5435-1, Type A1 and C3

Item number: 9047438

Compatible with MarSurf PS 10, M 310 and M 410

- Cuboid shape with sinusoidal periodic profile, depth adjustment groove, optical flat range
- Metal with nickel layer
- Parameters approx.: Depth adjustment groove Pt 12.0 µm, Rmax 3.0 µm, Rz 3.0 µm, Ra 1.0 µm, optical flat surface Rz0 0.02 µm
- Without calibration certificate



**Wireless printer set**

Item number: 6910271

Compatible with MarSurf M 310/M 410

- Set consisting of Star Micronics SM-L200 Bluetooth® printer and USB wireless adapter
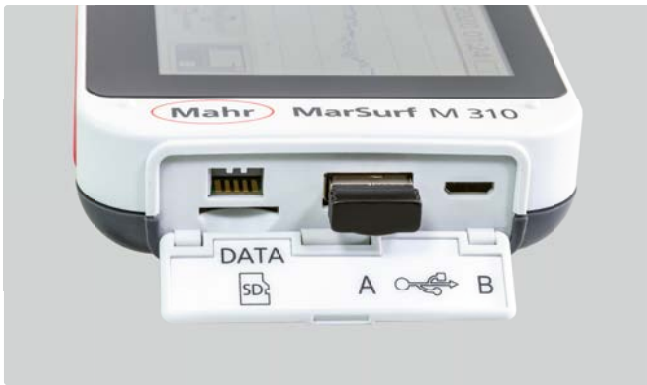- For printing results and profiles either with cable or wireless



**Data connection cable**

Item number: 4102603

Compatible with MarSurf PS 10 / M 310 / M 410

- USB bidirectional DK-U1 for connecting to MarCom software
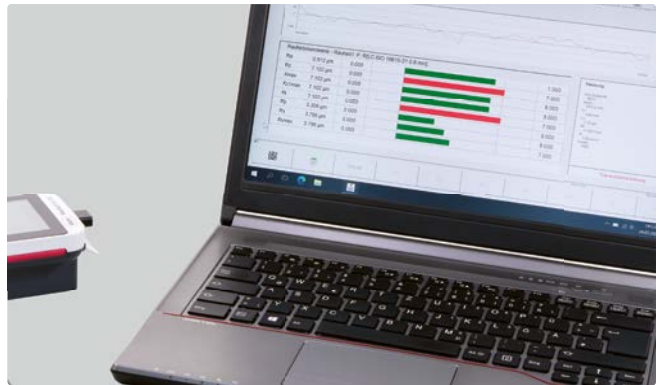- For transferring measuring results, e.g. to Excel

## USB wireless adapter

Item number: 3008896

Compatible with MarSurf M 310/M 410

- For transferring the measuring results data to MarCom
- For use with the wireless Star Micronics SM-L200 Bluetooth® printer



## Marwin Easy Roughness mobile

Item number: 6299436

Compatible with MarSurf M 310/M 410/MD 26

- Roughness software for advanced evaluation
- Software for controlling the MarSurf M 310/M 410 and MD 26



## MGS 1 geometry standard
incl. Mahr calibration certificate

Item number: 6800000KAL

Compatible with MarSurf PS 10 / M 310 / M 410

- MGS 1 geometry standard
- ISO 5436-1, type C3
- Sinusoidal profile, glass
- Parameters approx.: Rmax 1.0 µm, Rz 1.0 µm, Ra 0.3 µm



## MGS 1 geometry standard
incl. DAkkS/DKD calibration certificate

Item number: 6800000DKS

Compatible with MarSurf PS 10 / M 310 / M 410

- MGS 1 geometry standard
- ISO 5436-1, type C3
- Sinusoidal profile, glass
- Parameters approx.: Rmax 1.0 µm, Rz 1.0 µm, Ra 0.3 µm

**MGS 3 geometry standard**
incl. Mahr calibration certificate

Item number: 6800001KAL

Compatible with MarSurf PS 10 / M 310 / M 410

• MGS 3 geometry standard
• ISO 5436-1, type C3
• Sinusoidal profile, glass
• Parameters approx.: Rmax 3.0 µm, Rz 3.0 µm, Ra 0.9 µm



**MGS 3 geometry standard**
incl. DAkkS/DKD calibration certificate

Item number: 6800001DKS

Compatible with MarSurf PS 10 / M 310 / M 410

• MGS 3 geometry standard
• ISO 5436-1, type C3
• Sinusoidal profile, glass
• Parameters approx.: Rmax 3.0 µm, Rz 3.0 µm, Ra 0.9 µm



**MGS 10 geometry standard**
incl. Mahr calibration certificate

Item number: 6800002KAL

Compatible with MarSurf PS 10/M 310/M 410

• MGS 10 geometry standard
• ISO 5436-1, type C3
• Sinusoidal profile, glass
• Parameters approx.:
  Rmax 9.0 µm, Rz 9.0 µm, Ra 2.0 µm



**MGS 10 geometry standard**
incl. DAkkS/DKD calibration certificate

Item number: 6800002DKS

Compatible with MarSurf PS 10/M 310/M 410

• MGS 10 geometry standard
• ISO 5436-1, type C3
• Sinusoidal profile, glass
• Parameters approx.:
  Rmax 9.0 µm, Rz 9.0 µm, Ra 2.0 µm

Removable folding card

# Roughness:
# **Parameters**

Use our practical folding card to keep all relevant parameters on hand – in one place and available at a glance.

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