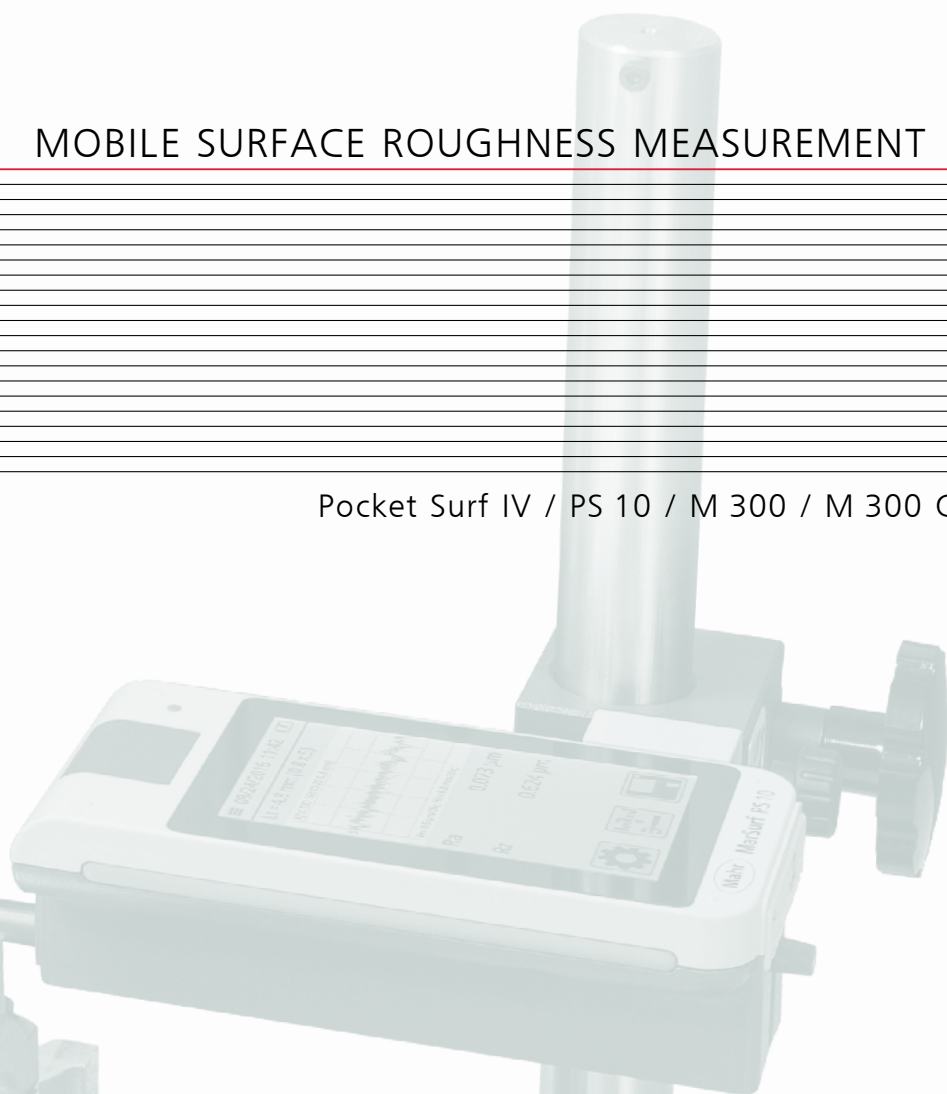


MARSURF | MOBILE SURFACE ROUGHNESS MEASUREMENT



Pocket Surf IV / PS 10 / M 300 / M 300 C



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- 0 +

Mahr

E X A C T L Y

IN THE PAST, THERE WAS THE FINGERNAIL TEST TODAY, THERE IS MARSURF



The test information on MARSURF products can be found on our website:
www.mahr.com

► | Wherever surface structures influence the function, processing or appearance of components or products, careful testing is essential. But how can surfaces be tested? At the beginning of the 20th century, experts were still testing by eye and touch. They believed a practiced eye could detect features in the μm range, and even the much maligned thumbnail test delivered perfectly acceptable results. We currently live in an age of interchangeable parts and globalization, where subjective tests as such are no longer adequate. Today, computer-aided measuring instruments provide objective data. Because of this, measurement and evaluation have become considerably easier. For decades, Mahr has been a worldwide pioneer in this area, as demonstrated by the company's numerous innovations and patented solutions in the field of surface roughness metrology. The interplay between the stylus, drive and measuring setup plays a key role in influencing the quality of surface measurement tasks. Over this time, we have succeeded in perfecting the stylus method, which is now in widespread use throughout the world. We can meet even the most demanding requirements for non contact measurement, e.g. where extremely soft materials or ultra short measuring times are involved, thanks to the range of optical sensors offered in the MarSurf product family. Developed with Mahr quality, expertise and know-how, MarSurf is the solution for all your surface metrology needs.

MarSurf | Mobile Surface Roughness Measuring Instruments

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DEFINITIONS

Real surface separates a body from the surrounding medium. (EN ISO 4287)

Stylus instrument enables two-dimensional tracing of a surface. The stylus is traversed normal to the surface at constant speed. (EN ISO 3274)

Traced profile is the enveloping profile of the real surface acquired by means of a stylus instrument. The traced profile consists of form deviations, waviness and roughness components. (EN ISO 3274, DIN 4760)

Parameters usually are defined over the sampling length. An average parameter estimate is calculated by taking the arithmetic mean of the parameter estimates from all the individual sampling lengths. For roughness profile parameters, the standard number of sampling lengths is five.

For curves and related parameters (e.g. material ratio), the basis for the calculation of the parameters' values is the evaluation length. (EN ISO 4288)

Traversing length l_t is the overall length traveled by the stylus when acquiring the traced profile. It is the sum of pre-travel, evaluation length l_n and post-travel.

Cutoff λ_c of a profile filter determines which wavelengths belong to roughness and which ones to waviness.

Sampling length l_r is the reference for roughness evaluation. Its length is equal to the cutoff wavelength λ_c .

The sampling lengths l_p and l_w , respectively, are the reference lengths for the P-profile and the W-profile evaluation.

Evaluation length l_n is that part of the traversing length l_t over which the values of surface parameters are determined. The standard roughness evaluation length comprises five consecutive sampling lengths.

Pre-travel is the first part of the traversing length l_t .

Post-travel is the last part of the traversing length l_t . Pre-travel and post-travel are required for phase correct filtering.

R_a , R_q Mean Roughness

EN ISO 4287, ASME B46.1

Roughness average R_a is the arithmetic average of the absolute values of the roughness profile ordinates.

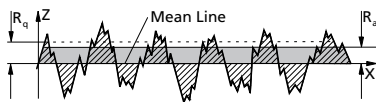
$$R_a = \frac{1}{l} \int_0^l |Z(x)| dx$$

Root mean square (RMS) roughness R_q is the root mean square average of the roughness profile ordinates.

$$R_q = \sqrt{\frac{1}{l} \int_0^l Z^2(x) dx}$$

$Z(x)$ = profile ordinates of the roughness profile.

R_a is also called AA and CLA, R_q also RMS.



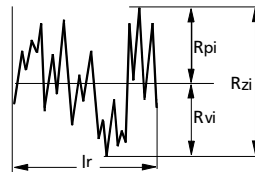
R_p Peak Height, R_v

EN ISO 4287, ASME B46.1

R_p is the height of the highest profile peak of the roughness profile within one sampling length. According to ASME, the R_p mean value (average calculated over the evaluation length) is called R_{pm} .

R_v is the depth of the deepest profile valley of the roughness profile within one sampling length. So far, the parameter symbol R_m was used in place of R_v .

The sum of R_p + R_v is the single roughness depth R_z .



Selection of Cutoff λ_c

EN ISO 4288, ASME B46.1

Periodic Profiles	Nonperiodic Profiles		Cutoff	Sampl./ Eval. Length
R _{sm} (mm)	R _z (μm)	R _a (μm)	λ _c (mm)	l _r / l _n (mm)
over 0,013 up to 0,04	up to 0,1 over 0,1	up to 0,02	0,08	0,08 / 0,4
over 0,04 up to 0,13	up to 0,5 over 0,5	over 0,02 up to 0,1	0,25	0,25/ 1,25
over 0,13 up to 0,4	up to 10 over 10	over 0,1 up to 2	0,8	0,8 / 4
over 0,4 up to 1,3	up to 50 over 50	over 2 up to 10	2,5	2,5 / 12,5
over 1,3 up to 4	up to 200	over 10 up to 80	8	8 / 40

R_z , R_{max} Roughness Depth

EN ISO 4287, ASME B46.1

Single roughness depth R_{zi} is the vertical distance between the highest peak and the deepest valley within a sampling length.

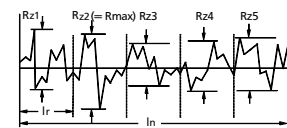
Mean roughness depth R_z is the arithmetic mean value of the single roughness depths R_{zi} of consecutive sampling lengths:

$$R_z = \frac{1}{n} (R_{z1} + R_{z2} + \dots + R_{zn})$$

The R_z definition is identical to the definition in DIN 4768:1990. The ten point height R_z as well as the parameter symbol R_y of ISO 4287:1984 have been canceled.

Maximum roughness depth R_{max} is the largest single roughness depth within the evaluation length.

(cf. EN ISO 4288; R_{max} is also called R_{z1max})



R_{mr} , t_p Material Ratio

EN ISO 4287, ASME B46.1

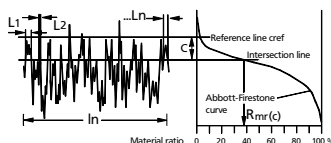
Material ratio R_{mr} (ASME: bearing length ratio t_p) is the ratio expressed in percent of the material-filled length to the evaluation length l_n at the profile section level c.

$$R_{mr} = (L_1 + L_2 + \dots + L_n) 100 [\%]$$

The profile section level c is the distance between the evaluated intersection line and the specified reference line c_{ref} .

Material ratio curve (Abbott-Firestone curve) shows the material ratio R_{mr} as a function of the profile section level c.

The material ratio can also be evaluated on the P- or the W-profile (P_{mr} or W_{mr}).



R_k , R_{pk} , R_{vk} , M_{r1} , M_{r2}

EN ISO 13565-1 and -2

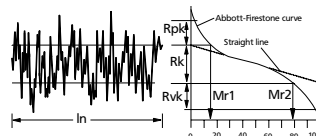
The roughness profile as per 13565-1 is generated by a special filtering technique minimizing profile distortions due to deep valleys in plateau profiles. A straight line divides the Abbott-Firestone curve into three areas from which the parameters are then computed as per 13565-2:

Core roughness depth R_k is the depth of the roughness core profile.

Reduced peak height R_{pk} is the mean height of the peaks protruding from the roughness core profile.

Reduced valley depth R_{vk} is the mean depth of the valleys protruding from the roughness core profile.

M_{r1} and M_{r2} are the smallest and the highest material ratios of the roughness core profile.



R_{sm} , $R_{\Delta q}$

EN ISO 4287, ASME B46.1

Mean width of profile elements R_{sm} is the arithmetic mean value of the widths of profile elements of the roughness profile.

$$R_{sm} = \frac{1}{n} \sum_{i=1}^n X_{si}$$

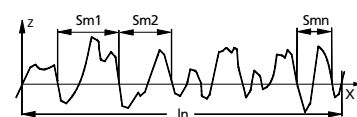
A profile element consists of a profile peak and an adjacent profile valley.

A_p is an older designation for R_{sm} .

Root mean square slope $R_{\Delta q}$ is the root mean square average of all local profile slopes.

$$R_{\Delta q} = \sqrt{\frac{1}{l} \int_0^l \left(\frac{dz}{dx} \right)^2 dx}$$

The local profile slope is computed via a leveling function in order to reduce the influence of noise.



Pocket Surf® IV Portable Surface Roughness Gage



A pocket-sized, economically priced, completely portable instrument which performs traceable surface roughness measurements on a wide variety of surfaces; can be used confidently in production, on the shop floor and in the laboratory.



▲ Easy, single button operation



▲ Built-in measurement output



▲ Economical and simple to replace battery

FEATURES

- Durable cast aluminum housing provides accurate and reliable surface finish gaging
- Measures four switch selectable parameters: R_a , R_{max}/R_y , R_z
- Reviews parameters after measurement is complete
- Selectable traverse length 1, 3 or 5 cut-offs of 0,8 mm / 0.030 in
- Operates in horizontal, vertical, and upside down positions
- Four switchable probe positions - axial (folded) or at 90°, 180° or 270°
- Difficult-to-reach surfaces (inside and outside diameters)
- MarConnect data output for SPC-processing that is compatible with common data processing systems
- Easy-to-read LCD readout
- Roughness within half a second after the surface is traversed
- Out-of-range (high or low) and battery low signals displayed
- Improved digital calibration process eliminate scandrivers and potentiometers to simplify and enhance the calibration process
- Improved battery life and easy-to-replace standard 9V battery

TECHNICAL DATA

Dimensions		140 mm x 76 mm x 25 mm / 5.5 in x 3 in x 1 in
Weight		435 g / 14 oz
Measuring Ranges	R_a	0,03 μm to 6,35 μm / 1 μin to 250 μin
	R_y	0,2 μm to 25,3 μm / 8 μin to 999 μin
	R_{max}	0,2 μm to 25,3 μm / 8 μin to 999 μin
	R_z	0,2 μm to 25,3 μm / 8 μin to 999 μin
Display Resolution		0,01 μm / 1 μin
Measurement Accuracy		Meets ASME-B46.1, ISO, DIN standards and MIL specifications
Digital Readout		LCD with, "Battery low" signal; "H" and "L" (measured values out-of-range)

TECHNICAL DATA

POCKET SURF SETS		
Order No.	2191800	2191802
Description	90° probe, 10 µm radius, PMD-90101 certified specimen, including test certificate	90° probe, 5 µm radius, PMD-90101 certified specimen, including test certificate
Model No.	EGH-1019	EGH-1026

A Pocket Surf Kit is furnished complete in a fitted case, and includes a Pocket Surf unit with a general purpose probe** and a 3,2 µm/125 µin (nominal) reference specimen**, 9 Volt battery and riser plate.

** Part numbers listed in table above



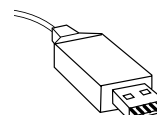
▲ Pocket surf set

PROBING AND TRAVERSE LENGTHS			
Parameters	Traverse Length (Nominal)	Evaluation Length	Number of Cutoffs/ Switch Position*
R_a/R_y	2,0 mm/ 0.075 in	0,8 mm/ 0.030 in	1
	3,5 mm/ 0.135 in	2,4 mm/ 0.090 in	3
$R_a/R_z/R_{max}$	5,0 mm/ 0.195 in	4,0 mm/ 0.150 in	5
Traverse Speed	5,08 mm/ 0.2 in per second		
Cutoff	0,8 mm/ 0.030 in ASME 2 RC-filter		
Probe Type	Piezoelectric		
Maximum Stylus Force	15.0 mN / 1500 mgf		
Power	Consumer type alkaline battery 9 Volt		
Battery Capacity	Approx. 2,500 measurements, depending on frequency of use and output option		
Operating Temperature	10° C to 45° C / 50° F to 113° F		
Storage Temperature	-20 °C to 65 °C / -4 °F to 149 °F		

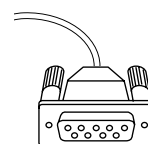
* Other cutoff/switch positions may be used



▲ Easy to use switchable settings



4346023



4346020

MarConnect – USB ready

The Pocket Surf IV® employs the MarConnect interface from Mahr. MarConnect simplifies data transmission to a PC and enables quick and universal assembly of a multiple measuring station.

Order No.	Description	Model No.
4346023	Data connection cable USB (2 m) incl. MarCom Standard Software	2000 USB
4346020	Data connection cable Opto RS232C (2 m), with SUB-D jack 9-pin	2000 r
4102552	MarCom Professional 4.0 Software allows for up to 68 wired devices	-
4102551	Marcom Standard 3.1 Software allows for 1 wired device	-

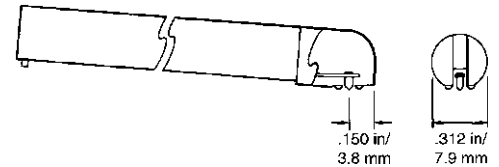
Accessories for data processing: see Dimensional Metrology Catalog, Chapter 11

Pocket Surf® IV Portable Surface Roughness Gage

Probes

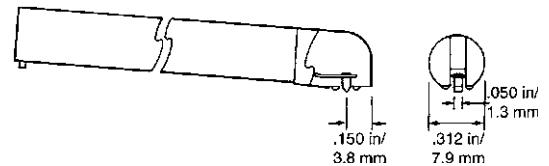
General Purpose Probes

Order No.	Description	Application
EGH-1019	With a 90° conical diamond stylus, 10 µm/ 0.0004 in radius	For most surface roughness applications
EGH-1026	With a 90° conical diamond stylus, 5 µm/ 0.0002 in radius*	
EGH-1029	With a 90° conical diamond stylus 10 µm/ 0.0004 in radius, stainless steel skid	



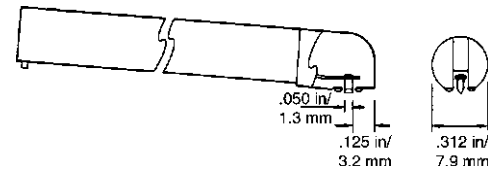
Transverse Chisel Probe

Order No.	Description
EGH-1020-W1	For gaging sharp edges or small OD's where probe is aligned (in 180° or closed position) to axis of traverse, 90° sapphire chisel, 10 µm/ 0.0004 µin radius



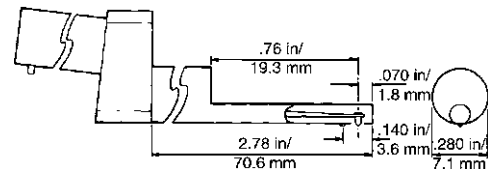
Parallel Chisel Probe

Order No.	Description
EGH-1020-W2	For gaging sharp edges or small OD's where probe is perpendicular (in 90° or 270° position) to axis of traverse. 90° sapphire chisel, 10 µm. / 0.0004 µin radius.
EAS-2421	Also used with V-Block fixture for OD's smaller than 6,35 mm / 0.25 in



Small Bore Probe

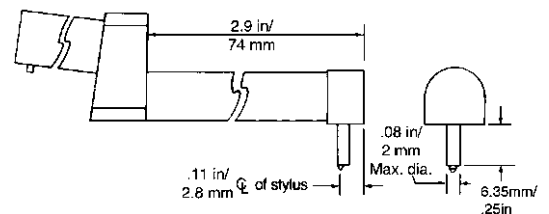
Order No.	Description	Application
EGH-1021	With a 90° conical diamond stylus, 10 µm / 0.0004 in radius	For gaging small bores (3,2 mm / 0.125 in minimum ID) up to a depth of 19 mm / 0.75 in
EGH-1027	With a 90° conical diamond stylus, 5 µm / 0.0002 radius*	



Groove Bottom Probe

Order No.	Description
EGH-1028	Measuring the bottom of grooves, recesses and small holes to depths of 6,35 mm/ 0.25 in, used for short lands and shoulders 90° conical diamond stylus, 10 µm / 0.0004 µin radius

Note: Small bore and groove bottom probes can only be used in 180° position with the Pocket Surf unit supported in a height stand or other fixture



* Yellow dot at connector end signifies 5 µm/ 0.0002 µin radius

Using the groove bottom probe to check an "O" ring groove



Shown with optional height stand EAS-2496



Applications and Accessories

Height Stand**Order No.** EAS-2496

A compact, convenient fixture with a bracket to hold the Pocket Surf gage; designed for making measurements on a granite surface plate or on any suitable, flat working surface to a maximum height of about 111 mm / 4.375 in

**Portable V-Block Fixture****Order No.** EAS-2421

For measuring small parts with outside diameters from 3,1 mm / 0.125 in to 25 mm / 1 in for lengths of 25 mm / 1 in minimum - includes PS-145 setting pin

**Bore Adapter Kit****Order No.** EAS-2839

For timesaving handheld measurement of bores without having to fix the workpiece; accommodates all inside diameters from: 25 mm / 1 in to 150 mm / 6 in; depths from 25 mm / 1 in to 60 mm / 2.4 in

**Bottom Plate****Order No.** EAS-2584

For measuring cylindrical workpieces too short (less than 89 mm / 3.5 in long) for the closed probe position; for workpieces with short OD's from 6,35 mm / 0.25 in (minimum 38 mm / 1.5 in long)

**V-Block Adapter Kit****Order No.** EAS-2739

Attaches to bottom of Pocket Surf unit, permitting convenient, handheld measurements of hard-to-reach cylindrical surfaces, such as crankshaft journals without having to fix the work piece; suitable for parts with diameters from 5,0 mm / 0.19 in to 125 mm / 5 in

**Mounting Bracket for Height Gages****Order No.** EAS-3048

For mounting the Pocket Surf to most standard height gages; the bracket includes a rectangular bar that is 11,5 mm x 6,35 mm (0.45 in x 0.25 in) to fit the holder of the height gage and a swivel feature is included to permit the Pocket Surf to be set anywhere within a 360° rotation

**Universal Stand****Order No.** EAS-2426

A heavy-duty stand equipped with an adjustable bracket to hold the Pocket Surf for measuring of workpieces, up to 213 mm / 8.37 in tall

**Height Stand with Swivel****Order No.** 2236687

A compact, convenient fixture with an adjustable bracket to hold the Pocket Surf, anywhere within a 360° rotation, for making measurements on a surface plate or on any suitable, flat working surface



Mobile Surface Roughness Measuring Instrument MarSurf PS 10



APPLICATIONS

- On-site surface roughness measurement
- Production process measurements
- Machine tool
- Incoming applications inspection



FEATURES

- Small and lightweight
- Large illuminated 4.3 in TFT touch display
- Display can be rotated
- Simple to operate
- Increased flexibility with the removable drive unit
- Start button is also the home button for direct access to the start screen
- Direct access to your customized functions with favorites
- 31 parameters offer same range of functions as a laboratory instrument
- Data is saved on the device, e.g. TXT, X3P, CSV and PDF file
- Evaluation of most common parameters conforming to standards and in accordance to ISO /JIS and parameter lists
- Integrated, removable roughness standard for the standard pick-up PHT 6-350
- Dynamic calibration function
- Select standards (DIN-ISO/JIS/ASME /MOTIF)
- Automatic cutoff selection patented to ensure correct measuring results
- Individual sampling lengths and shortened cutoff can be selected
- Setting of unsymmetric intersection lines for peak count calculation
- Phase-correct profile filter (Gaussian filter) acc. To DIN EN ISO 16610-21 (before DIN EN ISO 11562), special filter acc. to

- DIN EN ISO 13565-1, Is-filter acc. to DIN EN ISO 3274 (disengageable)
- Tolerance monitoring
- Lock settings and/or password protection
- Date and/or time of measurement
- Integrated memory to store approx. 500,000 results, 3,900 profiles and 1,500 PDF files
- Data transmission via the USB interface to a PC or via micro SD-Card
- MarConnect interface, to connect hardware via the MarCom Software
- Built-in rechargeable battery can be used for up to 1,200 measurements before being recharged

SUPPLIED WITH:

- MarSurf PS 10 base unit
- Drive unit (removable)
- 1 standard pick-up PHT 6-350 (conforming to standards)
- Built-in battery
- Roughness standard integrated (removable) into base unit with Mahr calibration certificate
- Pick-up protection
- Charger / power source with 3 mains power source adapters
- Operating instructions
- Carrying case with shoulder strap
- USB cable
- Extension cable drive unit
- Height adjustment accessory (integrated)

TECHNICAL DATA

Order No.		6910230 (2 μm radius tip)
Order No.		6910232 (5 μm radius tip)
Unit of Measurement		Metric / inch
Measuring Principle		Stylus method
Pick-up		Inductive skidded pick-up, 2 μm (80 μin) stylus tip, measuring force approx. 0.7 mN
Parameters	DIN / ISO	Ra, Rq, Rz, Rmax, Rp, Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, R _{Pc} , Rmr, RSm, Rsk, CR, CF, CL, R, AR, Rx
	JIS	Ra, Rq, Ry (equiv. to Rz), RzJIS, tp (equiv. to Rmr), RSm, S
	ASME	Rp, Rpm, R _{Pc} , Rsk, tp (enquir. to Rmr)
	MOTIF	R, AR, Rx, CR, CF, CL
Languages		English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Czech, Polish, Russian, Japanese, Chinese, Korean, Turkish, Hungary, Romanian
Measuring Range		350 μm (0.014 μin)
Profile Resolution		8 nm
Filter*		Phase-correct profile filter (Gaussian filter) according to DIN EN ISO 16610-21 (before ISO 11562) Special filter according to DIN EN ISO 13565-1, Is filter according to DIN EN ISO 3274 (can be disabled)
Cutoff lc*		0,25 mm / 0,8 mm / 2,5 mm (0.010 in / 0.030 in / 0.100 in); automatic
Traversing Length Lt*		1,5 mm / 4,8 mm / 15 mm (0.06 in / 0.192 in / 0.6 in); automatic
Traversing Length (according to MOTIF)		1 mm / 2 mm / 4 mm / 8 mm / 12 mm / 16 mm (0.040 in / 0.080 in / 0.160 in / 0.320 in / 0.480 in / 0.640 in)
Short Cutoff*		Selectable
Evaluation Length ln*		1,25 mm, 4,0 mm, 12,5 mm (0.050 in, 0.16 in, 0.50 in)
Number n of Sampling Lengths*		Selectable: 1 to 16
Calibration Function		Dynamic
Memory		3900 profiles, 500000 results, 1500 PDF files memory can be extended with micro SD-Card up to 32 GB
Additional Functions		Lock settings / password protection, Date/Time
Dimensions		160 mm x 77 mm x 50 mm (6.29 in x 3.03 in x 1.97 in)
Weight		500 g (1.10 lbs)
Rechargeable Battery		Li-ion battery, 3,7 V, rating 11,6 Wh
Interfaces		USB-Device, MarConnect (RS232, USB), micro SD Slot for SD™ / SDHC-Cards up to 32 GB
Long-Range Power Supply		100 V to 264 V

* In accordance to ISO/JIS



▲ Connections for USB data transfer and micro SD card



▲ Smart phone like user interface

Mobile Surface Roughness Measuring Instrument MarSurf M 300 A Step Ahead



M 300



APPLICATIONS

- Shafts, housing parts
- Large scale machines
- Large workpieces
- Milling and turning parts
- Grinding and honing components
- Production line, or directly upon a machine. Ideal for rapid testing of the surface roughness of a workpiece in or on a machine
- Simple universal measuring station for checking surface roughness



RD 18



FEATURES

- Bluetooth wireless connection between the evaluation unit and drive unit (up to 4 m)
- Bright, illuminated color display
- Automatic selection of filter and traversing length conforming to standards
- Integrated thermal graphics printer of high print quality
- Print the R-profile via the thermal graphics printer
- Printed log by pressing a button or automatically
- Data transfer of results and profiles via USB interface to your hardware
- Evaluation of most common parameters conforming to

- standards and in accordance with ISO/JIS as well as characteristic curves, parameter lists (e.g. material ratio curve)
- Printing of R-profile (ISO/ASME/JIS), P-profile (MOTIF), material ratio curve, measuring record
- Measuring units ($\mu\text{m}/\mu\text{in}$) and standards (ISO/JIS/ASME/MOTIF) are selectable
- Tolerance monitoring
- Integrated memory for the results of up to 40,000 measurements and 30 profiles
- Setting of unsymmetric intersection lines for peak count calculation

- Individual sampling lengths and short cutoff can be selected
- Key pad lock and/or password protection for instrument settings
- Built-in rechargeable battery with power management
- Integrated roughness standard for the standard pick-up PHT 6-350
- Dynamic calibration function
- Date and/or time of measurement
- MarSurf PS1/M 300 Explorer Software for recording measurements (optional)

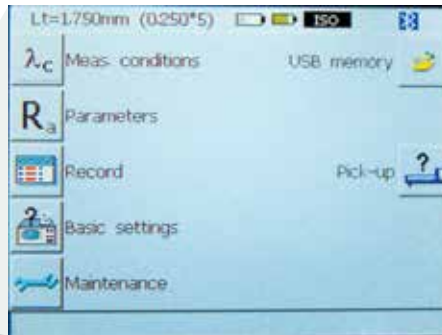
SUPPLIED WITH:

- Evaluation unit M 300, drive unit RD 18 with integrated roughness standard, standard pick-up PHT 6-350/2 μm (conforming to standards),
- Charger / mains adapter with 3 mains power adapters, height adjustment accessory, pick-up protection, pick-up protection with prismatic underside, end face V-Block-block, 2 x USB cables, 1 roll of thermal paper, shoulder strap, carrying case, Mahr calibration certificate, operating instructions

Mobile Surface Roughness Measuring Instrument MarSurf M 300 C



▲
M 300 C



▲
RD 18 C + Handheld V-Block
(detachable)

APPLICATIONS

- Shafts, housing parts
- Large scale machines
- Large workpieces
- Milling and turning parts
- Use on grinding and honing components
- Production line, or directly upon a machine; ideal for rapid testing of the surface roughness of a workpiece in or on a machine
- Simple universal measuring station for checking surface roughness



▲
Upside down measurement



▲
Measurement on an end face V

FEATURES

- Bright, illuminated color display
- Automatic selection of filter and traversing length conforming to standards
- Integrated thermal graphics printer of high print quality
- Easy-to-use operator guidance
- Large color display
- Printing of R-profiles with the thermo printer
- Printed log either by pressing a button or automatically
- Data transfer of results and profiles via USB interface to your hardware
- Evaluation of most common parameters conforming to standards and in accordance to ISO/JIS as well as characteristic curves, parameter lists (e.g. material ratio curve)
- Printing of R-profile (ISO/ASME/JIS), P-profile (MOTIF), material ratio curve measuring record
- Measuring units ($\mu\text{m}/\mu\text{inch}$) and standards (ISO/JIS/ASME/MOTIF) are selectable
- Integrated memory for the results of up to 40,000 measurements and 30 profiles
- Tolerance monitoring
- Setting of unsymmetric intersection lines for peak count calculation
- Cylindrical drive unit with handheld V-Block and PHT pick-up protection
- Individual sampling lengths and short cutoff can be selected
- Lock instrument settings
- Date and/or time of measurement
- Can be expanded to be an stationary measuring station
- MarSurf PS1/M 300 Explorer Software for recording measurements (option)

SUPPLIED WITH:

- Evaluation unit M 300 C, cylindrical drive unit
- RD 18 C incl. 1.8 m data connection cable, handheld V-Block with height adjustable feet, standard pick-up PHT 6-350/ $2\mu\text{m}$ (conforming to standards), roughness standard PRN 10 with Mahr calibration certificate, 1 roll of thermal paper, pick-up protection with prismatic underside, dia. 8 mm mounting clamp for drive unit, charger / mains adapter with 3 mains power adapters, 1 x USB cable (for connection to a PC), shoulder strap, carrying case, operating instructions

Mobile Surface Roughness Measuring Instrument MarSurf M 300 / M 300 C

TECHNICAL DATA

Order No.	M 300 Set	6910401 (2 µm radius tip)
Order No.		6910411 (5 µm radius tip)
Order No.	M 300C Set	6910431 (2 µm radius tip)
Order No.		6910438 (5 µm radius tip)
Measuring Principle		Stylus method
Traversing Speed		0,5 mm/s (0.02 in/s)
Measuring Range		350 µm (0.014 in)
Profile Resolution		8 nm
Filter		Gaussian filter, Ls-Filter (switchable)
Cutoff		0,25 mm, 0,8 mm, 2,5 mm (0.010 in, 0.032 in, 0.100 in)
Short Cutoff		Selectable
Traversing Lengths as per DIN / ISO / ASME / JIS		1,75 mm, 5,6 mm, 17,5 mm (0.070 in, 0.2242 in, 0.700 in)
Traversing Lengths as per EN ISO 12085 (MOTIF)		1 mm, 2 mm, 4 mm, 8 mm, 12 mm, 16 mm
Evaluation Lengths		1,25 mm, 4 mm, 12,5 mm (0.05 in, 0.16 in, 0.5 in)
Number of Sampling Lengths Selectable:		1-5
Parameters	DIN / ISO	Ra, Rq, Rz, Rmax, Rp, Rv, Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Vo, Rt, R3z, R _{Pc} , R _{mr} , R _{Sm} , R _{sk} , R, AR, Rx, W, CR, CF, CL
	JIS	Ra, Rq, Ry (equiv. to Rz), RzJIS, Rp, Rv, Rpk, Rk, Rvk, Mr1, Mr2, A1, A2, Rt, tp (equiv. to R _{mr}), R _{Sm} , R _{sk} , S, R, AR, Rx, W, CR, CF, CL
	ASME	RpA, R _{pm} , R _{mr} , R _{Sm} , R _{sk}
	MOTIF	R, AR, Rx, W, CR, CF, CL
Vertical Scale		Automatic/Selectable
Horizontal Scale		Depending on the cutoff
Record Contents		R -profile, MRK, P-profile (MOTIF), results
Printing		Automatic/Manual, record with time
Surface Hardness		Ideal for surface hardness >50 shore
Calibration Function		Dynamic
Memory		Integrated memory
		Storage up to 40,000 measurements and up to 30 profiles
Measuring Units		µm/µin selectable
Languages Selectable		English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Czech, Polish, Russian, Japanese, Chinese, Korean, Turkish
Blocking Instrument Settings		Yes
Password Protection		Yes
LCD		High resolution color display, 3.5 in, 320 x 240 pixels
Printer		Thermal printer, 384 points/horizontal line, 20 characters/line
Printing Speed		Approx. 6 lines/second corresponds to approx. 25 mm/s (1 in/s)
Thermal Paper		Dia. 40,0 mm - 1,0 mm, width 57,5 mm - 0,5 mm, Coated
Interface		USB, MarConnect
Power Supply		NiMH battery, capacity: approx. 500 measurements (depending on the number and length of record printouts), plug-in power pack with Three power source plugs, for input voltages from 90 V to 264 V
Power Management		Yes
Connections		Drive unit, power pack, USB, MarConnect
Protection Class	M 300 / M 300 C	IP 42
	RD 18 / RD 18 C	IP 40
Temperature Range for Storage		-15° C to +55° C (5° F to 131° F)
Temperature Range for operation		+5° C to +40° C (41° F to 104° F)
Relative Humidity		30 % to 85 %
Dimensions (L x W x H)	M 300 / M 300 C	190 mm x 140 mm x 75 mm (7.5 in x 5.5 in x 3 in)
Dimensions (L x W x H)	RD 18	130 mm x 70 mm x 50 mm (5.1 in x 2.7 in x 2 in)
Dimensions (L x D)	RD 18 C	139 mm x 26 mm (5.5 in x 1 in)
Dimensions (L x W x H)	RD 18 C*	82 mm x 34 mm x 59 mm (3.2 in x 1.3 in x 2.3 in)
Weight	M 300 / M 300 C	Approx. 1 kg
	RD 18	Approx. 300 g
	RD 18 C	Approx. 165 g
	RD 18 C*	Approx. 55 g

* Handheld V-Block

Mobile Surface Roughness Measuring Instrument MarSurf M 300

Drive Unit MarSurf RD 18

BOOTH TOOTH TECHNOLOGY

- Unique cable-free connection between evaluation unit and drive unit
- Connection of several drive units to only one evaluation unit



Probe ordered separately; not supplied with probe protector shown

FEATURES

- Well-proven PHT skid probes are implemented in the drive unit
- Ability to connect via a cable

SUPPLIED WITH:

- Drive unit RD 18 with integrated roughness standard

TECHNICAL DATA

Order No.	6910403
Tracing Direction	Longitudinal
Traversing Length	Adjustable on M 300
As per DIN/ISO	1,75 mm, 5,6 mm, 17,5 mm (0.07 in, 0.22 in, 0.7 in)
As per EN ISO 12085	1 mm, 2 mm, 4 mm, 8 mm, 12 mm, 16 mm
Traverse Speed	0,5 mm/s
Dimensions (w/o pick-up protection)	Dia. 24 mm, L = 112 mm
Bluetooth Range	Up to 4 m

Drive Unit MarSurf RD 18 C2 for Transverse Tracing for M 300 C / PS 10

FEATURES

- Transverse scanning
- The well-proven PHT-skid probes are implemented in the drive unit
- The drive unit RD 18 C2 is attached in the same way as the RD 18
- The range of application offered by the mobile MarSurf M 300 C and MarSurf PS 10 is broadened, by being able to use both types of drive units

SUPPLIED WITH:

- Drive unit RD 18 C2 with integrated roughness standard
- Pick-up protection with prismatic underside, pick-up protection and a screwdriver

Probe ordered separately



Shaft alignment fixture for RD 18 C2

Positions the probe at a right angle to the shaft for axial surface trace requirements

Order No. V-Clamp 6850738
For Ø 5 mm to Ø 80 mm

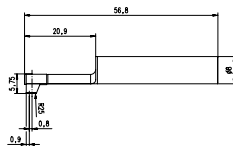
TECHNICAL DATA

Order No.	6910426
Tracing Direction	Transverse
Traversing Length	Adjustable on M 300
As per DIN/ISO	1,75 mm, 5,6 mm (0.07 in, 0.22 in)
As per EN ISO 12085	1 mm, 2 mm, 4 mm
Traverse Speed	0,1 mm/s and 0,5 mm/s
Dimensions (w/o pick-up protection)	Dia. 24 mm, L = 142 mm

Optional probes for MarSurf PS 10 / M 300 / M 300 C

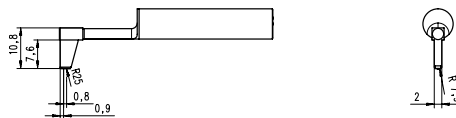
PROBES FOR VARIOUS MEASURING TASKS

- The P Series probes are characterized by special construction features:
- Stylus tip geometry as per EN ISO 3274, standard $2\text{ }\mu\text{m}/90^\circ$
 - Measuring force of approx. 0.7 mN (as per EN ISO 3274)
 - Reliable inductive converter
 - Robust, rigid housing
 - Self-aligning, elastic bearings
 - Reliable plug and socket connections



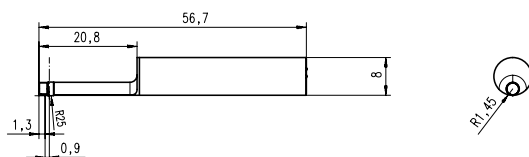
Pick-up PHT 6-350 – Standard Probe

Order No.	6111520	2 μm radius
	6111526	5 μm radius
	6111527	10 μm radius
System	Single-skid pick-up with spherical skid	
Skid Radius	In traversing direction 25 mm (0.984 in) at right angles 2.9 mm (0.114 in)	
Contact Point	0.8 mm (0.0315 in) in front of the stylus	
Measuring Range	350 μm (0.014 μin)	
Specification	For plane surfaces, bores with a diameter larger than 6 mm (0.236 in) and a max. depth of 17 mm (0.669 in), grooves with a width larger than 3 mm (0.118 in); min. workpiece length = traversing length + 1 mm (0.0394 in); included depending on model ordered	



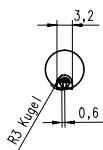
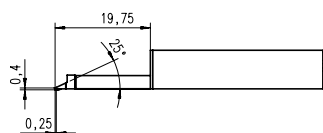
Pick-up PHT 11-100 – Groove Bottom Probe

Order No.	6111524	2 μm radius
	9056384	5 μm radius
System	Single-skid pick-up with spherical skid	
Skid Radius	In traversing direction 25 mm (0.984 in) at right angles 2.9 mm (0.114 in)	
Contact Point	0.8 mm (0.0315 in) in front of the stylus	
Measuring Range	100 μm (0.00394 μin)	
Specification	For plane surfaces, bores with a diameter larger than 11 mm (0.433 in) and a max. depth of 14 mm (0.551 in), grooves with a width larger than 2.5 mm (0.098 in)	



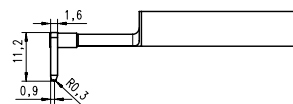
Pick-up PHT 3-350 – Small Bore Probe

Order No.	6111521	2 μm radius
	9056383	5 μm radius
System	Single-skid pick-up with spherical skid	
Skid Radius	In traversing direction 25 mm (0.984 in) at right angles 1.45 mm (0.0571 in)	
Contact Point	0.9 mm (0.0354 in) in front of the stylus	
Measuring Range	350 μm (0.014 μin)	
Specification	For plane surfaces, bores with a diameter larger than 3 mm (0.118 in) and a max. depth of 17 mm (0.669 in) min. workpiece length = traversing length + 1 mm (0.0394 in)	



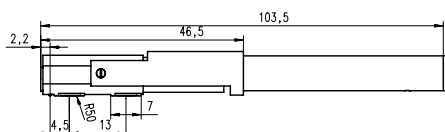
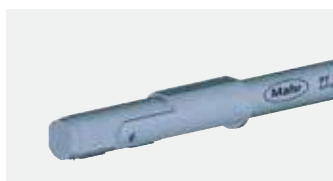
Pick-up PHTF 0.5-100 – Gear Tooth Probe

Order No.	6111522 2 μm radius
System	Single-skid pick-up with spherical skid
Skid Radius	In traversing direction 25 mm (0.984 in) at right angles 1.45 mm (0.0571 in)
Contact Point	0.6 mm (0.0236 in) in front of the stylus
Measuring Range	100 μm (0.00394 in)
Specification	e.g. for gear tooth flanks with a modulus larger than 0.8 mm (0.3 in)
Calibration	via Geometric Standard PGN



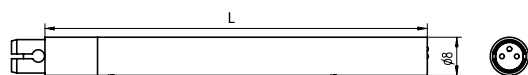
Pick-up PHTR-100 – Spherical Surface Probe (For Maximum Roughness of 0.5 μm / 20 μin)

Order No.	6111525 2 μm radius
System	Single-skid pick-up with spherical skid
Skid Radius	In traversing direction 0.03 mm (0.012 in)
Stylus Radius	2 μm (0.0008 μin), 90°
Specification	For measurements on concave and convex surfaces
Calibration	via Geometric Standard PGN



Pick-up PT 150 – Sheet Metal Probe

Order No.	6111523
System	Dual-skid pick-up with spherical skid
Skid Radius	In traversing direction 50 mm (1.969 in), at right angles 3 mm (0.118 in)
Contact Point	4.5 mm (0.177 in) in front of the stylus
Specification	For measurements on metal sheets and roller surfaces according to DIN EN 10049 (SEP).min. workpiece length = tracing length + 5 mm (0.197 in)
Measuring Range	150 μm (0.006 μin)



Pick-up extensions PHT for P probes – Pick-up extensions / Adapters / Accessories

Order No.	L - Extension Length
9045417	55 mm
6850540	80 mm
9058148	120 mm
9054403	200 mm
6850541	Right angle tracing adaptor
6910203	End face V-Block for measuring ends of cylindrical parts

MarSurf PS 10 / M 300 Accessories



MarStand measuring stands offer high stability which ensures precise measurements

- Rugged base ensures both maximum stability and sturdiness
- Upper side of the base has a convenient hand grip
- Support arm can be finely adjusted

Measuring Stand MarStand 815 GN

Order No.	Total Height with Base
4413000	300 mm
4413001	500 mm
4413005	750 mm



8 mm mount PS 10 / RD 18 C

Stand Adapter for MarSurf PS 10 / RD 18 C

Order No.	Description
6910435	Stand adapter



The handheld support with its multiple contact surfaces offers various application possibilities

Measuring Stand MarStand 815 GN

Order No.	Total Height with Base
4413000	300 mm
4413001	500 mm
4413005	750 mm



Illustration: 7028532

Pick-up Protection for PS 10 / RD 18 / RD 18 C

Order No.	Description
6850716	Pick-up protection, steel
6850715	Pick-up protection with header V-Block, steel
7028532	Pick-up protection, plastic*
7028530	Pick-up protection header V-Block, plastic**

* Included with M 300 set

** Included with M 300 and M 300 C set

MarSurf PS 10 / M 300 / M 300 C Accessories

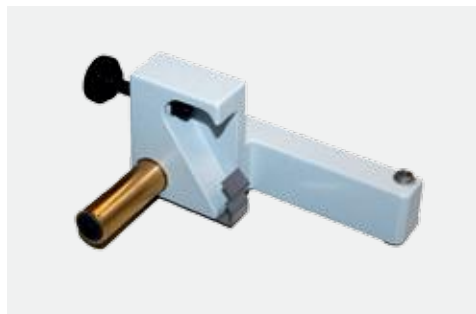


Illustration: 6910201

Measuring stand not included

Accessories for measuring stands

Mount for Measuring Stand ST

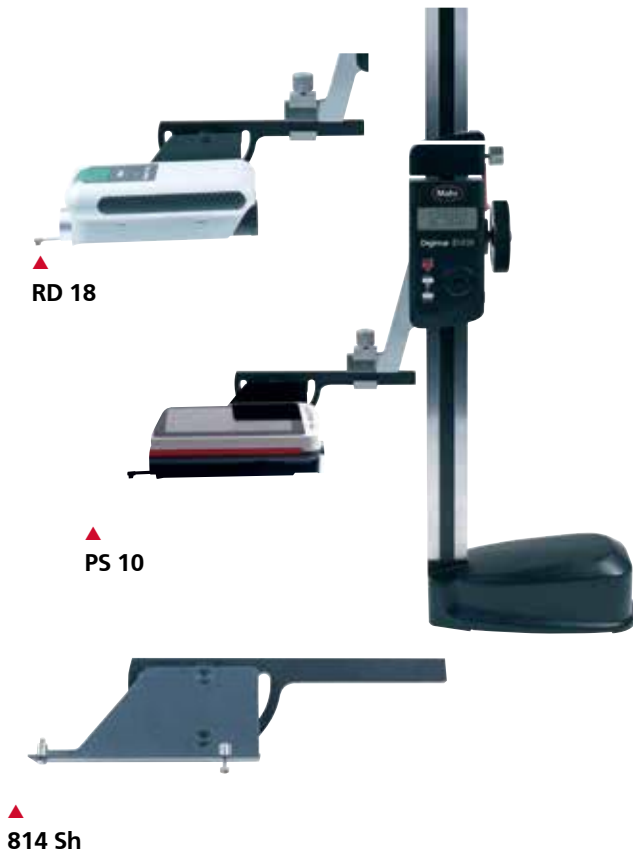
Order No.	Description
6910201	Mount for MarSurf PS 10 / RD 18 The RD 18 drive unit can be pivoted and locked in any position in the mount ($\pm 15^\circ$)
6851304	Mount for MarSurf RD 18 C The RD 18 C drive unit can be pivoted and locked in any position in the mount ($\pm 15^\circ$)



Mount for Stand ST

Order No.	Description	Height Adjustment	Dimensions (L x W x H)	Weight
6710803	Measuring Stand ST-D with Metal Stand	0 to 300 mm, with a hand wheel	175 mm x 190 mm x 385 mm	Approx. 3 kg
6710806	Measuring Stand ST-F <ul style="list-style-type: none"> Granite plate Required measuring height can be adjusted with a hand wheel for convenient and accurate positioning of the drive unit 	0 to 300 mm, with a hand wheel	400 mm x 300 mm x 415 mm	Approx. 35 kg
6710807	Measuring Stand ST-G <ul style="list-style-type: none"> Granite plate 10 mm (0.39 in) T-slot for mounting work pieces Required measuring height can be adjusted with a hand wheel for convenient and accurate positioning of the drive unit 	0 to 300 mm, with a hand wheel	500 mm x 300 mm x 415 mm	Approx. 35 kg

MarSurf PS 10 / M 300 Accessories



Mounting Bracket for Digimar 814 SR

Order No.	Description	Model No.
2247086	Adjustable mounting bracket to connect the PS 10 / RD 18 to a 814 SR	814 Sh



FUNCTIONS

- RESET (set the display to zero for relative measurement), ABS (switch between relative and absolute measurement), mm/inch, Reference-Lock/Unlock, PRESET (to enter a numerical value), DATA (data transmission via connection cable), Auto-ON/OFF
- Max. measuring speed 1,5 m/s (60 in/s)
- High contrast LCD with 12 mm sized digits
- Sturdy heavy-duty base, easy-to-handle
- Hardened and lapped contact surface that produces a smooth and even movement
- Slide and beam made of hardened stainless steel
- Hand crank for positioning and measuring
- Fine adjustment
- Locking screw
- Interchangeable scriber point, carbide tipped

SUPPLIED WITH:

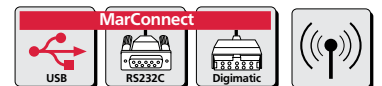
- Scriber point
- Cardboard box
- Battery
- Operating instructions



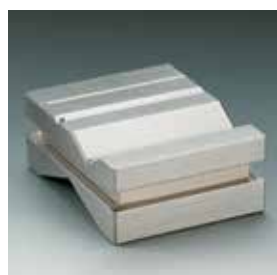
Height Measuring and Scribing Instrument Digimar 814 SR for MarSurf PS 10 / RD 18

Order No.	Description	Model No.
4426100	Measuring range 350 mm	814 SR
4426101	Measuring range 600 mm	814 SR

REFERENCE



MarSurf PS 10 / M 300 / M 300 C Accessories



V-Block PP	
Order No.	6710401
Description	<ul style="list-style-type: none"> Four different prisms for mounting axis-symmetrical workpieces with diameters from 1 mm to 160 mm (0.0394 in to 6.30 in) Includes clamping springs for holding light workpieces in the prism
Dimensions (L x X W x H)	80 mm x 100 mm x 40 mm (3.91 in x 3.15 in x 1.58 in)



XY Table CT	
Order No.	6710529
Description	<ul style="list-style-type: none"> Mounting and aligning workpieces Can be adjusted in two coordinates by 15 mm (0.591 in)
Table Surface	120 mm x 120 mm 4.728 in x 4.728 in (with two brackets)



Parallel Vise PPS and Stand PKS		
Order No.	6710604	6710610
Description	<ul style="list-style-type: none"> PPS for mounting rectangular and cylindrical workpieces 	<ul style="list-style-type: none"> PKS — vise above with stand/ball socket joint for easy positioning
Jaw Width	80 mm x 100 mm x 40 mm (3.91 in x 3.15 in x 1.58 in)	
Jaw Height	70 mm / 2.76 in	
Span	25 mm / 0.984 in	
Total Height	58 mm / 2.28 in	



Mini Precision Vise 109 PS as set	
Order No.	4246819
Description	<ul style="list-style-type: none"> Mini precision vises Prism jaws, carrier plates, stands and mini dividing attachment depends on version Plastic case included
Width of Jaws	15 mm / 25 mm / 35 mm



Pocket Surf Specimens	
Order No.	
Description	<ul style="list-style-type: none"> Molded reference patch for economical checking of the roughness measuring station



Roughness Standard PRN 10	
Order No.	6820420
Description	<ul style="list-style-type: none"> Roughness standard with turned profile Chromed Profile depth approx. 10 µm (0.394 in), for checking the roughness measuring station Supplied with M 300 C 2 µm system

▲ NIST traceable certificate

Order No.	Description
PMD-90101	Certified reference specimen, single patch 3,2 µm / 125 µin
2238983	Certified reference specimen, double patch, 0,4 µm / 16 µin - 3,0 µm / 118 µin, certified for Ra, Rz, Rmax, and Sm
2008143	Certified reference specimen, sinusoidal, single patch, certified for Ra 3,0 / 118 µin, Rz 9,75 µm / 386 µin and Rmax 9,8 µm / 386 µin

▲ Mahr calibration certificate

Order No.	Description
2240360	PRN10-2N – Same as above but with certificate traceable to NIST using 2 µm probe
2249863	PRN10-5N – Same as above but with certificate traceable to NIST using 5 µm probe
2252018	PRN10-10N – Same as above but with certificate traceable to NIST using 10 µm probe

MarSurf Available Parameters

PARAMETERS FOR MARSURF PS 10 / M 300 / M 300 C

Parameter	Output	Meaning	Standards
Ra	RA	Arithmetic mean roughness Ra	DIN EN ISO 4287 : 1998; ISO 4287 : 1997; JIS B 0601 : 2001
Rq	RQ	Root mean square roughness Rq	
Rz Ry (JIS) equiv. to Rz	RZ	Mean peak-to-valley height Rz (acc. to ISO) or Ry (acc. to JIS)	
Rz (JIS)	RZJ	Mean height Rz of profile elements	JIS B 0601 : 2001 (früher: ISO 4287/1 : 1984)
Rmax	RMAX	Maximum roughness depth Rmax	DIN 4768 : 1990
Rp	RP	Mean profile peak height Rp	DIN EN ISO 4287 : 1998; ISO 4287 : 1997
RpA (ASME)	RP	Maximum profile peak height Rp	ASME B46
Rpm (ASME)	RPM	Mean profile peak height Rp	
Rpk	RPK	Reduced peak height Rpk	DIN EN ISO 13565-2 : 1998
Rk	RK	Core roughness depth Rk	
Rvk	RVK	Reduced valley depth Rvk	
Mr1	MR1	Smallest material ratio Mr1 of roughness core profile	
Mr2	MR2	Largest material ratio Mr2 of roughness core profile	
A1	A1	Material-filled profile peak area A1	DIN EN ISO 4287 : 1998
A2	A2	Lubricant-filled profile valley area A2	
Vo	VO	Oil-retaining volume Vo	
Rt	RT	Total height Rt of R-profile	DIN EN ISO 4287 : 1998
R3z	R3Z	Arithmetic mean third peak-to-valley R3z	DB N 31007 : 1983
RPc	RPC	Peak count RPc is the number of profile elements (see Rsm) per cm that exceed the set upper profile section level c1 and then fall short of the lower c2.	EN 10049 : 2005; ASME B46
Rmr tp (JIS, ASME) equiv. to Rmr	RMR	Material ratio Rmr	DIN EN ISO 4287 : 1998; ISO 4287 : 1997; JIS B 0601 : 2001
RSm	RSM	Mean width RSm of profile elements (previously: groove spacing)	
Rsk	RSK	Skewness Rsk of the profile	DIN EN ISO 4287. ASME B46.1
S	S	Mean spacing S of local profile peaks	JIS B 0601 : 1994
CR	CR	Zone width CR of the profile peak zone (French „critère de rodage“) (dependent on intersection lines Scr1 and Scr2)	cf. Pöc (Pdc) in: DIN EN ISO 4287 : 1998 ISO 4287 : 1997 JIS B 0601 : 2001
CF	CF	Zone width CF of the profile core zone (French „critère de fonctionnement“) (dependent on intersection lines Scf1 and Scf2)	
CL	CL	Zone width CL of the profile valley zone (French „critère de lubrification“) (dependent on intersection lines Scl1 and Scl2)	
R	R	Mean depth R of roughness motifs	ISO 12085 : 1996
Ar	AR	Mean width Ar of roughness motifs	
Rx	RX	Maximum depth Rx of profile irregularity	

ADDITIONAL PARAMETERS FOR MARSURF M 300 / M 300 C

Rv	Rv	Mean profile valley depth Rv	DIN EN ISO 4287 : 1998 ISO 4287 : 1997 JIS B 0601 : 2001
W	W	Mean depth W of waviness motifs (dependent on operators A and B)	DIN EN ISO 12085 : 1998 ISO 12085 : 1996 JIS B 0631 : 2000

MICROSCOPES



SURFACE
MEASUREMENT



HEIGHT
MEASUREMENT



CALIPERS &
MICROMETERS



INDICATORS &
COMPARATORS



AIR
GAGING



SNAP
GAGES



TEST
INDICATORS



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E X A C T L Y



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