
Instructions



Pocket Surf[®] IV

Portable Surface Roughness Gages

MAHR GMBH, GERMANY • MAHR FEDERAL INC., USA

Description

The Pocket Surf® gage is a portable battery-powered instrument for checking surface roughness with the measured values displayed on a digital readout. The instrument can be used in the laboratory, an inspection area, in the shop, or wherever on-site surface roughness gaging is required.

A Pocket Surf kit is furnished in a fitted case, and includes a Pocket Surf unit with a General Purpose Probe † and a 125µ"/3.2µm (nominal) Reference Specimen † plus:

- **EBY-1014** 9-volt Alkaline Battery
- **EPL-1681** Riser Plate, for calibrating the gage with the Reference Specimen.

† Part Numbers listed in the Pocket Surf sets table on next page.



Even though this gage is designed and built to withstand the rigors of handling and use, it is a precision instrument and should be treated with care to assure measurement accuracy and reliable performance.

Note: U.S. Patent No. 4,776,212
Product design and specifications subject to change without notice.
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Specifications

Measuring Ranges	R_a — 1 μ " to 250 μ "/0.03 μ m to 6.35 μ m R_y — 8 μ " to 999 μ "/0.2 μ m to 25.3 μ m R_{max} — 8 μ " to 999 μ "/0.2 μ m to 25.3 μ m R_z — 8 μ " to 999 μ "/0.2 μ m to 25.3 μ m
Display Resolution	1 μ "/0.01 μ m
Measurement Accuracy	Meets ASME B46.1, ISO and DIN standards
Digital Readout	3-digit LCD display, with "Battery" icon
Traverse Length (Selectable)	See table on page 9.
Evaluation Length (Selectable)	See table on page 9.
Traverse Speed2"/5.08mm per second
Cutoff030"/0.8mm; 2 RC filter
Probe Type	Piezoelectric
Maximum Stylus Force (within displacement range)	1500mgf/15.0mN
Power	9-volt consumer-type alkaline battery
Battery Capacity	Approx. 2500 measurements, depending on frequency/degree of usage
Operating Temperature	50° to 113°F/10° to 45°C
Storage Temperature	-4° to 149°F/-20° to 65°C

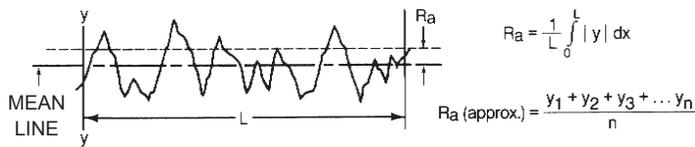
Pocket Surf Sets

Order no.

2191800	EGH-1019	Probe, 90°, 10 μ m radius, PMD-90101, Certified Specimen, incl. Test Certificate traceable to NIST
2191802	EGH-1026	Probe, 90°, 5 μ m radius, PMD-90101, Certified Specimen, incl. Test Certificate traceable to NIST

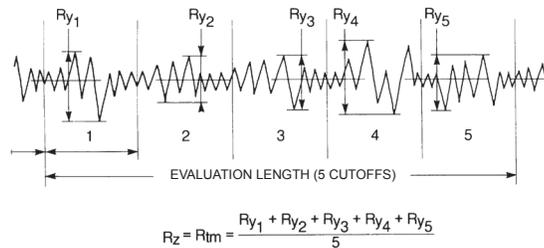
Pocket Surf Measurement Parameters

R_a Roughness Average — the arithmetic average height of roughness irregularities measured from a mean line within the evaluation length (L).



R_{max} Maximum Roughness Height — the largest of the 5 maximum peak-to-valley roughness depths in 5 successive sampling lengths. In the illustration below, R_{max} (DIN) = R_{y4} .

R_z Mean Peak to Valley Height — also known as R_{tm} — the mean of 5 maximum peak-to-valley roughness depths in 5 successive sampling lengths.



Selection of Cutoff according to DIN EN ISO 4287, ASME B46.1

Periodic Profile	Non-Periodic Profile		Cutoff	Sample/Evaluation Length
R_{Sm} (mm/in)	R_z ($\mu\text{m}/\mu\text{in}$)	R_a ($\mu\text{m}/\mu\text{in}$)	R_λ ($\mu\text{m}/\mu\text{in}$)	l_r / l_n (mm/in)
> 0.13 to 0.4/0.005 to 0.016	> 0.5 to 10/20 to 400	> 0.1 to 2/4 to 80	0.8/0.030	0.8/4.0 ; 0.030/0.150

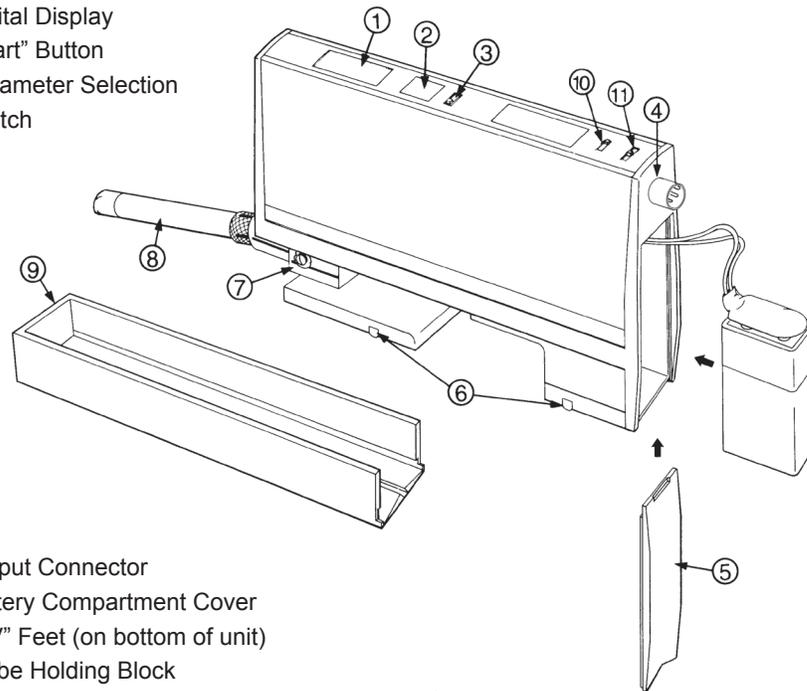
Pocket Surf Measurement Parameters (continued)

R_y Maximum Roughness Depth — For the Evaluation Length equaling one cutoff, it is the vertical distance between the highest peak and the deepest valley within the sampling length. For the Evaluation Length equaling 3 cutoffs, it is the largest of the 3 maximum peak-to-valley roughness depths in 3 successive sampling lengths.

Parameters as per ISO / ASME / JIS	Meaning	Standards
R_a	Arithmetic mean roughness R_a	DIN EN ISO 4287: 1998 ISO 4287: 1997 JIS B 0601: 1994 + 2001
R_z	Mean Peak to Valley Height R_z R_y (JIS B 0601: 1994) Corresponds with R_z	DIN EN ISO 4287: 1998 ISO 4287: 1997 JIS B 0601: 2001
R_{max}	Maximum roughness height R_{max} (formerly: DIN 4768: 1990)	VDA 2006: 2002

Pocket Surf Features

- ① Digital Display
- ② "Start" Button
- ③ Parameter Selection Switch



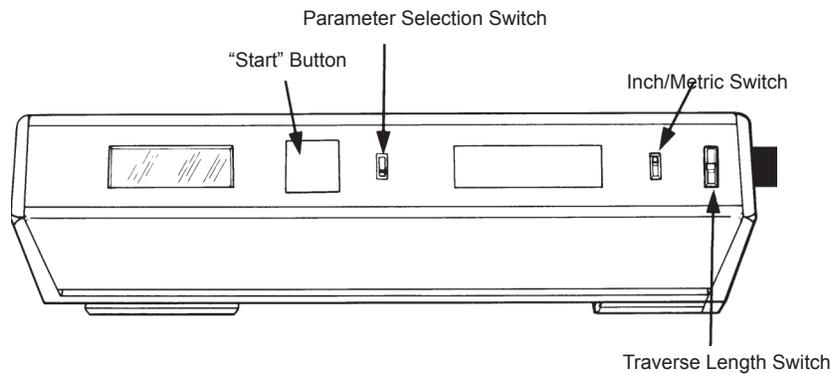
- ④ Output Connector
- ⑤ Battery Compartment Cover
- ⑥ 2 "V" Feet (on bottom of unit)
- ⑦ Probe Holding Block
- ⑧ Probe
- ⑨ Protective Cover
- ⑩ Inch/Metric Switch
- ⑪ Traverse Length Switch

Battery Installation/Replacement (Alkaline only)

1. Remove Protective Cover (9) from Pocket Surf base and slide Battery Compartment Cover (5) off end of Pocket Surf unit.
2. Install/replace battery and replace Battery Compartment Cover.
3. Press and release "Start" button to check battery condition (see next section).

Duracell #MN/1604 and Eveready® Energizer® #522 or other equivalent 9-volt alkaline batteries are suitable replacements. Avoid non-alkaline or rechargeable batteries because these types do not have sufficient power.

Pocket Surf Controls and Digital Display



1. Set Inch/Metric Switch for inch (μin) or metric (μm).
Set Traverse Length Switch for 1, 3 or 5. Refer to Traverse Length section for details.
Set Parameter Switch to desired parameter -- R_a , R_{max} , or R_z . If the Traverse Length Switch is set to positions 1 or 3, the R_{max} selection will actually calculate R_y . R_{max}/R_y and R_z can be measured on the non-standard length 1 and 3, in addition to the standard full length of 5. The display will "blink" the reading as a warning that it is non-standard (not in accordance with ISO Standards).

Pocket Surf Controls and Digital Display (continued)

In addition to displaying the measured roughness value, the digital readout also signals other conditions:

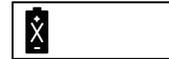
2. Immediately after pressing and releasing the “Start” button, the readout should display the “Battery” icon and “all 8’s” (full display), indicating satisfactory battery condition for normal operation.



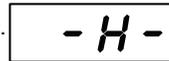
The display shows the reading for about seven seconds.

When the reading is first displayed within seven seconds, the operator can switch the R_a , R_{max}/R_y and R_z setting from one to another to display the results for all three parameters. Switching to a new parameter allows another seven seconds for the display to hold the reading. Likewise the operator can switch the uin/um setting and the reading is converted from one to the other.

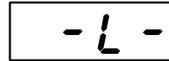
3. A “low” (weak) battery is indicated by only the “Battery” icon being displayed on the LCD readout — no other characters displayed. A dead battery (or none installed) results in no display at all. In either instance, remove and replace the battery as directed in **Battery Installation/Replacement** section on page 7.



4. When taking a measurement, an “-H-” or an “-L-” may appear, indicating that the measured value is out of range, either too high or too low. Refer to **Specifications** section on page 3 for parameter measuring ranges.



5. The non-standard Traverse Lengths 1 and 3 for R_{max}/R_y and R_z causes the display to blink, as explained above in step 1 (page 7). Otherwise, if the display “blinks” when a measurement is made, it indicates that the displayed value has been contaminated by three



or more off-scale peaks or valleys during the measurement. For example, the probe may have traversed over a scratch or other random irregularity on the surface. Measure again, with the probe positioned at a different place on the surface.

6. If a malfunction or other error occurs during operation, the readout will display an error code: “E1”, “E2”, “E3” or “E4”. Refer to **Maintenance & Troubleshooting** section on page 24 for details.



Traverse Length

There are three traverse lengths available. For measuring short surfaces such as o-ring grooves, short lands and shoulders, use Switch Positions 1 or 3.

Nominal Traverse Length	Evaluation Length	Number of Cutoffs/ Switch Position
.075"/2.0mm	.030"/0.8mm	1
.135"/3.5mm	.090"/2.4mm	3
.195"/5.0mm	.150"/4.0mm	5

Cutoff equals .030"/0.8mm.

Gage Operation

The Pocket Surf gage will operate in any one of four different probe positions (see illustration on next page). Selection of the proper probe position depends on the application.

When changing probe positions, gently grasp the probe by its body; never handle the probe by its skid and stylus end.

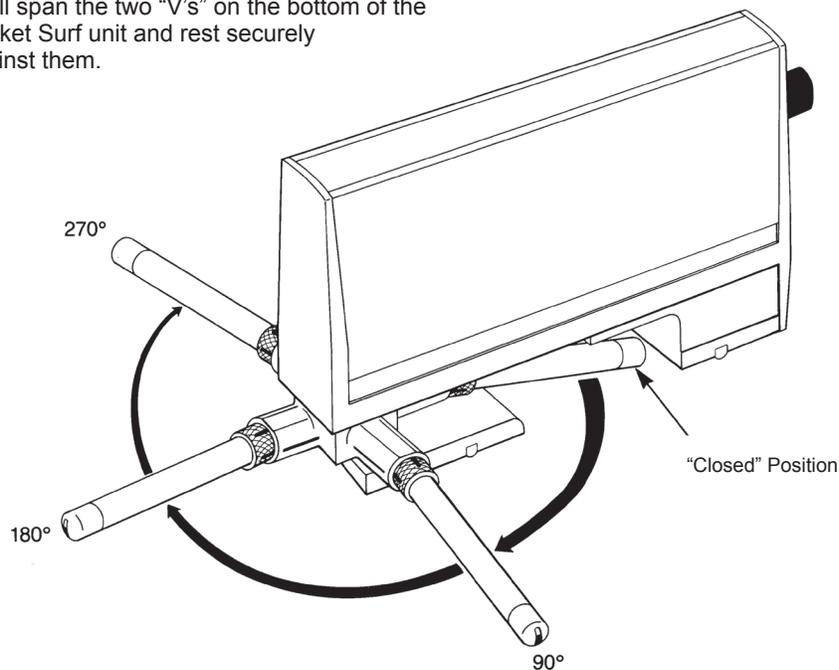
Prior to operating the gage, its calibration should be checked. Refer to the **Calibration** section for details.

Important: During the measuring cycle, the probe stylus and skid should be in contact with a surface, and the setup should be properly aligned (as outlined in the following sections). Otherwise, any readings obtained are not valid and are not to be used for measurement or gage performance evaluation purposes.



“Closed” Position

The Pocket Surf gage can be hand held or placed on a surface in any attitude; it will operate in virtually any position — horizontally, vertically, at any angle in between, even upside-down. In the “Closed” probe position, the gage can measure flat surfaces or cylindrical surfaces (O.D.’s) down to $\frac{1}{4}$ ”/6.35mm in diameter. However, the workpiece or surface to be measured must be at least $3\frac{1}{2}$ ”/89mm long so that it will span the two “V’s” on the bottom of the Pocket Surf unit and rest securely against them.



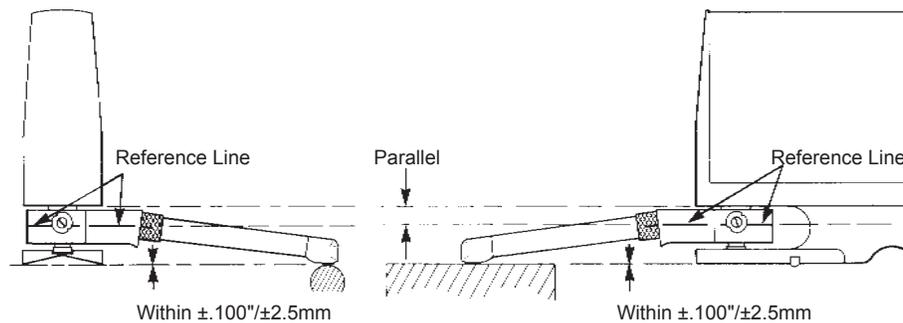
For workpieces or surfaces less than $3\frac{1}{2}$ ”/89mm long (too short to span the “V’s”), use of EAS-2584 Bottom Plate (an optional accessory) is recommended.



Other Probe Positions

To use the gage in the other probe positions — 90°, 180° or 270°, the Pocket Surf unit and probe must be carefully aligned to the workpiece surface to be measured. The base of the Pocket Surf unit must be at approximately the **same elevation** (within $\pm .100"/\pm 2.5\text{mm}$) as the surface being measured, and the axis of probe traverse must be **parallel** to the surface being measured.

With the probe positioned on the workpiece surface to be measured, carefully adjust the gage and workpiece setup so that the black, scribed Reference Line on the Probe Mounting Block is **parallel** to the bottom of the Pocket Surf housing and parallel to the work surface. This ensures that the probe skid and stylus are flush on the surface, even though (except for the Small Bore Probes) the probe body will be at an angle to the surface.



180° “Extended”

In the 180° “Extended” position, the Pocket Surf gage can measure flat surfaces, large cylindrical or O.D. surfaces and inside diameters. Because there is some leeway permitted in the elevation between the base of the Pocket Surf unit and the surface to be measured, the gage can be used to measure surfaces that are raised slightly above or recessed slightly below (within $\pm .100"/\pm 2.5\text{mm}$) adjacent surface(s).

Be sure the two “V’s” on the bottom of the Pocket Surf unit sit firmly on the adjacent workpiece surface.

Inside diameters larger than 1.1"/28.0mm may be measured up to a depth (in-reach) of 2.0"/50mm using a General Purpose Probe. For smaller inside diameters down to 1/8"/3.2mm an optional Small Bore Probe is required. For most I.D. measurements, the Pocket Surf unit cannot be hand held; it must be mounted on a stand such as the optional EAS-2426 Universal Stand or EAS-2496 Height Stand. Refer to **Optional Accessories** section for additional information.

Both the 90° and 270° positions can be used, in conjunction with a suitable stand or fixture for holding the Pocket Surf unit, to measure surfaces (such as crankshaft pins and journals)

90° and 270° Positions



that cannot be accessed with the probe in its “Closed” or 180° “Extended” positions.

The 90° probe position is also used for measuring small workpieces with the EAS-2421 Vee Fixture. Refer to the **Vee Fixture** section on page 17 for specific instructions.

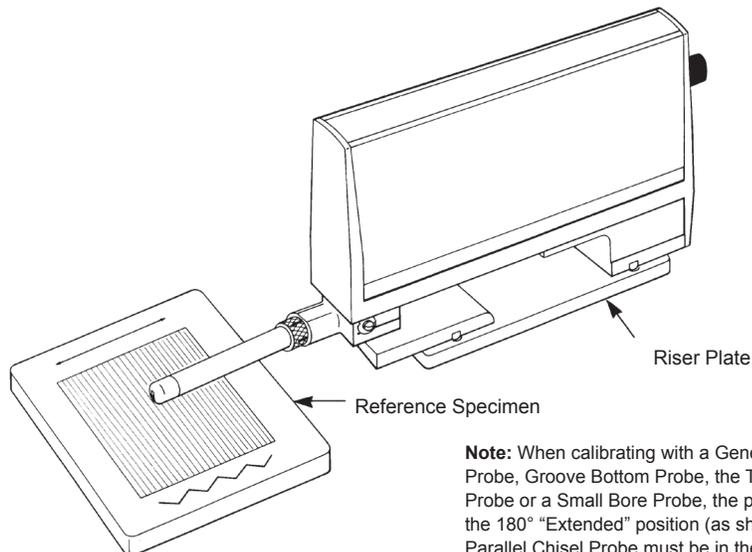
Calibration

The Pocket Surf gage is calibrated using the Reference Specimen and the EPL-1681 Riser Plate supplied with the Pocket Surf Kit.

Set the Parameter Selection Switch to "R_a". The other two parameters, R_{max} and R_z will automatically be calibrated when R_a is calibrated.

Set the Traverse Length Switch to position 5 because a full 5 cutoffs are required for proper calibration of the instrument.

1. To elevate the Pocket Surf base to the same height as the surface of the Reference Specimen, place the Pocket Surf unit on the Riser Plate so that the two "V"s on the bottom of the Pocket Surf Unit sit in the shallow recesses of the Riser Plate. Align the Reference Specimen so that the gage probe will traverse across it in the direction of the double-ended arrow. Take a reading from the center of the specimen.



Note: When calibrating with a General Purpose Probe, Groove Bottom Probe, the Transverse Chisel Probe or a Small Bore Probe, the probe should be in the 180° "Extended" position (as shown above). The Parallel Chisel Probe must be in the 90° or 270° position and the setup rearranged so that the probe will traverse the Specimen in the direction of the arrow.

Calibration (continued)

If the reading is within $\pm 4\mu\text{in}/\pm 0.1\mu\text{m}$ of the value stated on the label on the bottom of the specimen*, calibration is within tolerance.

If the reading differs from the value stated on the label (or on a Report of Calibration certificate) by more than $\pm 4\mu\text{in}/\pm 0.1\mu\text{m}$, take additional readings around the central area of the Reference Specimen. If the readings still differ by more than the allowable tolerance, recalibrate the Pocket Surf unit following the procedure below.

2. Take a measurement on the Reference Specimen. While there is a measurement on the display go to Step 3 below. The display remains visible for about 7 seconds. Be sure to proceed from Steps 2 through 6 within seven seconds during each step or you will have to begin again from Step 2 should the display go blank.
3. Press and hold the Start Button for three seconds until the letters CAL appear.
4. Briefly press the Start Button again, while CAL is shown on the display.
5. Press the Start Button again to enter the assessed value found on the calibration certificate of the Reference Specimen. Or, enter the value found on the back of the reference

specimen. Continue pressing the Start Button to change the number in the display until the same number as the assessed value appears. The values can range from $106\mu\text{in}/2.69\mu\text{m}$ through $135\mu\text{in}/3.43\mu\text{m}$. Select the closest value to the assessed value of the Reference Specimen.

6. After the correct value appears, press and hold the Start Button for three seconds to lock-in the assessed value. When the value flashes a couple of times and disappears, release the Start Button. The Pocket Surf® IV is now calibrated.
7. Finally, run a test of the Reference Specimen.

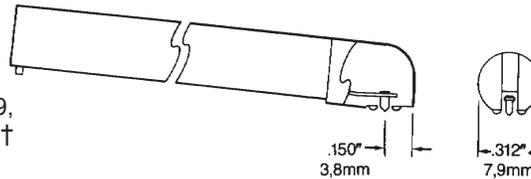
To check the condition of the probe stylus, a "double patch" Reference Specimen (optionally available) is recommended. A "double patch" Specimen can also be used for calibration of the gage; however, **be sure to use only the $125\mu\text{in}/3.17\mu\text{m}$ section of the specimen for calibration purposes.** Be careful not to use the other section of the "double patch" Specimen for calibration as it could introduce serious errors into the gage's roughness readings. The $20\mu\text{in}/0.5$ section is only to be used for checking probe stylus condition.

**Or on the Report of Calibration certificate which accompanies a "Certificate" Reference Specimen.*

Pocket Surf Probes

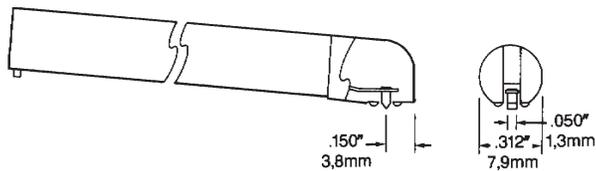
General Purpose Probe

(normally furnished) — For most surface roughness applications.
 90° conical diamond stylus —
 0.0004"/10µm radius for EGH-1019,
 0.0002"/5µm radius for EGH-1026.†



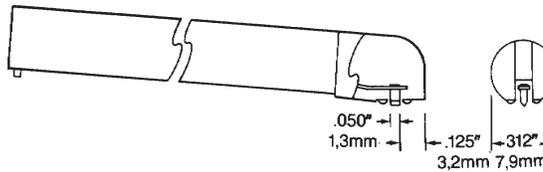
Transverse Chisel Probe

EGH-1020-W1 (optional) — For gaging sharp edges or small O.D.'s where the probe moves parallel to the axis of traverse.
 90° sapphire chisel stylus,
 0.0004"/10µm radius.



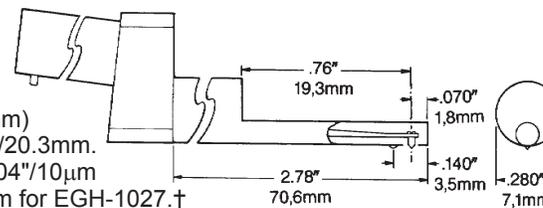
Parallel Chisel Probe

EGH-1020-W2 (optional) — For outside diameters smaller than 1/4"/6.35mm (placed in the EAS-2421 "V" Fixture), or measuring sharp edges with the probe in the 90° or 270° position (perpendicular to the axis of traverse).
 90° sapphire chisel stylus,
 0.0004"/10µm radius.



Small Bore Probe (optional) —

For measuring small bores (min. inside diameter of 1/8"/3.2mm) up to a depth ("in-reach") of 0.80"/20.3mm.
 90° conical diamond stylus — 0.0004"/10µm radius for EGH-1021, 0.0002"/5µm for EGH-1027.†



Small Bore Probes and the Groove Bottom Probe can only be used in the 180° "Extended" position with the Pocket Surf unit supported in a height stand or other suitable fixture; they are not intended to be used in any other position.

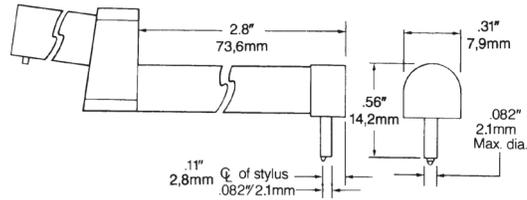
† Yellow dot at connector end signifies .0002"/5µm radius.



Pocket Surf Probes (continued)

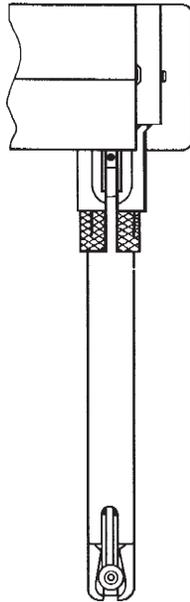
Groove Bottom Probe

EGH-1028 (optional) — For measuring the bottoms of “O” ring grooves, recesses and holes to depths of $\frac{1}{4}$ "/6.35mm. Also used for short lands and shoulders. 90° conical diamond stylus— 0.0004 "/ $10\mu\text{m}$ radius.



The Groove Bottom Probe can only be used in the 180° “Extended” position with the Pocket Surf unit supported in a height stand or other suitable fixture; they are not intended to be used in any other position.

Probe Replacement



1. Turn the Pocket Surf unit upside down and swivel the Probe to its 90° “Extended” position.
2. Loosen the knurled Locking Collar by turning it counterclockwise approximately 2 1/2 turns, until the access slot is aligned with the Probe Pin slot in the Probe Mounting Block. Grasping the probe by its body section, carefully withdraw the Probe from its Mounting Block and the knurled Locking Collar.

Do not grasp the probe by its skid and stylus end.

Caution: Do not remove the knurled Locking Collar from the Probe Mounting Block; loosen it only enough to slide the Probe out easily.

3. Reverse the procedure to install a Probe, aligning the Pin on the bottom of the probe body with the access slot in the Locking Collar.

Note: Make sure that the Probe is fully inserted into the Probe Mounting Block (so that the electrical connector is completely engaged) before tightening the Locking Collar. **Finger tighten only.**

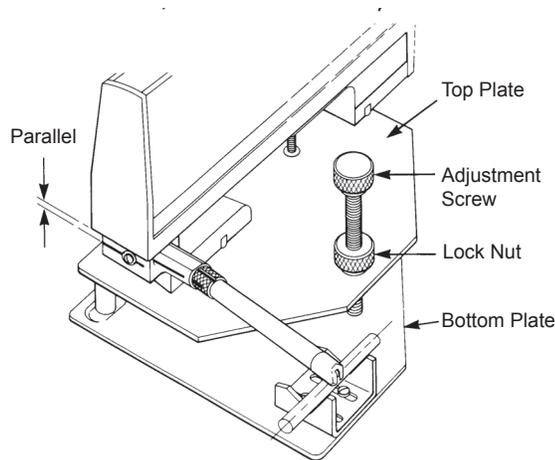
4. Check the gage’s calibration after changing Probes.

EAS-2421 VEE Fixture

The EAS 2421 Vee Fixture is used for measuring cylindrical (O.D.) parts up to approximately 1"/25mm in diameter that are too small to be accommodated in the gage's "Closed" probe position mode. The fixture consists of two parts — a Top Plate for holding the Pocket Surf unit and a Bottom Plate with a Vee for holding the workpiece.

With the Vee Fixture, the probe is used in its 90° position. Either a General Purpose Probe or an optional Parallel Chisel Probe (which is recommended for cylindrical parts less than ¼"/6.35mm in diameter) can be used.

1. Mount the Pocket Surf unit, with the



probe in its 90° position, to the fixture's Top Plate using the captive screw in the Top Plate.

The screw mates with the tapped hole in the bottom of Pocket Surf housing.

2. Place the cylindrical workpiece to be measured across the Vee on the Bottom Plate.
3. Position the Top Plate, with the Pocket Surf unit attached to it, on the fixture's Bottom Plate so that the Top Plate's two legs rest in the recesses in the Bottom Plate and the probe stylus and skid rest on the top of the workpiece.
4. Use the fixture's Adjustment Screw to raise or lower the Top Plate so that the Reference Line on the Probe Mounting Block is parallel to the bottom of the Pocket Surf housing (as outlined in the **Gage Operation** section).

When correctly adjusted, tighten the knurled Lock Nut on the Adjustment Screw to secure the setup.



Vee Fixture Alignment

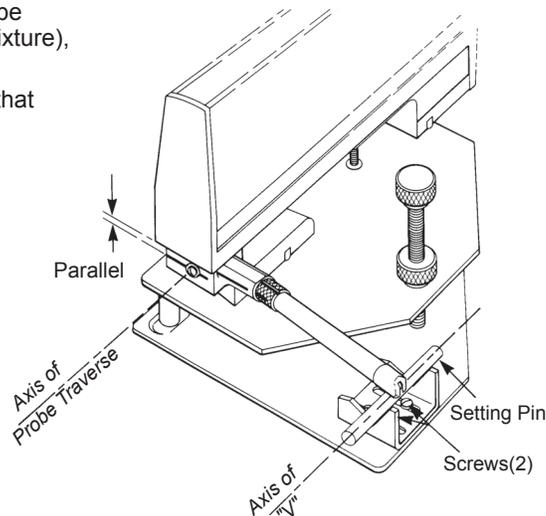
For accurate measurement with the Vee Fixture, the axis of the Vee must be aligned parallel to the axis of probe traverse and at the proper distance from the Pocket Surf unit so that the probe skid and stylus travel precisely along the top ("crown" or "high spot") of the workpiece.

The Vee Fixture was set, at the factory, for correct parallelism and distance to accommodate its normal range of cylindrical workpiece sizes from 1/8"/13.2mm up to approximately 1"/25mm in diameter. If, for some reason, the factory setting has been disturbed, or another workpiece fixture is installed in place of the normally furnished Vee, its alignment must be reset. To adjust the Vee (or other fixture), use the following procedure.

1. Slightly loosen the two screws that

secure the Vee to the fixture's Bottom Plate just enough so that the Vee can be repositioned with a little effort.

2. Place the 1/8"/3.2mm diameter Setting Pin, PS-145, in the Vee and proceed to measure it like a regular workpiece (steps 3 and 4 from previous page). Closely observe the path of the probe skid and stylus on the Setting Pin during the traverse.



Vee Fixture Alignment (continued)

3. Carefully adjust the position of the Vee so that the probe skid and stylus travel precisely along the top ("crown" or "high spot") of the Setting Pin throughout the entire traverse (measurement stroke). Make several passes to ensure that the Vee is properly adjusted, and that the probe skid and stylus do not wander off the top of the Setting Pin during the traverse.
4. Once the Vee is properly adjusted, remove the Top Plate (with the Pocket Surf unit on it) from the Bottom Plate, and remove the Setting Pin from the Vee. Securely tighten the two screws in the bottom of the Vee. Be very careful not to disturb the position of the Vee in performing this step.
5. Place the Setting Pin back in the Vee and place the Top Plate (with the Pocket Surf unit) back on the Bottom Plate, with the probe skid and stylus resting on the top of the Setting Pin. Make two or three more traverses to ensure that proper alignment of the Vee was maintained after it was secured.

Alternate Vee's or other fixturing, fabricated by the user to accommodate specific workpieces, can be substituted for the normally furnished Vee.

Optional Accessories

EAS 2426 Universal Stand

The EAS 2426 Universal Stand is a heavy duty, fully adjustable, multi-position comparator stand for staging the Pocket Surf unit in any position relative to the workpiece surface to be measured. The stand will accommodate workpieces ranging in height from flush with the stand's work surface up to 8.4"/215mm high, and can be used with or without additional workpiece fixturing.

The probe can be in its 90°, 180°

- ① Column Clamp — to adjust height (Elevation) and radial position around column (thru 360°)
- ② Tilt — to adjust Pocket Surf bracket in plane parallel to column (thru 360°)
- ③ Tilt — to adjust Pocket Surf bracket in plane perpendicular to column (thru 90°)

“Extended” or 270° positions. The stand's 360° Column Clamp and Bracket can be positioned anywhere vertically and radially on the column, permitting the stand to be used as a height stand on a surface plate or other suitable work surface to measure workpieces positioned adjacent to it.

A typical application using the Universal Stand. Note



that the bracket with the Pocket Surf unit is tilted, using adjustment ②, to align with the tapered workpiece surface being measured.

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Optional Accessories

EAS 2426 Universal Stand

(cont'd)

1. Mount the Pocket Surf unit in the bracket on the Stand using the captive screw in the base of the bracket. The screw mates with the tapped hole in the bottom of the Pocket Surf housing. Tighten the screw using a screwdriver or coin; do not over tighten.
2. Using the appropriate controls, adjust the setup so that the base of the Pocket Surf bracket (and the bottom of the Pocket Surf housing) is parallel to the surface to be measured and the probe skid and stylus are barely in contact with surface. Use the Fine Adjustment to make the black, scribed Reference Line on the Probe Mounting Block parallel to the bottom of the Pocket Surf housing (as outlined in the **Gage Operation** section).
3. Once the setup is correctly adjusted, and the probe is properly positioned on the workpiece surface, gently press and release the "Start" button on the Pocket Surf unit to make the measurement.

EAS-2567 Column Clamp & Bracket

The EAS-2567 Column Clamp & Bracket is the same Column Clamp & Bracket assembly furnished with the EAS-2426 Universal Stand, and can be used on any height stand or comparator stand having a 1¼"/32mm diameter column.

Follow the same setup/adjustment instructions as for the EAS-2426 Universal Stand.

Do not place the probe in the "closed" position with the Pocket Surf® mounted on the EAS-2426 Universal Stand unless the CP-96 Probe Protector clip is installed. Otherwise, without the protective clip, damage to the probe stylus will result.



Optional Accessories

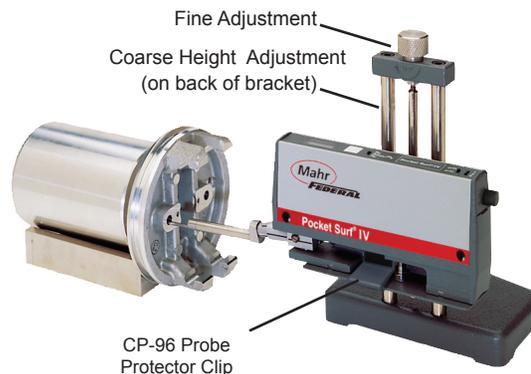
EAS-2496 Height Stand

The EAS-2496 Height Stand is intended to be used on a surface plate or other suitably flat surface to measure workpiece surfaces ranging in height (elevation) from flush with the work surface to a maximum height of approximately 4 3/8"/110mm. The Pocket Surf probe can be in either its 90° or 180° "Extended" position.

1. Mount the Pocket Surf unit in the bracket on the Height Stand using the captive screw in the base of the bracket. The screw mates with the tapped hole in the bottom of the Pocket Surf housing. Tighten the screw using a screwdriver or coin; **do not over tighten.**
2. Position the Height Stand so that the probe is above the workpiece surface to be measured. Use the Coarse Height Adjustment to bring the probe skid and stylus barely in contact with the surface. Use the Fine Adjustment to make the black, scribed Reference Line on the Probe Mounting Block parallel to the bottom of the Pocket Surf housing (as outlined in the **Gage Operation** section).
3. Once the setup is correctly adjusted, and the probe is properly positioned on the workpiece surface, gently press and release the "Start" button on the Pocket Surf unit to make the measurement.

Do not place the probe in the "closed" position with the Pocket Surf® mounted on the EAS-2426 Universal Stand unless the CP-96 Probe Protector clip is installed. Otherwise, without the protective clip, damage to the probe stylus will result.

Photograph shows typical application using Small Bore Probe.

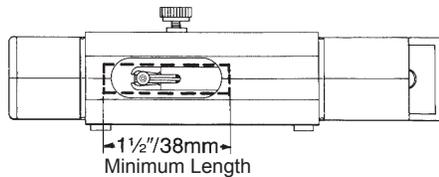


Optional Accessories

EAS-2584 Bottom Plate

When measuring workpiece surfaces with the Pocket Surf probe in the "Closed" position, the EAS-2584 Bottom Plate will accommodate cylindrical workpieces too short (less than $3\frac{1}{2}$ "/89mm long) to span the "V's" on the bottom of the Pocket Surf housing.

The Bottom Plate accommodates



cylindrical workpieces from $\frac{1}{4}$ "/6.35mm diameter up to $1\frac{1}{2}$ "/38mm long — long enough to span the slot lengthwise and sit securely in the "V" of the Bottom Plate.

To install the Bottom Plate, remove the Protective Cover from the Pocket Surf unit and turn the Pocket Surf unit upside down. Loosen the Clamping Screw on the side of the Bottom Plate and position the Bottom Plate over the base of the Pocket Surf unit between the two "V's". Tighten the Clamping Screw **finger tight only; do not over tighten.**



Maintenance & Troubleshooting

Protection & Storage

To protect the gage when not in use, always return the probe to its "Closed" position and replace the Protective Cover on the Pocket Surf unit. Also, when not in use, always keep the Pocket Surf unit and its accessories in the fitted carrying case.

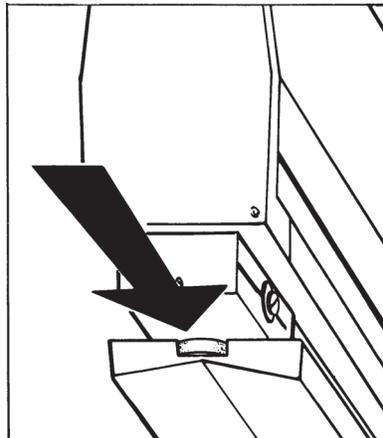
Cleaning

To clean the Pocket Surf unit, use a soft, lint free cloth moistened with a mild, non abrasive, liquid or foam cleaning agent. **Do not spray any liquid or foam cleaners directly onto the Pocket Surf unit. Do not use petroleum-based solvents or cleaning fluids.**

Using a magnifier, periodically inspect the probe skid and stylus area for dust, dirt or other contamination. To clean the probe skid and stylus, use a soft (camel's hair), artist's brush moistened with denatured alcohol. Point the skid and stylus end of the probe downwards to the floor to permit dirt to flow out.

Gently brush the ruby skid and diamond stylus tip to remove any foreign matter. Clean the brush well in denatured alcohol and repeat the cleaning process until all contamination has been removed. **Do not use isopropyl ("rubbing") alcohol.**

Using denatured alcohol in a "squeeze" bottle with a small nozzle opening, carefully bathe the bearing slot beneath the Probe Mounting Block to remove any dust, dirt or other contamination. To prevent damage to the self-lubricating bearing, **do not use anything sharp, pointed or hard to scrape foreign matter from the slot or the bearing. Do not lubricate.**



Maintenance & Troubleshooting (continued)

Error Messages

- E1 — Motor did not start.
- E2 — Motor failed to accelerate to proper operating speed.
- E3 — Motor failed to maintain proper operating speed.
- E4 — Excessive traverse length.

If error message “E1” or “E4” is displayed on the digital readout, it usually indicates an internal electrical or mechanical malfunction requiring repair; see the **Repairs** section on page 26.

If error message “E2” or “E3” is displayed on the digital readout, it usually indicates that a malfunction has occurred in the probe traverse which prevented or interfered with normal movement. One or more of the following conditions may be the cause:

1. An obstruction or excessive pressure on the probe or the Probe Holding Block.
2. Dust, dirt or other contamination around the probe skid and stylus, and/or in and around the bearing and its slot beneath the Probe Holding Block.
3. A weak battery (but not weak enough to cause the “low” battery signal to be displayed on the readout).

To remedy these conditions:

1. Make sure the workpiece is clean and dry, and the surface to be measured is free from gross defects.
2. Make sure the gage and workpiece setup is properly adjusted, with the surface to be measured at approximately the same elevation as the base of the Pocket Surf unit and parallel to it, and the Reference Line on the Probe Mounting Block parallel to the bottom edge of the Pocket Surf housing (as outlined in the **Gage Operation** section on page 9).



Maintenance & Troubleshooting (continued)

3. Clean the probe skid and stylus area.
4. Clean the bearing slot beneath the Probe Mounting Block.
5. Replace the battery. Alkaline batteries are only to be used.

Repairs

If none of the above remedies work, and an error message persists — particularly “E1” or “E4”, contact Mahr Federal Inc. Service Department for assistance and repair information.

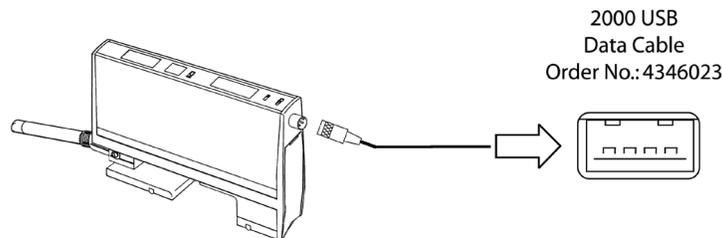
Do not disassemble the Pocket Surf unit or attempt any further remedies or repairs.

Digital Output

The Pocket Surf® IV outputs the reading simultaneously that is currently appearing on the display. Furthermore, after one reading is transmitted, the operator can send readings from the other parameters by simply sliding the switch to another parameter, exemplified as from R_a to R_{max} to R_z .

The following are cables available for the Pocket Surf® IV:

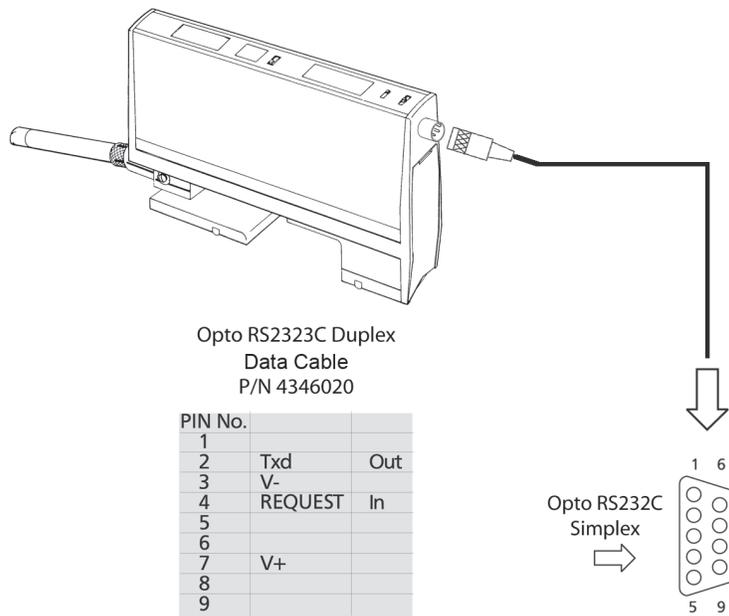
USB Output Cable - Includes MarCom Standard Software



Virtual Com Interface Driver:

The Driver emulates for every connected cable an additional virtual COM-Port. The application software communicates to the instrument in exactly the same manner as a normal hardware COM-Port

RS-232C Output Cable



4800 Baud, 1 start bit, 7 Data bits,
even parity, 2 stop bits
request for measuring value: ? CR*

* Within 30 seconds of system time out (power down). Refer to page 8 for operating details.