



Bedienungsanleitung
Operating Instructions
Instructions de service

Digimar M

Höhenmess- und Anreißgerät
Height Measuring and Scribing Instrument
Appareil de mesure de hauteur et de traçage

814 G

814 N

814 X

3752897

Version 1.1

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Safety Instructions

- Read the operating instructions carefully **before** connecting and putting into operation. Observe the safety instructions! If the Digimar M is connected to additional instruments (e.g. a computer, printer, etc.) observe the appropriate operating instructions
- The height Measuring Instrument Digimar M complies with the relevant safety provisions.
- This instrument may only be used for the intended purposes i.e. for height measurements and for marking and scribing components.
- Ever put you hands between the scribe and test sample. Danger!
- Before maintenance and repair work disconnect the Digimar M by pressing the ON/OFF key.
- Trained personnel instructed by Mahr may only perform work on the opened machine. Protective caps may only be removed by trained personnel in the case of repair work. Any unauthorized opening of the machine or unauthorized intervention cause the given warranty to be invalidated and the manufacturer freed from liability.
- Safety instructions and accident prevention regulations must be complied with. If required, the safety expert of the client gives further instructions according to local conditions and in-house guidelines.
- Mounting and first putting into operation as well as maintenance and repair work may only be performed by trained personnel.
- Used batteries may be disposed of in an environment conscious way.

Instructions concerning measuring accuracy

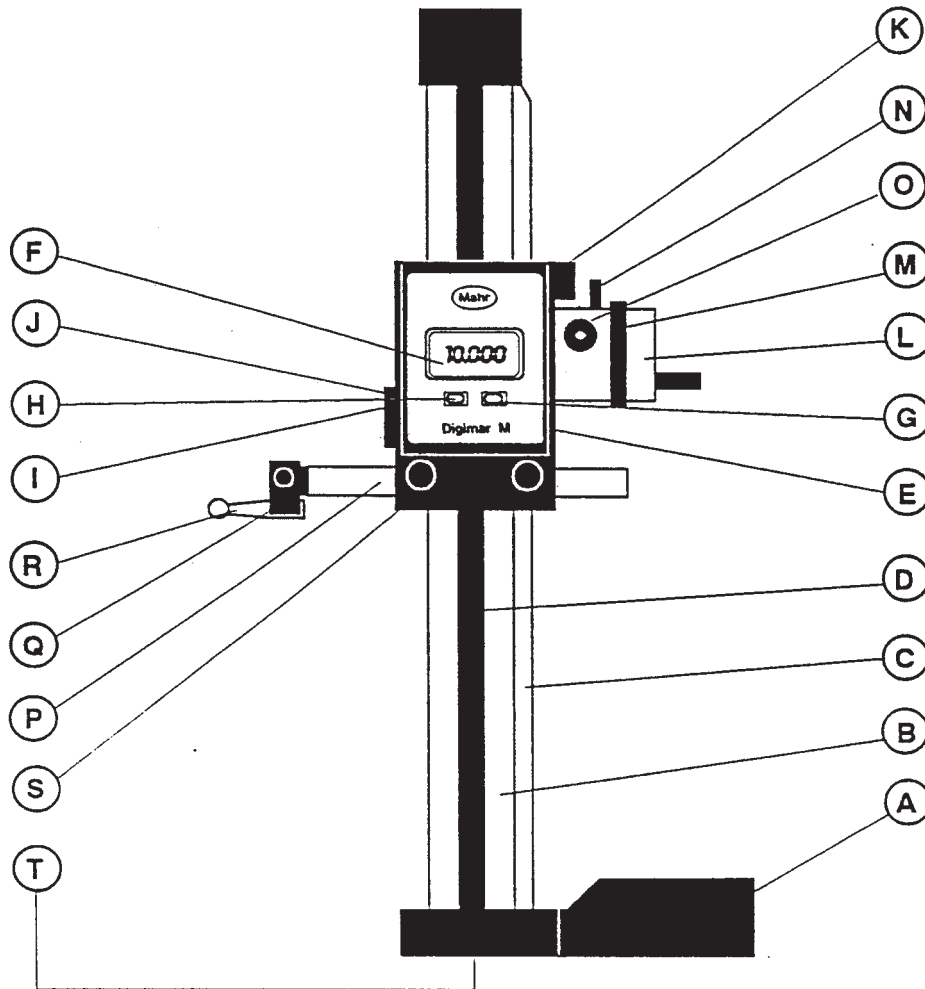
- Never tilt the Digimar M more than 90°.
- Before any transport of the instrument lock the counter weight using the locking screw (see chapter V.1).
- Never lift the Digimar M by grasping the measuring carriage
- Never use cleaning powder or cleaning agents which are harmful to plastics. Never let liquids get inside the Digimar M.
- Any setting modifications of the Digimar M – apart from the modifications described in the present operating instructions are admissible.

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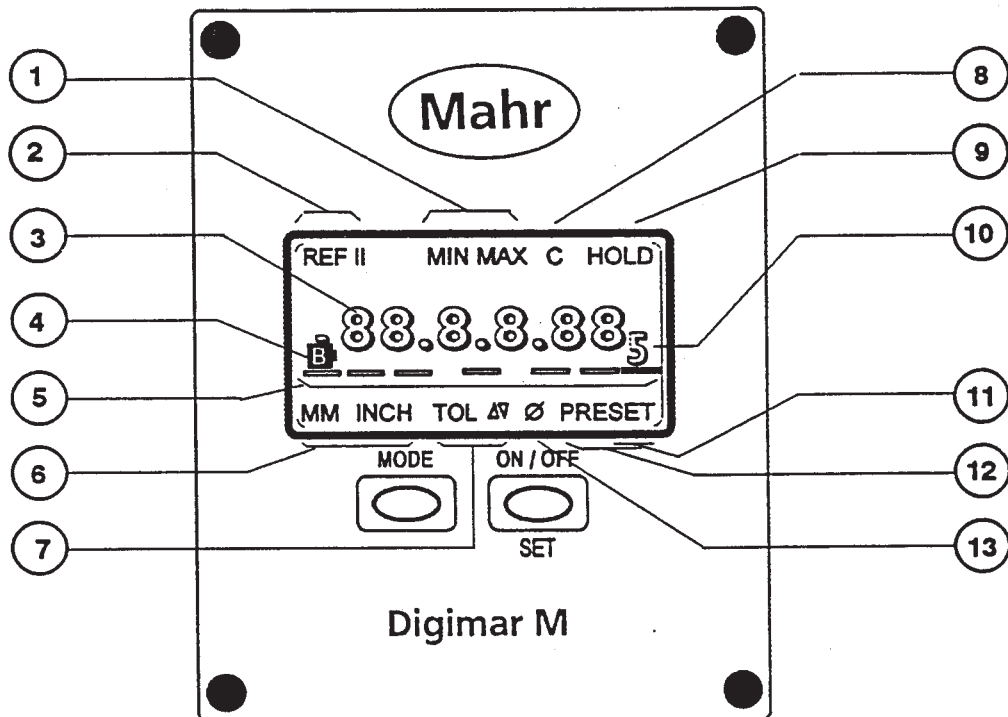
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I.1 Instrument Construction



- A. Cast iron base of functional design (hammered finish lacquer coating).
Alternatively a granite base can be supplied.
- B. Measuring column, of hard chromed steel and precision ground.
- C. Guide bar.
- D. Protected scale.
- E. Measuring carriage (its movement is axially controlled by ball races) containing the electronic display unit, a handwheel and a probe holder location. (balanced by a counterweight).
- F. LCD digital display.
- G. **ON/OFF** and **SET** switch.
- H. **MODE** selector switch.
- I. Battery compartment (battery: 1x3V, lithium).
- J. Data output (opto coupler RS232C).
- K. Locking knob (to lock the measuring carriage during the scribing process).
- L. Handwheel for easy displacement of the measuring carriage.
- M. Pre-load ring for setting of a constant measuring force in either direction.
- N. Locking lever when using fine adjustment screw.
- O. Fine adjustment screw.
- P. Interchangeable probe holder with connector to fix various accessories.
- Q. Connector for accessories having a 8 mm/.315" bore.
- R. Interchangeable probes.
- S. Knurled knobs to fix the probe holder in position.
- T. Locking screw to fix counter weight during transport.

II.1 Functions of the display



1. MIN/MAX function indicator
2. Reference (REF I or II) indicator
3. Indication of value
4. Battery life warning display (B)
5. Cursor for PRESET and TOL input
6. Measuring unit (MM/INCH) indicator
7. Tolerance (TOL) mode indicator
8. Indication of non-active (locked) display (C)
9. HOLD function indicator
10. Display in inch mode of .0005" or .00005"
11. PRESET mode indicator and input of tolerance values (SET)
12. PRESET mode indicator
13. Two (o) times factor indicator

III.1 Specifications

Measuring range.....	0 - 320mm/0 - 12.6"	0 - 620mm/0 - 24.4"
Resolution.....	0.01mm/0.001mm or .0005"/.00005"	0.01mm/0.001mm or .0005"/.00005"
Accuracy.....	20µm/.0008"	30µm/.0012"
Repeatability.....	5µm/.0002" (+/-2s)	5µm/.0002" (+/-2s)
Squareness (measuring direction) error max....	0.02mm/.0008"	0.03mm/.0012"
Max. displacement speed of meas. carriage...	1m /sec. (40"/sec.)	1m /sec. (40"/sec.)
Number of measurements per second:		
Normal measuring mode:.....	12 measurements/sec.....	
Using min/max mode:.....	>20 measurements/sec.....	
Using tolerance mode:.....	10 measurements/sec.....	
Measuring force.....	approx. 3N.....	
Measuring units.....	metric/inch. (direct conversion).....	
Digital Display.....	LCD display : sign (-), 6 digits (7 in inch mode), height of digits: 8.5mm/.33", indication of active functions.....	
Power supply.....	1 lithium battery, 3 V, type CR2032, capacité 190 mAh.	
Type of batteries to be used.....	Toshiba CR2032.....	
	Maxell CR2032.....	
	Renata B/CR2032.....	
	Sanyo CR2032.....	
	Ucar CR2032.....	
	Panasonic CR2032.....	
	Rayovac CR2032.....	
	Varta CR2032.....	
Power consumption.....	80µA.....	
Battery life.....	1 year if normally used (approx. 2000 hours a year)..... When "B" is displayed, the remaining battery life will be slightly more than a day of use. (To protect our environment, please recycle the battery)	
Working temperature.....	+5 to +40°C / +41 to 104 F	
Data output.....	RS232 compatible.....	
Interface.....	RS232 compatible interface cable with opto-electronic coupler	
Dimensions		
814 N with cast iron base:.....		
Total height:.....	513mm/20.2"	813mm/32"
Length and width of the base:.....	180x102mm/7.08"x4.02"	200x140mm/7.87"x5.52"
Weight.....	6.2kg/13.67lbs	10.5kg/23.15lbs
814 G with granite base:.....		
Total height:.....	558mm/22"	858mm/33.78"
Dimensions of granite base:.....	200x300mm/7.87"x11.8"	200x300mm/7.87"x11.8"
Surface accuracy:.....	grade I (5µm/.0002")	grade I (5µm/.0002")
Weight.....	14kg/30.87"	18.3kg/40.4lbs

IV.1 Delivery

The Instrument is supplied as follows:

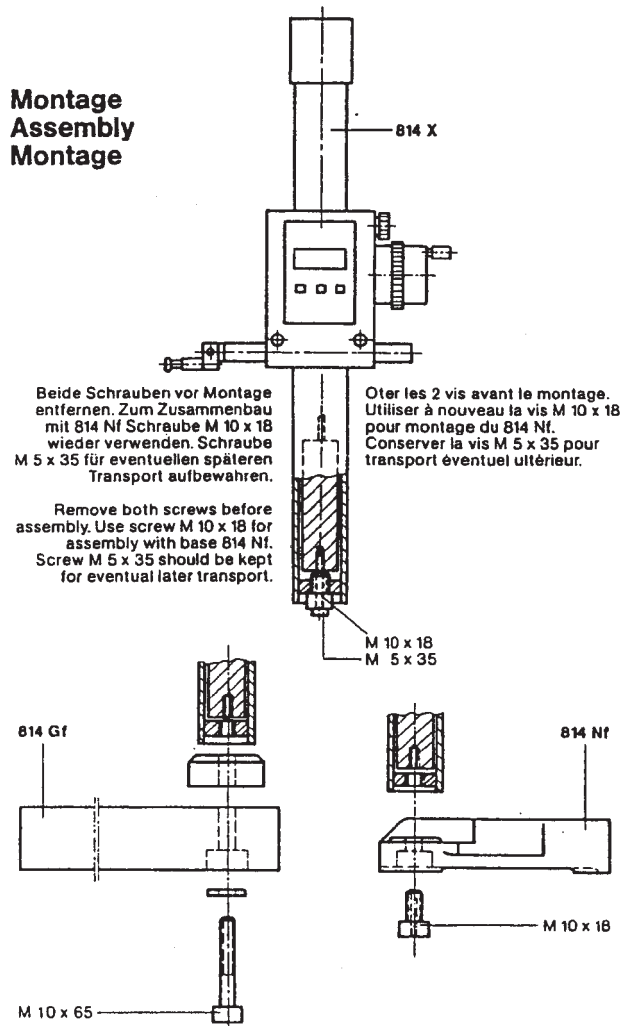
- Instrument according to specifications including a main probe holder, length: 150mm/5.9" with connector having a 8mm location bore and one ball probe dia. 8mm/ .315"
- 1 battery (lithium,3V) - Protection cover
- Instructions for use - Test and guarantee certificate

The instrument is supplied in a specially designed shockproof box and protected against dirt and dust by a protective cover. Whenever the instrument is transported, the original packing should be used.

DURING EACH TRANSIT THE COUNTER WEIGHT MUST BE LOCKED USING THE LOCKING SCREW (T). NEVER TURN THE INSTRUMENT UPSIDE DOWN (MORE THAN 90°) .

V.1 Setting up

- Unpack the instrument, incline it. **NEVER TURN IT UPSIDE DOWN !**



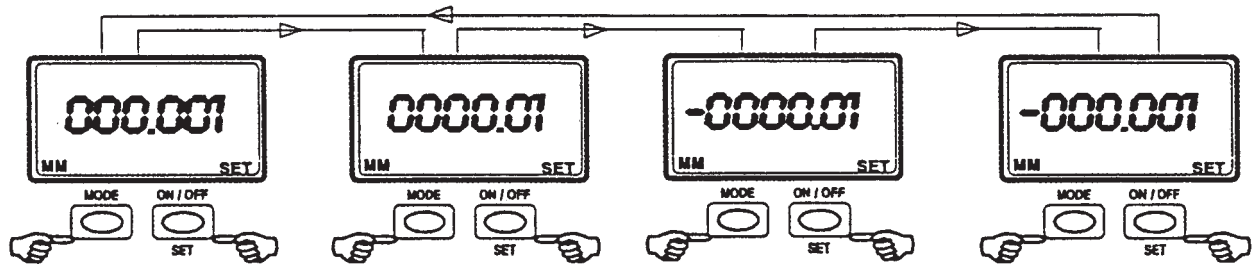
814 Y: Compressed-air supply 4 bar
Compressed-air free from oil and condensation water.
Place a 40 µm filter in front of the instrument to avoid impurities (advice).

- Position the instrument on a measuring table.
- Clean the instrument using fine oil (do not lubricate the scale).
- Position the probe holder (P) and a probe (R) and lock it using the knurled knobs (S).
- Unlock the measuring carriage (E) by turning the locking knob (K) counter clockwise.
- Remove the rubber collar.
- Switch the digital display on (ON).- Check the movement of the measuring carriage by turning the crank of the handwheel (L) and check whether all the digits light up .

VI.1 Measuring

VI.1 Setting the measuring direction and the required resolution

- Lock the measuring carriage using the locking lever (N) of the handwheel to activate the fine adjustment screw (O).
- Press **MODE** and **ON/OFF** key simultaneously.



- The digital display changes the resolution and then the measuring direction every second the keys are held. If you have obtained the required modes, release the keys.
000.001 = negative direction and resolution of 1µm. **0000.01** = negative direction and resolution of 10µm.
-000.010 = positive direction and resolution of 10µm. **-000.001** = positive direction and resolution of 1µm.
- The instrument is supplied in **-000.001** mode. These set parameters are memorized by the electronic and will be recalled each time the instrument is switched OFF and ON again.

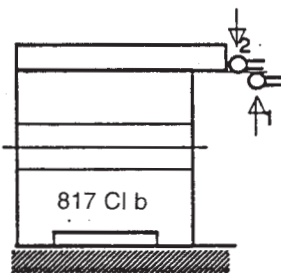
VI.1.2 Measuring using rigid probes

of heights, distances, gaps, diameters (I.D. and O.D.), etc.

TO OBTAIN REPEATITIVE MEASUREMENTS, THE CONSTANT MEASURING FORCE MUST BE ACTIVATED.

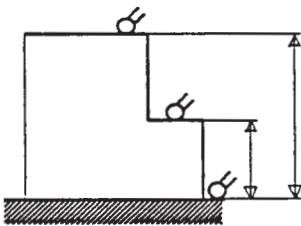
- By turning the pre-load ring (M) counter clockwise to its stop, the measuring pressure will be set in downwards direction.
- By turning the pre-load ring (M) clockwise to its stop, the measuring pressure will be set in upwards direction.
- With the pre-load ring in neutral position, the measuring carriage is in a free state.

Most of the measurements require the **DETERMINATION OF THE PROBE CONSTANT** (dimension of the probe in use, deflections of its shaft caused by setting the measuring force). This probe constant is measured using the setting gauge 817 Cl b



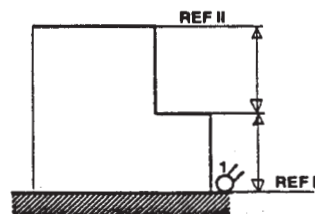
- Set the probe on surface 1.
- Set measuring force in a downwards direction.
- Press **SET** key (zero).
- Remove measuring force.
- Set probe from bottom on surface 2
- Set measuring pressure in an upwards direction.
- The probe constant will be displayed.

VI.1.3 Measuring of flat surfaces

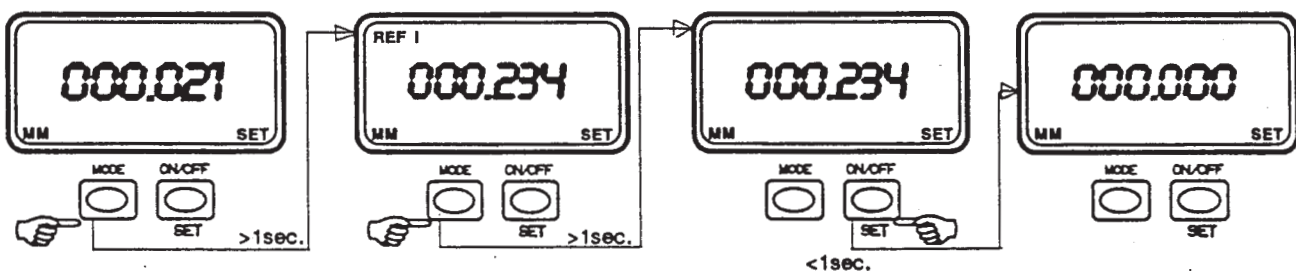


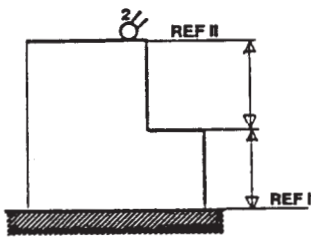
- Set the probe on the reference surface (plate or gauge block).
- Set measuring force in a downwards direction.
- Press **SET** key (zero).
- Remove measuring force.
- Set probe on the next surface.
- Set measuring force in a downwards direction.
- Value of distance will be displayed.
- Remove measuring force, etc.

VI.1.4 Measuring of flat surfaces using two references (REF I and REF II)

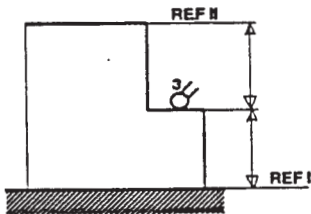
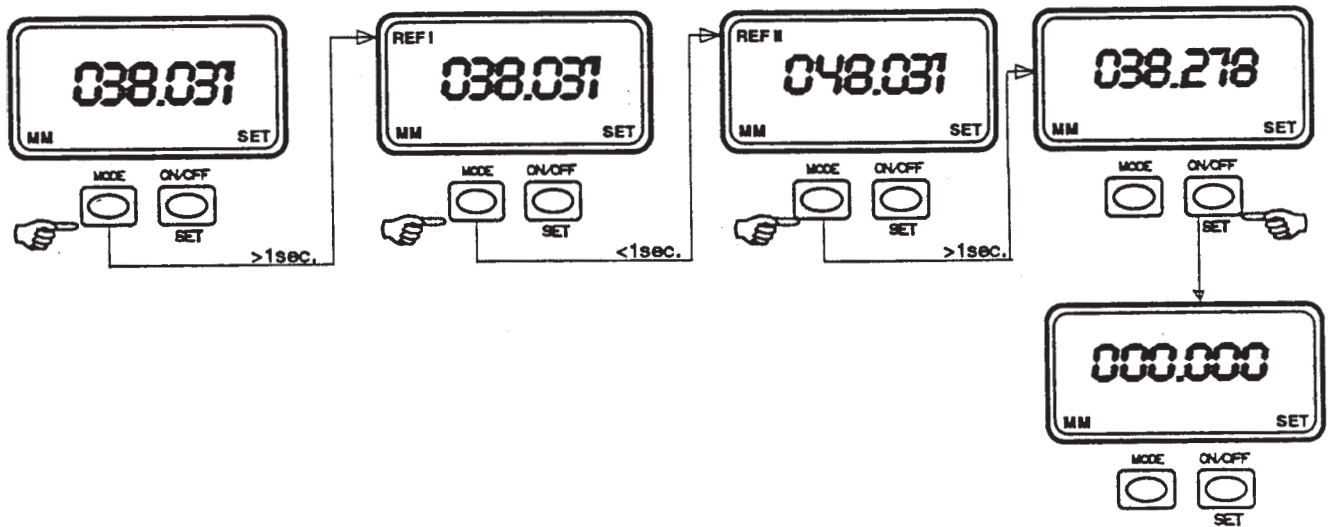


- Set the probe on surface 1.
- Set measuring force in a downwards direction.
- Press **MODE** key a little longer than 1 second (>1sec.).
- Make sure you are in REF I mode.
- Press **MODE** key a little longer than 1second (>1sec.).
- Press **SET** key (zero).
- REF I is now set at zero (first reference)

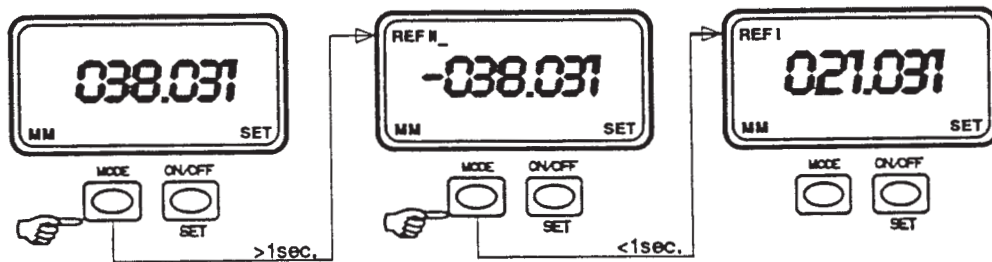




- Set probe on surface 2.
- Set measuring force in a downwards direction.
- Press **MODE** key a little longer than 1 second (>1sec.).
- Make sure you are in REF I mode.
- Press **MODE** key a little less than 1 second (<1sec.).
- REF II will be displayed.
- Press **MODE** key a little longer than 1second (>1sec.).
- Press **SET** key (zero).
- REF II is now set at zero.

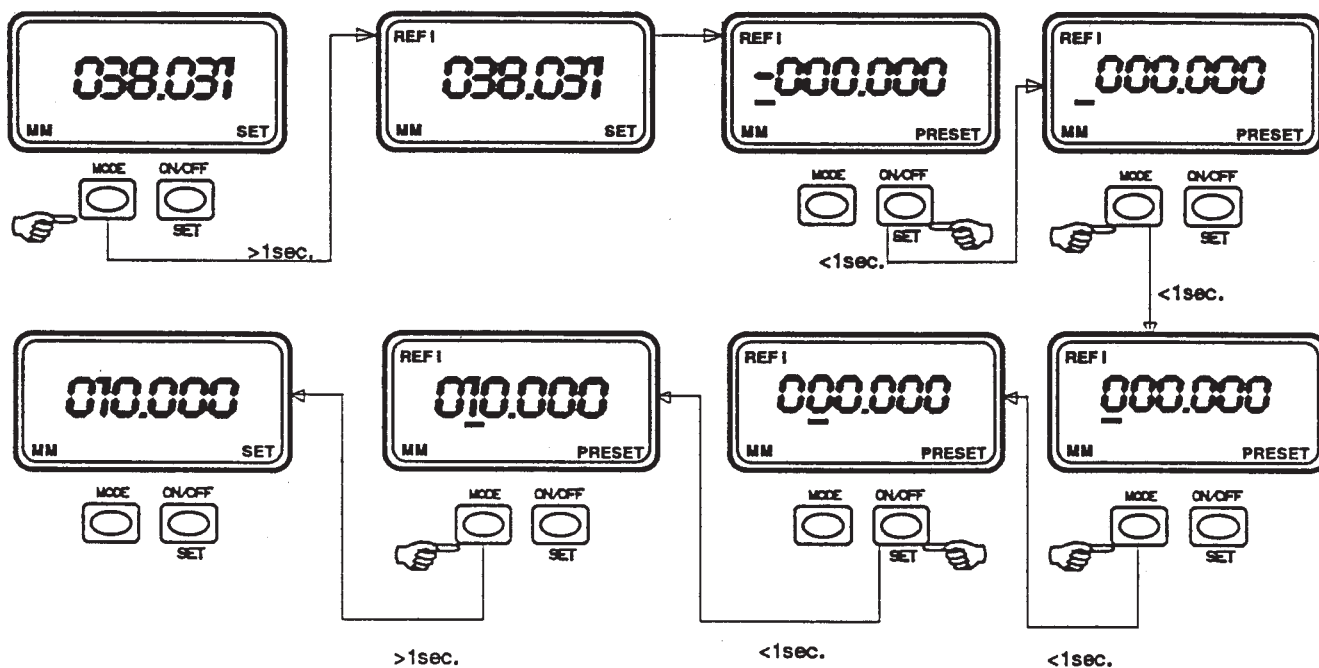


- Set the probe on surface 3.
- Set measuring force in a downwards direction.
- Press **MODE** key a little longer than 1 second (>1sec.).
- You are in REF II mode and the displayed value is the one starting from REF II (zero).
- Press **MODE** key a little less than 1 second (<1sec.).
- Back to REF I. The displayed value is the one starting from REF I (zero).

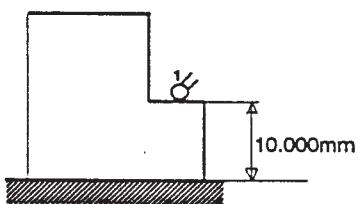


VI.1.5 Measuring using one reference and PRESET input

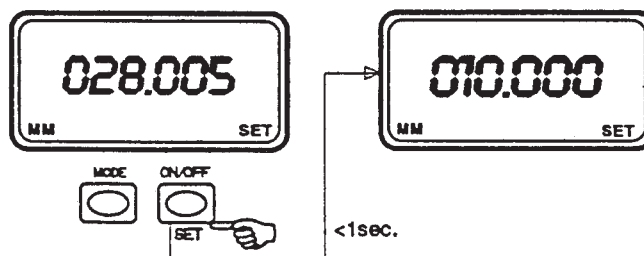
- Lock the measuring carriage in position using knob (K).
- Press **MODE** key a little longer than 1 second (>1sec.) until **PRESET** mode will be displayed.
- Release the **MODE** key at this moment.
- Press **SET** key to change the + or - sign (< 1sec.).
A cursor is displayed.



- Press **MODE** key less than 1 second (<1 sec.).
- Press **MODE** key less than 1 second (<1 sec.) The cursor moves from one to the other digit.
- Press **SET** key (<1 sec.) to introduce a number, e.g. 1.
- Press **MODE** key longer than 1second (>1sec.).
Back into measuring mode which includes now a memorized value in REF I.
- Release the locking knob (K).



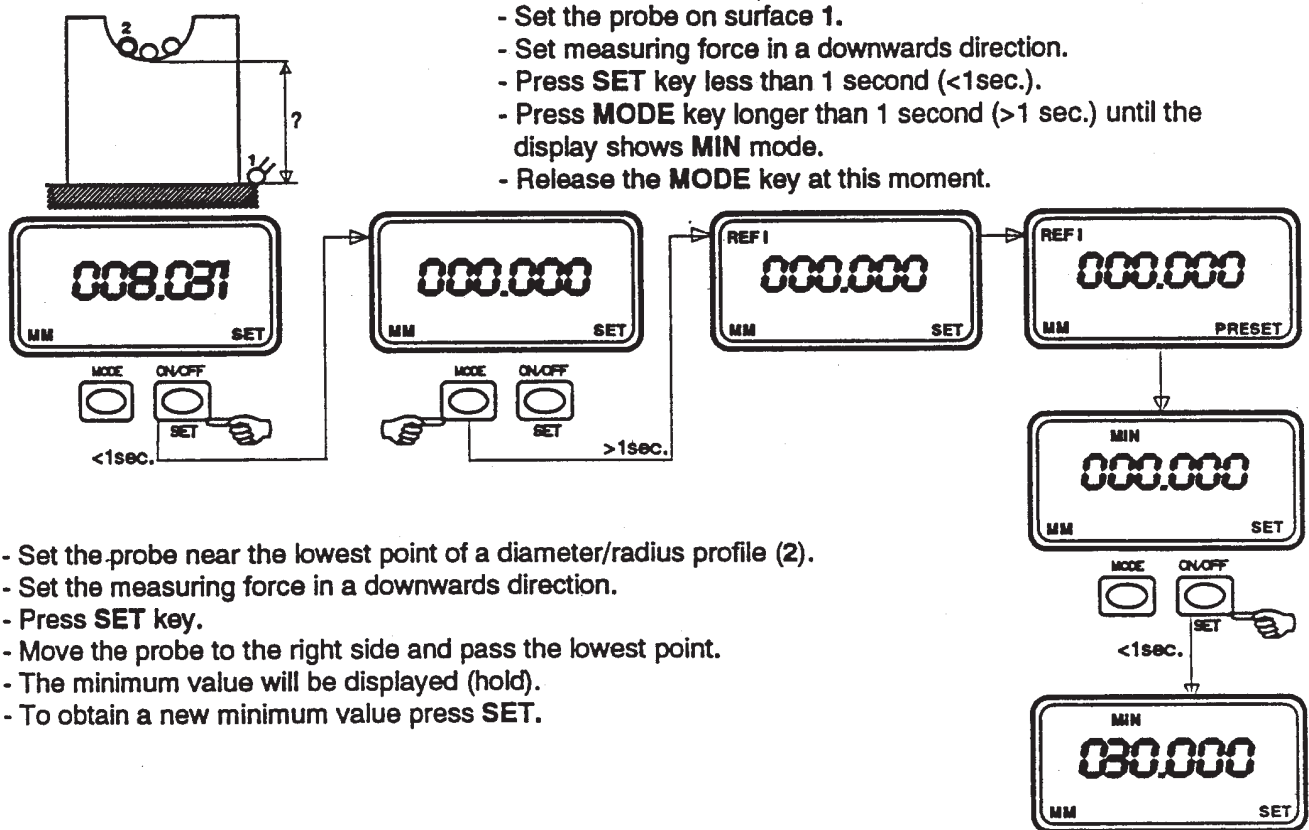
- Set the probe on surface 1.
- Set measuring force in a downwards direction.
- Press **SET** key less than 1 second (< 1 sec.).



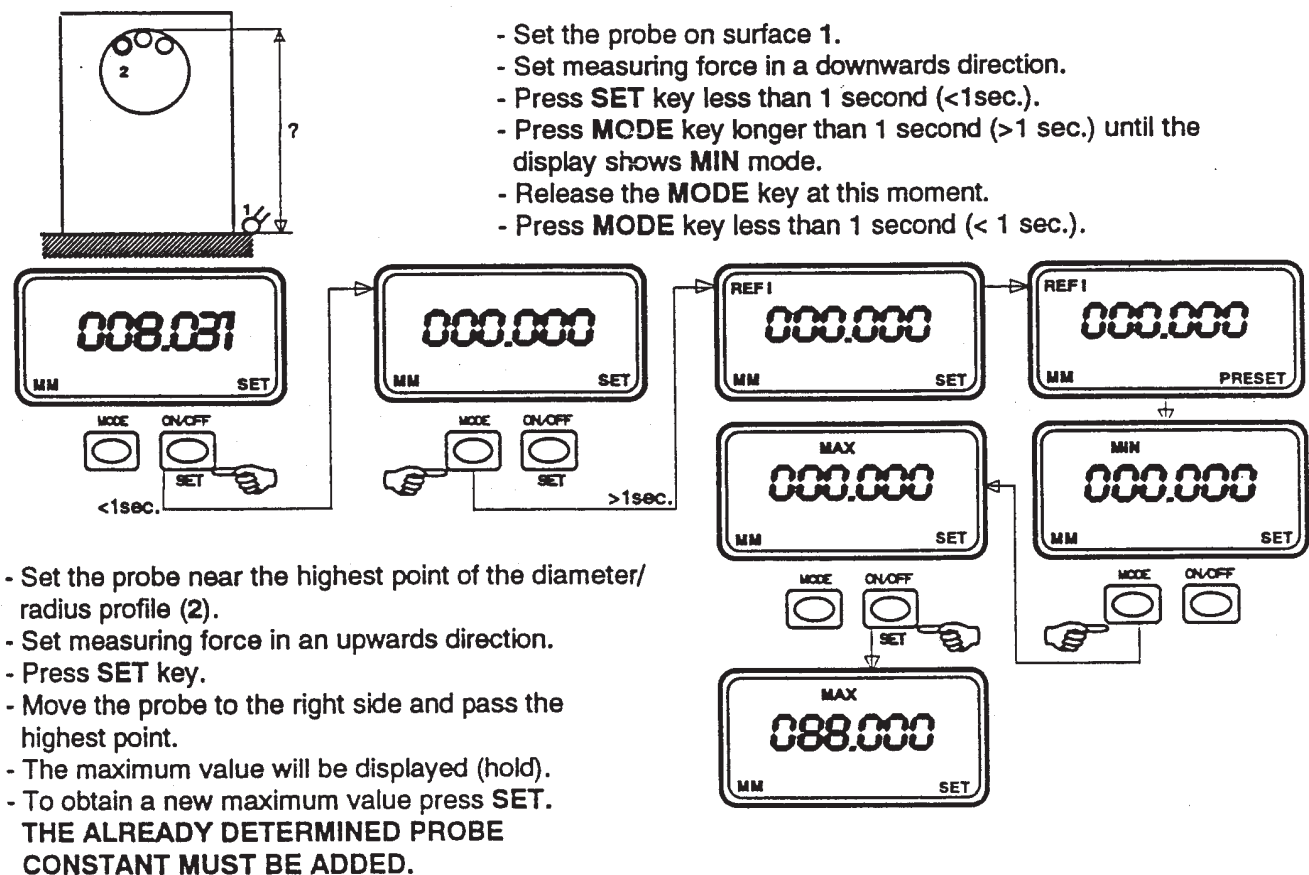
NOTE:

- To introduce a preset value in REF II proceed as for REF I.

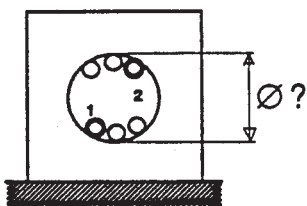
VI.1.6 Measuring using MIN (minimum) mode



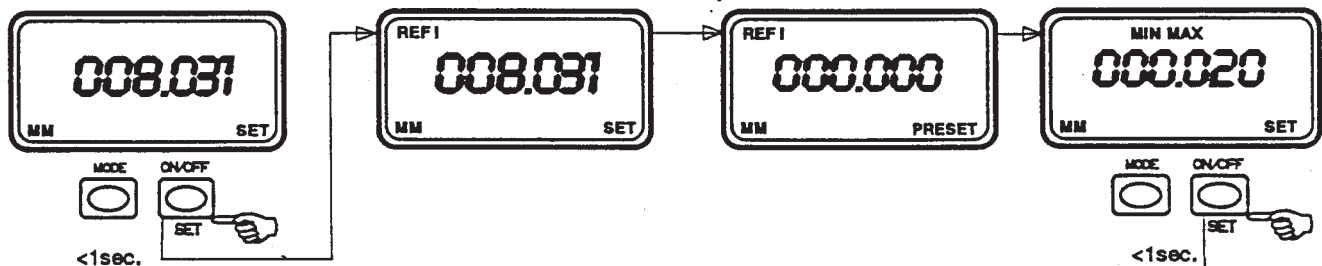
VI.1.7 Measuring using MAX (maximum) mode



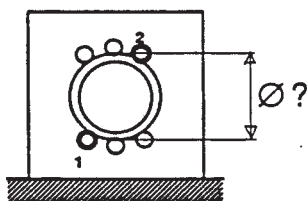
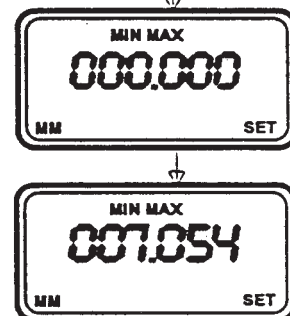
VI.1.8 Measuring using MIN/MAX (Minimum-Maximum/Delta) mode



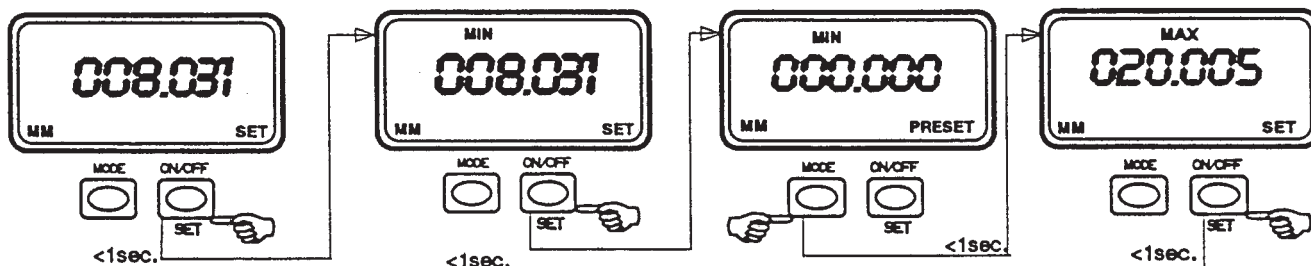
- Set the probe near the lowest point of the diameter profile (1).
- Set the measuring force in a downwards direction.
- Press **MODE** key longer than 1 second (>1sec.) until the display shows **MIN MAX** mode.
- Release the **MODE** key at this moment.
- Press **SET** key less than 1 second (<1sec.).
- Move the probe to the right side and pass the lowest point.



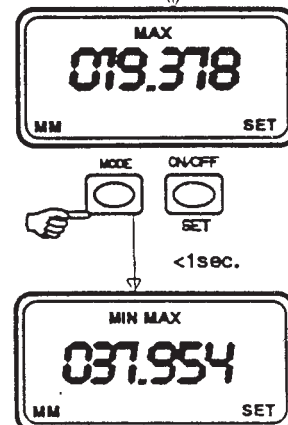
- Set the probe near the highest point of the diameter profile (2).
- Set the measuring force in an upwards direction.
- Move the probe to the left side and pass the highest point.
- The diameter value will be displayed.
- **THE ALREADY DETERMINED PROBE CONSTANT MUST BE ADDED.**



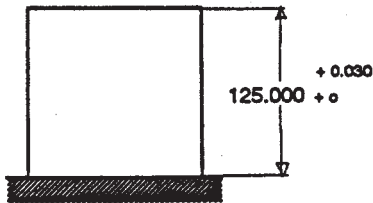
- Set the probe near the lowest point of the diameter profile (1).
- Set measuring force in an upwards direction.
- Press **MODE** key longer than 1 second (>1sec.) until the display shows **MIN** mode.
- Release the **MODE** key at this moment.



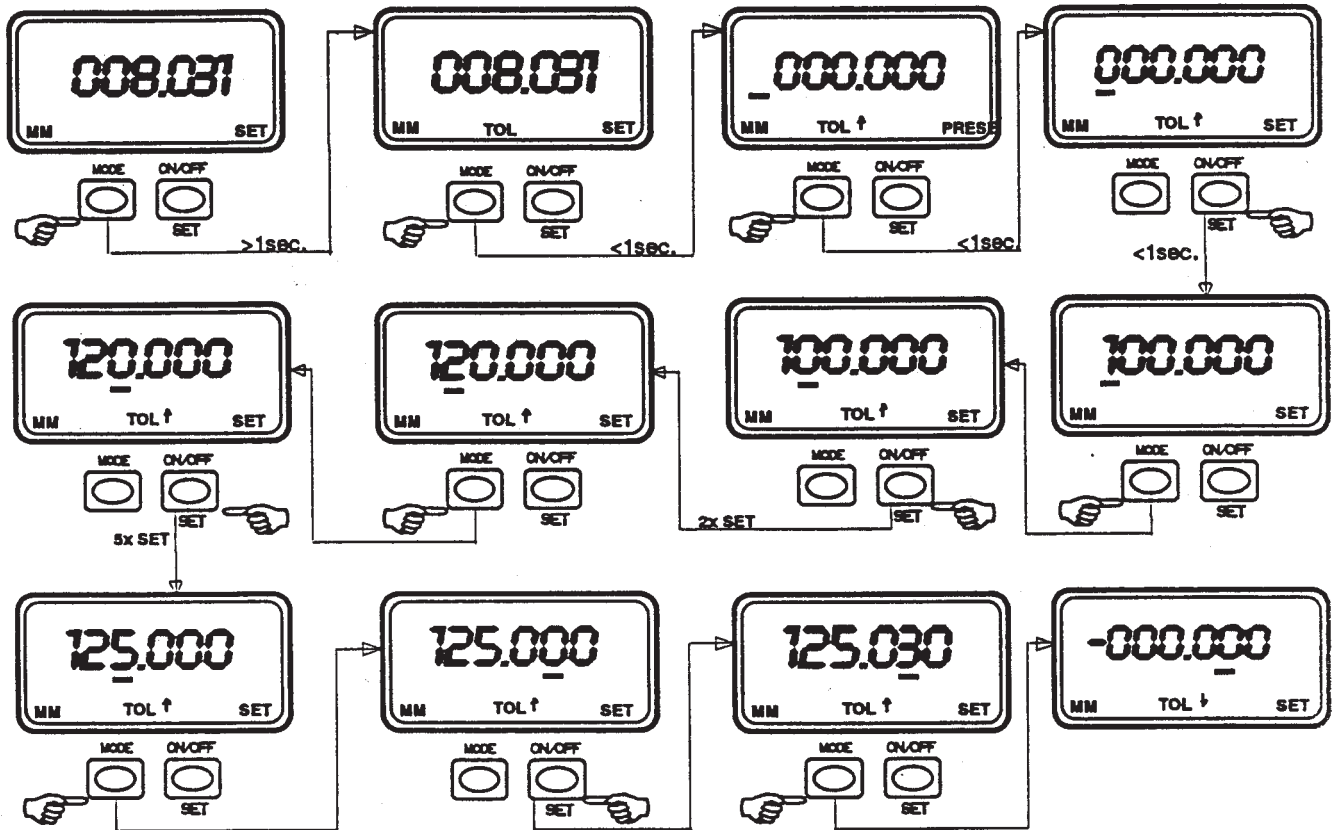
- Press **SET** key.
- Move the probe to the right side and pass the lowest point.
- Set the probe near the highest point of the diameter profile (2).
- Press **MODE** key less than 1 second (< 1sec.) until **MAX** mode is displayed.
- Press **SET** key.
- Set measuring force in a downwards direction.
- Move the probe to the left side and pass the highest point.
- Press **MODE** key less than 1 sec. (< 1 sec.) until **MIN MAX** mode is displayed
- The diameter value will be displayed..
- **THE ALREADY DETERMINED PROBE CONSTANT MUST BE SUBTRACTED.**



VI.1.9 Measuring using (TOL input) mode



- Lock the measuring carriage in position using the knob (K).
- Press **MODE** key longer than 1second (> 1 sec.) until the display shows TOL mode.
- Release the **MODE** at this moment.
- Press **MODE** key less than 1second (<1sec.).



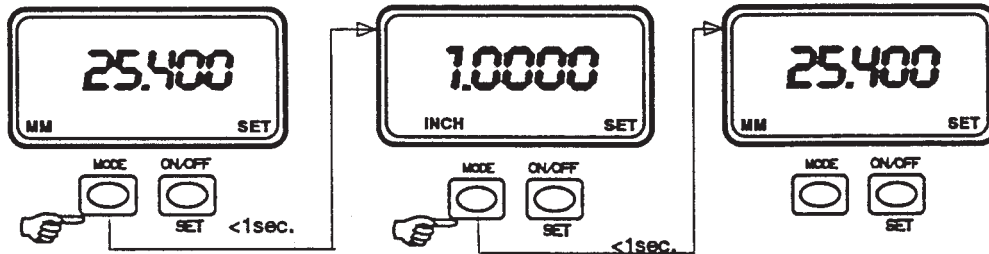
- Press **MODE** key less than 1second (< 1 sec.) until the cursor moves under the first digit.
- Press **SET** key less than 1 second to introduce the number 1 (125.030mm).
- Press **MODE** key less than 1second (< 1 sec.) until the cursor moves under the second digit.
- Press **SET** key two times less than 1second to introduce the number 2 (125.030mm).
- Continue until the preset value is completed.
- Press **MODE** key longer than 1 second (>1sec.) to introduce the lower tolerance value.
- Proceed as already explained for introduction of the upper tolerance value.
- Press **MODE** key longer than 1 second (>1 sec.) to quit the TOL mode.
- The tolerance values are now memorized..

MEASURING IN MODE TOL:

- Set the display to zero in normal measuring mode (**SET** key).
- Press **MODE** key until the display shows TOL mode.
- Carry out the required measurement.
- The display indicates by showing an arrow:
 - in an upwards direction => over the upper limit
 - in a downwards direction => under the lower limit
 - without arrow => the measured value is in tolerance

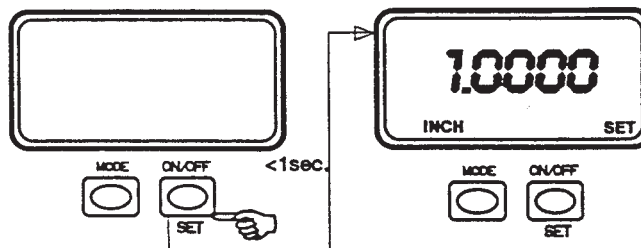
VI.1.10 MM/INCH conversion (direct conversion)

- Press **MODE** key less than 1second (< 1 sec.).
- The display indicates "inch" measuring mode.
- Press **MODE** less than 1 second (< 1 sec.).
- The display indicates metric (mm) measuring mode.

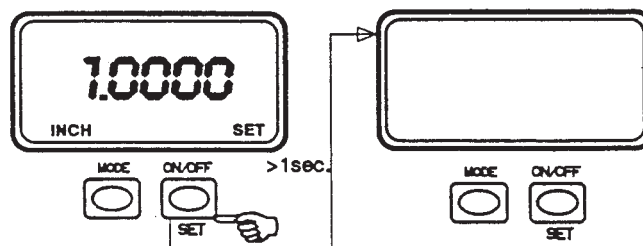


VI.1.11 ON/OFF (power connection/disconnection)

- Power connection = **ON**.
- Press **ON/OFF** key less than 1second (< 1 sec.).
- The display is active.



- Power disconnection = **OFF**
- Press **ON/OFF** key longer than 1second (> 1 sec.).
- The display is not activated.
- The instrument is switched OFF on the last active measuring mode.



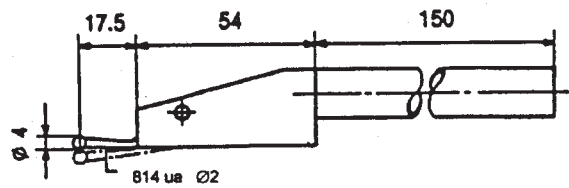
VII.1 Measuring with special accessories

VII.1.1 Measuring using bi directional probe 814 u

The bi-directional probe will be mounted instead of the probe holder (P) and locked using the knurled knobs (S).

NOTE : The probe body must be fixed to allow true vertical movement of the probe, otherwise incorrect values will result.

- Set the lateral part of the probe body against a square surface for parallel adjustment.
- Lock the knurled knobs (O).

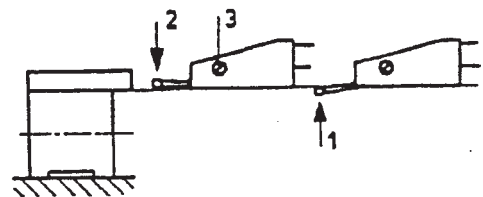


VII.1.2 Calibration of the bi directional probe 814 u

- Set the probe first from below onto surface 1, Run through the free travel.
- Set measuring force in an upwards direction.
- Press **SET key** (zero setting).
- Remove measuring force.
- Set the probe from above onto surface 2.
- Set measuring force in a downwards direction.
- A value will be displayed.

If this value does not correspond to "zero", turn the adjustment screw (3) until the display shows "zero" (000.000). Leave the locking screw of the adjustment screw (bottom of screw 3) slightly tightened.

- Repeat the checking/setting procedure.



NOTE : Measuring from the bottom upwards, the bi-directional probe has a free travel which corresponds to the diameter of the ball. This free travel must be passed before setting the measuring force.

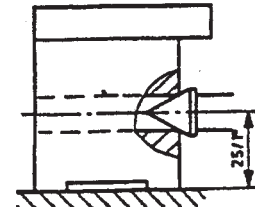
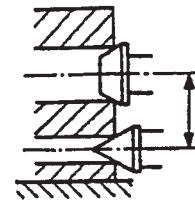
NOTE : THERE IS NO ADDING OR SUBTRACTING OF THE PROBE CONSTANT WHEN MEASURING WITH THE BI-DIRECTIONAL PROBE, as opposed to measurements with rigid probes. The probe constant is compensated by the free travel of the ball which corresponds to the diameter of the ball.

VII.1.3 Measuring centerline distances between centering cones

The cone holder 814 kh mounted instead of the standard probe holder (P) and locked using the knurled knobs (S).

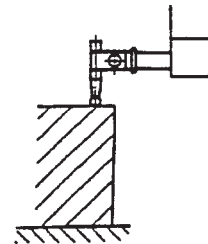
- The carriage movement is in a free state.
The measuring force is not required.
- Select the appropriate cone and position it into the holder.
- Set the cone into the reference bore (or into the bore of the setting gauge 817 Cl b).
- Press **SET** key (zero setting or preset input).
- Set cone into the next bore.
- the value of the centerline distance will be displayed.

Interchange cones according to the bore sizes.



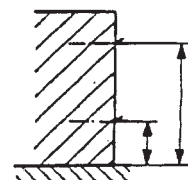
VII.1.4 Checking the parallelism

- Mount appropriate ball probe..
- Set the probe on the surface to be checked.
- Set measuring force in a downwards direction.
- Press **SET** key (zero setting)
- Pass over the surface
- Values will be displayed

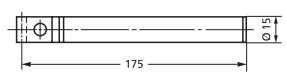
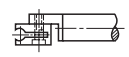
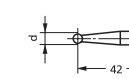
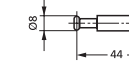
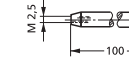

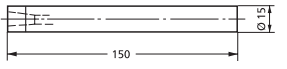
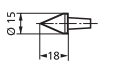
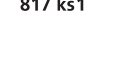
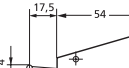

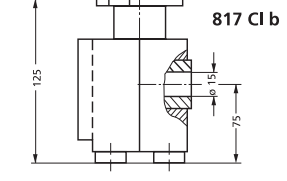
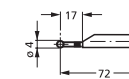
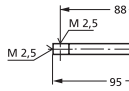
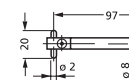
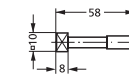


VII.1.4 Scribing using the scriber 814 a

- Fix the scriber on the standard probe holder.
- Set the scriber on a reference surface.
Do not activate the measuring force.
- Press **SET** key (zero setting or preset input)
- Move the measuring carriage (E) until the approximate required value is displayed.
- Lock the measuring carriage using the locking lever (N) of the handwheel.
- Set the required value by turning the fine adjustment screw (O).
- Tighten firmly the locking knob (K).
- Marking of the required distance.



VIII. Accessories

					Order no.
	814 t	Probe arm			4426510
	814 m	Spherical probing elements	8 mm ball 7 mm ball 6 mm ball 5 mm ball 4 mm ball 3 mm ball 2 mm ball		4426509 4426528 4426511 4426527 4426512 4426526 4426525
	814 s				
	814 h	Probe with plate	8 mm plate	3 mm plate width	4426513
	814 h	Probe holder	M 2,5		4426514
	814 a	Scriber			4426515
	814 kh	Holder			4426516
	817 ks1	Measuring taper	0 – 15		4426071
	817 ks2	Measuring taper	14 – 20		4426072
	817 ks3	Measuring taper	18 – 24		4426073
	817 ks4	Measuring taper	23 – 30		4426074
	814 u	Two direction probe	4 mm ball		4426517
	814 ua	Exchangeable probe arm	2 mm ball	for 814 u	4426518
	817 Cl m	Stylus ball	4 mm ball		4426436
	817 Cl am	Holder with connection thread	M 2,5		4426434
	817 Cl sa	Stylus with pin			4426433
	817 Cl p	Stylus with parallel meas. faces			4426435
	817 Cl b	Setting block			4426437
	817 ks1				
	817 ks2				
	817 ks3				
	817 ks4				
		Battery 3 V, type CR 2032			4102520
		Dust cover	0–320 mm		4426616
		Dust cover	0–620 mm		4426619
	814 Nf	Cast iron base			4426506
	814 Gf	Table plate			4426507
	814 ua	Column with measuring head	320 mm		4426544
	814 u	Column with measuring head	620 mm		4426545
	16 ESv	Data connection cable	Opto RS232C	2 m	4102510
		Adapter for foot switch			3014927
		Foot switch			3014928
		Optoface Software			4102519
	MSP2	Statistics printer			4102040
	817 Cl m				
	817 Cl am				
	817 Cl sa				
	817 Cl p				

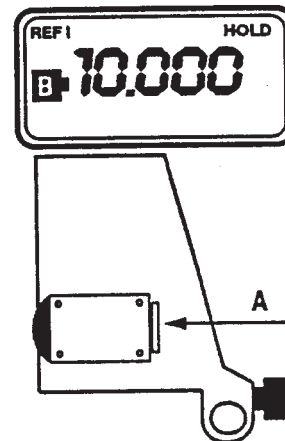
IX.1 Maintenance

IX.1.1 Maintenance

- Keep the measuring column (B) and the scale (D) clean.
- Lubricate the column very lightly using fine oil (viscosity 20), Do not lubricate the scale.
- If the instrument is not in use, switch it OFF.
- When moving the instrument from one location to another, carry it only in vertical position.
NEVER INCLINE THE INSTRUMENT BEYOND THE HORIZONTAL.

IX.1.2 Replacement of battery

- Becomes necessary when B is displayed.
- Remove the cover of the battery compartment (A) and the battery and replace it (usable types of battery see chapter III.1). Check the polarity (+/-).
- The instrument is automatically reset after replacement of the battery
If any error occurs, remove the battery for approx. 30 sec. and insert it again.
- Use only a battery out of the listing on page 5 of this instructions for use.



IX.1.3 Transport

- If possible, use the original packing.
- Place the instrument in a horizontal position.
NEVER INCLINE IT MORE !
- Lock the measuring carriage in most upper position using locking knob (K).
- Remove the probe holder (P).
- Lock the counter weight using the locking screw (T).
- Protect the instrument against and dirt using a protective cover.
- Ensure firm location in packing material before transportation.

IX.1.4 Repairs

All parts of the instrument are interchangeable. Mahr GmbH (Göttingen) has a stock of spare parts. In case of need, contact us.

IX.1.5 Complaints

Mahr can accept any complaints only in case that the instrument has been returned in **clean conditions and packed according to instructions.**



Konformitätserklärung

Declaration of Conformity / Déclaration de conformité / Atestado de conformidad / Dichiarazione di conformità

Wir	Mahr GmbH	erklären in alleiniger Verantwortung, daß das Produkt
We	Brauweg 38	declare under our sole responsibility that the product
Nous	D- 37073 Göttingen	déclarons sous notre seule responsabilité que le produit
Nosotros	Germany	declaramos con responsabilidad exclusiva que el producto
Noi		dichiariamo con la responsabilità esclusiva che il prodotto

Bezeichnung: Höhenmeßgerät
 name: / nom: / nombre: / nome:

Typ: DIGIMAR 814
 type: / type: / tipo: / tipo:

ab Lieferdatum oder Serien-Nr.: 29.5.96
 from delivery date or serial number:
 à partir de date de livraison ou n° de série:
 a partir de fecha de entrega o núm. de serie:
 da data di consegna o numero di serie:

mit folgenden Nomen übereinstimmt: VDE 160
 is in conformity with the following standards: EN 50081- 2, EN 50082-2
 est conforme aux normes: EN 55022: 1987;
 está conforme con las normas siguientes: IEC 801-3: 1984
 è conforme alle norme seguenti: IEC 801-2: 1991, IEC 801- 4: 1988

gemäß der Richtlinie(n): Niederspannungsrichtlinie 73/23/EWG,
 following the Directive(s): i.d.F. 93/68/EWG
 conformément à la Directive: Richtlinie Elektromagnetische Verträglichkeit 89/336/EWG,
 con arreglo a la Directiva: .d.F. 93/68/EWG
 secondo alla Direttiva:

Ort u. Datum: Göttingen 20.7.97	Unterschrift: <i>G. Kochta</i>	Prüfbeauftragter Inspector Contrôleur en chef Ingegnere collaudatore Verificador jefe
Place and date:	Signature: Gerhard Kochta	
Lieu et date:	Signature:	
Lugar y fecha:	Firma:	
Luogo e data:	Firma:	

Dokument-Id.-Nr.:
3753845

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