



Instruction Manual

TESA Micro-Hite[®] Plus M

*Base instrument,
1D Control Panel
and Accessories*



TESA micro-hite **plus** **M**

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1 GENERAL FEATURES

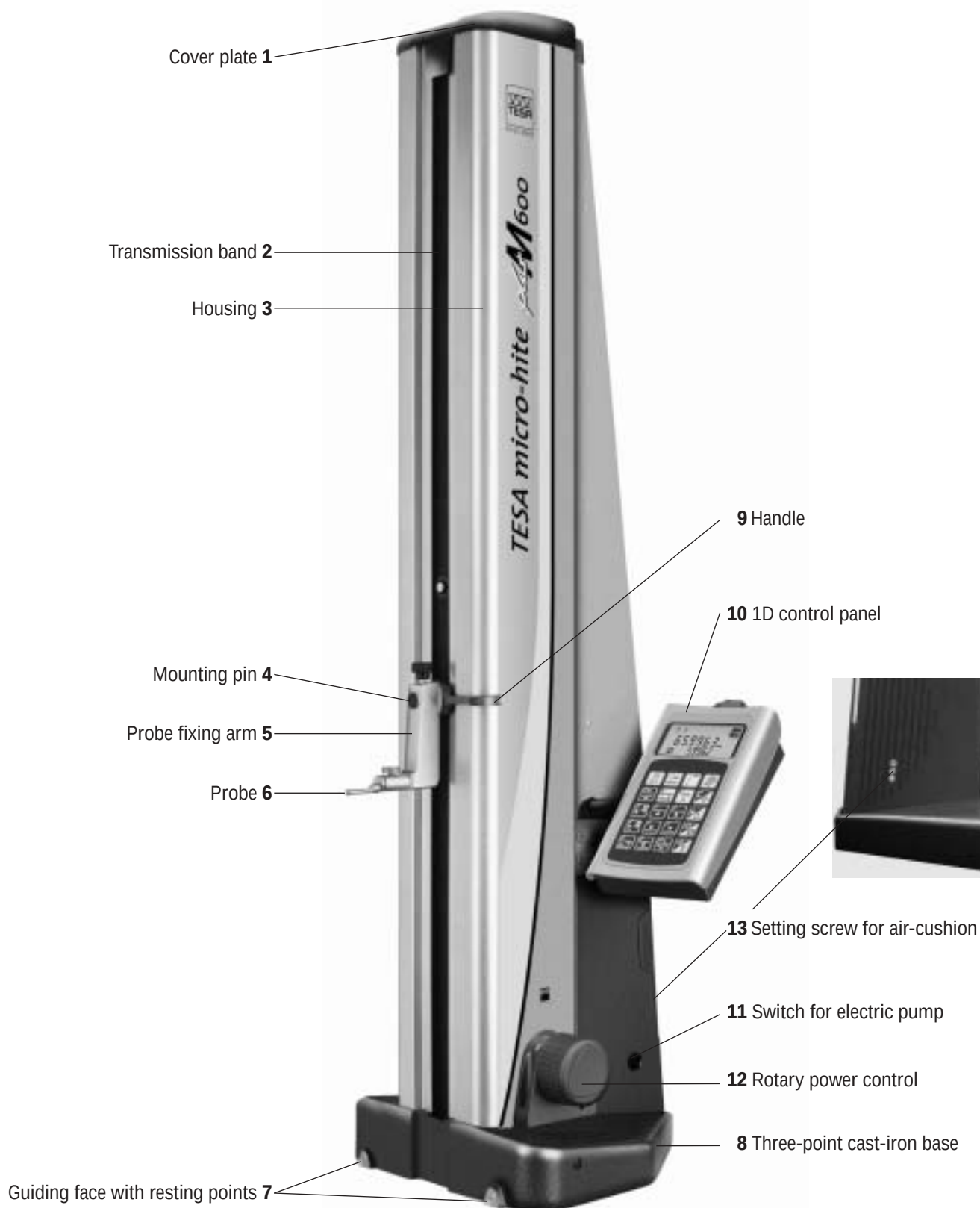


Fig. 1

1 GENERAL FEATURES

All TESA Micro-hite plus M of the latest generation are different from the other height gauges in that they have exceptional metrological capabilities and can be used intuitively with ease. The unique and revolutionary rotary power control combines the speed of a manually operated height gauge with the precision and easy handling of a motorised one. Each of them incorporates a number of new features for which patents are pending.

These height gauges are specially designed for measuring lengths in the form of internal, external, step, height or depth dimensions as well as distances. Their concept also permits, for instance, deviations from straightness and perpendicularity to be measured.

Every TESA Micro-hite plus M is mechanically adjusted at our premises based on a TESA's patented system, thus allowing random errors in perpendicularity to be quickly and easily detected using a dial test indicator.

Value processing is ensured via the control panel. With their modular concept, TESA Micro-hite plus M offer an individual solution to each measuring application.

The Power Panel plus M, which may be provided with or without built-in printer, can be used besides the 1D control panel – thus enabling single or two coordinate measurements to be carried out as well as bore position to be determined, both in polar and rectangular coordinates. Furthermore, this panel can measure straightness and perpendicularity along with angles. It also allows direct connection of a measuring instrument fitted with an RS232 digital output.

The heavy cast-iron base features three resting points precisely ground to ensure high stability. Once integrated, the electric pump generates the air-cushion so that your height gauge can easily be moved across the surface plate.

The rigid column under the housing includes the guiding part that is rigorously straight and perpendicular to the base. The patented opto-electronic system measures any head displacement.

Value acquisition is very simple and reliable. Rotating the power control or activating the appropriate function key causes the insert to move to the point to be probed automatically. The measured value is then captured after a wait for stabilisation. A constant measuring force is ensured by the mechanical friction release mechanism, which has been specially developed for this purpose. An acoustic signal confirms the capture of the measured values, which are displayed at once and further transferred via the RS output provided they are judged to be correct.

Round-shaped cylindrical surfaces (e.g. bores or shafts) can equally be inspected easily and reliably through automatic detection of the culmination point.

The computer-aided value correction enhances the accuracy of every TESA Micro-hite plus M even further. The correction values stored in the electronics compensate for the bias errors when measuring lengths.

Continuous mains independent operation is ensured by the rechargeable battery pack with no cumbersome cables or power cord to hinder the operator.

2 INSTALLATION

2.1 Unpacking and setting up

TESA Micro-hite plus M is supplied in a special box giving protection against shocks and corrosion. Keep this box for use whenever the instrument is transported at a later date.

- First lay the box flat, then carefully lift the height gauge and place it on a safe surface. For this operation, ask for the help of someone else.

- Stand the instrument up on the clear surface plate.
- Fix the control panel on the articulated support and tighten with screw.

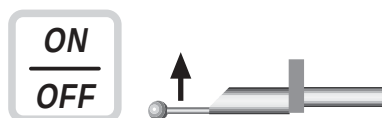
For safe transportation of your height gauge from a surface plate to another, we advise to use the handle set N° 00760129 available as an option.

2.2 Getting started

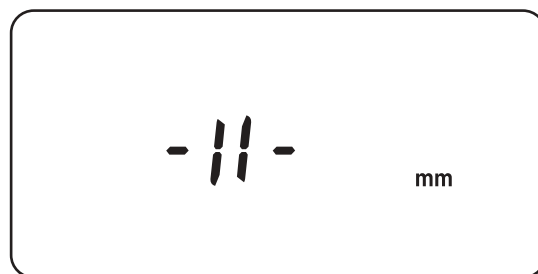
Activate the electric pump using the relevant switch (11) to generate the air-cushion for easy displacement.

Next, start the height gauge by pressing key  for more than one second.

Starting up



This causes the measuring head to move past the reference mark and position itself at the point where the master piece is located. Head displacement can be accelerated by using either the handle or the rotary power control.



Displayed value once the head has travelled past the reference mark

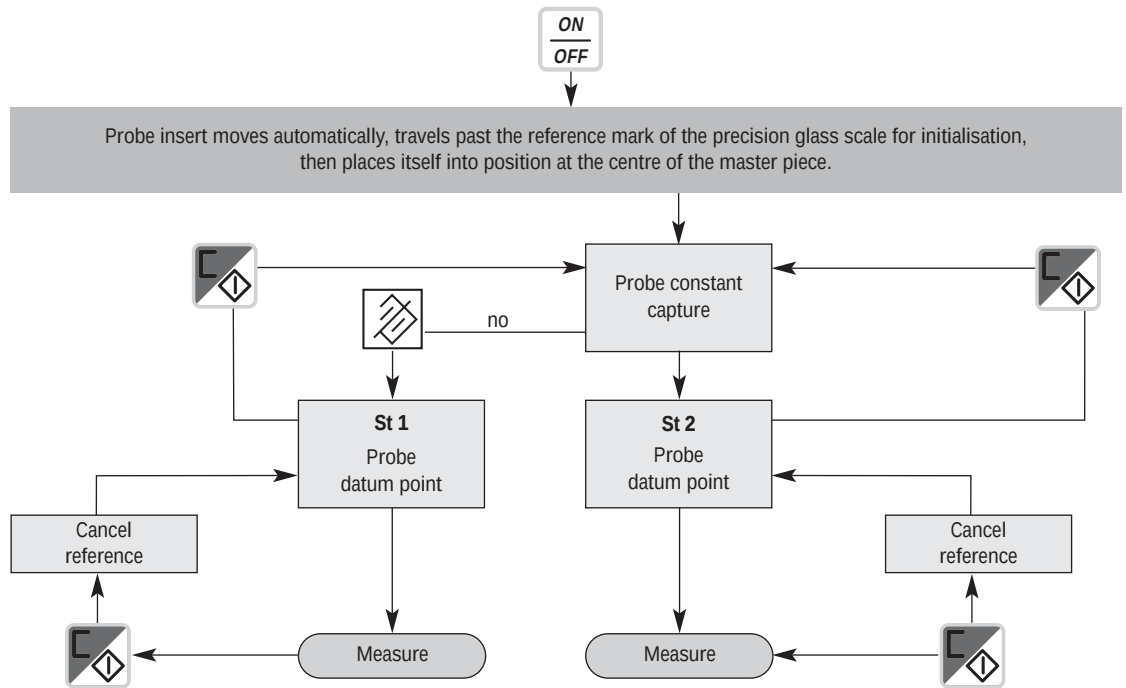


Start capturing probe constant value by pressing key  or  which is used for groove measurement.

For more details, report to chapter 4.5.

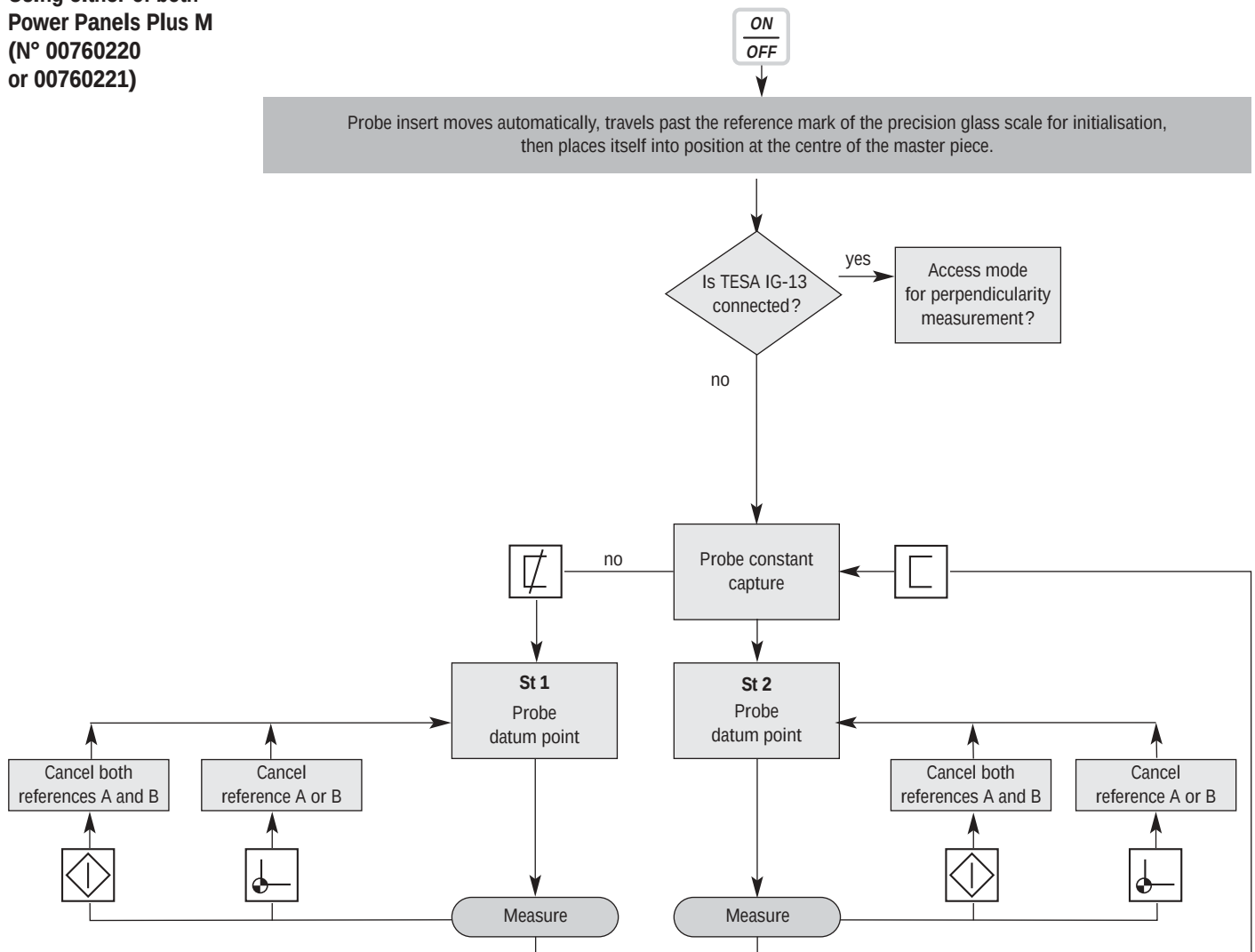
Using the
1D control panel
(N° 00760216)

Switch the instrument on



Using either of both
Power Panels Plus M
(N° 00760220
or 00760221)

Switch the instrument on



3 KEY COMPONENTS

3.1 Height gauge base

Rugged nickel plated base for high resistance to corrosion. The precision ground bottom face includes three supporting points which are finely lapped to guarantee high stability to your TESA Micro-hite plus M. They form together a large surface so that grooves and slots on the surface plate can be safely run over.

The faces 7 (Fig.1, page 4) are specially designed to allow TESA Micro-hite plus M to rest on or be guided in straight-line along the length of a rule, for instance.

3.2 Air-bearing base

The air-bearing base, which is generated by the pneumatic system linked to the electric pump N° 00760142 integrated into the main part, permits the height gauge to be moved safely and easily. Once activated, the pump creates an air-cushion only a few μm thick between the height gauge base and the surface plate so that TESA Micro-hite plus M can be displaced effortless and quite wear-free. The thickness of the air cushion can be set according to the surface quality of the granite plate. This is done by turning screw 13, which acts on the valve located into the pneumatic system. Experience has shown that the air cushion should not be thicker than necessary. Once enabled, it has to support the weight of the height gauge while contacting the surface plate lightly.



3.3 Vertical column, measuring head, head displacement

The rigid column is mounted at right angle to the base, into fix position. As the measuring head is sliding along the guiding part, its displacements are captured by the opto-electronic measuring system (TESA's patent). A counterweight is mounted on the steel tape supporting the measuring head. This enables it to stand still in any position with use of the accessories that came with your TESA Micro-hite plus M.

Head displacement is electro-motorised. This includes a servomotor drive which allows you to set the speed at which you want the head to be shifted, conveniently. The specially designed friction mechanism ensures a constant measuring force during the measurement operations.

3.4 Rotary power control

This new feature with its unique and revolutionary design is located close to the base. It serves for shifting TESA Micro-hite plus M on the air-bearing, for commanding fast motion of the probe insert as well as for triggering all main measuring functions. Since the rotary power control is used intuitively, the instrument moves quickly and precisely across the surface plate. It needs just be rotated clockwise or counterclockwise for approaching the measuring point whether quickly or slowly, probing up and down or performing bore measurement.



Operating functions using the rotary power control

Usually, these functions are identical to those of the probe insert.



Ways to move the probe insert

- Turn the rotary power control clockwise to move it up (Fig. 1).
- Turn the rotary power control counterclockwise to move it down (Fig. 2).



Fig. 1

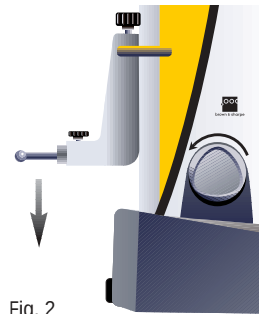
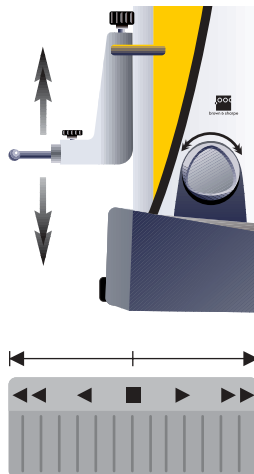


Fig. 2

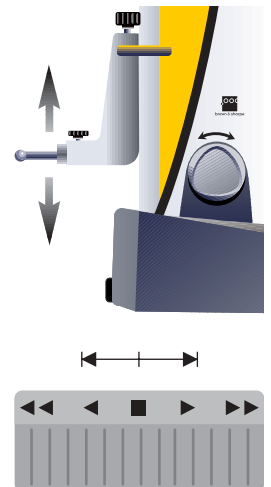
Fast displacement

A continuous rotation

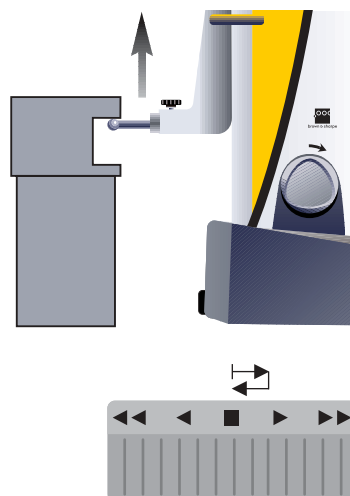
causes the probe insert to move even faster (according to the angle the power control is rotated) and to decelerate or stop when approaching the zero point (■) or releasing the rotary power control.



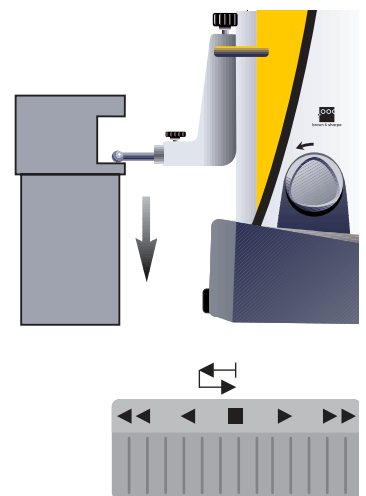
Positioning probe insert



Probing up



Probing down

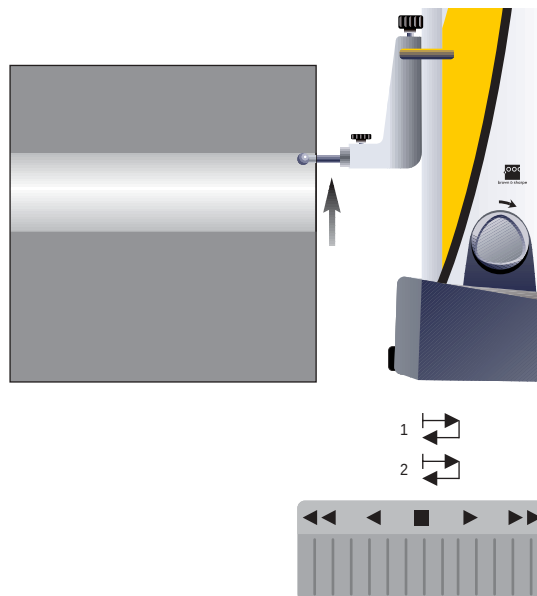


↺↻ Short rotation (< 0,7 s) in the probing direction.

Bore measurement

A second short rotation of the power control in the same direction permits bore measurement with detection of the culmination point.

- Turn the power control clockwise to start probing the upper point.
- Turn the rotary power control counterclockwise, to start probing the lower point first.



Stop

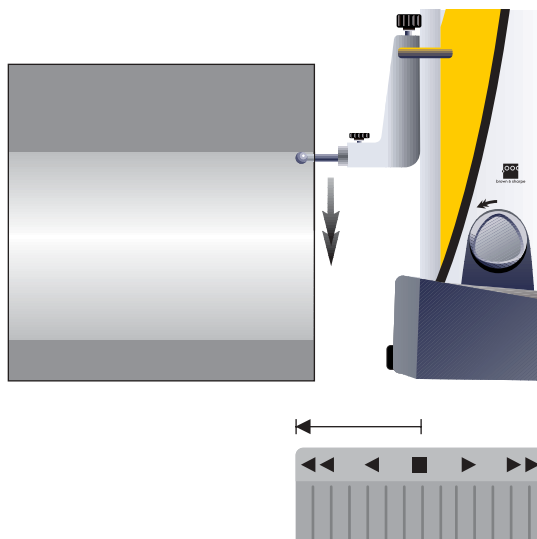
A second or third short rotation in reverse direction causes the probe insert to stop.

- Selected measuring function is then quit.



Fast displacement

When measuring bores or grooves, this function can be enabled to shift the probe faster from the upper to the lower point and the other way round.



3.5 Power supply

TESA Micro-hite plus M is provided with the battery pack N° 00760141, which can be charged using the mains adaptor (N° 04761054) along with either of both cables EU 04761055 or US 04761056 (see chapter 5.2 – Recharging the battery pack). Use of a second battery pack (optional) provides full autonomy as one can be recharging while the

other is in use. Continuous operation is thus made easier as there are no cables to clutter up the operator working on the surface plate.

The battery pack is also used for powering the control panel directly connected to the height gauge.

3.6 Measuring system

TESA Micro-hite plus M incorporates an opto-electronic measuring system (TESA's patent), which catches the measured quantity (also known as measurand) digitally. The glass scale with both incremental graduations and reference mark serve as material measure. According to the principle of the reflected light, each graduation is scanned by the photocells inside the optical sensor, with no mechanical contact. As next step, the measurement signal is transmitted to the control panel, which operates an analogue/digital conversion.

The probing procedure is either started by activating a measuring function or rotating the power control. As soon as the measuring insert enters into contact with the point to be probed, the friction clutch ensures a constant measuring force. After a wait for stabilisation, the measured value is processed through the control panel.

3.7 Automatic value correction

It is agreed that producing a perfectly accurate measuring instrument is quite impossible. Consequently, any displayed value shows a deviation from the exact value, which is more or less significant. This deviation mainly includes the systematic (bias) errors and random errors of the measuring instrument being used. The latter often result from influences which can not be predicted – e.g. value dispersion.

On the other hand, any detectable systematic errors can be compensated for by corrections. These errors may be due to inaccuracies in the graduations of the material measure or to form and position errors of the head guides.

TESA Micro-hite plus M is able to execute the automatic correction of the measured values through CAA (computer-aided accuracy) while taking bias errors into account. This is done in two ways: while one is based on the measured lengths, the other refers to both perpendicularity and straightness checked with the aid of a TESA IG-13 digital probe (N° 00760139) listed under optional accessories (this probe can only be used with the Power Panel Plus M).

Straightness and perpendicularity errors are first corrected once the main part has been entirely assembled.

TESA Micro-hite plus M is calibrated on the high quality surface plate with the aid of a high accuracy master angle square to 90°; both features are made of granite – a hard (usually grey) stone. The measurements are carried out in both measuring directions (frontal and lateral) with use of a TESA GT-21 electronic probe, which only serves as reference at our plant. The EEPROM memory inside the main part includes a correction table for each direction. It should be noted that automatic value correction cannot be activated unless TESA IG-13 probe is connected. With regard to this, report to chapter 4.13.

Length values are corrected based on the actual deviations previously determined step by step at each probing point throughout the measuring range using reference gauge blocks. These deviations are then captured by the computer used for calculating all correction values and further stored in the electronics (EEPROM) for automatic correction using the 1D control panel or the Power Panel plus M.

Note

When the height gauge is switched on, the control panel will read all stored values during the initialising procedure (display shows the Init sign).

3.8 Control panels

The modular concept of your TESA Micro-hite plus M makes it possible for the measured values to be captured and further processed separately. So they are first measured on the workpiece being inspected, then transferred to the control panel for correction, processing and displaying. Necessary allowances are made for the systematic errors.

You may either connect the 1D control panel or one of both Power Panel plus M (with or without built-in printer). To switch the height gauge on or off, press this key on the relevant control panel, which also provides various interfaces.

1D control panel Model No. 00760216

This model includes the following features:

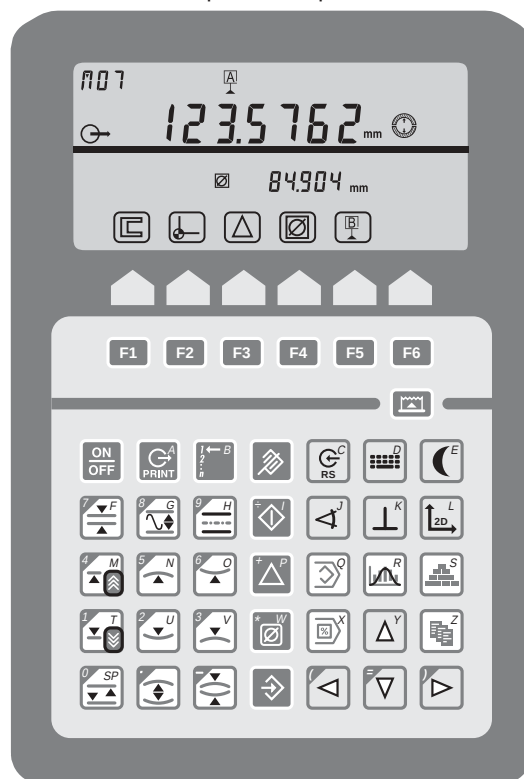
- RS 232 serial interface for bi-directional data transmission.
- input for the foot switch used to activate the PRINT function or repeat last measuring function.



Power Panels Plus M Model No. 00760220 or 00760221

– First model comes with built-in printer.
Both models include the following features:

- RS 232 serial interface for bi-directional data transmission;
- input for equipment with RS 232 interface;
- input for TESA IG-13 digital probe;
- input for the foot switch used to activate the PRINT function or repeat last measuring function;
- CENTRONICS output for A4 printer.



4 MEASURING

4.1 General

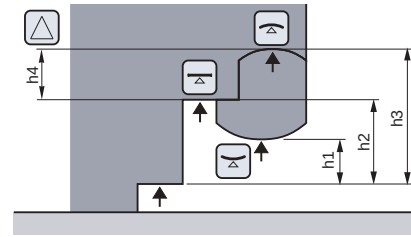
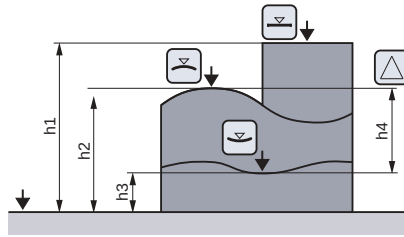
The way TESA Micro-hite plus M will execute a value acquisition often depends on the measuring application, which is mainly based on the following:

- Measuring without inversion of the probe direction (St1).
- Measuring with inversion of the probe direction (St2).
- Detecting form, parallelism or run-out errors.
- Measuring perpendicularity errors using TESATAST.

- Measuring perpendicularity and straightness with the aid of TESA IG-13 probe (only with connected Power Panel Plus M).
- Measuring angles (only with connected Power Panel Plus M).
- Measuring in two coordinate directions (only with connected Power Panel Plus M).

Measuring without inversion of the probing direction

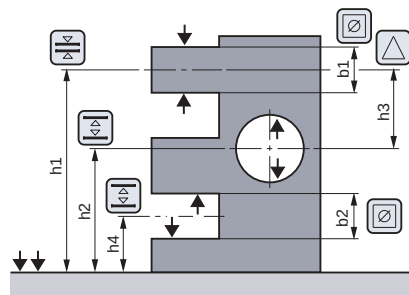
Making no allowance for the probe constant



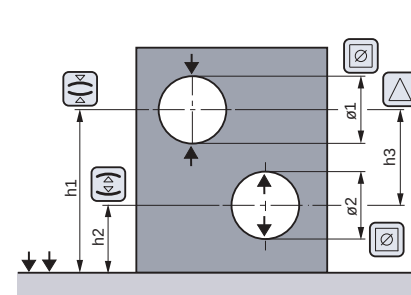
Measuring with inversion of the probing direction

Making allowance for the probe constant

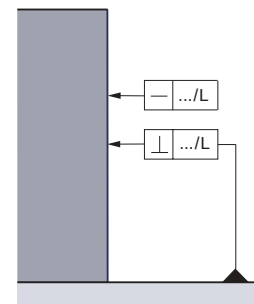
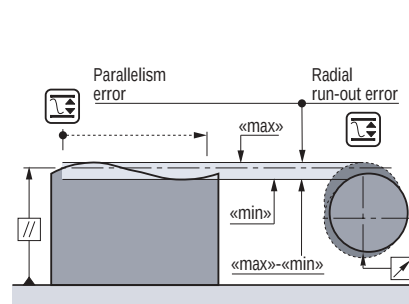
– with no storage of the culmination point



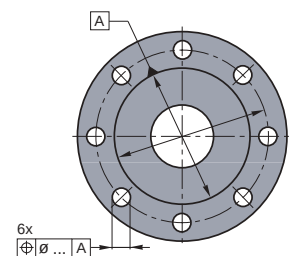
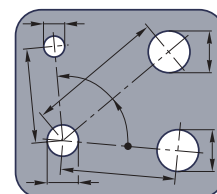
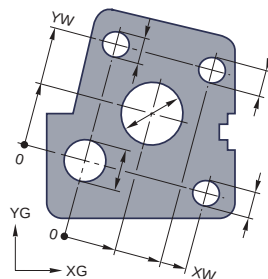
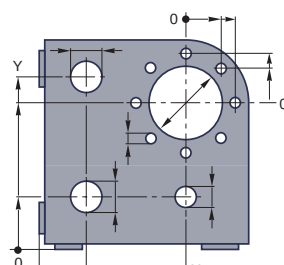
– with storage of the culmination point



Capturing form and position errors



Measuring in two coordinate directions



4.2

1D control panel with function keys (N° 00760216)



Press this key to turn the height gauge on or off and keep pressing (> 0.6 s) to get confirmation.



Press shortly (< 0.6 s) to transfer the value from main display to a peripheral device. Keep pressing this key (> 0.6 s) to transfer full table contents (including up to 99 numbered values) to a peripheral device.



Press to reset counter to zero. This key also allows headings to be printed providing the relevant dip switches are appropriately set to enable language selection.
Note: Press CANCEL key to restore earlier version of the measurement table.



Press to cancel last function or probing operation.



Press to measure the centre, then the width of a rib.



Press to measure parallelism or run-out errors.



Press to switch over from a unit system to another. Whenever the gauge height is turned off, selected unit remains stored.



Press to cancel captured reference and return to menu St1/2 for taking a new one along with probe constant if you wish to. This key also allows you to return to ST1/2 from any menu.



✓ Press shortly (< 6 s) to probe up.

↘ Keep pressing this key (>0,6 s) to move the probe up quickly (30 mm/s). Probe will stop moving as soon as you release it.



Press to probe up with detection of the highest culmination point.



Press to probe up with detection of the lowest culmination point.



Press Delta to enable the difference between the last two probe contacts to be calculated and further displayed. Pressing the hand allows manual input of numbered values for delta based calculation. The value that refers to the master piece can also be changed in this way.



✓ Press shortly (<0,6 s) to probe down.

↘ Keep pressing this key (>0,6 s) to move the probe down quickly (30 mm/s). Probe will stop moving as soon as you release it.



Press to probe down with detection of the lowest culmination point



Press to probe down with detection of the highest culmination point.



Press for temporary or continuous displaying of the bore or shaft diameter or the width of a groove or a rib (difference between two probe contacts).



Press to measure the centre, then the width of a groove.



Press to measure both the centre and diameter of a bore.



Press to measure both the centre and diameter of a shaft.



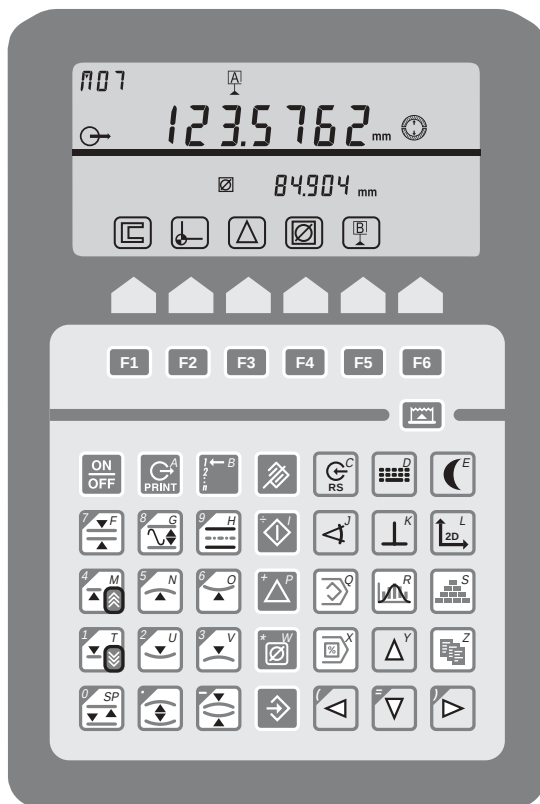
Press to acknowledge any operation or input a PRESET value. The ENTER key permits to validate the measured value if stabilisation is not yet completed or preset time is infinite (dip switch 3 set on ON).

SW	SW1		SW2	SW3	SW4	SW5	SW6	SW7
OFF	0.1 μm /0.00001" 7,5 mm/s		Ext. P = Print	t = 1 s		Print manual	OFF	Auto OFF
ON	1 μm /0.0001" 15 mm/s		Ext P = Measure	t = 00		Print auto	1, 2, n	ON/ OFF
	Data	French	German	English	Spanish	Italian	Portuguese	Swedish
SW8	OFF	ON	OFF	ON	OFF	ON	OFF	ON
SW9	OFF	OFF	ON	ON	OFF	OFF	ON	ON
SW10	OFF	OFF	OFF	OFF	ON	ON	ON	ON

Dip switch settings

- SW1** Resolution selection (0.1 μm / 1 μm). Probe speed switches over from 7,5 to 15 mm/s before starting measuring.
- SW2** EXT.P selection (to enable PRINT function or repeat last measuring function).
- SW3** Stabilisation time selection (1 s or infinite). In the latter case, press ENTER for value capture.
- SW4** BEEP sound selection (ON or OFF).
- SW5** Automatic or manual PRINT selection. Either function is selected after each measuring operation or in case display has switched over.
- SW6** OFF selection: only the last two displayed values will be retained in the memory since numbering is omitted.
ON selection: automatic numbering of up to 99 values.
- SW7** OFF selection: height gauge switches itself off after 20 minutes if no function key is activated.
ON selection: height gauge is turned off by pressing ON/OFF key.
- SW8 to SW10** DATA mode selection. If these switches are set on OFF, rough value is sent to the RS port. Other settings enable language selection for headings.

4.3 Power Panel Plus M with function keys (N° 00760220 or 00760221)



F1 Function keys



ON OFF Press to switch height gauge on or off. Keep pressing this key (> 0.6 s) to get confirmation.



Press shortly (< 0.6 s) to transfer the value from main display to a peripheral device. Keep pressing this key (> 0.6 s) to transfer full table contents to a peripheral.



Press to reset counter to zero and get prompted for value storage or not. If heading option has been selected, a new heading can be entered each time this key is pressed.



Press to cancel last function or probing operation.



Press to measure the centre, then the width of a rib.



Press to measure parallelism or run-out errors.



Press to enable mean value from the last two probe contacts or from both numbered values selected in the logbook to be calculated and further displayed.



Press to cancel both references A and B and return to menu St1/2 to take a new reference A and/or B along with probe constant if you wish to. This key also permits to return to St1/2 from any menu.



✓ Press shortly (< 0.6 s) to probe up.
↘ Keep pressing this key (> 0.6 s) to move probe up quickly (30 mm/s). Probe will stop moving as soon as you release it.



Press to probe up with detection of the highest culmination point.



Press to probe up with detection of the lowest culmination point.



Press to enable the difference between the last two probe contacts or numbered values selected in the logbook to be calculated and further displayed.



✓ Press shortly (< 0.6 s) to probe down.
↘ Keep pressing this key (> 0.6 s) to move probe down quickly (30 mm/s). Probe will stop moving as soon as you release it.



Press to probe down with detection of the lowest culmination point.



Press to probe down with detection of the highest culmination point.



Press for temporary or continuous displaying of a bore or shaft diameter or the width of a groove or a rib (difference between two probe contacts).



Press to measure both the centre and width of a groove.



Press to measure both the centre and diameter of a bore.



Press to measure both the centre and diameter of a shaft.



Press to enter in statistics menu.



Press ENTER to validate your operation.



Press to enter in configuration menu.



Press for value capture from the measuring instrument connected to RS port.



Press to enter in menu for executing a programme.



Press to input a value via the keyboard.



When pressed in measuring mode: let you access to logbook and have the first 5 values displayed. Also allows the cursor to move up by one position or one field.



Press to activate idle mode.



Press to enter in menu for generating data files.



Press to access mode for angle measurement.



Press to move cursor to the left by one position or one field.



Press to access mode for perpendicularity measurement.



When pressed in measuring mode: let you access to the logbook and have the last 5 values to come be displayed. Also allows the cursor to move down by one position or one field.



Press to access 2D measuring mode.



Press to move cursor to the right by one position or one field.



Press to create a learn programme.

Each Power Panel *plus M* comes with an additional instruction manual.

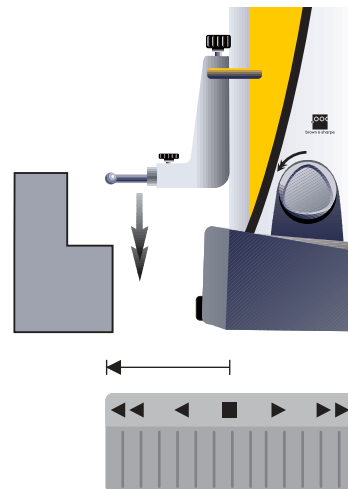
4.4 Probing procedure at the contact point

In order to guarantee the reliability of the measured values, the following condition has to be met: ensure that the probe is firmly fixed on fixing arm 5, which is clamped on mounting pin 4. Also check that both knurled screws of the probe holder are fully tighten.

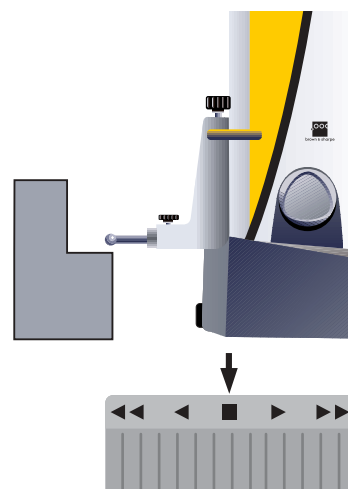
As you are fitting the insert, be sure it is not pushed beyond the stop that comes first (start of spring travel) before clamping tight. Since the spring force will act over a distance of 1 mm approximately, the guiding part of the measuring head is thus protected against shocks

Probe contact procedure for value acquisition

- 1 Move both measuring head and probe insert quickly using the rotary power control or the handle 9. You may also enable fast displacement through the keyboard.

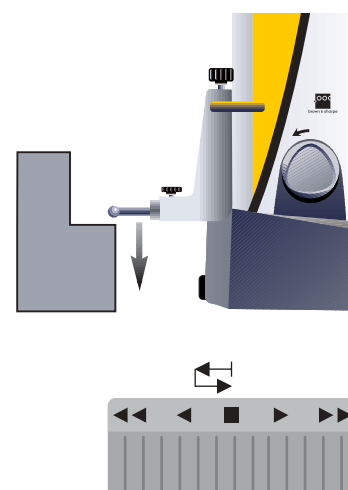


- 2 Position the insert close to the point to be probed. The rotary power control must then regain its neutral position (■).



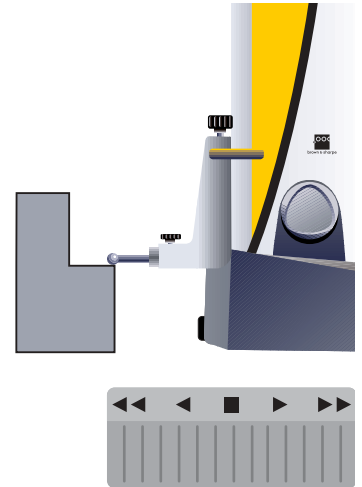
- 3 Release value capture by means of the rotary power control or by activating the relevant function key.

Probe speed:
7,5 mm/s with a resolution to 0,1µm
15 mm/s with a resolution to 1µm

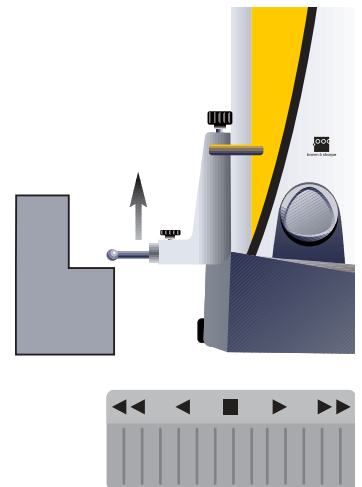


- 4 Constant measuring force is ensured by the friction mechanism as soon as the insert is contacting the relevant point. After a wait for stabilisation, the measured value will be registered and further displayed via the control panel.

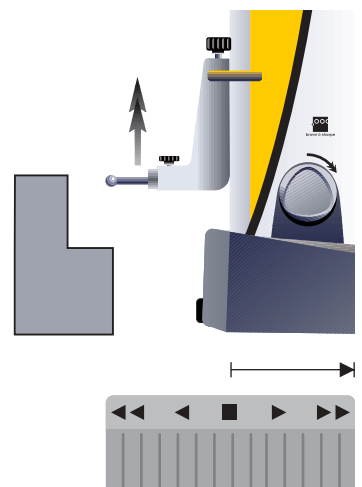
Stabilisation related criteria:
with a resolution to $0,1\mu\text{m}$:
variation $< 1\mu\text{m}$ during 1 s.
with a resolution to $1\mu\text{m}$:
variation $< 5\mu\text{m}$ during 1 s.



- 5 Insert will retract automatically once the measured value has been captured. Programmable retraction travel r (default setting= 3 mm).



- 6 Move the probe insert clear of the contact point using the rotary power control or the handle.



4.5

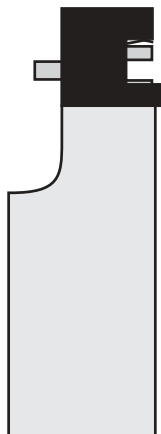
Establishing probe constant for length measurements with inversion of the probing direction

Whenever bores, shafts, grooves and the like are measured with inversion of the probing direction, the probe constant has to be taken into account. To allow you carrying out your measurements without any time-consuming calculation, this constant is determined on a reference standard whose actual dimension is known – in this case the master piece N° 00760219 that came with your height gauge. This gauge block combination matches the internal or external size of 6,350 mm / .25000 in.

Note

- Use only the master piece marked with number 00760219 that came with TESA Micro-hite plus M. Its serial number is identical to that of the height gauge.
- Final inspection also refers to this master piece. Same goes for the SCS calibration certificate provided with the height gauge.

This piece has been specially designed for use with TESA Micro-hite plus M. The reason for this new feature was to reduce the error resulting from the calibration of the inserts having a 5 mm diameter or smaller. The external part allows the constant of longer inserts to be determined.



The probe constant, which is a permanent correction factor, is computed by the control panel once the probing operations on the master piece have been completed. The value obtained is then stored in the memory and automatically taken into account for any subsequent measurement.

The probe constant makes allowance or compensates for the following:

- True diameter of the ball tip or disc of the probe insert used.
- Elasticity of the probe with mounted insert under the action of the measuring force.
- Hysteresis of the measuring system.

Should the measuring conditions be changed, the probe constant must be determined afresh.

Main reasons for changes are:

- whenever the height gauge is switched off;
- when probe insert has been exchanged;
- when insert position has been altered.

The function «Establishing probe constant» requires at least 2 probe contacts at each point. The difference between both values obtained at each point must be equal to the given limit value which depends on the selected resolution. Should this value be exceeded, display shows the difference value which can either be accepted or the system asks for the contact operations to be repeated.

Enabling keys/gauge	Displaying	Explanation
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Probe insert moves into position at the centre of the master piece automatically as soon as either of the following conditions is met: height gauge is switched on, probe has travelled past the reference

mark or probe constant key has been activated. TESA Micro-hite plus M then displays the measured value as shown below.

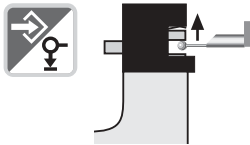


Constant value can be changed by pressing key . Value storage is enabled using key . This value remains stored even after the height gauge has been switched off.

There are several ways to start the measurement cycle for capturing the constant value.

Probing the inside part of the master piece

This requires the function enabling single probe contact to be activated using the rotary power control or either of both keys and .

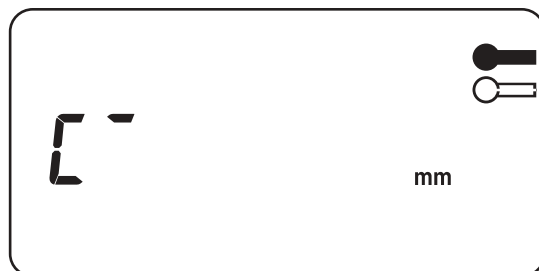
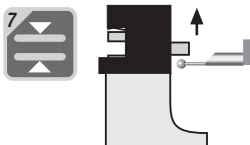


BEEP sound acknowledges each value acquisition. The programme executes a self-test for repeatability according to the following criteria:

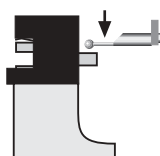
with a resolution to $0,1\mu\text{m}$ < $0,5\mu\text{m}$
with a resolution to $1\mu\text{m}$ < $2\mu\text{m}$

Probing the external part of the master piece

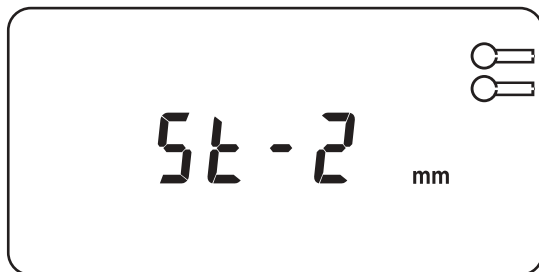
This is done by pressing key .



BEEP sound acknowledges each value acquisition. Once the first measurement has been taken, the insert will retract and automatically position itself so that upper point 2 can be probed. Therefore, the master piece must first be removed to let the insert move up, then replaced into position before the insert moves down automatically.



Once probe contact has been repeated once, the insert will retract and automatically position itself so that lower point 4 can be probed. Therefore, master piece must first be removed to let the insert move down, then replaced into position before the insert moves up automatically. Self-test is executed for repeatability according to the criteria as stated above.



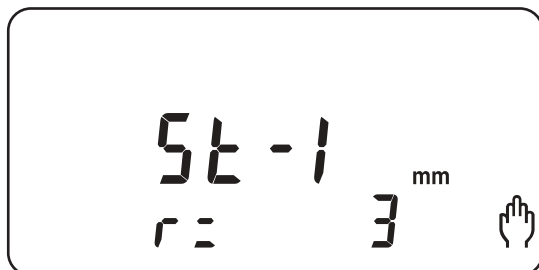
Displaying after probe constant acquisition

When the function for temperature correction has been enabled, the measured temperature value will only be displayed on the Power Panel plus M along with relevant symbol.

4.6 Programming retraction travel of the probe

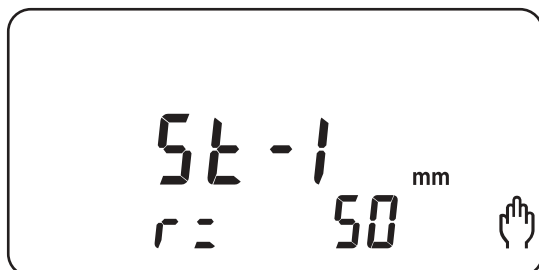
To prevent excess wearing, the probe insert retracts itself automatically after each probe contact. Retraction travel is set to 3 mm at our factory. For specific applications, however, you may wish to alter this default setting, especially when using the foot switch. If so, this can be done just before cap-

turing a reference value from menu St1/2. Since input value can either be zero (no retraction) or equal to the extent of the measuring range, proceed as follows:

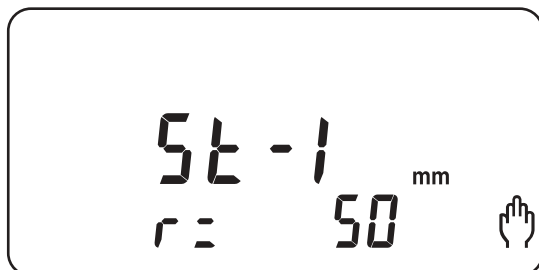


1D control panel

Activate key  from menu **St1/2**.



Enter new value.



Press ENTER to confirm.

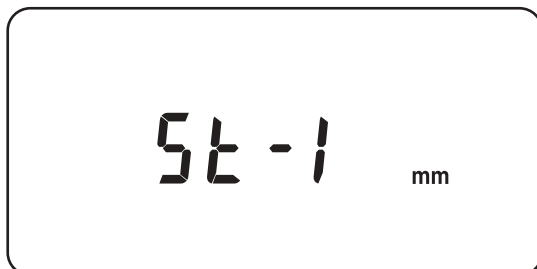
Power Panel plus M

Refer to the manual provided with this panel.

From then on, the probe insert will retract over 50 mm after each probe contact. This new setting allows you to carry out recurrent measurements quickly in half-automatic mode providing the function that enables last probe contact to be repeated was previously released using the relevant switch.

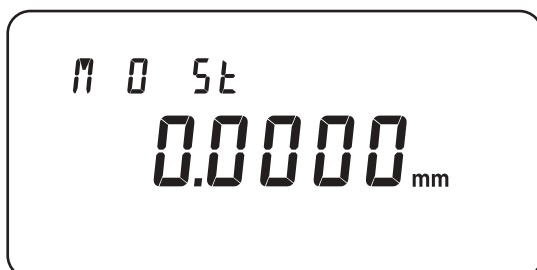
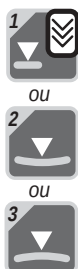
The half-automatic mode is particularly convenient for checking a critical dimension on part series. Maximum retraction travel is equal to the measuring span of the vertical column.

4.7 Capturing a reference value



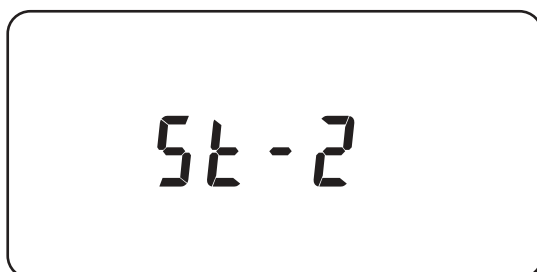
Measuring without inversion of the probe direction

Position probe insert close to the height of selected reference, then release value capture by pressing single probe contact key or using the rotary power control.



Measuring with inversion of the probe direction

Position probe insert close to the height of selected reference, then release value capture by activating the key for single or dual probe contact or by rotating the power control.



Reference value will match the mean value of the two probe contacts.

Examples

1 When activating one of these functions keys



you will get the following results:

- TESA Micro-hite plus M will repeat the same function at the same location If you don't press one of the keys for *fast displacement* within less than 3 seconds.
- The system allows you to choose one of the measuring functions available for probing another

point If you press either of these keys within less than 3 seconds,

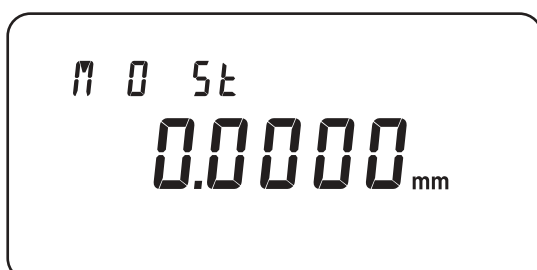
- TESA Micro-hite plus M will repeat the same function at the new location If you move the probe insert by rotating the power control.

In either case, reference value will match the mean calculated from both probe contacts.

- When activating either of these function keys

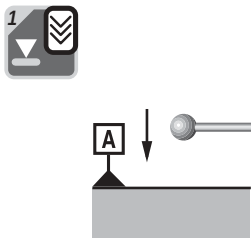
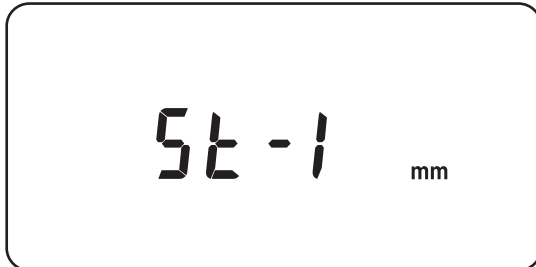


you will request reference value to be taken at the centre of the workpiece feature.

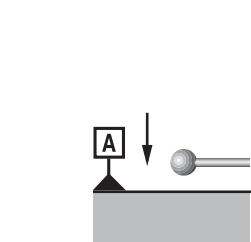
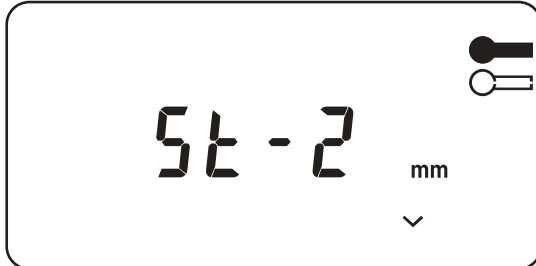


Enabling keys/gauge	Displaying	Explanation
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1

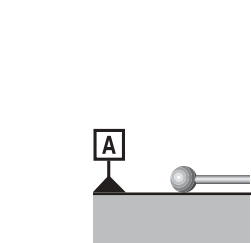



2

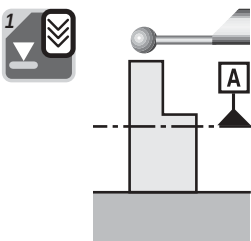



At this point, probing procedure will stop if none of the keys available for fast displacement is activated. Second probe contact will not be executed unless you press either function key again. Reference value will match the mean calculated from the two probe contacts.

3

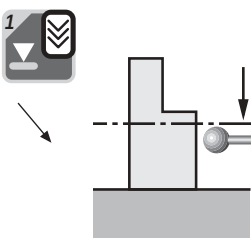
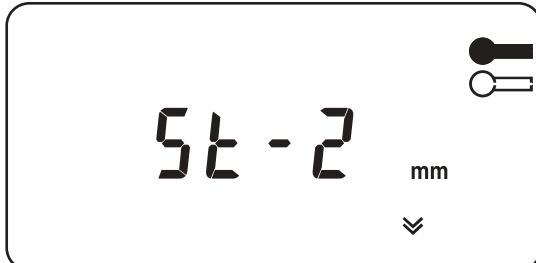



1



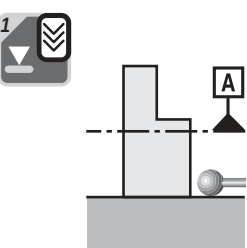
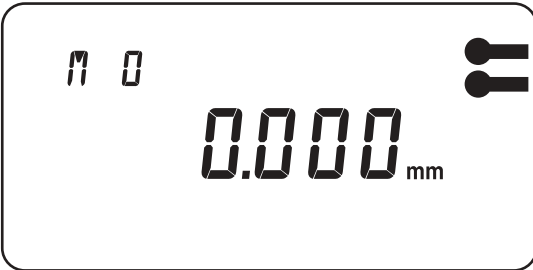

Dual probe contact half-way up and down.

2

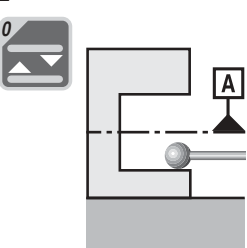
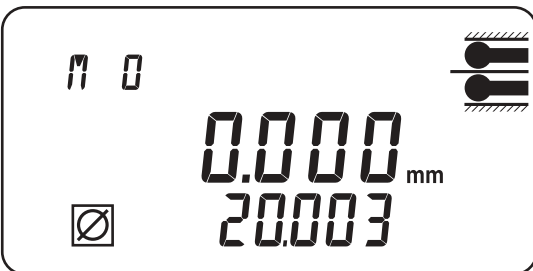



Enabling keys/gauge	Displaying	Explanation
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3

1

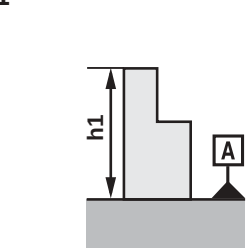
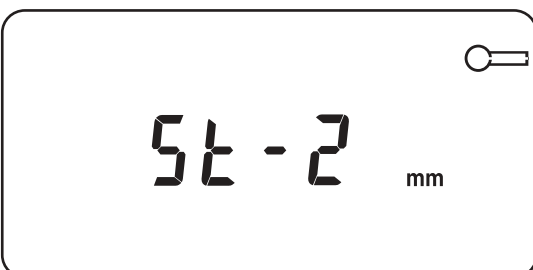



Reference value obtained from the two probe contacts.

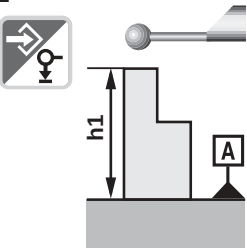
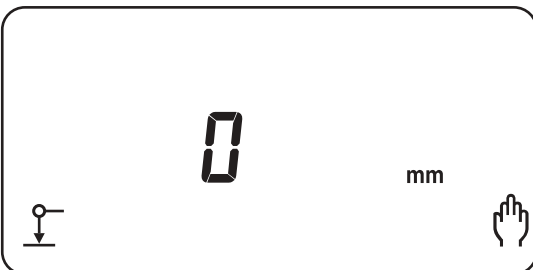
4.8 Fonction PRESET



1

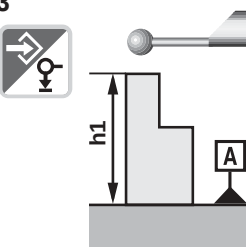
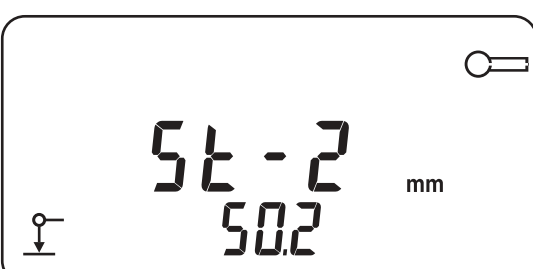



2

Enter a PRESET value in relation to an indirect reference through numerical keys (e.g. 50,2 mm).

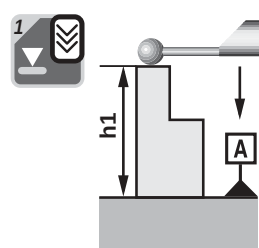
3

PRESET value is introduced.

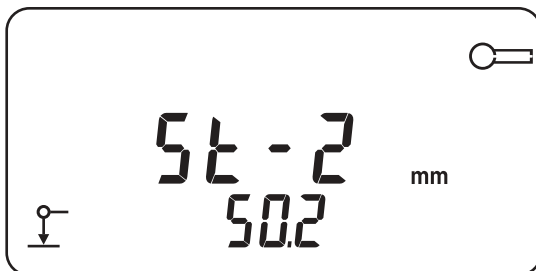
Activating keys/Instr.	Displaying	Explanation
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4



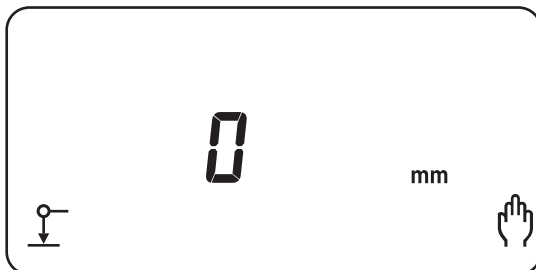

Capture reference value.

5

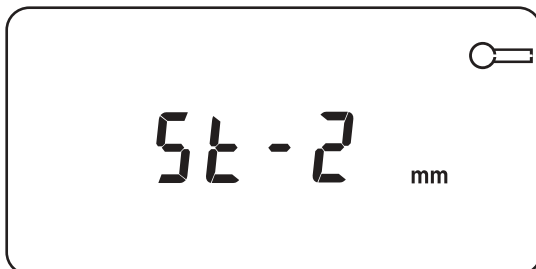
Cancel PRESET value.

6

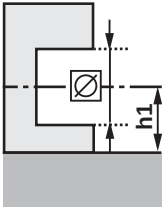
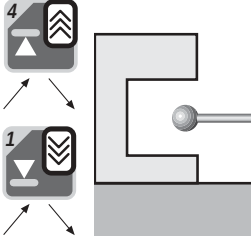
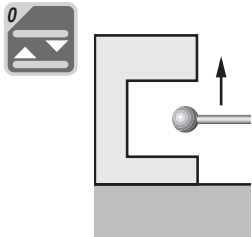
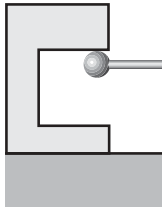
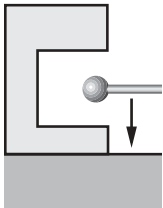
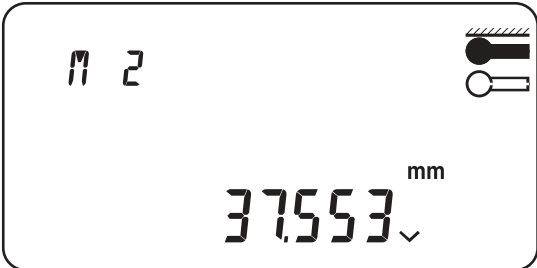



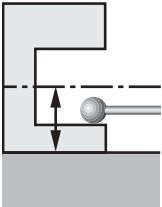
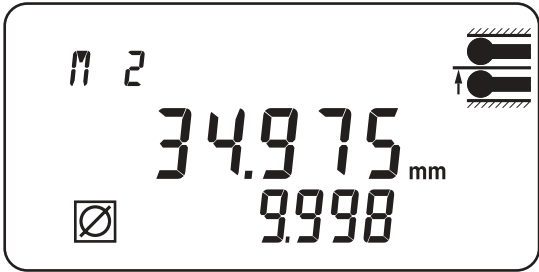
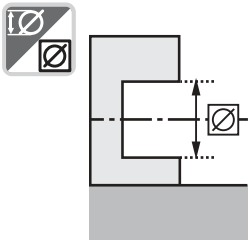
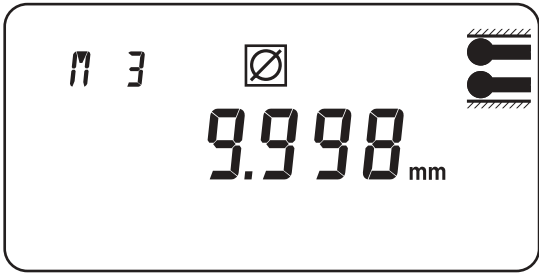
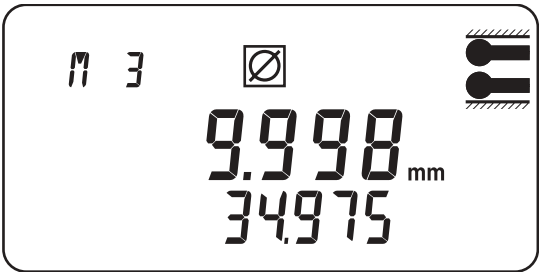
Input zero value by pressing ENTER key twice.

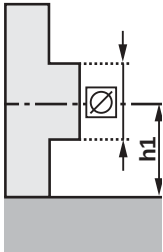
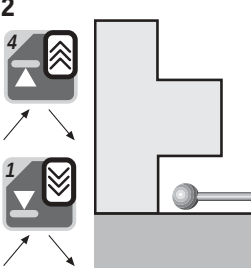
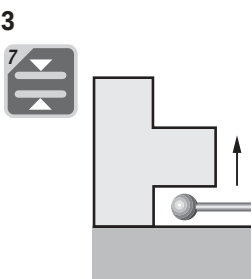
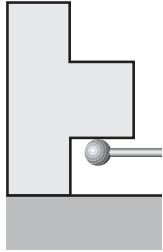
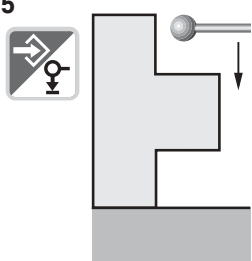
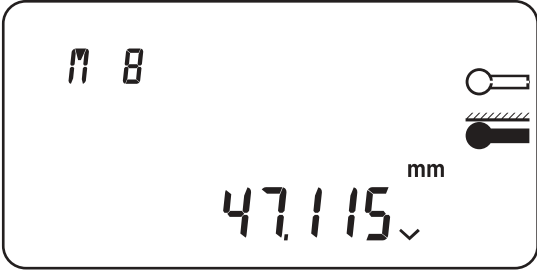
7

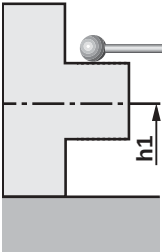
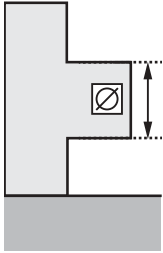
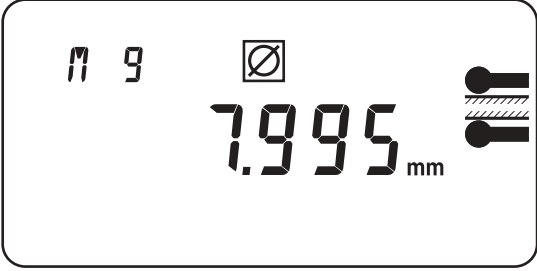
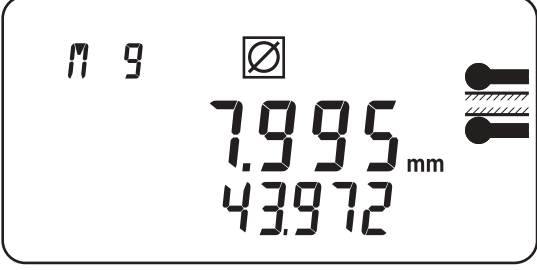



Follow the same procedure for entering a PRESET value in either of both modes St1 or St2.

Enabling keys/gauge	Displaying	Explanation
4.9 Measuring grooves		
1 		Probe contact procedure.
2 		Position probe insert into the groove by pressing both positioning keys or rotating the power control.
3 		Probe moves up automatically for capturing first value. Auxiliary display shows probe displacement, continuously.
4 		First value is being captured with simultaneous displaying of related symbol.
5 		Probe moves down automatically for capturing second value. Probe displacement can be accelerated by means of the rotary power control.

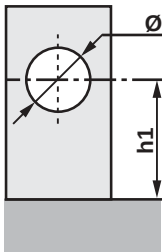
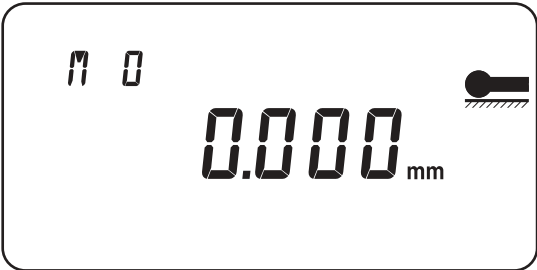
Enabling keys/gauge	Displaying	Comments
6 		Probing procedure is ended. Probe retraction occurs automatically. Values are normally displayed.
7 		Difference between both probe contacts is shown on the main display for a while. Numbered value is incremented providing dip switch 6 is set on ON
8 		Difference between both probe contacts is permanently shown on main display. These values are not retained in memory once the height gauge has been switched off.

Enabling keys/gauge	Displaying	Explanation
4.10 Measuring ribs		
1 		<i>Probe contact procedure.</i>
2 		<i>Position probe insert below the rib by pressing both positioning keys or rotating the power control</i>
3 		<i>Probe moves up automatically for capturing first value. Auxiliary display shows probe displacement, continuously.</i>
4 		<i>First value is being captured with simultaneous displaying of related symbol. Probe insert stands still once retracted. Use both positioning keys or the rotary power control to have it lying above the rib.</i>
5 		<i>Activate second value capture by pressing ENTER or rotating the power control. Probe moves down automatically for capturing second value.</i>

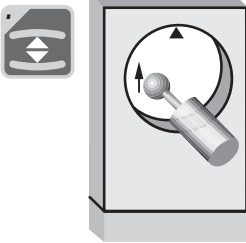
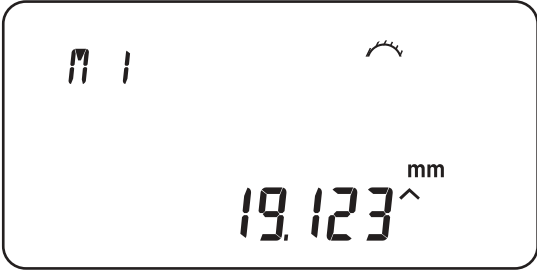
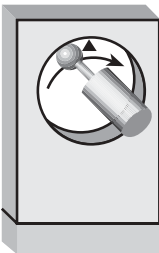
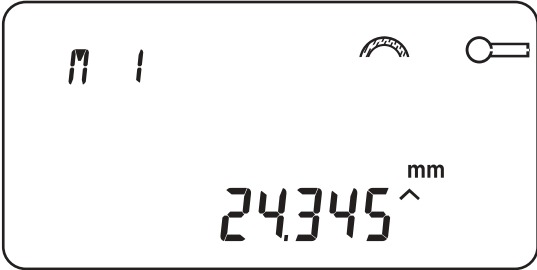
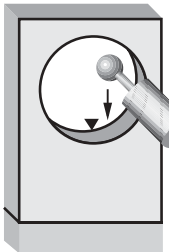
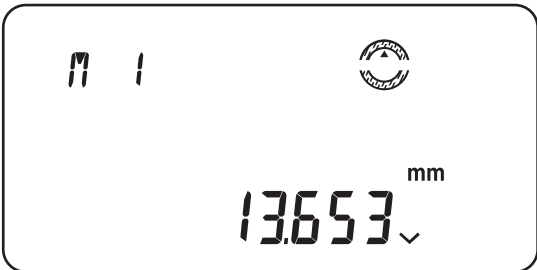
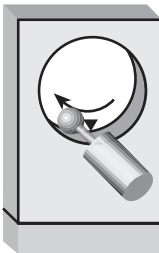
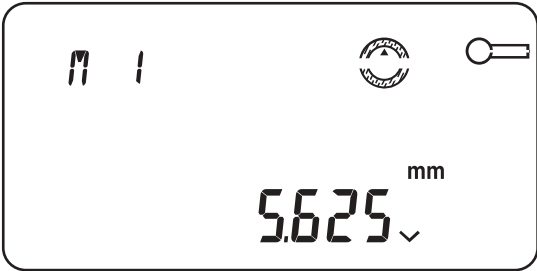
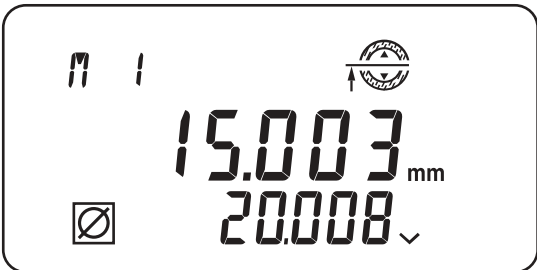
Enabling keys/gauge	Displaying	Explanation
6 		Probe contact procedure is completed. Probe insert retracts automatically. Measured values are normally displayed.
7  		Main display shows the difference between both probe contacts for a while. Numbered value is incremented providing dip switch 6 is set on ON
8  		Main display shows the difference between both probe contacts permanently. Displayed values are not retained in the memory once the height gauge has been switched off.

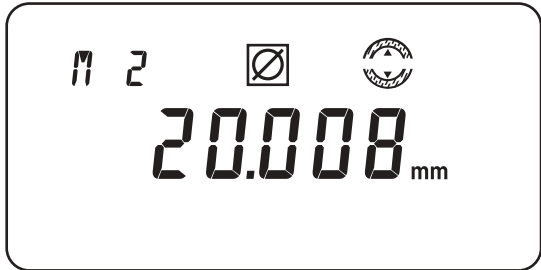
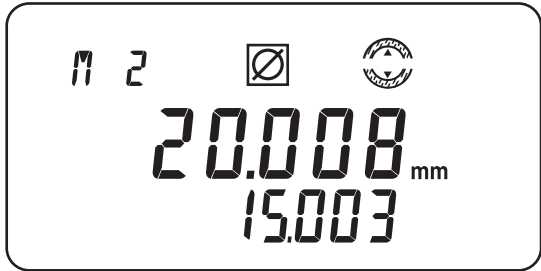
4.11 Measuring bores



1 	
---	---

Probe contact procedure.
 Press both relevant keys or use the rotary power control for correct positioning of the probe insert into the bore.

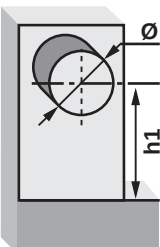
Enabling keys/gauge	Displaying	Explanation
2 		Release measurement cycle by pressing function key  or shortly rotating the power control twice in the direction you wish probe contact to be started. Starting probing operation As probe insert is moving, display shows its displacement continuously. Probe symbol appears as soon as the insert has stabilised after contacting the workpiece feature. Move the workpiece (or the vertical column) sideways for automatic detection of the culmination point, which is signalled by a beep sound while relevant probe symbol is being highlighted. This point must be probed once (default setting). But, you may also choose to travel past the culmination point twice by pressing ENTER. If the difference between both points is exceeding 10 µm, a beep warns you to restart probing procedure. Selected option remains stored for all subsequent measurements taken with detection of the culmination point. To return to the default option, press ENTER again or switch your height gauge off.
3 		
4 		Once first measurement cycle has been completed, displays shows probe insert moving down, continuously. Probe displacement can be accelerated by rotating the power control.
5 		Proceed in the same way to carry out second measurement cycle.
6 		Probing procedure is ended. Measured values are normally displayed.

Enabling keys/gauge	Displaying	Explanation
7 		Main display shows the difference between both probe contacts for a while. Numbered value is incremented providing dip switch 6 is set on ON.
8 		Main display shows the difference between both probe contacts permanently. Displayed values will not be retained in memory once the height gauge has been switched off.

4.12 Measuring shafts

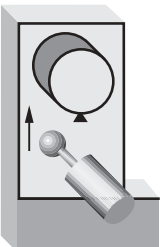
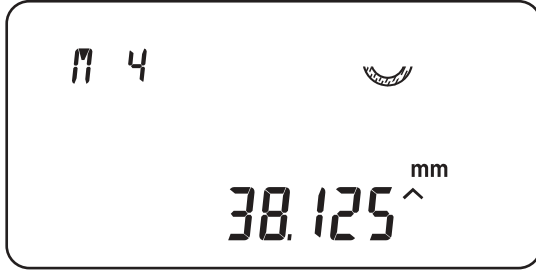


1




Position probe insert below the diameter to be checked by pressing both relevant keys or rotating the power control.

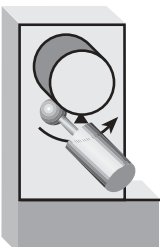
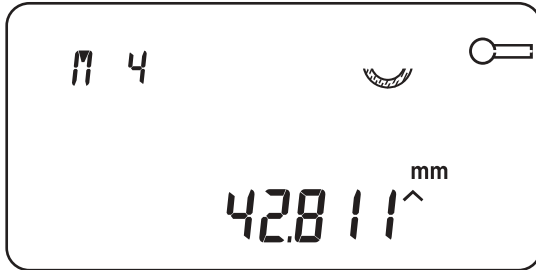
2

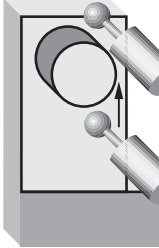
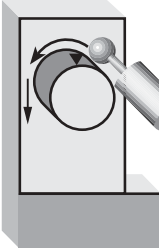
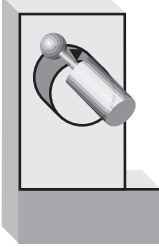
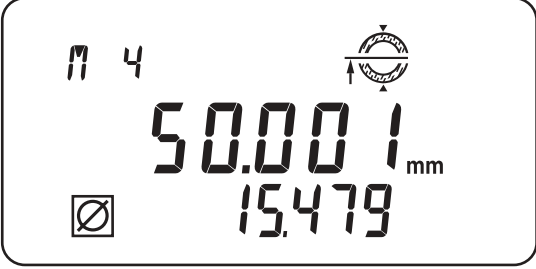
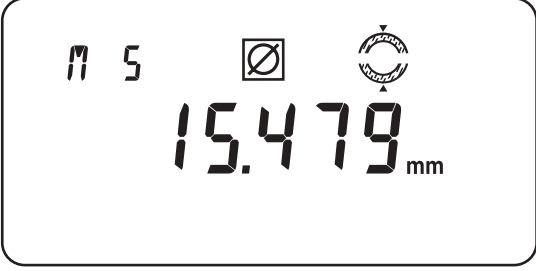
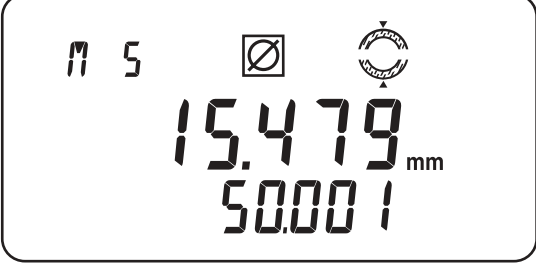



Starting probing operation

As probe insert is retracting, display shows its displacement continuously. Probe symbol appears as soon as the insert has stabilised after contacting the workpiece feature. Move the workpiece (or the vertical column) sideways for automatic detection of the culmination point, which is signalled by a beep sound while relevant probe symbol is being highlighted. This point must be probed once (default setting). But, you may also choose to travel past the culmination point twice by pressing ENTER. If the difference between both points is exceeding 10 µm, a beep warns you to restart probing procedure. Selected option remains stored for all subsequent measurements taken with detection of the culmination point. To return to the default option, press ENTER again or switch your height gauge off.

3

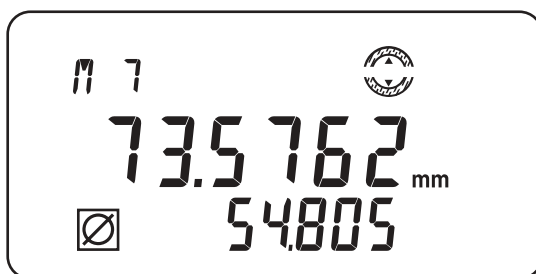
Enabling keys/gauge	Displaying	Explanation
4   		Once first measurement cycle has been completed, probe insert moves clear of the workpiece automatically, then stands still. Use both relevant keys or the rotary power control for correct positioning of the insert above the given diameter.
5  		Start second measurement cycle by pressing ENTER or rotating the power control. Display shows probe insert moving down, continuously. From then on, proceed as for the first measurement cycle.
6 		Second measurement cycle is completed. Measured values are normally displayed.
7 		Main display shows the difference between both probe contacts for a while. Numbered value is incremented providing dip switch 6 is set on ON.
8 		Display shows the difference between both probe contacts permanently. Displayed values are not retained in memory once the height gauge has been switched off.

Enabling keys/gauge	Displaying	Explanation
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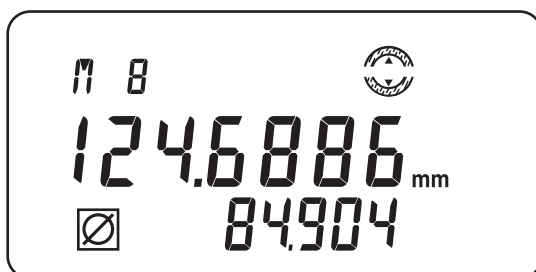
4.13 Calculating distances



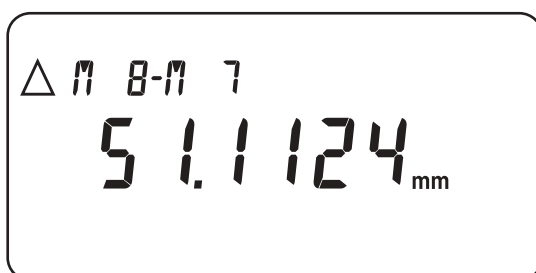
1



2



3



Display shows calculated distance between the last two measured workpiece features.

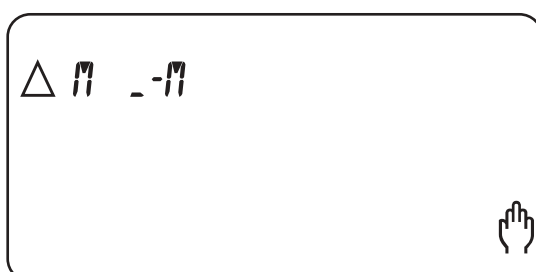
At this point, there are three ways of proceeding provided automatic numbering is activated (dip switch 6 on On):

1 Capture new numbered value (M09); in this case, the one obtained in delta mode will not be registered.

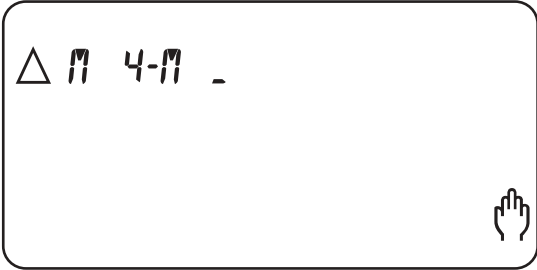
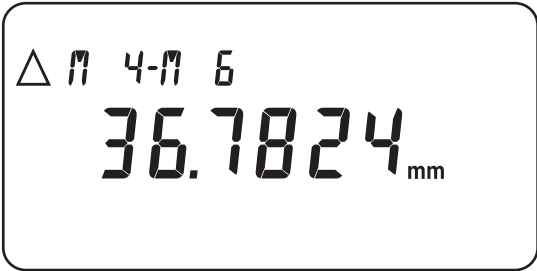
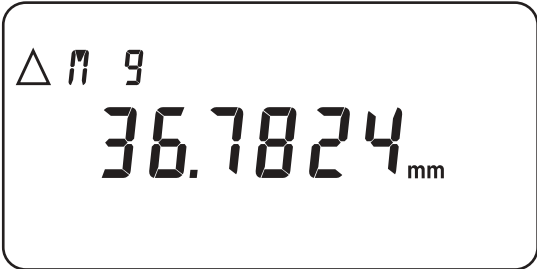
2 Store numbered value M09 by pressing key .

3 Calculate another distance (M? - M?) by pressing function key .

4

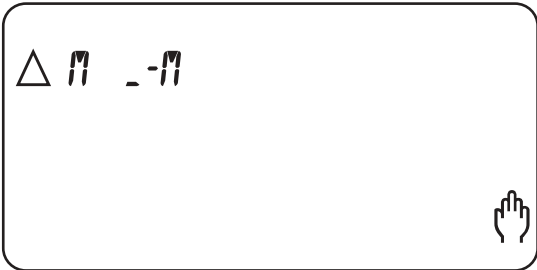
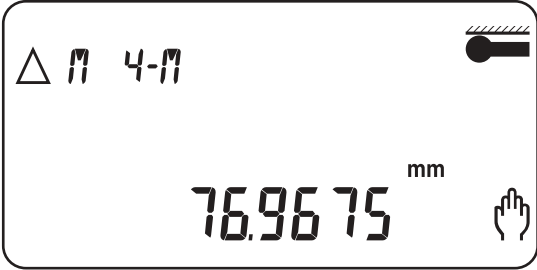


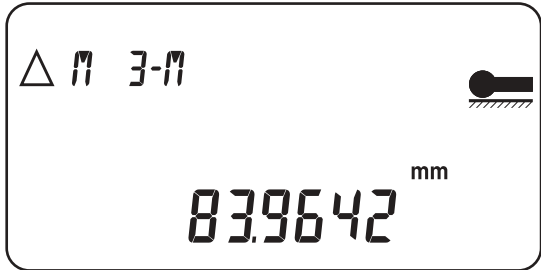
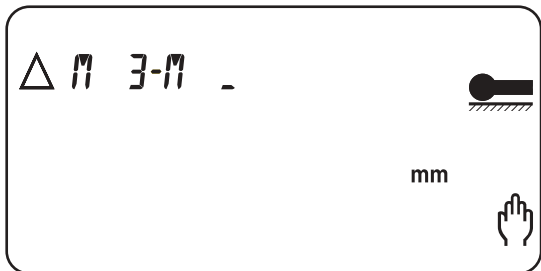
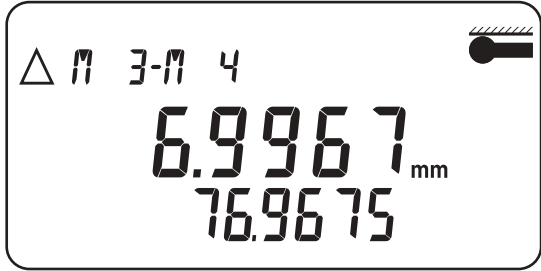
Enter first numbered value through numerical keys (e.g. 04), then confirm by pressing ENTER. Bright sign _ between both letters M will blink.

Enabling keys/gauge	Displaying	Explanation
5 		Enter second numbered value through numerical keys (e.g. 06), then confirm by pressing ENTER. Bright sign _ following second letter M will blink.
6 		At this stage, you may either let another distance be calculated by pressing key  or a new measurement be taken.
7 		Press key  once again to have this value input in the logbook. Each value will thus be suitably documented so as to allow any subsequent calculation in DELTA mode.

If key  is activated instead of , the value appears on the auxiliary display. This allows you to view all numbered values one after the other by acti-

vating both keys  and . To acknowledge desired value, press key .

8 		Enter first numbered value through numerical keys (e.g. 04), then press  for displaying. Bright sign _ between both letters M will blink.
9 		Display shows selected numbered value.

Enabling keys/gauge	Display	Explanation
10 		Press both keys  and  to display all numbered values subsequently.
11 		Press ENTER to confirm. Ready for entering second numbered value. Bright sign _ following second letter M will blink.
12  		Enter relevant value number, then press ENTER to confirm. Press this key once again to register this value if you wish to.
13 		Additional possibility: Access the logbook by pressing key  and have all values displayed subsequently by pressing both keys  and  .
14 		Press ENTER to confirm.

Enabling keys/gauge	Displaying	Explanation
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15



Press key  once more to register this value in the logbook.

Each value will thus be suitably documented so as to allow any subsequent calculation in DELTA mode.

4.14 Measuring centre distances of threads

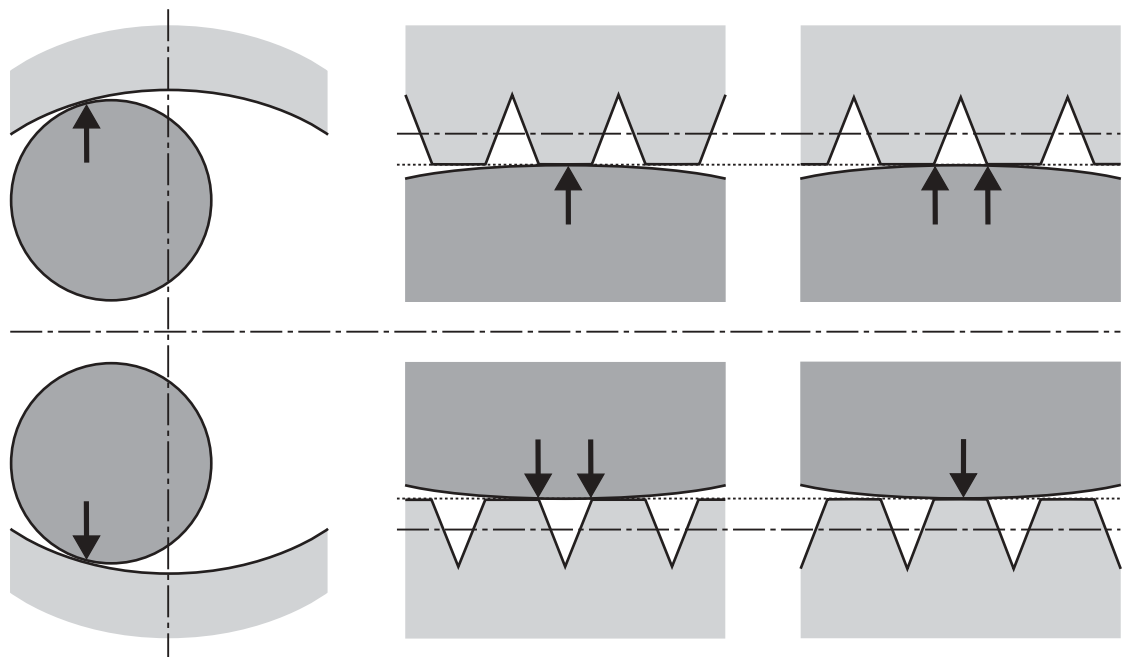
This requires the use of a barrel-shaped contact pin. Since the thread diameter itself needs not be determined for value capture, only the minor diameter will be probed. This is done by activating the function key , which is used for groove measurement.

One or two thread flanks are contacted by the insert while the minor diameter is being measured. The form of the probe insert is such that there is no need to search for the culmination point even in the thread axis.

During the probing operations, the probe axis must be, as far as possible, parallel to that of the thread to be inspected. Consequently, TESA Micro-hite plus M has to be positioned very carefully.

The determination of a thread axis using a barrel-shaped contact pin instead of a cone-shaped one is by far more accurate.

This type of measuring insert provides additional advantages such as the possibility to probe both flat and cylindrical surfaces simultaneously, thus eliminating the need for exchanging probe inserts. Furthermore, a barrel-shaped contact pin is as reliable as a ball tip.



Enabling keys/gauge	Displaying	Explanation
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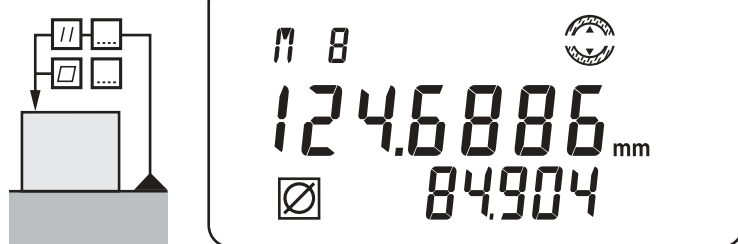
4.15 Measuring flatness or parallelism on flat surfaces



The mode enabling both MAX/MIN points to be detected can be accessed from any position by simply activating function key .

To leave this menu and return to the reference mode previously quitted, press the function key .

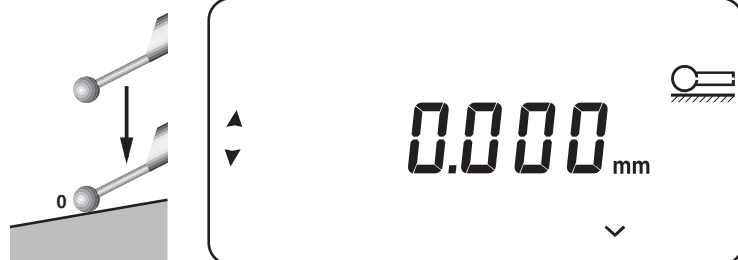
1



The diagram shows a probe measuring a flat surface. The digital display shows the measurement 124.6886 mm and a secondary value 84904. The display also shows a wavy line icon and a double-headed arrow icon.

Use relevant keys or the rotary power control for correct positioning of the probe insert.

2



The diagram shows a probe measuring a surface. The digital display shows the measurement 0.000 mm. The display also shows a wavy line icon and a double-headed arrow icon.

Select probing direction by pressing both keys  and .

3

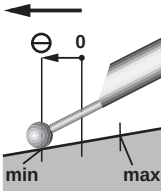
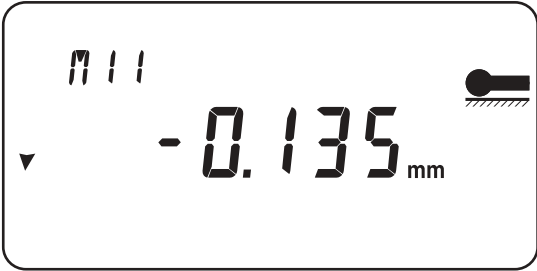
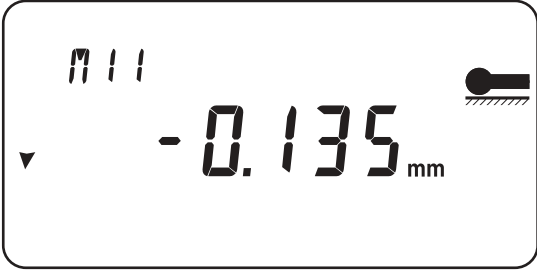


The diagram shows a probe measuring a surface. The digital display shows the measurement 0.123 mm and a secondary value 0.123^ (with a caret symbol). The display also shows a wavy line icon and a double-headed arrow icon.

4



The diagram shows a probe measuring a surface. The digital display shows the measurement 0.123 mm and a secondary value 0.065. The display also shows a wavy line icon and a double-headed arrow icon.

Enabling keys/gauge	Displaying	Explanation
5 		
6 		Display shows MAX minus MIN value.
7 		Display shows MAX value.
8 		Display shows MIN value.
9 		To quit MAX/MIN mode and return to measuring mode, press function key . References that were active before entering in the MAX/MIN mode will be activated again. If automatic numbering is enabled (dip switch 6 set on ON), displayed values MAX minus MIN, MAX and MIN will be successively registered as M09, M10, M11 etc.



To restart MAX/MIN mode,
simply press key .

4.16 Measuring perpendicularity errors using a dial test indicator

Each TESA Micro-hite plus M is adjusted mechanically so that any deviation from perpendicularity (frontal) can be established with use of a dial test indicator (e.g. TESAST). For this purpose, the indicator will be mounted on the probe-holder N° 00760222 which, in turn, will be clamped on the height gauge. The measurement is taken by moving the measuring carriage vertically using the rotary power control while reading out both maximum and minimum deviations captured by the indicator.



4.17 Measuring perpendicularity and straightness errors using a TESA IG-13 digital probe

The TESA IG-13 digital probe has been specially designed for use in association with a TESA MICRO-HITE in standard execution for measuring form and position errors. This probe mainly serves for measuring any deviation from perpendicularity and straightness. It cannot be used in conjunction with a TESA Micro-hite plus M unless it is linked to the Power Panel plus M. The measuring configuration is pictured in Fig. 1.

TESA IG-13 incorporates an opto-electronic measuring system which includes a precision glass scale with incremental divisions.

Measuring span	13 mm / 0.51 in
Signal resolution	0.0005 mm
Accuracy	1 µm
Measuring force	0,45 N (at zero) 0,75 N (at stop)

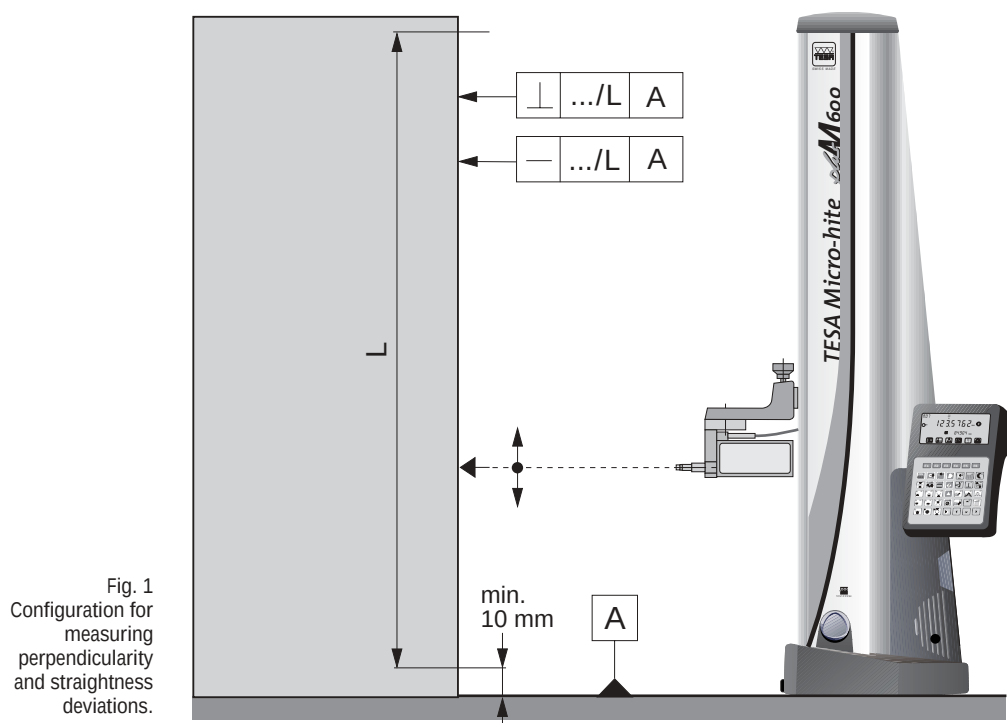


Fig. 1
Configuration for
measuring
perpendicularity
and straightness
deviations.

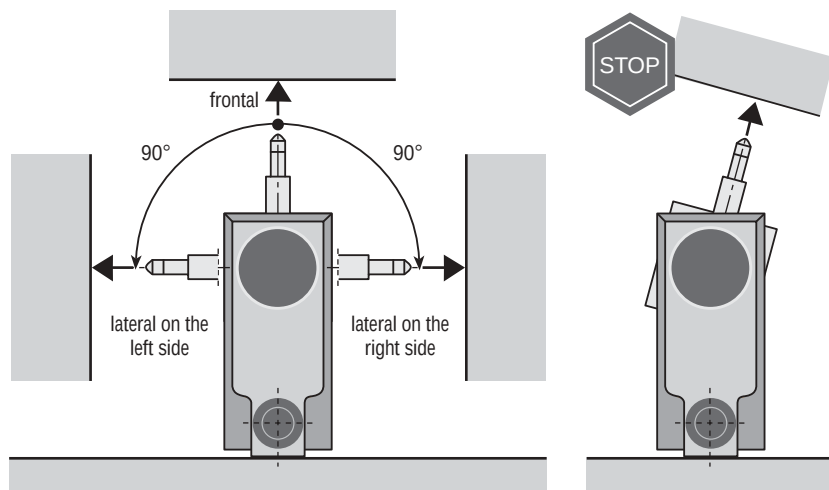


Fig. 3
Three lock-in positions
for correct positioning
of the TESA IG-13
digital probe.

Preparing the measurements

TESA IG-13 should always be used in conjunction with the attachment N° 00760138, which will then be fixed to mounting pin 4. The connecting cable is plug into the socket at the rear of the Power Panel plus M using the 1 m long cable extension N° 04761047. There are several ways to position the probe with its attachment as shown in both Fig. 1 and 2. Whenever perpendicularity and straightness errors are determined according to Fig. 1, the measurements can be carried out in either of the following directions: «frontal», «lateral on the left» or «lateral on the right». Therefore, each TESA Micro-hite plus M is capable to compensate for bias errors automatically. For more details with regard to this, read in chapter 3.7.

Measuring

- Mount TESA IG-13 probe on the holder, then clamp to the mounting pin located on the vertical column.
- Connect the cable to the socket at the rear of the Power Panel plus M using the cable extension N° 04761047.
- Initialise TESA IG-13 once mounted and properly connected before starting measuring. This is done by retracting the measuring bolt against the limit stop, manually.

The automatic value correction as programmed in the electronics (EEPROM) will only be active with connected digital probe clamped in one of the three lock-in positions as shown in Fig. 2. The correction values stored in the memory are different for both directions «frontal» and «lateral».

If a lock-in position is not respected or another measuring instrument such as a dial test indicator is used, the automatic correction remains inactive. In this case, the perpendicularity error as measured on your TESA Micro-hite plus M will match the limit values stated in chapter 7 – Technical data.

Your Power Panel plus M is specially programmed for value processing and displaying. To know more about the probe contact procedure, report to the manual specific to this feature.

When measuring perpendicularity and straightness errors according to Fig. 1, the maximum speed used for retracting TESA IG-13 shall not exceed 20 mm/s. Therefore, we recommend to use the rotary power control.

5 MAINTENANCE

To get the most of your TESA Micro-hite plus M you will need to choose a place where the limit values given for operating and storage temperature are

respected (see chapter 7 – Technical data). When not in use, we recommend to protect your height gauge with the dust cover supplied.

5.1 General cleaning

Use only a dry, non-fluffy cloth to clean your TESA Micro-hite plus M. Never use abrasive solvents. For any other operation such as cleaning the head guides, the measuring system or the air-bearing base which must be cautiously carried out by a

skilled personal. So, if necessary, ask for our after-sales service or get in touch with your TESA's local agent or dealer.

5.2 Recharge de la batterie

First of all, you should know that new batteries or batteries that are not used for a long period of time only attain their full performance after 30 to 40 charges.

Fully recharging the battery pack with the mains adaptor N° 04761054 requires about 8 hours. TESA Micro-hite plus M can then be used for about 12 hours.

If the battery charge is not sufficient (under 5,8 V), the battery symbol appears on the display as the 1D control panel or the Power Panel plus M is being used. The operator can continue with the measurements for about 15 minutes. Once this time has gone, the operating function will deteriorate.

For charging batteries, use only the original adaptor N° 04761054 and proceed as follows:

- Connect mains adaptor to the socket of the battery pack, whether in place in the TESA Micro-hite plus M or not.
- Connect adaptor to the mains 110 to 240 Vac / 50 to 60 Hz with connecting cable supplied.
- Complete charging takes about 8 hours.

– After full recharging, the adaptor may remain connected to the mains up to max. 24 hours without danger to the battery.

If TESA Micro-hite plus M is used with the battery pack in place during recharging, the time necessary for this purpose will be longer or the autonomy will be reduced in proportion.

To ensure continuous operation, we recommend to use the second battery pack N° 00760141 available as an option. Since one can be recharged while the other is in use, there are no cables or power cords to hinder the operator working on the surface plate.

Note

Unused batteries will gradually lose charge as time goes by and, if not recharged, deteriorate. They must therefore be charged at intervals which do not exceed 6 months.

5.3 Changing worn-out batteries

After about 300 recharges, the batteries contained in the battery pack will no longer hold the charge so that they must be replaced. For this operation, you may choose between two possibilities, i.e.:

- Send the battery pack to TESA's after-sales service for exchange against a new one.
- Replace batteries yourself (order N° 00760157).

In the later case, the procedure is as follows:

- Undo single flat head screw on the lateral side of the housing, then lift the battery to remove it from the pack.
- Change battery by pulling at the connector end only, not on the wire itself.

– Make sure the connectors are positioned with the correct polarity on the new battery (red = positive pole, black = negative pole). Also see the diagram on the cover plate.

Danger

Do not by-pass both positive and negative poles otherwise the battery will deteriorate with the risk of fire (100 A).

- Remount the housing, then follow the charging procedure.
- Hand worn-out batteries in at a collection centre.

6 DELIVERY PROGRAMME

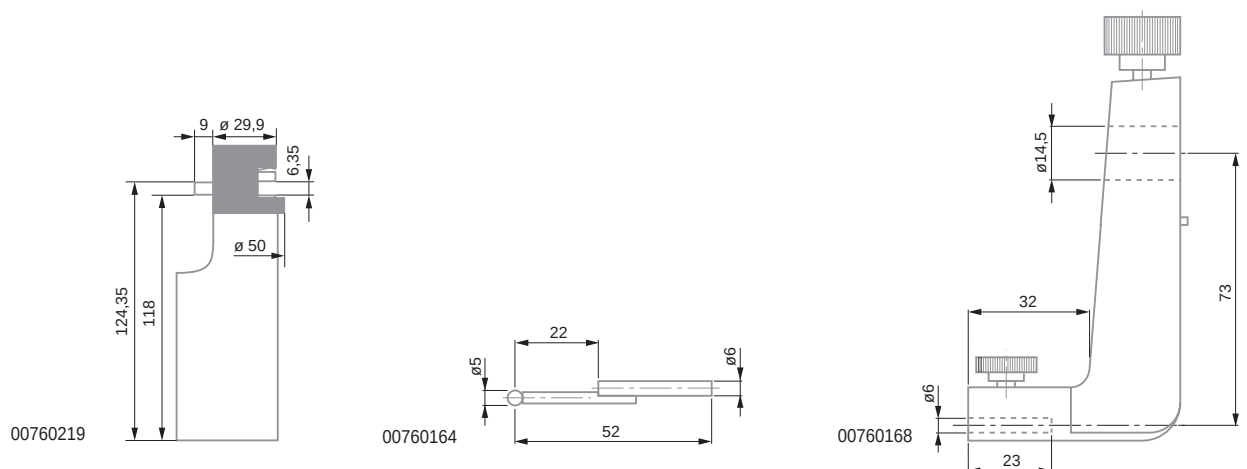
6.1 TESA Micro-hite plus M height gauges

Ordering information

TESA Micro-hite plus M base set	350	600	900
Order number	00730063	00730064	00730065
Measuring span	365 mm / 14 in	615 mm / 24 in	920 mm / 36 in
Application range with standard insert-holder 00760143	0 à 520 mm / 20 in	0 à 770 mm / 30 in	0 à 1075 mm / 42 in
Application range with insert-holder 00760057	0 à 575 mm / 22 in	0 à 825 mm / 32 in	0 à 1130 mm / 44 in
Application range with insert-holder S07001622	0 à 745 mm / 29 in	0 à 995 mm / 39 in	0 à 1300 mm / 51 in

Each TESA Micro-hite plus M base set consists of the following components:

1 TESA Micro-hite plus M 350 or	00730060
TESA Micro-hite plus M 600 or	00730061
TESA Micro-hite plus M 900	00730062
1 Standard insert-holder	00760143
1 Standard probe insert with a 5 mm dia. tungsten carbide ball tip	00760062
1 Master piece with nominal dimension to 6.35 mm / 0.25 in	00760219
1 Electric pump for creating the air-cushion under the height gauge base, already mounted	00760142
1 Battery pack	00760141
1 Mains adaptor 110 to 240 Vac / 50 to 60 Hz	04761054
1 Cable EU for adaptor	04761055
1 Cable US for adaptor	04761056
1 Dust cover for TESA Micro-hite plus M 350 or	00760151
TESA Micro-hite plus M600 or	00760152
TESA Micro-hite plus M900	00760153
1 SCS calibration certificate	
1 Instruction manual with a declaration of conformity	
1 Shipping box for TESA Micro-hite plus M 350 or	00760154
600 or	00760155
900	00760156



6.2 Control panels

1D control panel 00760216

Key features include:

- RS232 serial interface for bi-directional data transmission.
- Input for the foot switch used for triggering PRINT function or repeat last measurement operation.

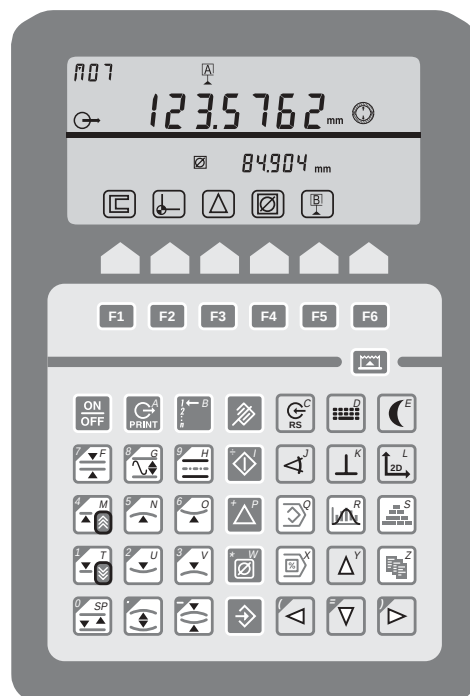


POWER PANEL PLUS M 00760220, with built-in printer

POWER PANEL PLUS M 00760221, without built-in printer

Key features include:

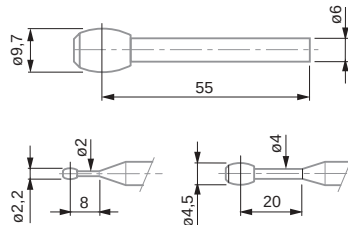
- RS232 serial interface for bi-directional data transmission.
- Input for a measuring instrument with RS232 digital output.
- Input for a TESA IG-13 digital probe.
- Input for the foot switch used for triggering PRINT function or repeat last measurement operation.
- CENTRONICS output for A4 printer.



6.3 Optional accessories

Measuring insert

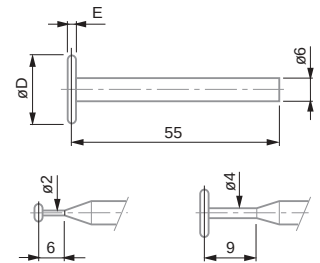
With tungsten carbide measuring face (convex) for inspecting cylindrical bores or establishing internal thread position (metric or similar).



D = 2,2 mm for M3 to M16 threads N° **00760066**
D = 4,5 mm for M6 to M48 threads N° **00760067**
D = 9,7 mm for M12 to M150 threads N° **00760068**

Measuring insert

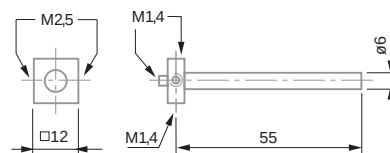
With disc-shaped, tungsten carbide measuring face for measuring grooves, turned grooves, centring shoulders etc.



E = 1 mm / 4,5 mm dia. N° **00760074**
E = 2 mm / 14 mm dia. N° **00760075***
E = 3 mm / 19 mm dia. N° **00760076**

Insert holder

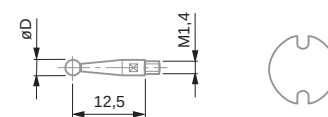
For measuring inserts with M1,4 or M2,5 threads.



N° **00760096***

Measuring insert

With tungsten carbide ball tip plus M1,4 thread.

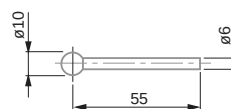


Ø 1 mm N° **18.60201***
Ø 2 mm N° **18.60202***
Ø 3 mm N° **18.60203***
Key N° **18.60307***

Measuring insert

With tungsten carbide ball tip, 10 mm. dia.

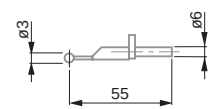
N° **00760060***



Measuring insert

With tungsten carbide ball tip, 3 mm dia.

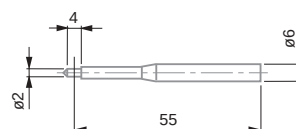
N° **00760061***



Measuring insert

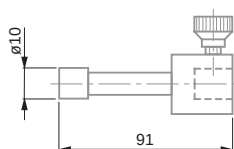
With small tungsten carbide measuring face, 2 mm dia.

N° **00760082**



Measuring insert

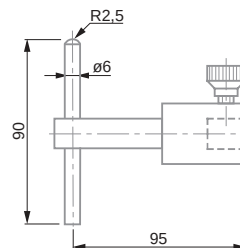
With a 10 mm dia. tungsten carbide cylindrical face, 12 mm long. Hardened stainless steel body.



N° 00760093*

Measuring insert

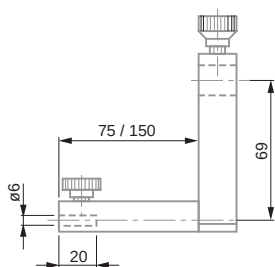
With both a flat and spherical tungsten carbide measuring face. Hardened stainless steel pin, interchangeable..



N° 00760094*

Insert holder

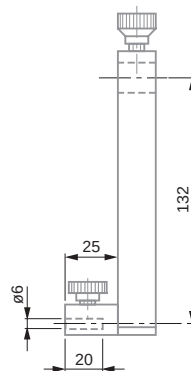
For increasing the measurement depth.



Depth 110 mm (L = 75 mm) N° 00760086
185 mm (L = 150 mm) N° 00760087

Insert holder

For extending the application range.



N° 00760057

Accessories – Partial set N° 00760173

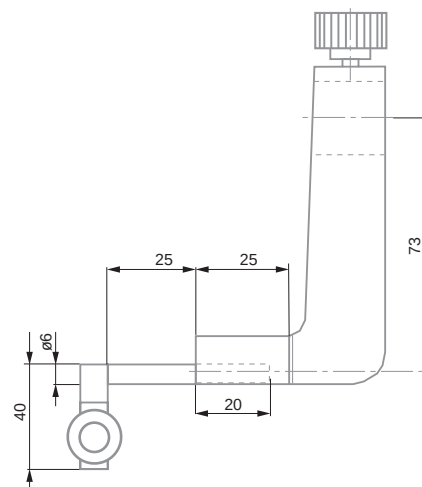
Supplied in a molded plastic case* with all accessories marked with an asterisk «*».

Accessories – Full set N° 00760148

Supplied in a molded plastic case* with all accessories listed above.

* Not pictured on these pages.

Special insert holder for TESATAST, N° 00760222

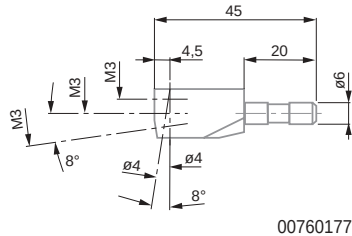


Handle for safe transportation of the height gauge, N° 00760129.

PROBE INSERT SET

N° 00760175

Supplied in a suited plastic case.



00760177

1 Insert holder

N° 00760177

1 Hardened steel pin

For grooves, centring shoulders, blind bores etc. Tilted through 8°.

N° 00760178

1 Hardened steel pin

For depth measurement.

N° 00760179

3 Measuring inserts

With a tungsten carbide ball tip,
0,9 mm dia.
1,9 mm dia.
2,9 mm dia.

N° 00760180

N° 00760181

N° 00760182

1 Measuring insert

With a 8 mm dia. cone-shaped measuring face in hardened steel

N° 00760183

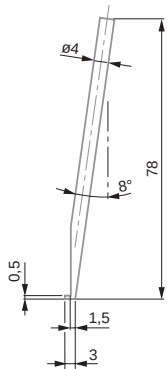
2 Extensions

20 mm long for M3 to M3 threads

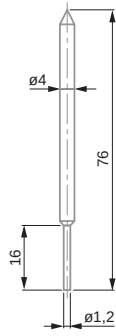
N° 00760184

20 mm long for M3 to M2,5 threads

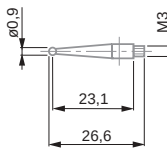
N° 00760185



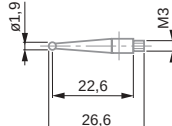
00760178



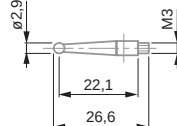
00760179



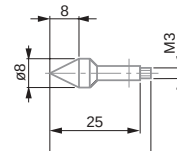
00760180



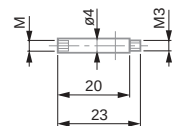
00760181



00760182

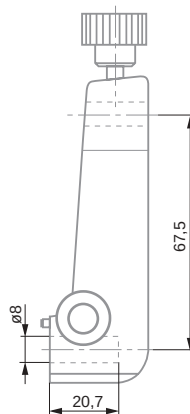


00760183

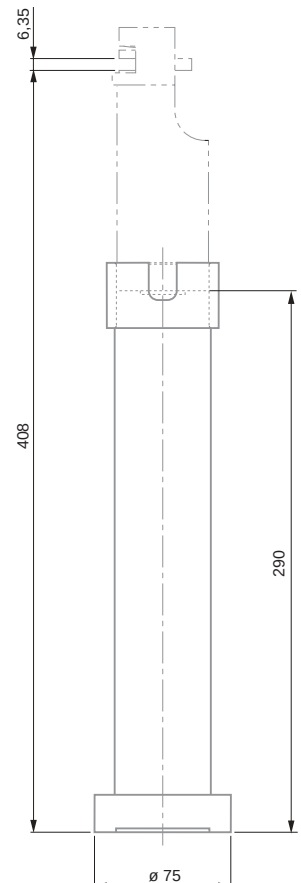


00760184/5

Insert holder for use with the CAPAX 2000 probe inserts, N° 00760223



00760224



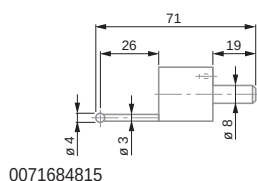


ACCESSORY SET

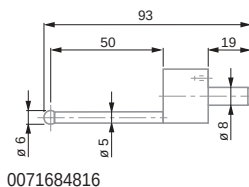
N° 0071684849

consisting of:

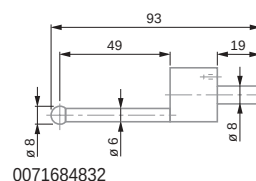
- | | |
|--|---------------|
| 1 Plug-in panel in plexiglass | N° 0071684848 |
| 1 Insert with a 4 mm dia. tungsten carbide ball tip | N° 0071684815 |
| 1 Insert with a 6 mm dia. tungsten carbide ball tip | N° 0071684816 |
| 1 Insert with a 8 mm dia. tungsten carbide ball tip | N° 0071684832 |
| 1 Long insert with a 10 mm dia. tungsten carbide ball tip | N° 0071684817 |
| 1 Attachment for interchangeable probe inserts with a M1,4 thread. Provided with 1 insert having a 1 mm dia. tungsten carbide ball tip (N° 01860201). | N° 0071684826 |
| 1 Insert with a small cylindrical measuring face in hardened steel, 12 mm dia., 2 mm long. | N° 0071684835 |
| 1 Insert with a cylindrical measuring face in hardened steel, 10 mm dia., 12 mm long. | N° 0071684820 |
| 1 Insert with a disc-shaped measuring face in hardened steel for blind bores or short centring shoulders, 12 mm dia., 3 mm wide. | N° 0071684827 |
| 1 Insert with a cone-shaped measuring face in hardened steel for 0,5 to 5,5 mm dia. | N° 0071684822 |
| 1 Insert with a cone-shaped measuring face in hardened steel for 5 to 20 mm dia | N° 0071684819 |
| 1 Attachment for interchangeable probe inserts with a M1,4 thread. Provided with 2 inserts having a 2 mm dia. tungsten carbide ball tip (N° 01860202). | N° 0071684828 |
| 1 Attachment for interchangeable probe inserts with a M1,4, M2,5 or M3 thread. Provided with connectors M3 for M1,4 and M3 for M2,5. Radial alignment. | N° 0071684852 |
| 1 Insert with a 1 mm hardened steel ball tip. Also with adjustable steel pin for depth measurement. | N° 0071684818 |



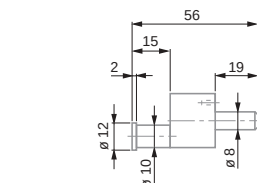
0071684815



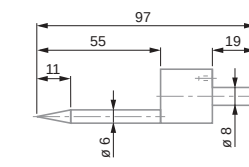
0071684816



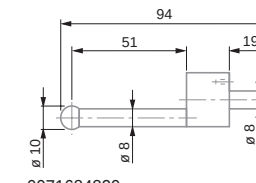
0071684832



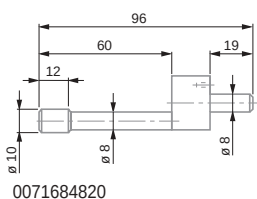
0071684835



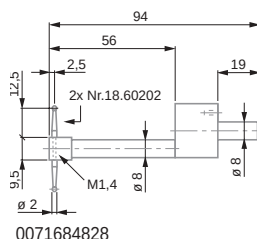
0071684822



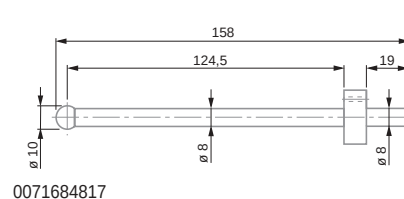
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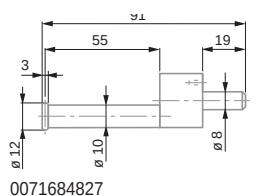
0071684820



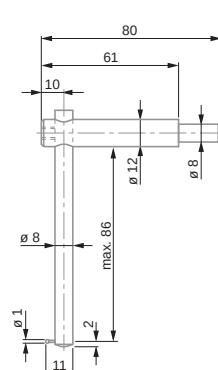
0071684828



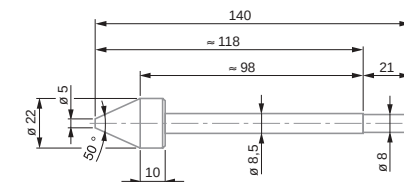
0071684817



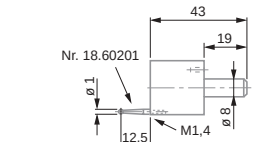
0071684827



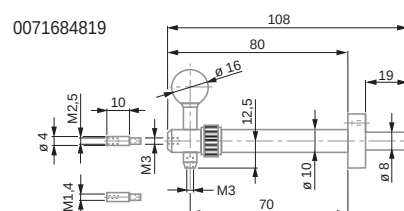
0071684818



0071684819



0071684826



0071684852

ACCESSORIES FOR USE WITH THE POWER PANEL PLUS M ONLY

TESA IG-13 probe set

N° 00760140

consisting of

- 1 TESA IG-13 digital probe,
measuring span
13 mm/0.5 in
- 1 Probe attachment
TESA IG-13

N° 00760139

N° 00760138

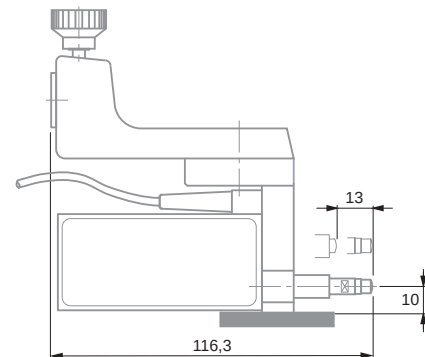
Additional accessories

- Lift lever for measuring bolt
- Extension for probe insert,
10 mm long
- Connecting cable for
IG-13 to control panel (1 m)

N° 01960005

N° 03540501

N° 04761047



TESA MEMOTAST- special

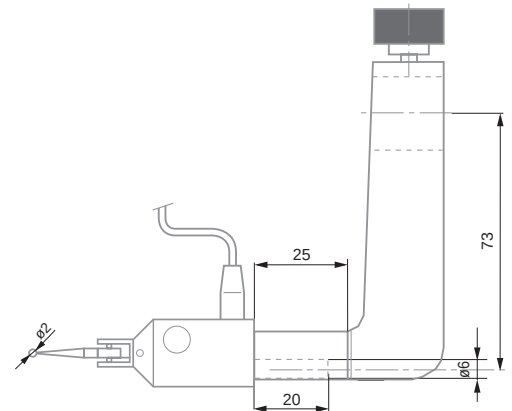
N° S07020086

Auxiliary probe.
Technical data are valid when used
with TESA Micro-hite pLus M.

Measuring force
Max. perm. error

0,5 N
(3 + 3 . L) μ m
L en m
 $\leq 3 \mu$ m

Repeatability limit



TESA PRINTER SPC N° 06430000

Provided with the following items:

- 1 Thermal paper roll
- 1 Mains adaptor, 100 to 240 Vac /
50 to 60 Hz, 6,6 Vdc / 750 mA N° 04761054
- 1 Instruction manual with a declaration of
conformity according to EN 45014

Accessories for TESA PRINTER SPC

Battery pack

6 V

N° 04768035

Trigger for data transfer (to TESA Printer SPC)

Hand switch

N° 04768000

Foot switch

N° 04768001

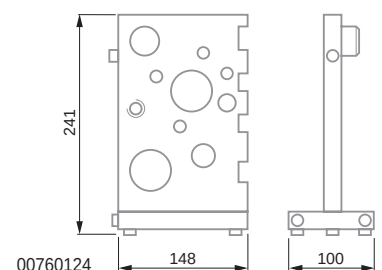
Connecting cable

RS232, opto-coupled with 9 pin/m/f trapezoidal
connector for TESA PRINTER SPC
(N° 06430000) or a PC/AT computer,
2 m long.

N° 04761052



PRACTICE WORKPIECE N° 00760124



7 TECHNICAL SPECIFICATIONS

MICRO-HITE PLUS M HEIGHT GAUGES, 1D CONTROL PANEL, POWER PANEL PLUS M

	350	600	900
Measuring span	365 mm	615 mm	920 mm
Application range with standard insert holder 00760143	520 mm	770 mm	1075 mm
Application range with standard insert holder 00760057	575 mm	825 mm	1130 mm
Application range with insert holder S07001622	745 mm	995 mm	1300 mm
Max. perm. error	(2+ 1.5 L) µm – (L in m)		
Repeatability	on flat surfaces: 2 s = <0.5 µm – Within bores: 2 s = <1 µm		
Max. deviation from perpendicularity	Mechanical perpendicularity (frontal) < 6 µm < 8 µm < 12 µm These values are valid with height gauge linked to a digital handtool < 5 µm < 6 µm < 10 µm		
Resolution	1D control panel: 0.0001/0.001 mm – 00001/.0001in Power Panel plus M: 0.0001/0.001/0.01 mm – .00001/.0001/.001/.01/.1in		
Displacement speed	600 mm/s (hand operated) – 30 mm/s (motorised fast motion)		
Probing speed	7,5 / 15 mm/s	7,5 / 15 mm/s	7,5 / 15 mm/s
Measuring force	1N	1N	1N
Autonomy	~12 h	~12 h	~12 h
Masse	~33 kg	~38 kg	~45 kg
Air-bearing base	yes (3-point bearing)	yes (3-point bearing)	yes (3-point bearing)
Batteries	Battery pack 00760141		
Data output	1D control panel: RS-232 Power Panel plus M: RS-232 and Centronics		
Degree of protection	IP 40	IP 40	IP 40
Carriage lock	no	no	no
Storage temperature range	-10°÷60°	-10°÷60°	-10°÷60°
Operating temperature range	5°÷40°	5°÷40°	5°÷40°
Two-dimensional measurement capability	1D power panel: no Power Panel plus M: yes		
Printer	For direct printing of inspection reports in A4 format. Suitable for use with Power Panel plus M.		
Built-in printer	For direct printing with header. Suitable for use with Power Panel plus M 00760220.		

7.1 RS232 interface

The connecting cable 04761052 is used to link TESA Micro-hite plus M to SPC printer or a PC.

Baud rate	4800 bauds
Data bits	7 bits
Start	1 bit
Stop	2 bits
Parity	even

7.2 Monodirectional data transmission

Data transfer may either be triggered off by activating the function key  or using a remote control switch (hand switch or foot switch) connected to the port «EXT.P» on the back side of the control panel.

Data transfer

mm ±9999.999(9) <cr/lf>
In ±99.99999 <cr/lf>

7.3 Bidirectional data transmission

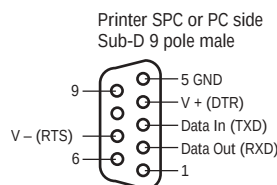
This transmission mode allows direct control of the height gauge from a PC. Given instructions are as follows:

Each command must be ended using ASCII code «CR»

?<cr>	Measured value	
ID ?<cr>	Serial number	TE...<cr/lf>
VER ?<cr>	Model number	2.1<cr/lf>
UNI ?<cr>	Unit system	MM or IN<cr/lf>
MM<cr>	Metric unit (mm)	<cr/lf>
IN<cr>	Inch unit (in)	<cr/lf>

Pin layout on the 9-pin (female) connector:

Control panel		PC
2 TXD (Data Out)	→	2 RXD
3 RXD (Data Req)	←	3 TXD
5 GND		
Other pins are leaved unused.		



8 WARRANTY

We guarantee this product against any fault of design, manufacture or material for a period of 12 months from the date of purchase. any repair work carried out under the guarantee conditions is free of charge. Our responsibility is limited to the repair of the product or, if we consider it necessary, to its free replacement.

The following are not covered by our guarantee: batteries and damages due to incorrect handling,

failure to observe the instruction manual, or attempts by any non-qualified party to repair the product; any consequences whatever which may be connected either directly or indirectly with the product supplied or its use.

(Extract from our General Terms of Delivery, December 1, 1981).

9 DECLARATION OF CONFORMITY

We thank you very much for your confidence in purchasing this product.

Declaration of conformity with confirmation of traceability

We declare under our sole responsibility that this product is in conformity with all technical data as specified in our sales literature (instruction manual, leaflet, general catalogue). In addition, we certify

that the measuring equipment used to check this product refers to national reference standards. Traceability of the measured values is ensured by our Quality Assurance.

Declaration of conformity with ISO/CEI Guide 22 as well as EN 45014**Manufacturer**

Brown & Sharpe TESA SA

Full name and address

Brown & Sharpe TESA SA
Bugnon 38
CH-1020 Renens
Switzerland

We declare that the following product(s)

product name	TESA MICRO-HITE plus M
and type	00730060 / 00730061 / 00730062 00730063 / 00730064 / 00730065

is (are) in compliance with the following standards (*)

EN 61326-1, class B

*with unplugged battery charger

Each product supplied conform with the European guidelines 73/23/CEE and 89/336/CEE, which were modified at a later date according to the guideline 93/68/CEE.

Renens, 15th March 2002



J.-D. Richard

Manager of Quality Assurance