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DHG-C420
1D MANUAL HEIGHT GAUGES
OPERATION MANUAL

PLEASE SCAN QR CODE TO
WATCH THE OPERATION
VIDEO OF PRODUCTS.

VIDEO

INSIZE

## General Warnings

◆ Protection against electrostatic interferences:
Static electricity can damage the electronic components of the instrument. In order to prevent this type of damages, avoid any contact with the connector pins.

◆ In order to prevent any changes of the instrument performance or any accident, the instrument should never be dismantled.

◆ If, for any reason, the electronic unit has to be opened, only authorized personnel are allowed to do so.

◆ Do not expose the instrument, its components and accessories to rain or any projection of fluids. Avoid penetration of foreign substances into the connectors and the instrument openings.Do not cover or wrap the display unit during use. The unit must be kept well ventilated to avoid any overheating.

◆ In case of problems with the instrument or any of its parts (no display, overheating, abnormal smell...), immediately switch off the instrument and disconnect the power supply. Please contact us.

◆ This is a high accuracy instrument. Particular care should be taken during its entire operational lifetime. Pay special attention to the following specific points:

– Use the instrument on a stable, smooth and clean surface plate.
– Avoid any shock to prevent the instrument from losing some or all of its performing characteristics.
– Use the instrument in a vibration free area.
– Avoid exposure to direct sunlight and excessive humidity.
– Avoid proximity of heating or air conditioning systems.
– Respect the advised environmental conditions.

1. INSTRUMENT DESCRIPTION

1.1 Introduction

◆ 1D measurements
◆ Programmable for batch measurement
◆ Probe can be moved quickly by hand
◆ Data statistics and analysis
◆ Built-in rechargeable battery
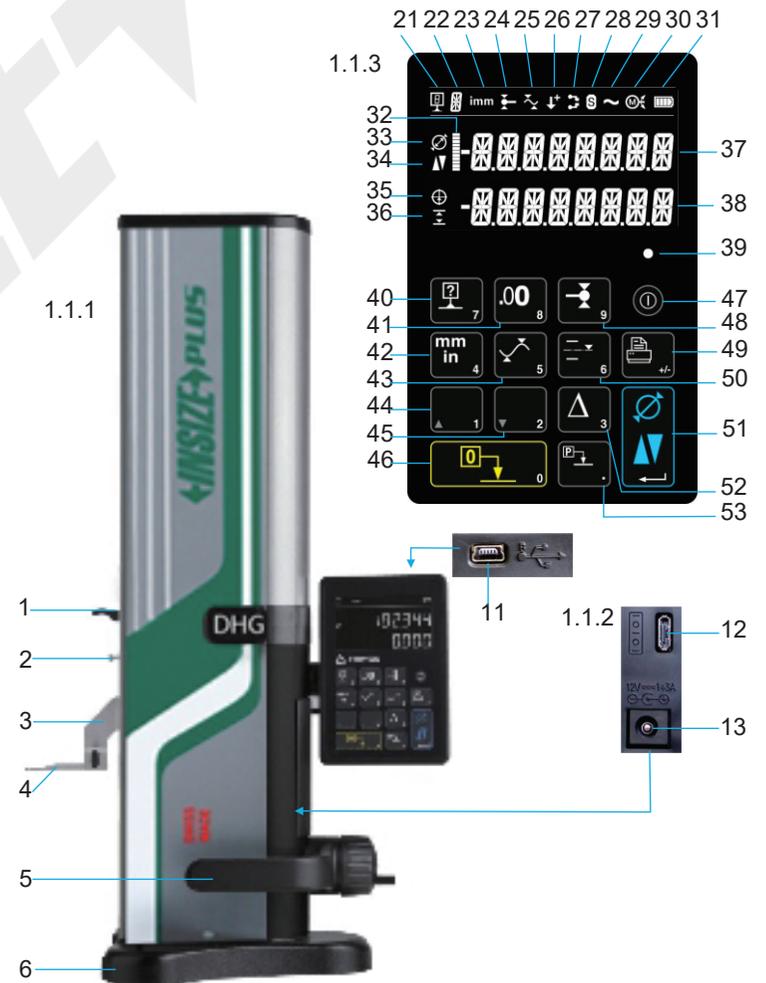
1.1.1 Instrument

1. Handle for carriage displacement.
2. Transport safety screw for locking of probe suspension (chromium plated).
3. Insert holder.
4. Measuring insert.
5. Operating handle for the displacement of the instrument.
6. Base with air cushion system for instrument displacement.

1.1.2 Interfaces / Connectors

11. Mini USB connector (on top of display unit).
12. Connector for RS232 communication (on lower right side of height gauge).
13. AC adaptor connection (on lower right side of height gauge).

1.1.3 Display

21. Number of current reference.
22. Function indicator.
23. Active measuring unit.
24. Probe constant indicator.
25. Min / Max / Delta mode indicator.
26. Inversion of measuring direction indicator.
27. Probe holder change indicator.
28. Shrinking factor ≠ 1 indicator.
29. Direct display mode indicator.
30. Motorisation indicator31. Battery charge level indicator.
32. Probing indicator.
33. "Diameter/centreline" mode – Value of diameter indicator.
34. Height measurement and probing direction indicator.
35. "Diameter/centreline" mode – Value of centreline indicator.
36. Tolerance limit/difference mode indicator.
37. Upper display line.
38. Lower display line.
39. Visual signal of function activation.
40. Selection of references / numeric function 7.
41. Selection of resolution / numeric function 8.
42. Selection of measuring unit (mm/inch) / numeric function 4.
43. Min, max or delta mode/ numeric function 5.
44. Up arrow / numeric function 1.
45. Down arrow / numeric function 2.
46. Zero setting of the display / numeric function 0.
47. On/Off key (power ON / OFF).

48. Storage of probe constant / numeric function 9.
49. Print-out of data / Function "+/-".
50. Average of last 2 measurements / numeric function 6.
51. Function key: Selection of height and diameter - centerline measurements / Validation key.
52. Difference between last 2 measurements / numeric function 3.
53. Sets the display to the previously input preset value of the current reference / Function ".".

2. SETTING-UP

1. Clean the pads positioned underneath the base using aclean cloth, slightly dampened with alcohol.
2. Position the instrument with care on a clean measuring plate.
3. Slide the measuring insert into the holder and lock it,using the knob. Take care to position the eccentric probes correctly.
4. Release the transport safety screw (chromium-plated).
   Note:
   Do not try to remove the screw (screw stop)!
5. If the instrument does not switch on or in case of lowbattery level, proceed to a full loading of the batteries(plug in the charging unit to the instrument). Empty batteries are fully loaded in about 3 hours.
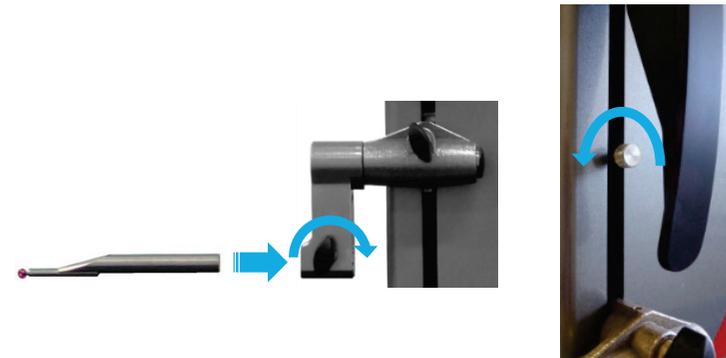
3. GETTING STARTED

3.1 Displacement Modes: Manual

DHG-C420 is manually operated only.
The manual displacement of the carriage is carried out with the help of the handle.

3.2 Setting Into Operation

◆ Switch on the instrument by pressing button On/Off during 2 seconds. All segments of the display will light up.
Switch off the instrument by pressing the same button until the instrument turns off.

>2s
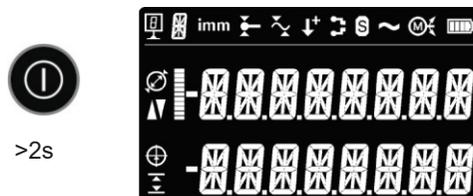
◆ The display will ask for the reference position. Move the measuring carriage slowly across the mark indicating the reference position with the help of the handle for carriage displacement (the acquisition of reference is carried out by displacing the carriage upwards). An acoustic signal will confirm that the reference has been detected and the display starts counting. If the display does not start counting, repeat the sequence.

REF
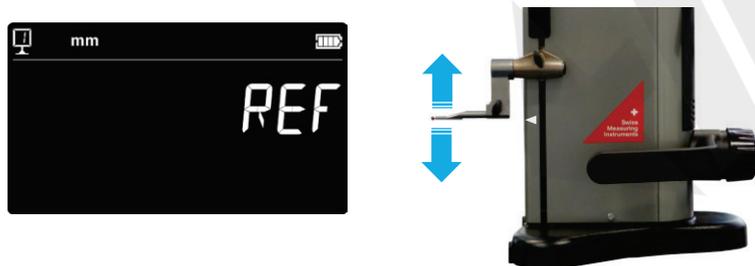
◆ The instrument is now asking for the probe constant. This function compensates the dimension and the deflexion of the measuring insert when probing downwards and upwards (reversed surfaces, diameters). The last stored probe constant value will be displayed.

Note 1 :
This procedure may be interrupted by pressing on the probe constant key or on the **Validation key**. The latest probe constant value measured is then recorded.
Note 2 :
The start mode can differ, according to the instrument configuration (§ 7).

◆ Use the setting gauge supplied with the instrument to carry out this operation.
Note: A different setting gauge may be used. In this case, its dimension must be configured in the set-up menu (§ 8).

mm
− 13.546
3.982

◆ Move the measuring insert downwards (use the handwheel for the displacement of the measuring carriage) until it touches the surface and an acoustic signal confirms the measurement (=probing).

mm
0.000
0.000
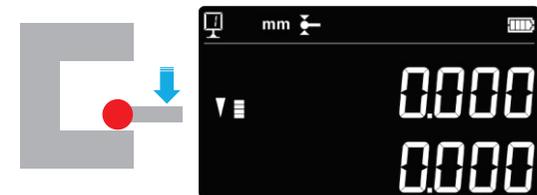
◆ Without moving any part (instrument and gauge), move the measuring insert towards the top and perform the same sequence on the upper surface of the setting gauge.

mm
25.000
3.980
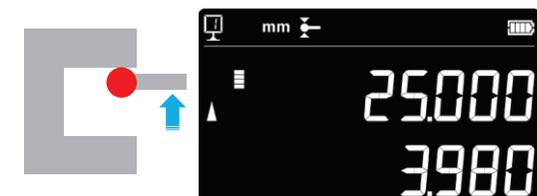
◆ Repeat the above two-sequences one more time. This allows establishing the probe constant more precisely.

◆ The screen will display the setting gauge value during the latest probing, as well as that of the new probe constant. The instrument is then ready to be used.


The probe constant needs to be checked and stored again after each measuring insert change, after change of its position in the holder, after each adjustment of the measuring force or adjustment of the floating probe suspension.

4. MAIN FUNCTION

4.1 Selection of height and diameter / centerline measurements

◆ To select the functions of height measurements or diameter/centreline distances, press the **Function key**. The corresponding symbol will be displayed.
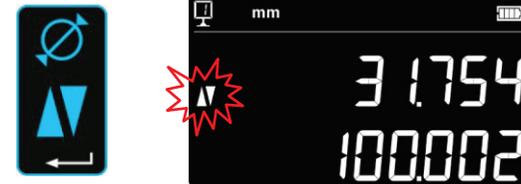
Height

diameter / centerline
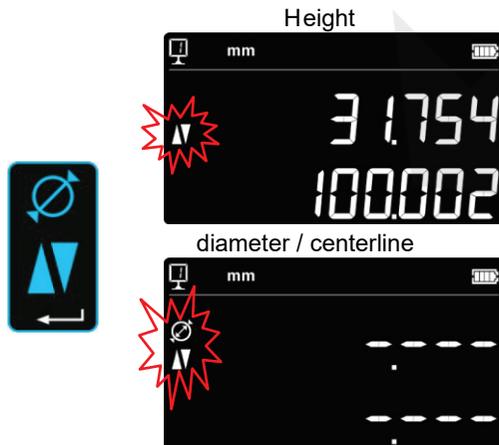
4.2 Height measurements

H1 = Height measurement downwards (▼)
H2 = Height measurement upwards (▲)
H12 = Chain dimensions H1
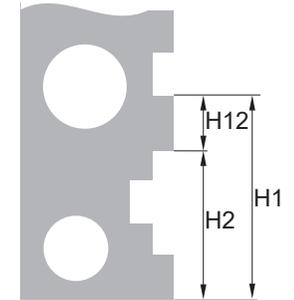
◆ Select height measurement mode.

◆ Set the display at zero or at a preset value with the measuring insert probing a reference surface (see §4.11 and § 4.4.2).

or

◆ Probe the surface to be measured downwards orupwards. The probing indicator will display the progression of the measuring force application.When the right force is reached, an acoustic signal will confirm the measurement.
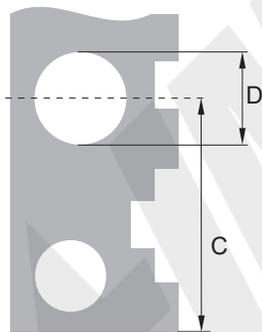Note:
The first line of the display indicates the height measured.The second line indicates the distance from the former height measurement (chain of dimensions).This display mode can be configured (§ 5.4).

4.3 Diameter and centerline measurements

D = Diameter measurement ($\varnothing$)
C = Centreline measurement ($\oplus$)

◆ Set the display at zero or at a preset value on a reference surface (see § 4.11 and § 4.4.2).

◆ Select the diameter / centerline mode by pressing the **Function key**.

◆ Internal diameter:
Position the measuring insert into the bore and set it on the lower profile as near as possible to the reversal point (1). Engage the measuring force until the acoustic signal. Move the instrument (or the part) laterally to determine the reversal point (2). The reversal point is stored automatically.
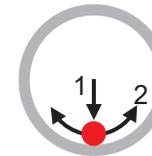
Move the measuring insert straight up and set it on the upper profile as near as possible to the reversal point (3). Engage the measuring force until the acoustic signal. Move the instrument (or the part) laterally to determine the reversal point (4). Diameter and centreline values are displayed on the 1st and 2nd lines of the display respectively.
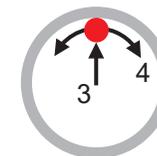
◆ External diameter :
Set the measuring insert off center on the lower shaft profile as near as possible to the reversal point (1). Engage the measuring force until the acoustic signal. Move the instrument (or the part) laterally to determine the reversal point (2). It is automatically stored. Remove the measuring insert slowly to the side, off center (3).
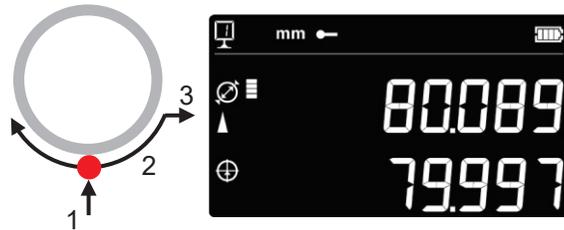
Set the measuring insert on the upper shaft profile as near as possible to the reversal point (4). Engage the measuring force until acoustic signal. Move the instrument (or the part) laterally to determine the reversal point (5). Remove the measuring insert slowly to the side, off center (6). Diameter and centreline values are displayed on the 1st and 2nd lines of the display respectively.
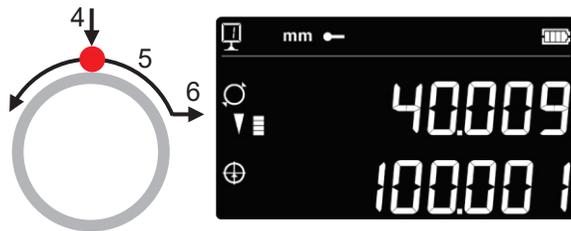
◆ When the measuring insert is removed, the display remains frozen on the diameter and centerline values. Restart above steps for a new measurement.

4.4 References

4.4.1 Selection of references

The use of references allows a parallel measurement starting from different points of origin (=references). The current reference is mentioned at the top left hand side of the display. For reference change, press reference key and enter the reference number.
Note : It is possible to choose the number of references (from 1 to 9). To configure the number of references, see § 7. If the number of references is limited to 2, a simple pressure on the key will allow to pass from one reference to the other (no need to enter the reference No.).

4.4.2 Assignment of a preset value to a reference

By pressing the Preset key, the previously entered preset value for each selected reference will be taken into consideration for height measurements, centerline distances or Min / Max values.
In direct mode (see § 5.4), the preset is executed at the current position of the probe.

A preset value can be assigned to each reference. Select the required reference and press the **Preset** key longer than 2 seconds. Enter the value and confirm by pressing the **Validation key** key.
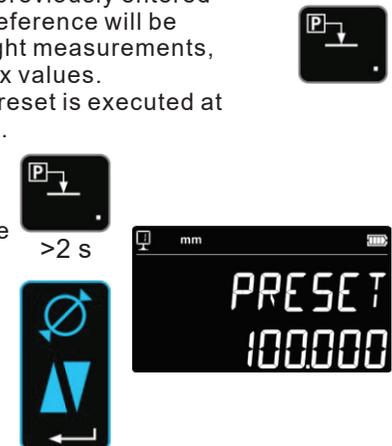
4.5 Selection of the resolution

To modify the display resolution, press key opposite

4.6 Setting / memorizing of the probe constant

To check and memorize the probe constant, press the following key and follow the same sequence as for "Setting into operation" (§ 3.1).
Note:
The current constant value is shown on the second line of the display by pressing this key once. A second pressure interrupts the acquisition of constant and brings the instrument back into height measuring mode. The constant value of the probe can also be manually (§ 5.5).

or

>2 s

4.7 Selection of the measuring unit

Measurements can be performed either in mm or in inch. To change the unit, press the mm/in key. The active unit is displayed on the top left of the display.
Note: It is possible to lock in the required measuring unit (§ 7).

4.8 Measuring in Min/Max/Delta mode

Max = Measurement of maximum value ($\smallsmile$)
Min = Measurement of minimum value ($\frown$)
Delta = Difference between Max and Min ($\wr$)
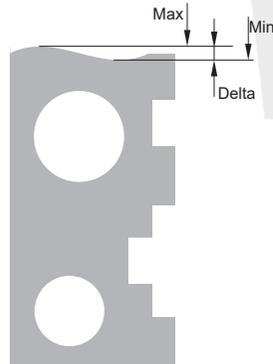
The measurements in mode Min, Max Delta have always to be done with the probe being in contact with the surface. It allows to determine the following values :
Min : Minimum value of the measured surface
Max : Maximum value of the measured surface
Delta : Difference between the maximum and minimum value

To select the Min, Max or Delta mode, press the key on the keyboard. By pressing the same key several times, the required mode will be displayed. To quit this mode, press the **Function key**.

Min   Max   Delta
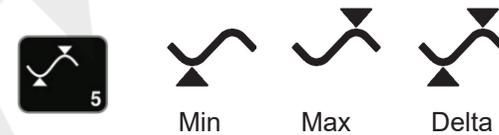
Note:
The upper line of the display shows the current position, the lower line shows the extreme position of Min, respectively Max or Delta reached.

4.8.1 Measuring in Min or Max mode

◆ Select Min or Max function. The corresponding indicator shows the activated mode.
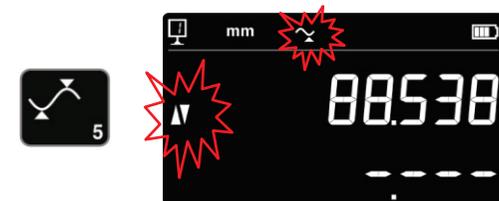
◆ Probe the surface to be measured and displace theinsert or the piece along the part to be analysed. The1st line on the display shows the instantaneous positionof the probe. The 2nd line indicates the minimum,respectively maximum value reached.
Note :
A zero setting or a preset reinitialize the display on theminimum or maximum value measured.

Min

Max
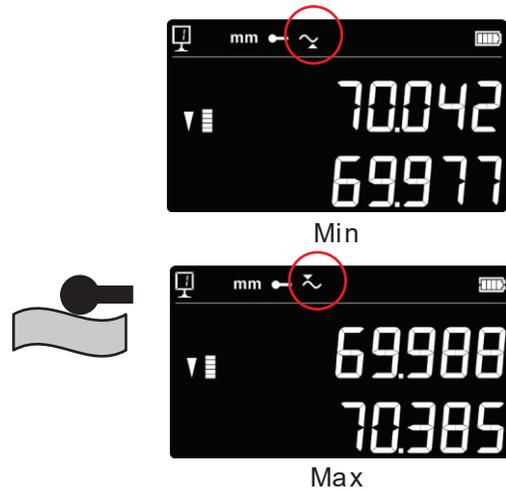
4.8.2 Measuring in Delta mode

◆ Select Delta function. The corresponding indicatorshows the activated mode.

◆ Probe the surface to be measured and displace theinsert or the piece along the part to be analysed. The1st line on the display shows the instantaneous position of the probe. The 2nd line indicates thedifference between the maximum and minimum (=Delta) measured.
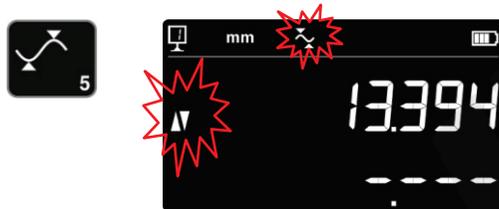Note :By pressing the **Zero** key, the Delta mode will be resetand the display will show zero.

Delta

4.9 Average between 2 last measurements

By pressing this key, the average between the 2 last height measurements, centerline, Min or Max is determined. These various measurements can be combined with each other.

Averages :
M1 = Between 2 centerlines
M2 = Between 2 heights
M3 = Between Min et Max
M12 = Between centreline and height
M13 = Between centreline and Min or Max
M23 = Between height and Min or Max

Note:
It is possible, after calculation of an average value, to give the calculated position a zero value or Preset value.
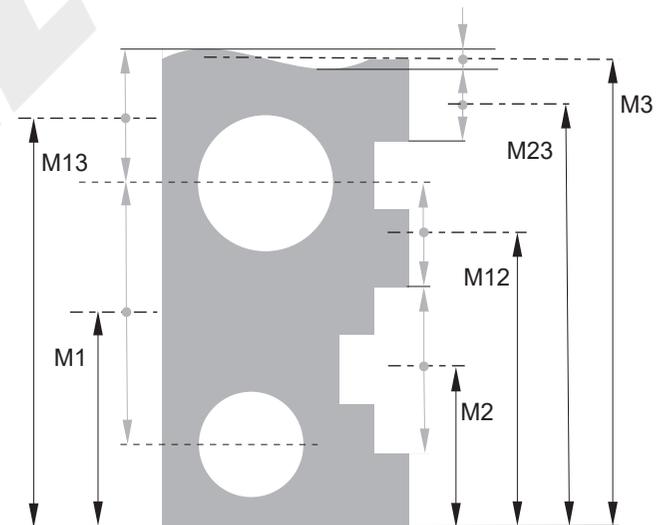
4.10 Difference between 2 last measurements

By pressing the difference key, the distance between the 2 last height measurements, centerline, Min or Max is determined and mentioned on the 2nd line of the display. These various measurements can be combined with each other.

Distances:
D1 = Between 2 centerlines
D2 = Between 2 heights
D3 = Between 2 values Min-Min, Min-Max or Max-Max
D12 = Between centreline and height
D13 = Between centreline and Min or Max
D23 = Between height and Min or Max
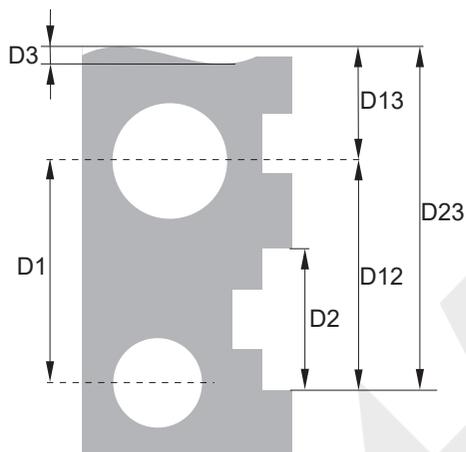
4.11 Zero setting of the display

In height measuring mode a zero setting will be done on the last surface measured by pressing the zero setting key.
In diameter / centerline mode a zero setting will be done on the last centerline distance measured.
In Min or Max mode a zero setting will be done on the last Min or Max value measured.

By pressing the key longer than 2 seconds, the preset value of the current reference will be displayed, disregarding the last probing step.

> 2 s

5. SECONDARY FUNCTION

5.1 Perpendicularity measurement

The carriage must be blocked before every perpendicularity measurement.

5.1.1 With a lever indicator

◆ Mount a lever indicator in the insert holder.

◆ Lightly press the lever of the indicator against the faceto be measured and adjust zero.

◆ Displace the carriage of the instrument vertically in order to check the perpendicularity of the face.

⚠️ The base of the instrument must be perfectly parallel to the face to be measured in order to ensure an optimal precision .
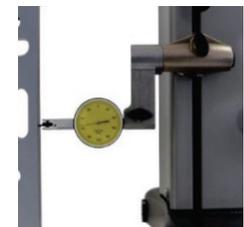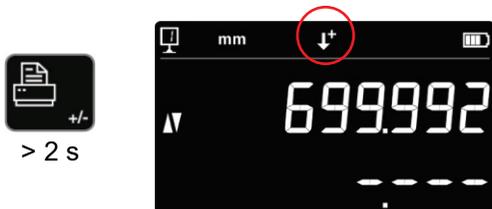
5.2 Inversion of the measuring direction

It is possible to invert the measuring direction to obtain positive measuring values in both directions (upwards and downwards starting at zero). This function is mainly used when the part to be measured is higher than the measuring range of the instrument. Press +/- key during 2 seconds to revert the direction of measurement. The inversion indicator of the measurement direction is mentioned as long as this mode remains active.

> 2 s

699.992

Preset

Immediately after having inverted the measuring direction, the preset value of the active reference will be replaced by the last measured value (height or centerline) before the inversion.

By pressing the **Preset** key, this last value will be displayed. Afterwards, the Preset value will be the initially entered one.

Procedure:
1). Perform measurements in a normal way
2). Turn the part when having reached the limit of the instrument range
3). Invert the measuring direction
4). Probe the last surface or centerline measured before
5). Press the Preset key (the last measured value will be displayed)
6). Continue measuring

> 2 s

Quit

Quit the function of inversion of the measuring direction by pressing once again the +/- key during 2 seconds

> 2 s

5.3 Prove Holder Change

This function allows to pass from one probe holder to another while keeping the same origin. Press the key opposite during 2 seconds to activate the probe holder change function

Procedure to follow
1). Before taking out the insert probe a reference surface of centerline and activate the probe holder change mode. The function symbol is blinking.
2). Mount the probe on the other probe holder.
3). Probe the same surface again, or reference centerline.
4). Press Preset key (the display mentions the latest measured value.

> 2 s

1008.011
904.500
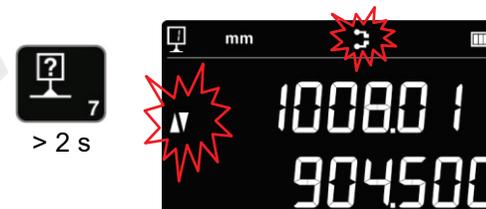
This procedure can be interrupted at any time by pressing the Validate key.

5.4 Shrinking factor

A shrinking factor can be entered here, for example for measuring injection moulds. This function allows in general "distending" or "shrinking" the measuring system by a defined factor.
To activate this function, press the key, shown at the right, during 2 seconds. Enter the shrinking factor (value between 0.7 and 1.2) and confirm by pressing Validation Key.

> 2 s

FACTOR
1.000

When the shrinking factor is different from 1, the following symbol appears at the top of the main display.

5.5 Display modes

In height measuring mode, 2 ways are possible to display the measured value :

"Standard" display
The upper line of the display permanently indicates the current position of the probe. It remains frozen at the measured value during probing.
During probing the lower line indicates the distance from the former height (Dimension in chain).
When the measuring force is released, this value is replaced by that of the last measurement.

"Direct" display
The upper line of the display permanently indicates the current position of the probe. It does not remain frozen during probing.
The lower line indicates the frozen value of the last measurement.
Activate the "direct" display mode by pressing the key opposite during 2 seconds. Do the same to deactivate this mode. When the "direct" display mode is activated, the symbol opposite appears at the top of the principal display.


> 2 s

Note: The "standard" and "direct" display modes only apply to height measurements.

5.6 Manual recording of the probe constant

The probe constant can be introduced manually. To do so, press the opposite function key during 2 seconds and enter the requested value with the numeric keypad. Confirm by pressing the **Function** key.
The registered value is taken into account during measurements. Each new constant acquisition replaces the old one.

> 2 s
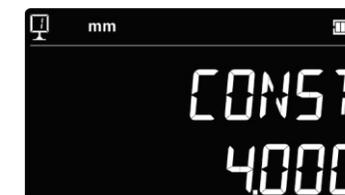
The constant is an essential element during bidirectional measurements. Great caution should be applied for the interpretation of the measurements results when this value is entered manually.

6. DATA TRANSFER AND PRINT-OUT

The instrument offers 2 communication ports:

Mini USB
This connector is placed at the back of the display unit. It allows a very simple connection to a PC for the transmission of data, upgrades, diagnosis, etc.

RS232
This connector is placed at the back of the height gauge. It allows a classic connection with external devices equipped with RS232 interfaces, such as printer or PC.

Measured values will be transferred in identical and simultaneous manner to both ports.

6.1 USB Connection

A mini-USB cable is required for the connection to a PC, as well as the communication software DataTransfer.

Cable: USB A-Mini B

Data transfer procedure:
1).Start DataTransfer software
2).Connect the instrument to the PC with cable and wait for the connection to be established
3).Click on the application to which the data has to be transferred (i.e. Microsoft Excel)
4).Press **data transfer** key: the value is displayed at the place having the focus. Data can also be automatically transferred after each probing (§7).
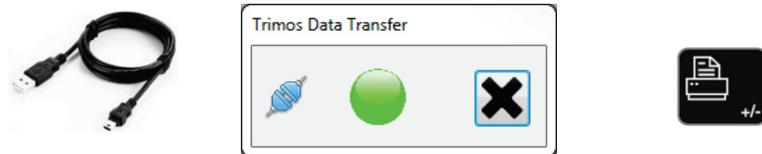
Format:
Numerical value (as on display) in ASCII characters.
In diameter / centerline mode both values are separated by LF (Line Feed).

7.2 Rs232 Connection

Data transmission:
– Speed :   4800 baud
– ASCII Code :   7 bits
– Parity :   even
– Stop bits :   2
– Handshake :   without

Connection to printer
Thermal printer, includes RS232 cable, charging unit and support.

Connection to PC
PC, includes RS232 cable, charging unit and support.

Data transfer
The data transfer is made by pressing the **Data Transfer** key.

Format
Numerical value (as on display) in ASCII characters.
In diameter / centerline mode both values are separated by EOT (End Of Transmission).

7. CONFIGURATION

Various parameters of the instrument can be configured, Press the **Validation** key during 2 seconds to enter set-up menu

A simple pressure on **Validation** key validates the choice and allows passing on to the next menu.

Quitting the set-up mode is automatically made after passing the last menu. It is however possible to quit at any moment by pressing the **Validation** key during 2 seconds.

> 2 s

◆ **Measuring force adjustment**
The measuring force can be electronically adjusted from 0.75 N to 1.5 N. To adjust, press the keys opposite.

◆ **Control of probe weight balancing**
This function allows adjusting the balancing of the probe weight.

a) Start-up display

b) As soon as a movement of the carriage is detected, a numeric value corresponding to the position of the double carriage is displayed.

c) The carriage is considered as balanced when OK is displayed in neutral position. The balancing procedure is described in § 8.3.

◆ **Number of references definiton**

The number of references available for the user can be defined (1 ~9). To do so, press keys opposite.

◆ **Port RS232**

The RS232 port can be configured in 2 ways :
–PRINTER: Data transfer to printer or PC
–OPTO RS: Communication according to Opto RS standard
Press the keys opposite to select the requested functions.

◆ **Data transfer mode**

The transfer of measured values can be configured according to 2 modes :
–MANUAL: The transfer of the measured value is simply carried out by pressing the data transfer button.
–AUTO: The measured value is automatically transferred after each probing.
Press opposite button to select requested mode.

◆ **Unit blocking**

The active unit can be blocked. Therefore it will not be possible to change it in work mode.
To block the function, select "LOCK" with the help of the keys opposite. To release it, select "UNLOCK".

◆ Size of reference gauge

If the measuring insert calibration has to be made with another reference gauge than that delivered with the instrument, the height of the gauge can be entered with the help of the numeric keypad.

◆ **Standby mode**

The instrument can switch to standby mode after a predefined time (5 ~ 120 min).
To define time before standby, press keys opposite. "OFF" means that the instrument will never switch to standby mode.

```
mm                    ▥
      STANDBY
               OFF
```

◆ **Acoustic signal level**

The acoustic signal level can be adjusted with the keys opposite.

```
mm                    ▥
      BUZZER
               MAX
```

◆ **Function after start-up**

The function immediately available after starting-up of the instrument can be selected with the keys opposite.
–CONST: Constant (by default)
–SUR: Height mode
–DIA: Diameter-centerline mode
–DELTA: Delta mode
–MAX: Max mode
–MIN: Min mode

```
mm                    ▥
      START-UP
               CONST
```

◆ **Serial number**

```
mm                    ▥
             S/N
       11128803
```

◆ **Firmware version**

```
mm                    ▥
             REV
            V 3.22
```

8. APPLICATION AND ADJUSTMENTS

8.1 Probing

The measurement precision is directly linked to the quality of contact between the probe and the part to be measured (→ probing). The instrument offers all tools allowing an optimal probing:

Probing indicator
Situated on the left of the measured value, it views the probing zone (1).
If the probing zone has been passed, the display shows-.- - -and an acoustic signal rings out as long as the indicator remains out of the probing zone.
Probing direction indicators Besides the acoustic signal, the measurement is visually confirmed by the indicators of the probing direction (2) and by the probing symbol (3).

```
                 3
mm    ◀──             ▥
  ▼▤
          80.007
  │
         28.996
```
2 (points to ▼▤)
1 (points to the indicator)
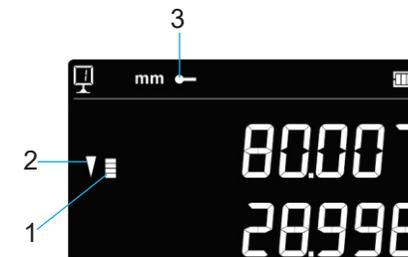
Acoustic signal
An acoustic signal confirms a correct measurement probing movement (measuring force set) and that the value has been taken.

♪
Acoustic signal

8.2 Replacement of battery block

When the instrument autonomy is not sufficient anymore, the
battery block must be replaced :
1).Get a battery block from us.
2).Open the lid at the back of the display.
3).Remove the old battery block and replace it by the new one
(pay attention to the connector polarity).
4).Close the lid tightly.
5).Load the new batteries.

8.3 Resetting of the instrument

In case of blocking, it is possible to force the resetting of the
electronics. To do so, open the lid at the back of the display and
press the **Reset button** (1) with the tip of a pencil.

1 ——

Code	DHG-C420
Measuring range	406mm
Accuracy	8μm
Repeatability	3μm
Max.resolution	0.001mm
Measuring force	fixed
Data output	USB / RS232
Weight	21kg
Weight of measuring insert	25 ± 5g
Environment requirements	temperature: 10~40°C relative humidity: 5~75%(without condensation)