

M1 / M3

Display units for 1 or 2 air gages



User's manual

Firmware 3.3

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2. FOREWORDS

ONE YEAR LIMITED GUARANTEE

MANUFACTURER'S RESPONSIBILITY

SPARE PARTS AND LABOUR.

The manufacturer commits himself to pay for repair or replacement costs (labour costs included) during a period of one year as from the date the guarantee came into force. The spare parts can be new or renovated and are guaranteed until the end of the initial guarantee period.

FIRST END-USER COVERAGE.

This guarantee applies only to the first end-user of the product and is not assignable to any other subsequent purchaser or user.

RESTRICTIONS.

Any accessory or expansion item not included in the original factory packaging is not guaranteed.

The present guarantee does not cover: installation or repair costs, damages resulting from circumstances beyond the manufacturer's control like damages following acts of God, misuse, or careless mistake from the user, damages during the transport or due to a wrong installation, use or application, such as any material damage caused by the use of non-supplied products, components or accessories. It also does not cover products modified without any written approval from the manufacturer, including electrical or mechanical modification, removal of serial numbers or of the manufacturer's trademarks or of any other identification.

THE SOLE RECOURSE UNDER THIS GUARANTEE SHALL BE THE REPAIR OR THE REPLACEMENT OF DEFECTIVE PARTS AS INDICATED ABOVE. UNDER NO CIRCUMSTANCES THE MANUFACTURER CAN BE HELD LIABLE FOR INDIRECT OR SPECIAL DAMAGES OR FOR DAMAGES RESULTING FROM THE USE OF THE PRODUCT, INCLUDING ANY LOSS OF DATA, BUSINESS OR PROFIT, AND WHETHER THESE DAMAGES CAN BE FORESEEN OR NOT AND WHETHER THEY ARE BASED ON A GUARANTEE VIOLATION OR NOT.

THE PRESENT GUARANTEE REPLACES ANY OTHER EXPRESSED OR IMPLIED GUARANTEE INCLUDING BUT NOT LIMITED TO ANY GUARANTEE OF

MARKETING OR ADEQUACY FOR A PARTICULAR USE; AND ALL THESE GUARANTEES ARE EXPRESSLY EXCLUDED AND CANCELLED.

WARNING

The information contained in this booklet can be changed without notice.

The manufacturer makes no warranty whatsoever with respect to the warranties of commercial quality of this product or its suitability to a particular use.

The manufacturer is not responsible for mistakes that could be found in this handbook and also for direct or indirect damage resulting from the equipment, its performances and the use of this product.

It is the responsibility of the user to verify the calibration of the display before measuring and it is advised to check periodically the calibration and measurement performance.

CLEANING

Use a soft cotton cloth slightly soaked with an ethyl alcohol-based product.
DO NOT USE the following products: acetone, benzene, toluene and halogens hydrocarbons.



3. INTRODUCTION

3.1. PRODUCT PRESENTATION

The M1 and M3 display units allow making dimensional control using 1 or 2 air gages. Depending on the version it is possible to make simple measurement (with one air gage), or display 2 characteristics on the screen and can make static measurement or dynamic (Max, Min, Max-Min...)

The M1-M3 can be connected to a PC thanks to its RS232 or USB connection.

A footswitch can be connected in order to transfer measurements.

The M1 / M3 displays for air gages requires 2 (eventually 3) masters for calibration.

3.2. VERSIONS

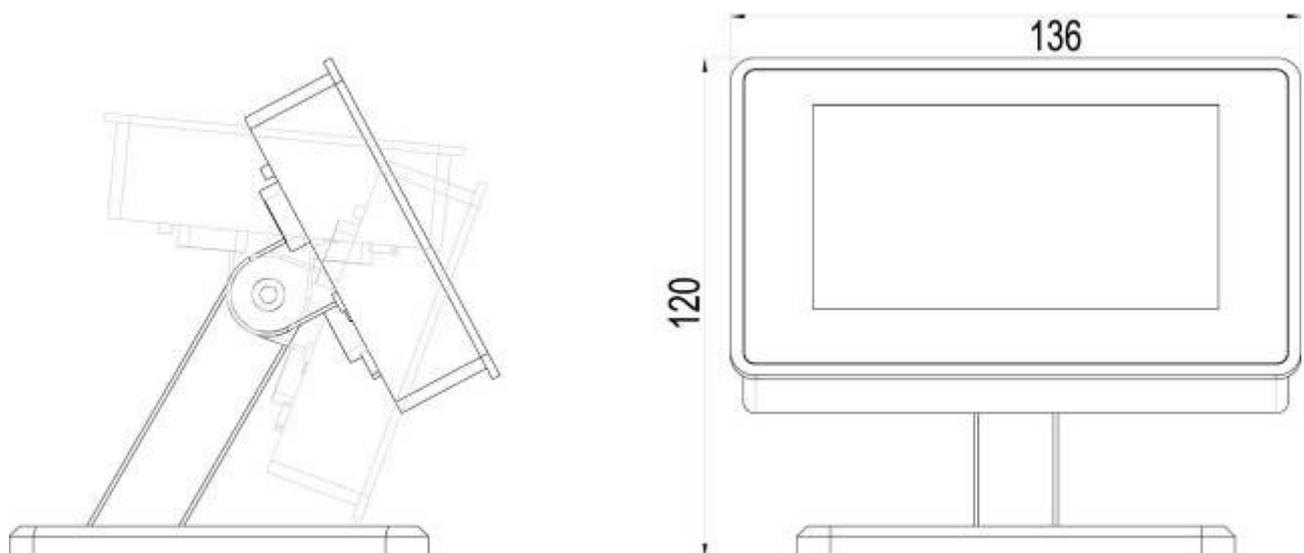
REF	Description
11040	Display unit M1 for 1 air gage
13040	Display unit M3 for 2 air gages or 1 air gage with 2 measuring levels

3.3. CHARACTERISTICS

3.3.1. Main technical characteristics

- TFT colour touch screen display 4,3", resolution 480x272.
- Static or dynamic measurements (Max, Min, Max-Min, Average, Median)
- Analogue or digital display
- 1 or 2 measurement configurations (2 characteristics)
- Possibility to automatically select the characteristic by using the air gage or by touching the screen.
- Relative or absolute display
- Display resolution (up to 0.1 μ m)
- Metric (mm or μ m) or Imperial (Inches) measurement
- RS232 port for communication with a PC
- USB port for communication and/or power supply
- USB Stick for data saving on a CSV file
- Optional connection of M-Bus modules
- Measurement transfer by pressing a key, footswitch input or retro-command on the RS232 port.
- Operating temperature: +15°C to +30°C
- Power supply from 85 to 265 VAC by using the supplied main transformer (or by connecting it directly on your PC USB port, or through the 24 VDC screw terminal.
- Relative humidity: maximum 80%
- Dimensions: width 130 mm, height 111 mm, depth 105 mm
- Mass: 600 grams (700g with the power supply)

3.3.2. Dimension and installation



The M3 is fitted with 4 thread M5 allowing to attach it. To access to these threads, it is necessary to remove the 4 antiskid plastic parts.



Remove the antiskid parts to attach it on the table or on a vertical panel

It is also possible to panel mount the display, with the accessory ref ACS-AFF-001. Be careful not to use longer screw than M4*16.



Pneumatic connections (see also chap.4) :





3.3.3. Contents of the packaging

The M1/3 package includes :

- 1 M1/3 display mounted on an orientable stand
- 1 USB cable, (length =1.8m) for power supply and/or data transfer
- 1 USB main adaptor for the display power supply. The M3 can also be powered by a computer when connected to it with the USB.

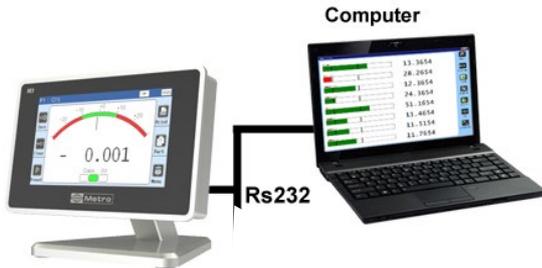
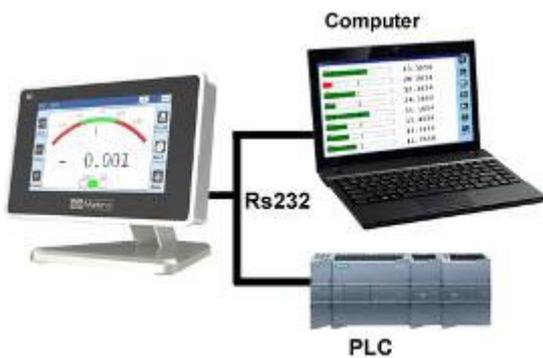
3.3.4. Accessories

Reference	Description	Picture
ACS-PNE-003	<p>Air preparation unit :</p> <p>It is mandatory to use a precision regulation system, otherwise the measurements will not be stable.</p> <p>We can supply the adapted air preparation unit from SMC, including stop valve, filter and regulator + precision regulator.</p> <p>The precision regulator must be adjusted at 3 BARS (0.3MPa)</p>	
ACS-PNE-004	<p>Air preparation unit with solenoid valve used with air gage. This regulator can be pilot with modules MB-RO</p>	
ACS-PNE-008	<p>For M3 displays.</p> <p>It allows to divide the 8mm tube at the output of the air preparation unit into 2 tubes of 6 mm adapted for the connection on the M3 input.</p>	

<p>ACS-PNE-006</p>	<p>Soft polyurethane tubes 6*4mm: The M1 / M3 are fitted with 2 connectors for air tube with 6mm external diameter and 4mm internal diameter. We advise to use soft polyurethane tubes from SMC, because their flexibility prevent the display to knock over due to the pressure of the tubes on the table.</p>	
<p>ACS-PNE-007</p>	<p>Soft polyurethane tubes 8*5mm: The air preparation unit is fitted with a connexion for 8mm tubes (external diameter)</p>	

3.3.5. Options / cables

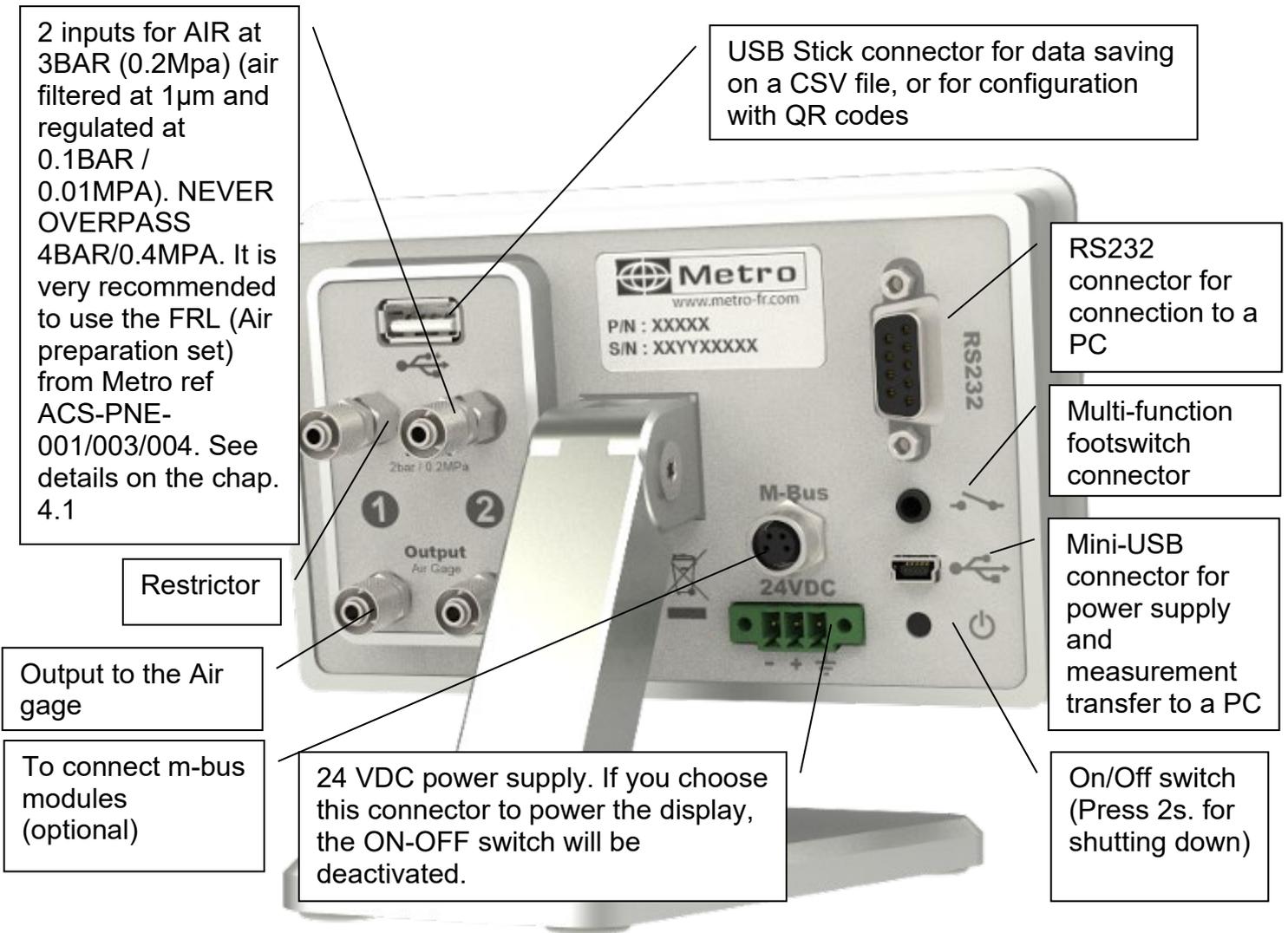
Reference	Description	Picture
18020	Footswitch : This footswitch with a robust construction can be configured in different ways: preset, measurement transmission, start dynamic measurement etc...	
18022	Handswitch This footswitch with a robust construction can be configured in different ways: preset, measurement transmission, start dynamic measurement etc...	
ACS-AFF-001	Accessory for panel mounting. To be installed instead of the stand. 	
MB-IO	This M-Bus module is fitted with 8 input/outputs isolated with optocouplers allowing to get additional functionalities, for example: output for Go/NoGo, input for preset or start dynamic measurement... The M-Bus modules are mounted on an aluminum profile allowing to mount them on a standard DIN rail. Up to 4 modules can be mounted	
MB-RL	The optional MB-RL module is fitted with 2 independent relays min and max, free of potential that indicate the position of the measure according to the part tolerances. The module is also fitted with 6 inputs allowing to remote control the display. This MB-RL module is wired exactly like the #24136 optional board for Monocote displays. It allows then to replace a Monocote by a M3 without changing the machine wiring.	

<p>MB-RO</p>	<p>The optional MB-RO module allows to pilot the air regulators in economy mode</p>	
<p>81213-1.5</p>	<p>M-Bus cable for M3 : This cable allows to connect the compatible M-Bus modules on a M3 display unit. Length 1.5m</p> 	
<p>18060</p>	<p>RS232 cable to update the Firmware</p> 	
<p>45160</p>	<p>RS232 cable This cable allows to connect a M1//M3 display to a computer or a PLC.</p> 	

<p>18193</p>	<p>This cable allows to connect a M1 /M3 display to a Multiplexer Mux from Metro, and to the DP1 printer from Mitutoyo</p> 	
<p>45173</p>	<p>RS232/USB cable converter: This cable allows a M1/M3 display to communicate with a computer. It creates a virtual COM port on the computer. The driver has to be downloaded from our web-site Metro www.metro-fr.com (support-dowload, password = metro)</p> 	
<p>ACS-AFF-002 + 45179</p>	<p>Tickets printer Allows to print the displayed value of the M1/M3 Requires cable ref 45179 to be connected to the M1 / M3</p>	
<p>ACS-AFF-003</p>	<p>QR code reader for Metro displays. 2 main functions: - Allow to send a configuration on the display (part definition, tolerance, display type, calibration of the air gage, etc...) - Send a Manufacturing order number. The export file will take the name of the number entered.</p>	

ACS-PNE-012	<p>Air cut-off footswitch Allows to simply cut off the air supply, for stopping the air flow when the air gage is not used.</p>	
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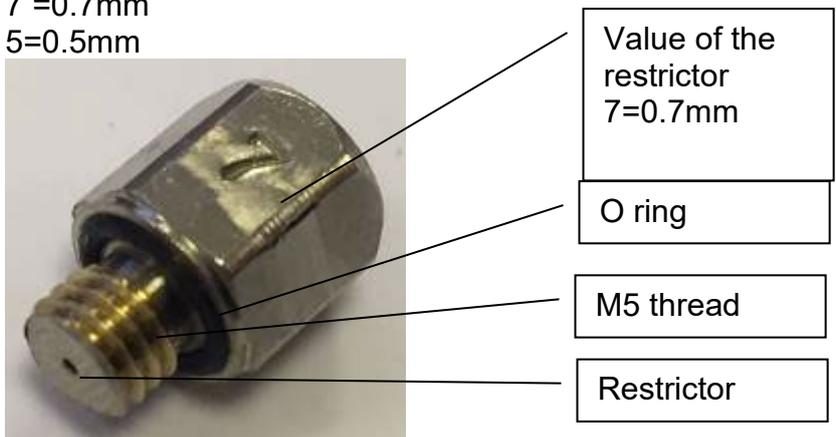
3.3.6. Connectors



3.3.7. Standard cabling – restrictor choice

The M1 or M3 are delivered with 1 or 2 restrictors of 0.5mm on the air input + 1 or 2 0.7mm restrictors as spare parts. The value of the restrictor is indicated as below:

7 = 0.7mm
5 = 0.5mm



The following table shows some frequent cases to define which restrictor will be the most adapted to your application. In order to get the best linearity, the most important is to get 2.7 BAR at the nominal (pressure indicated on the Setup menu, it is a relative pressure from the atmospheric pressure, while the 3 BAR at the output of the regulator is absolute)

If you order a turnkey solution at Metro, we will deliver the display with the adapted restrictor, or with an integrated restrictor (see chap 3.3.8). But if you want to use the M1 / M3 display together with your existing air gage, you will have to use the adapted restrictor by your own.

It is advised to contact Metro or one of its distributors for advice or confirmation around this subject.

Check this video for understanding the influence of the restrictor on the linearity :

[link to the video](#)



Or scan the QR code :



Nozzle diameter in mm	number of nozzles	total flow surface in mm ²	Restrictor
0,3	2	0,14	0,3
0,4	2	0,25	0,4
0,5	2	0,39	0,4
0,6	2	0,57	0,5
1	2	1,57	0,7
2,07	2	6,73	0,9
0,3	3	0,21	0,3
0,4	3	0,38	0,4
0,5	3	0,59	0,5
0,6	3	0,85	0,5
1	3	2,36	0,7
0,3	4	0,28	0,4
0,4	4	0,50	0,4
0,5	4	0,79	0,5
0,6	4	1,13	0,5
1	4	3,14	0,7

Example :



3.3.8. Cabling with by-pass nozzle (integrated restrictor)

Some air gages are delivered with a by-pass nozzle (or integrated restrictor). It means that the restrictor is integrated inside the air gage itself, and there is no need to install it on the display. **NO RESTRICTOR ON THE DISPLAY.**

This configuration allows to have a faster the reaction time and makes the installation easier by removing the need to choose the adapted restrictor.

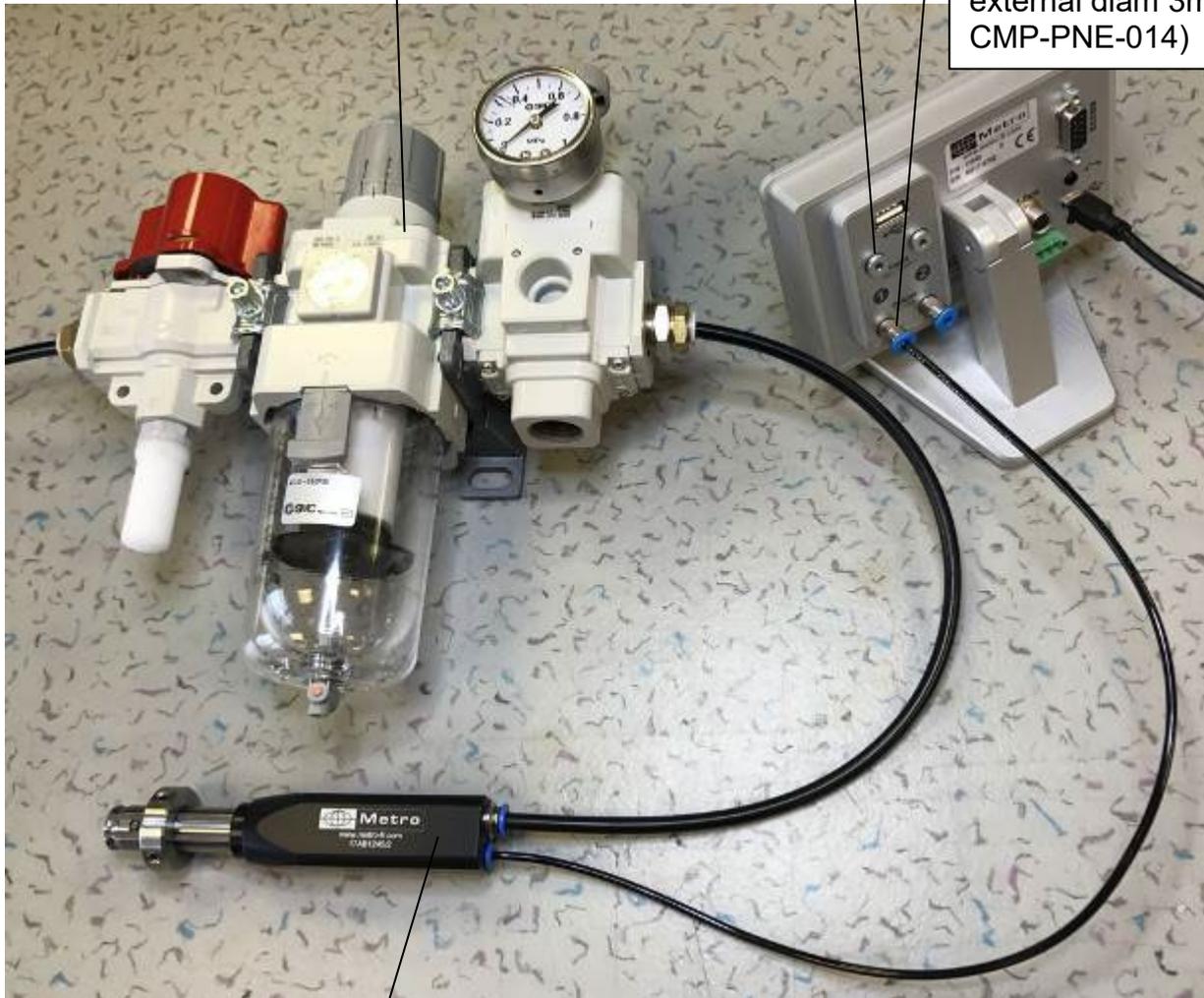
If you order a turnkey solution at Metro, it will generally be delivered according to this principle.

The cabling schema is the following:

Regulation unit
ref ACS-PNE-003 (delivers
3BAR/0.3MPa pressure)

Stopper ref CMP-PNE-018

Standard push-in
connector, M5 thread.
Generally, for tube
external diam 3mm (ref
CMP-PNE-014)



Air gage with by-pass nozzle
(integrated restrictor)

3.3.9. THE RS232 COMMUNICATION PORT

The M3 is fitted with a RS232 port. It allows linking the M1/M3 to PC or an external system. The configuration is as following

9600 bauds, 8 bits, 1 stop bit, no parity

CONNECTOR PINOUT

It is fitted with a SUBD 9 pins female connector.

<i>Pin</i>	<i>Signal</i>	<i>Direction</i>	<i>Description</i>
1			Not used
2	RX	Input	Reception of data
3	TX	Output	Transfer of data
4	IN1	Input	Do not use. Only for firmware update
5	Gnd	-	Ground
6			Not used
7	IN2	Input	Do not use. Only for firmware update
8 & 9			Not used

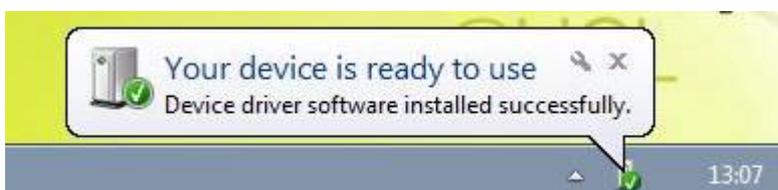
3.3.10. MINI-USB connector

The mini-USB connector has 2 functions

1. Power supply through a wall mounted transformer. This transformer supplies a regulated 5V/1A DC voltage.
2. Measurement transmission. If you connect your M3 to a PC, the PC will detect and install automatically the M3 as a standard USB keyboard with the standard drivers of your operating system (Windows, Mac OS etc..). When you will send the measurement, the value will be written on your PC screen where your cursor is, in the same way as it would have been typed with a keyboard.



Message that appears when the M1/M3 has been correctly installed:



3.3.11. The 24VDC connector

It is advised to use this power supply when the M3 is panel mounted.



Using this power supply instead of the mini-USB will deactivate the ON-OFF switch. Therefore, when the M3 is powered, it will start automatically.

3.3.12. The USB stick connector



This connector allows to connect USB sticks and USB bar code readers (see chapter 12). It is possible to connect both at the same time using a USB hub.

It is possible to save measurements on a CSV file.

In this case the display must be set the following way:

Configuration → Transfer → USB key

Then once the user either press on the « PRINT » button of the measuring screen or on the footswitch, one line will be added on the CSV file. (a « output.csv » file is created when the operator transfers the data for the first time).

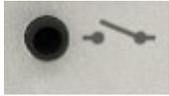
When the USB stick has been correctly detected, a USB logo will appear on top bar.

If the USB stick is not connected when the operator transfers the measurement, an error message will pop up.

USB sticks with partitions are not supported.

3.3.13. The footswitch connector

This connector is used to connect the Metro footswitch ref 18020.
This is a JACK MONO 3.5mm (dry contact)



The footswitch can then be used for several functions: please refer yourself to the chapter 7.4.1 for further information.

4. AIR PREPARATION UNIT – AIR PIPES

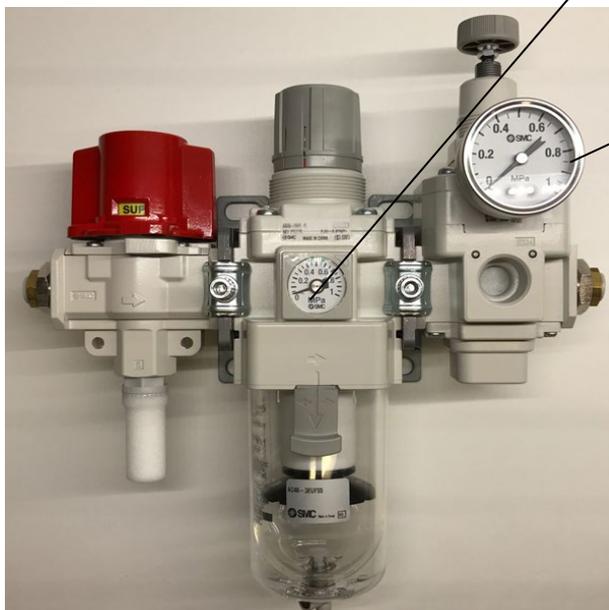
4.1. Air preparation unit

Air gaging is a measurement of pressure variation.

The variation of pressure must be due to the variation of distance between the gage and the part being measured. Therefore, it is mandatory to have a high stability air input, in order not to have variation of pressure due to air input variation.

Metro can supply several air preparation, already set.

ACS-PNE-003

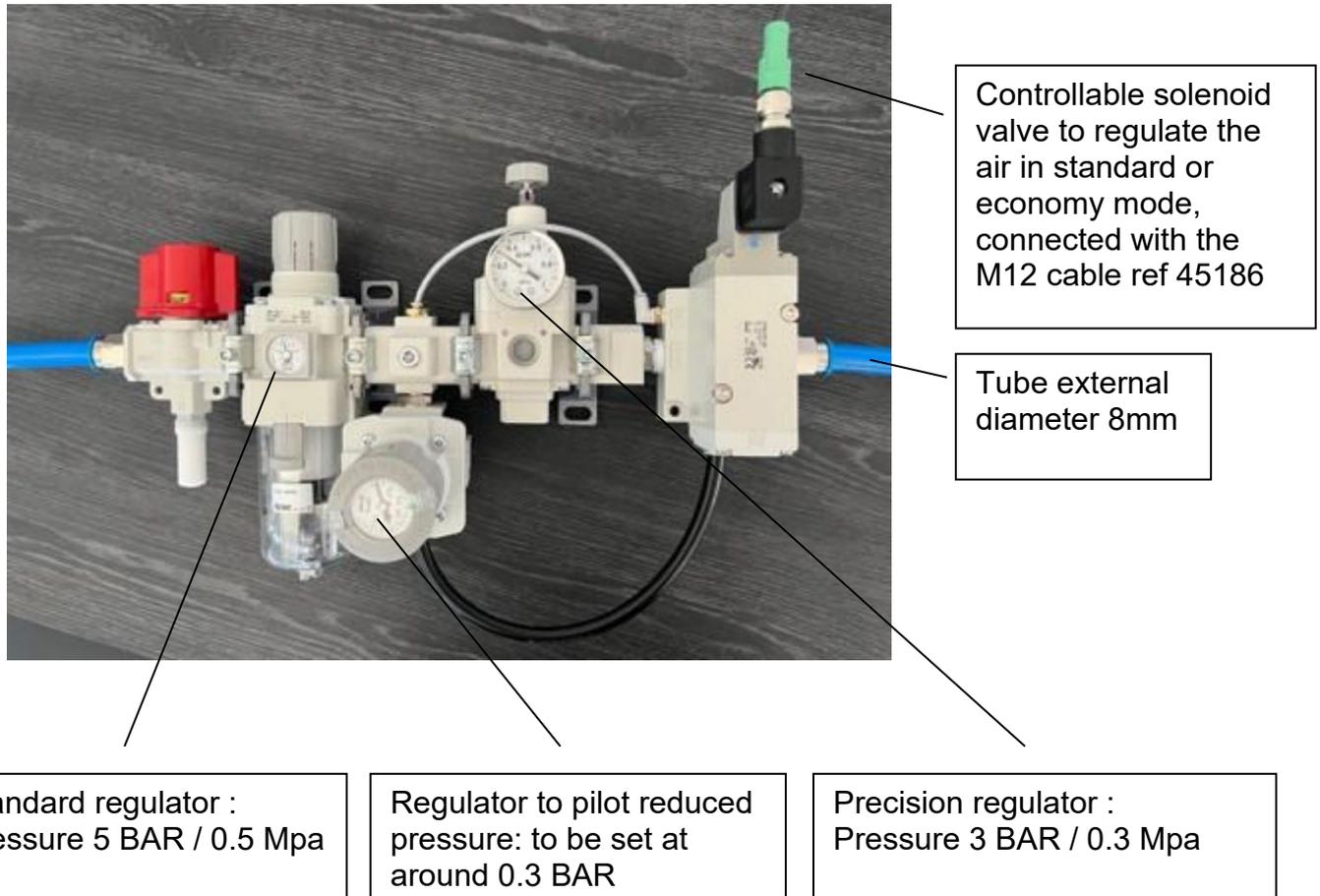


Standard regulator :
Pressure 5 BAR / 0.5 Mpa

Precision regulator :
Pressure = 3 BAR / 0.3 Mpa

1 push in connector for 8mm
ext. tubes

Reference : ACS-PNE-004



This air saving regulator can be controlled with the MB-RO module. It works either in standard or in “eco” mode, depending on the instruction given by the module.

The principle: Following a period without action (no pressure variation, no touch screen, etc.), the M1/M3 will send a command to the regulator which will switch to a much lower pressure (1 bar) to supply the air gage.

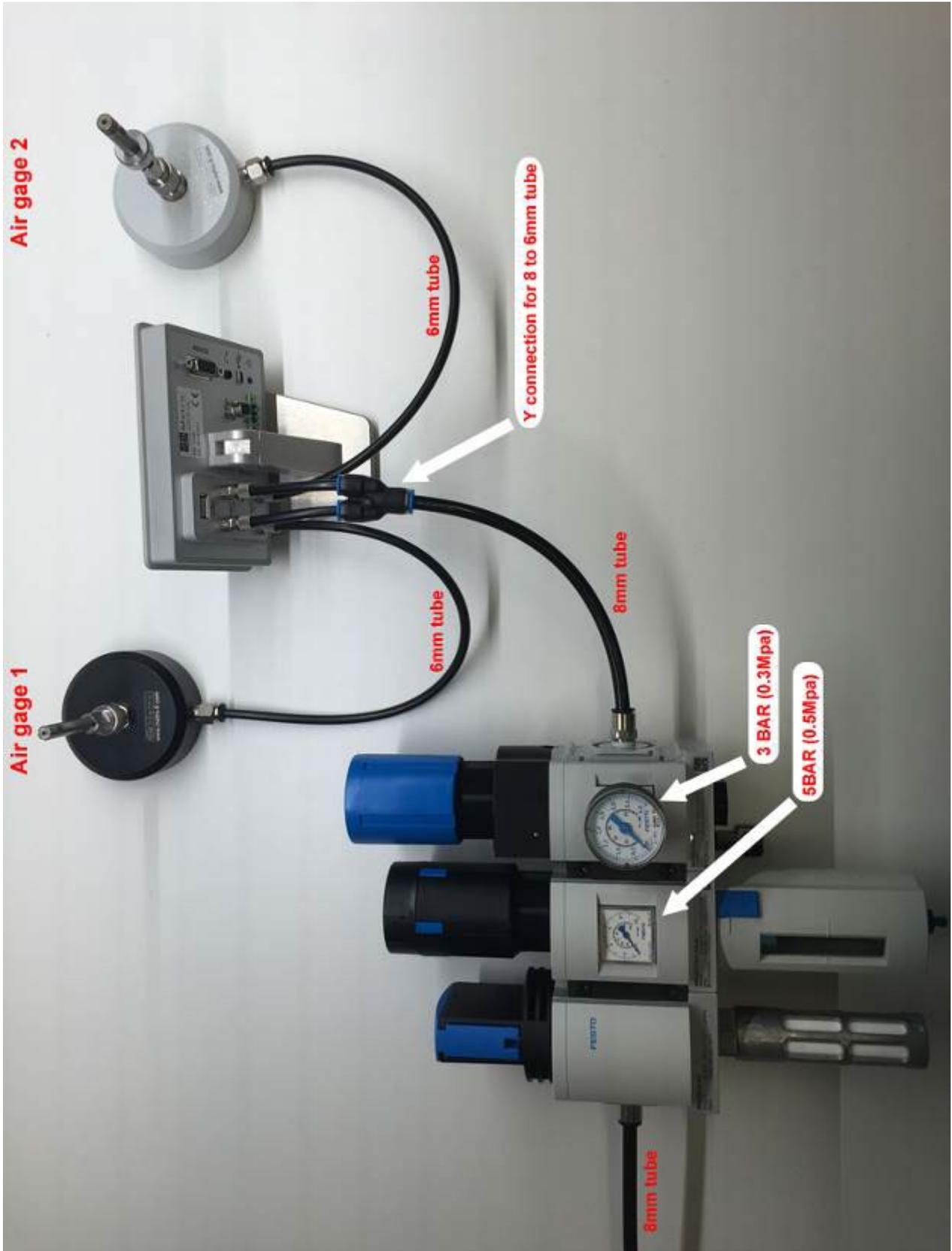
The objective is to maintain a constant +/- temperature on the air gage so as not to deteriorate the measurement and to reduce air consumption very significantly. When the operator places the piece back on the air gage or touches the M1/M3 screen, the regulator will return to 3BAR pressure for the measurement.

4.2. Air pipes

The M1/M3 are fitted with air connectors adapted to connected pipes with 6mm external diameter and 4mm internal diameter.

In the case of the M3, it is however recommended to use an 8mm ext. tube from the output of the air preparation unit to a Y connection/reduction to 6mm to the display.

We recommend using flexible pipes that prevent risk of fall or tilt over of the display due to the orientation of the pipes. See the following picture.



5. QUICK START

1 – Connect the air input to the air preparation unit ref Metro ACS-PNE-003. The air pressure should be at 3 BAR (0.3Mpa) and **never exceed 4 BAR (0.4MPA)**. It is advised to lock the pressure adjustment in order not to let someone change the pressure value after having calibrated the display.

2 – Connect your air gage on the output « OUTPUT – AIR GAGE »

3 – Power the M1/M3 either with the mini USB or with the 24VDC terminal.

4 – Turn on the M1/M3 by pressing the ON-OFF switch.

5 – Calibration of the device:

➔ To be done the first time, and can be done or verified again periodically (wear of the master or the gage)

➔ **The M1/M3 requires 2 masters for the calibration. The MIN and MAX masters should respectively correspond to the lower and upper tolerance limits of the measured part.**



A – From the « SETUP » icon, write the master values according to your calibration certificate. The display need 2 masters MIN and MAX to be used.

B – Place your MIN master in measuring position and press on the « calibration » button. The button becomes green for a couple of seconds.

C – Repeat the step B for the MAX master.

D – You can check by placing again the MIN master. The value on the « position » field must be at 0.0000, then by placing the MAX master, the « position » field must indicate the dimensional difference between the 2 masters.

6 – Configuration of the part to be measured. (From the Icon « definition »)

A – Use the scroll bar to reach the 2nd screen.

B – Write the value of MIN and MAX tolerances (that should correspond to your MIN and MAX masters). The tolerance must be written relative from the nominal value. For example, if your part has a nominal diameter of 10mm +/-0.005, you must write in the Upper tolerance 0.005 and lower tolerance -0.005, and in the nominal field: 10.

It is then advised to use the MAX master in the case of external diameter measurement, and to use the MIN master in the case of internal diameter measurement (in order to have fewer positioning problems). So you need to fill the « Master » field with the adapted value.

C – Close the window and come back to the measuring screen by pressing the « measure » icon.

7 – Preset

A – Place your Min or MAX master according to what you have defined in 6-B.

B – Press on the « PRESET » button. The value must change to the master value.

You can now check with the 2 masters if the values are correct.

You are now ready to measure.

6. GRAPHICAL INTERFACE

The graphical interface of the M1/M3 has been designed to be easy to use and intuitive. This section gives you a preview of the different screens and commands available

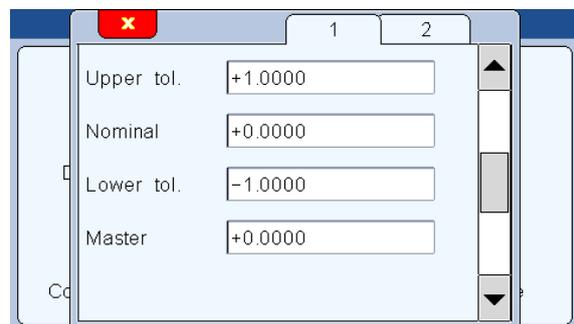
6.1. 2 MAIN PARTS

The graphical interface of your M3 is divided in 2 main parts:

1. A part that allows configuring the device and the measure. It consists of an icon desktop with windows.



Icon desktop



Icon desktop with configuration windows

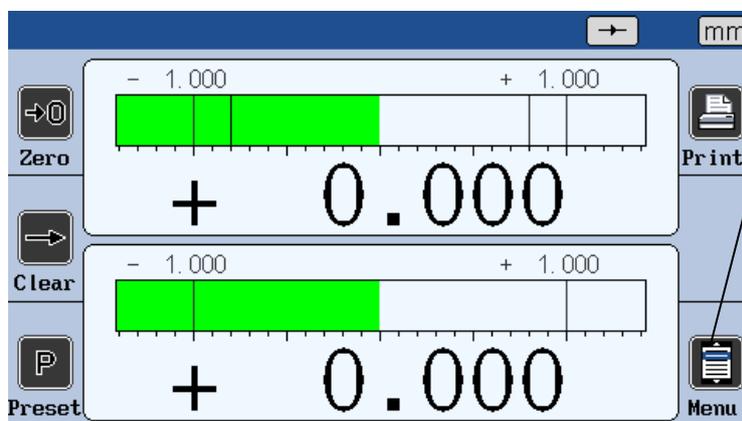


The second part (measuring screen) can be reached by pressing the button

2. This part allows to see the measurement result and to use them. The M3 starts on this screen. For reaching the configuration screens, press on the



button

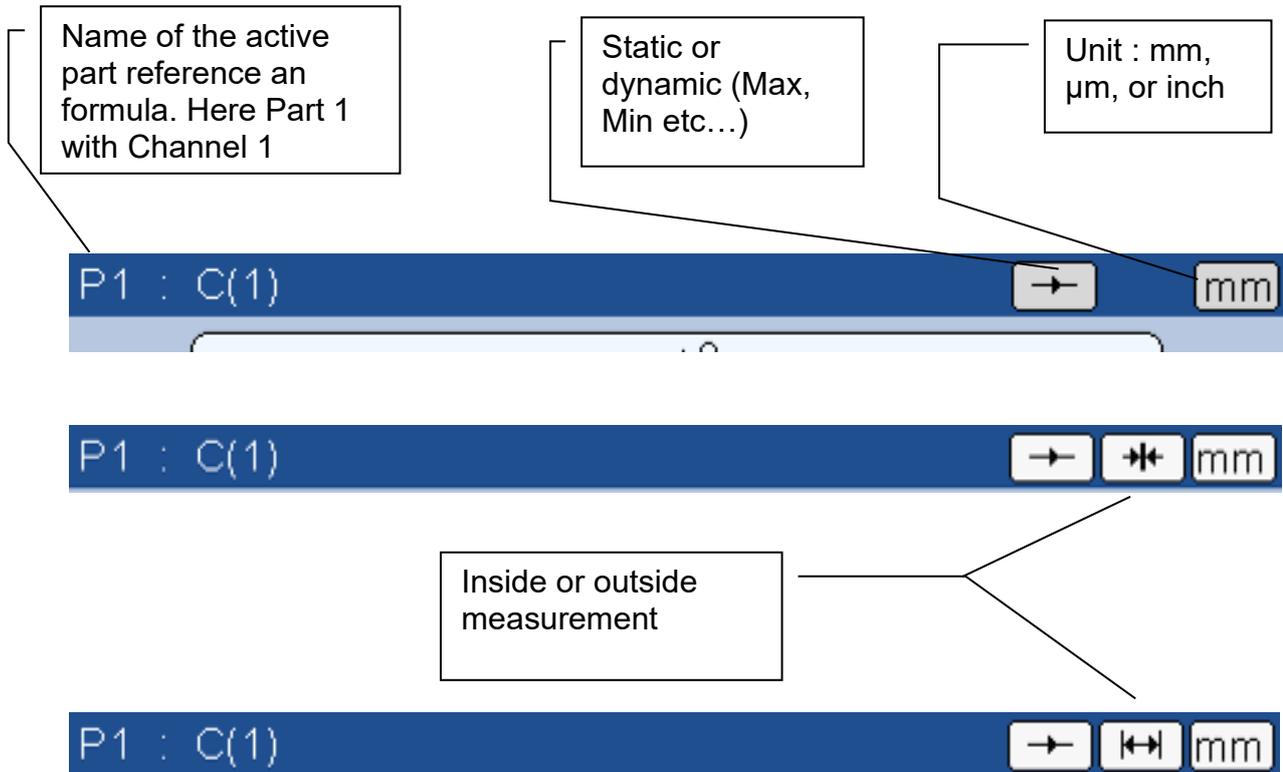


Example of measuring screen

Press on this icon to reach the main icon desktop for configuring your device

6.2. GENERALITIES

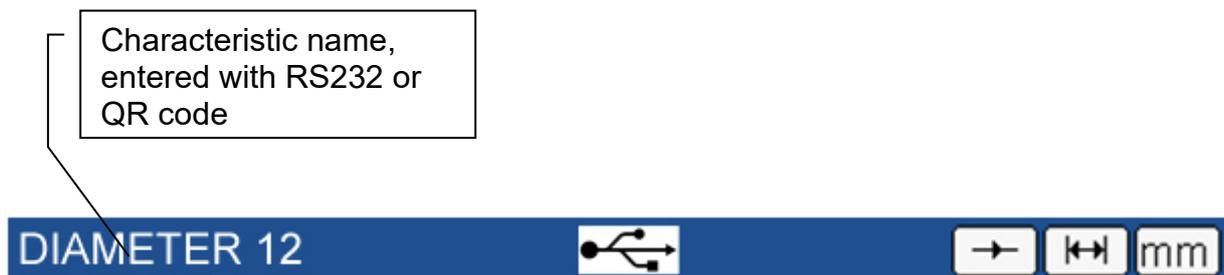
The following information can be seen of the upper part of the screen.



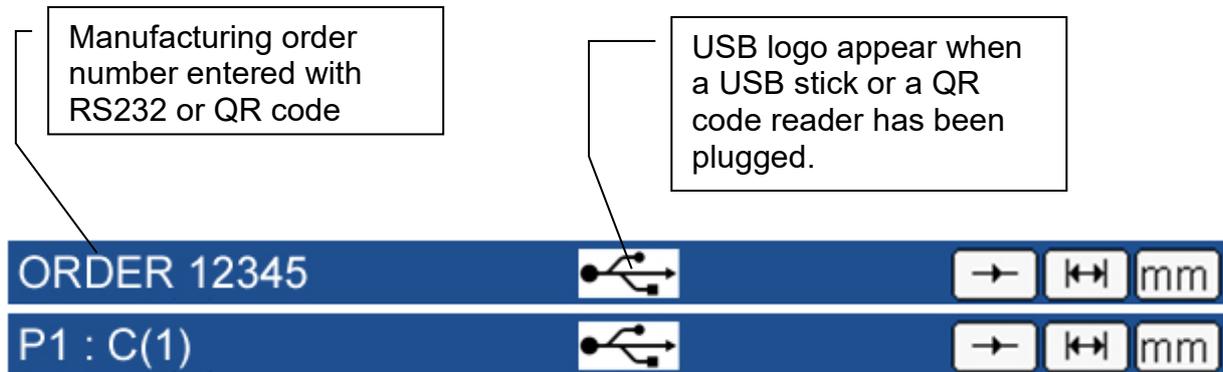
Advanced functions:

It is possible to enter a characteristic name, either with an RS232 command, or by scanning a QR code.

After this, the characteristic name is written instead of P1 : C(1).



In the same way it is also possible to input a manufacturer order either with an RS232 command, or by scanning a QR code :

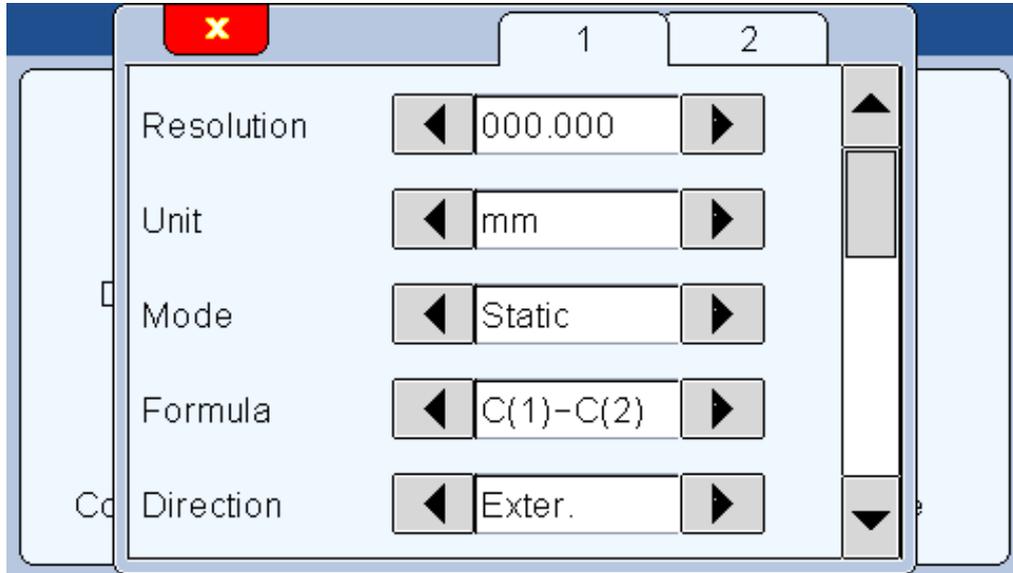


Note : When either a characteristic name or a manufacturing order name has been entered, only 1 information appear on the blue bar. However, the information display can be changed by touching the area :



6.3. CONFIGURATION WINDOWS

Configuration windows opens after pressing on the icons of the configuration screen



Example of configuration windows

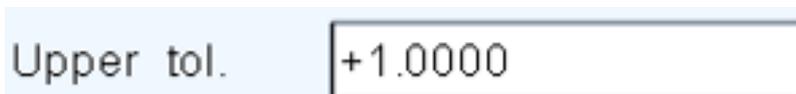
Data are typed by different ways and **are saved after validating while quitting the window.**

Here after are the different ways to input data:

- Multiple selection box. Press on the black arrows to change the pre-defined value.



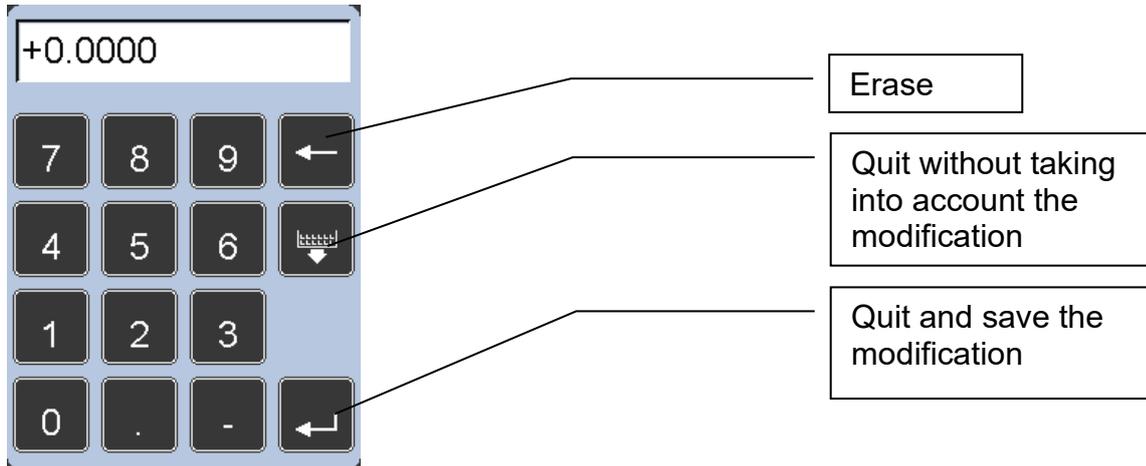
- Edit box. A virtual keyboard appears after clicking on the edit box.



- Closing a window: All the windows can be closed by clicking on the white cross on a red background on the top left corner on each window.



6.4. VIRTUAL KEYBOARD



7. CONFIGURATION OF THE DEVICE AND THE MEASURE

This section describes the different windows that are accessible from the icon desktop.

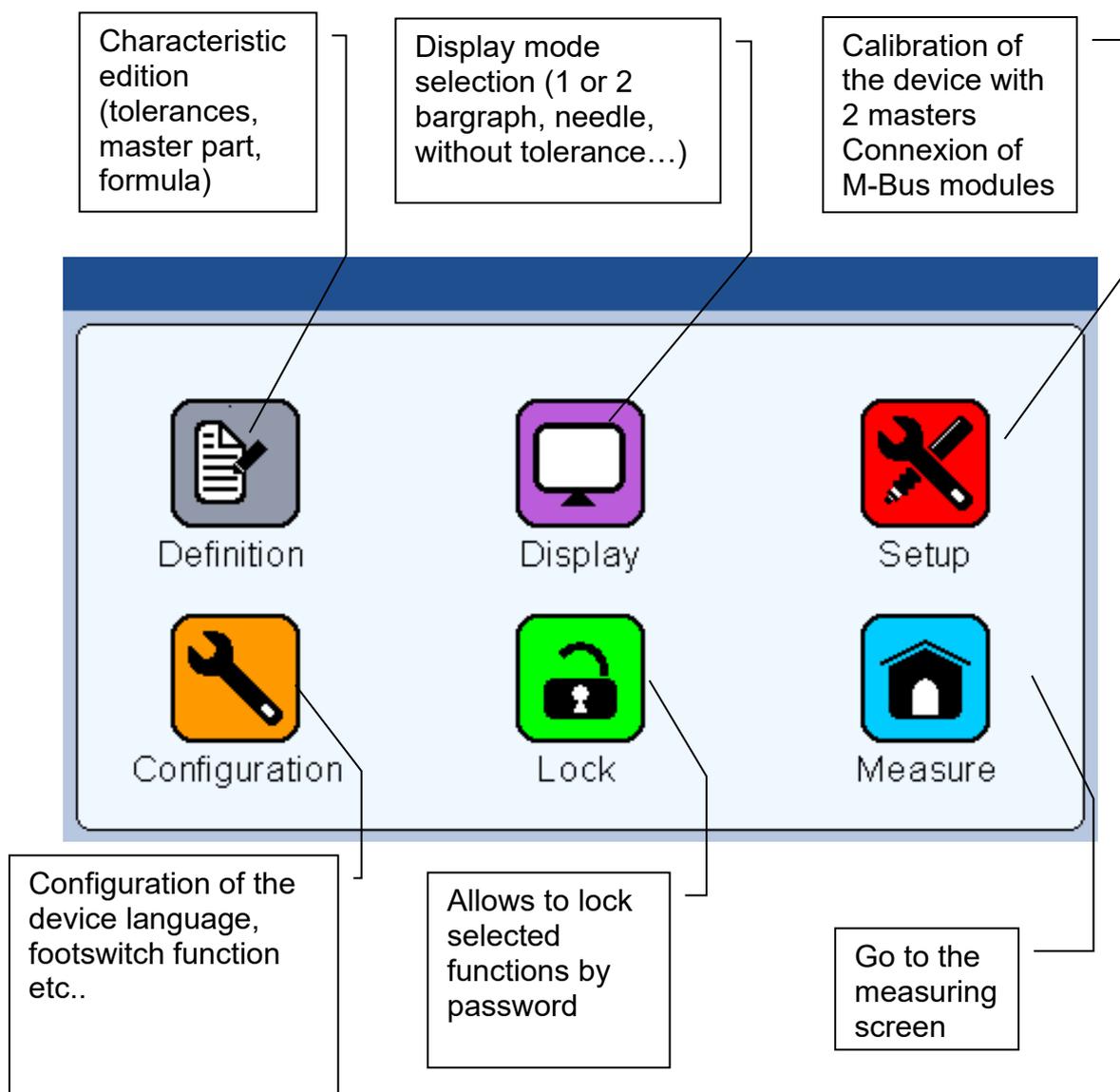
If you are on the measuring screen, you can reach the icon desktop by pressing on



the **Menu** button.

Your M3 can be entirely configured (language, communication etc...) from this window.

The measure (tolerances, characteristics etc...) is also configured from this window.



The 6 following sections describe the 6 icons of this screen.

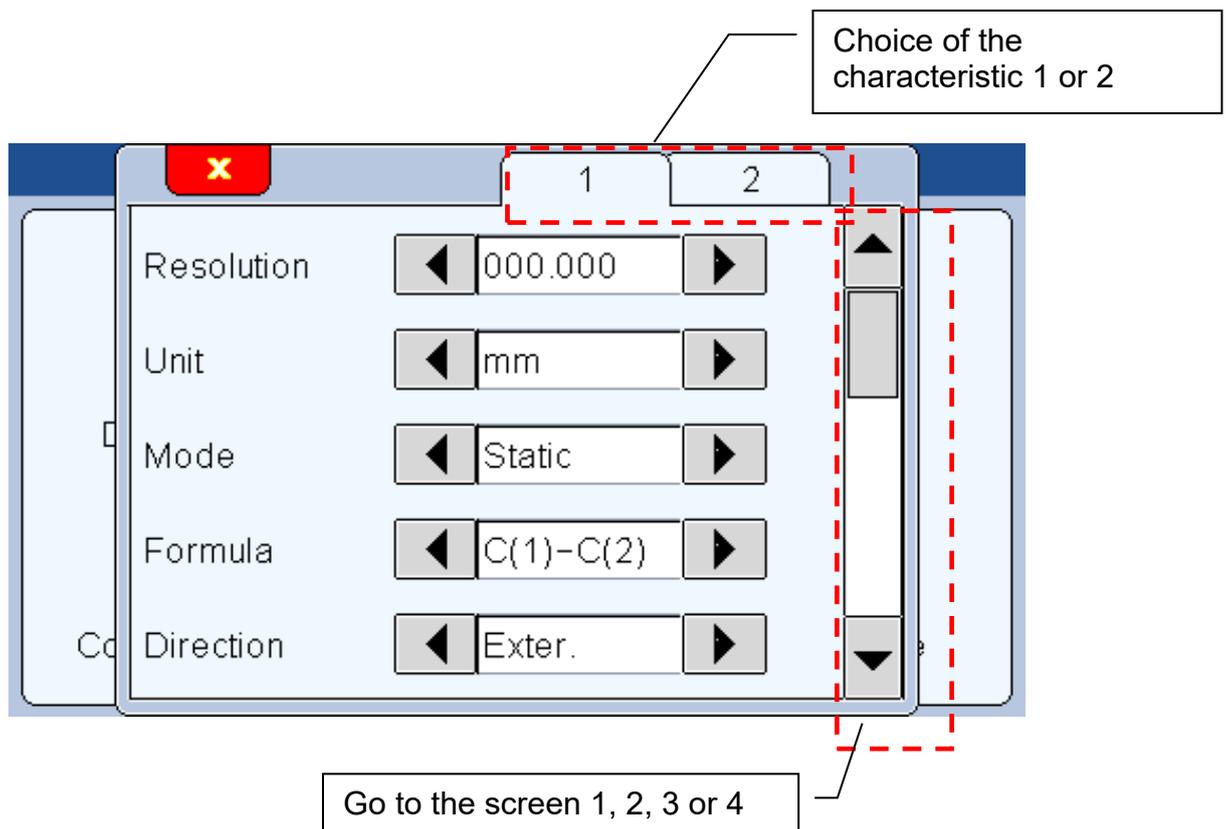
7.1. DEFINITION



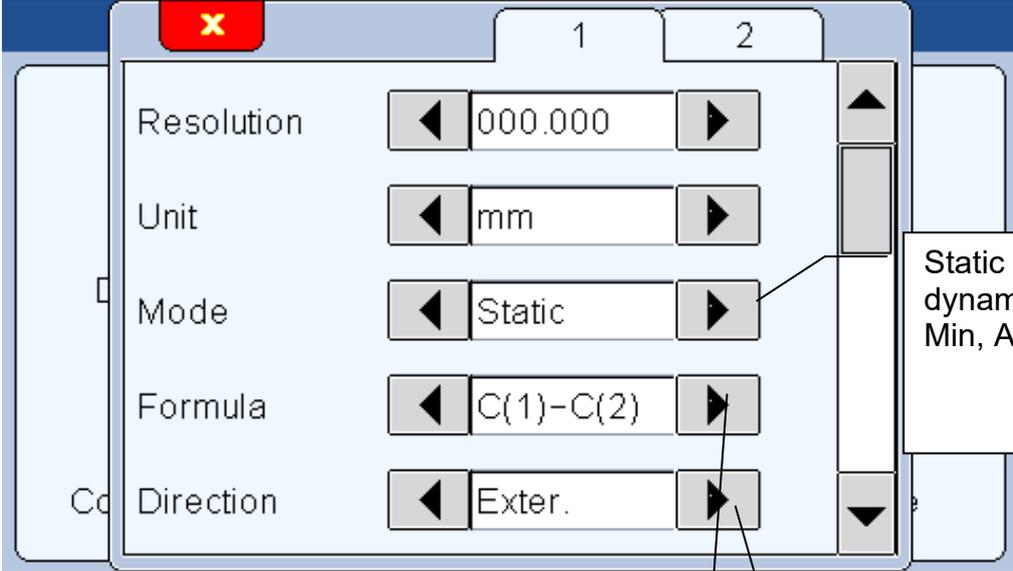
After pressing on this icon, the bellow window appears:

It gives the possibility to define the resolution, unit, formula, tolerances, master dimension, of each of the 2 available measurement configurations. The sorting of parts into classes is also configurable from this window.

→ This window is divided in 2 parts for the configuration of the 2 characteristics, and in 4 screens.



7.1.1. Part 1



The screenshot shows a software interface with a red 'X' button at the top left. Below it are two tabs labeled '1' and '2'. The main area contains five settings, each with a left and right arrow button:

- Resolution: 000.000
- Unit: mm
- Mode: Static
- Formula: C(1)-C(2)
- Direction: Exter.

Callout boxes provide additional information:

- Mode:** Static = direct reading or dynamic : Max, Min, Max-Min, Average or Median
- Direction:** For measuring internal or external diameters. It defines the indicators colour and gives information to the user if the part can be used again.

Choice of the calculation formula:

- C(1)
- C(2)
- C(1) + C(2)
- C(1) - C(2)
- - C(1)
- - C(2)
- - C(1) + C(2)
- - C(1) - C(2)
- Taper
- Half taper

A and B are the channel where the probe/air gage is connected.

Resolution

0000.000 = micron
000.0000 = 0.1 micron
00.00000 = 0.01 micron
Etc...

Unit

Distance

mm = Millimeters

in = Inches

um = Microns

Angles

deg = decimal degrees (automatic choice when the formula is set as Taper)

dms = Degrees / Minutes / Seconds

Mode

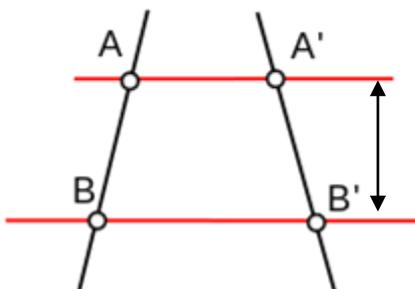
Static = direct reading: The display is refreshed together with the probe is moving.

Dynamic : The following mode starts after pressing on the “clear” button of the measuring screen. (or through a I/O or footswitch command)

- Max
- Min
- Max-Min
- Average
- Median = $(\max + \min) / 2$

Formula : taper, $\frac{1}{2}$ taper

This mode is used to calculate an angle of a taper.



To measure the angle, you require an air gage with 2 level. The distance between each diameter has to be entered on the parameters.

Resolution 0000.000

Unit deg

Mode Static

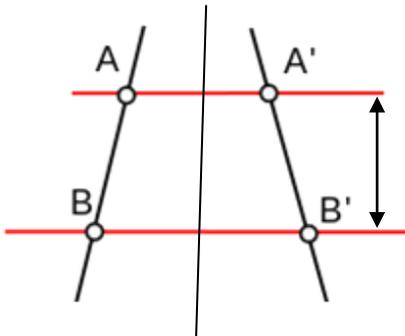
Formula Taper

Diameter dist. +0.000 mm

When the "taper mode" is used, the choice of the unit is limited to deg (decimal degrees) or DMS (degrees, minutes, seconds)

A new choice appears the distance between the 2 diameters must be written here.

The half taper formula, will give the value of half an angle of a taper



Direction

Direction: none

With this direction of measurement, any measure outside of the tolerance limits will appears in red. All the good measure will be in green.

P2 : C(2) mm

Zero

Clear

Preset

Part

Menu

1.403

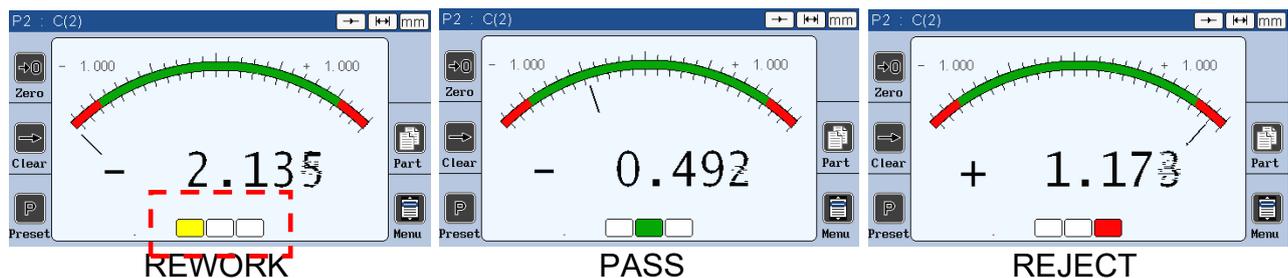
0.492

1.173

Direction: Internal diameter

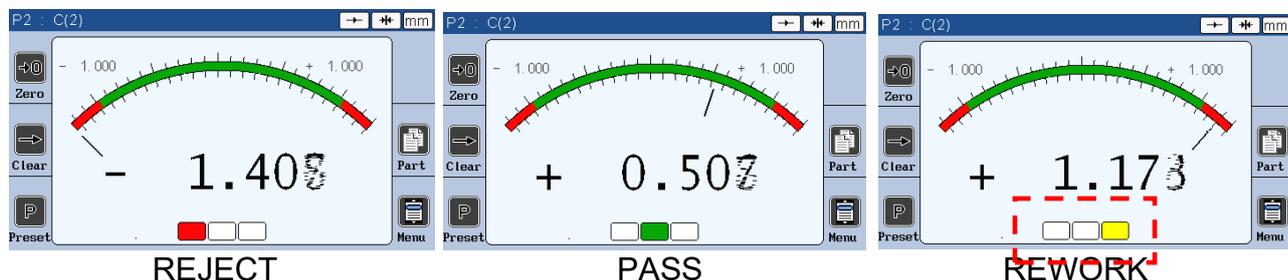
The direction of measurement is used to measure internal or external diameters. The difference between these two modes is that according to the part, the part might still be rework. For example, the size of a bore in a part: if the bore is too big, there is no way to rework the part, so the indicator is RED. However, if the bore is too small, it can still be increased, and then the part could fit in the tolerance interval, so the indicator is YELLOW. In this case, the internal diameter is used, as on the pictures below.

On the measuring screen, a yellow indicator shows when the part is too small (so possible to rework), and a red indicator if the part is too big (rejected)



Direction: External diameter

The opposite phenomena happens for the external diameter.



7.1.2. Part 2

This screen allows to input tolerances and the characteristics (nominal and master)
Just press on the corresponding edit box to input the needed values.

The tolerances are in relative from the nominal.

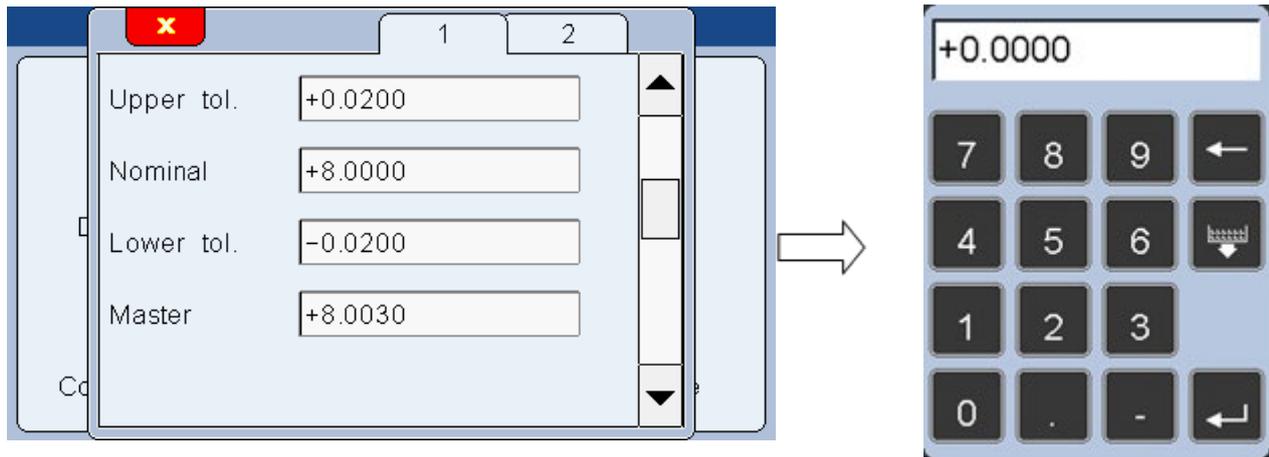
Example : diameter 8mm +/-20µm

→ upper tol : 0.020

→ nominal : 8

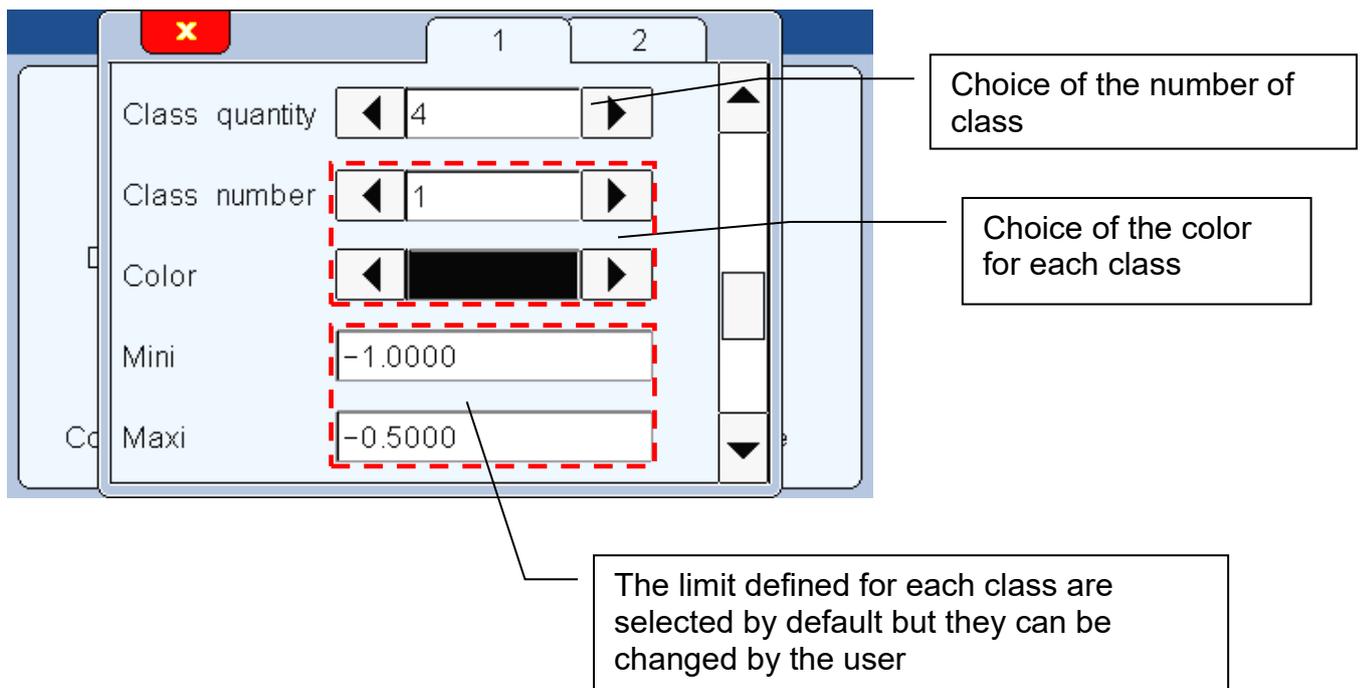
→ lower tol :-0.020

→ master : real value according to the calibration certificate, example 8.003

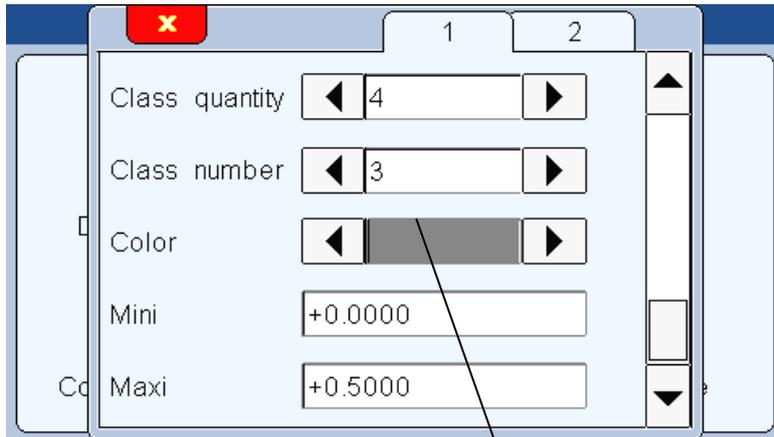


7.1.3. Part 3 - class

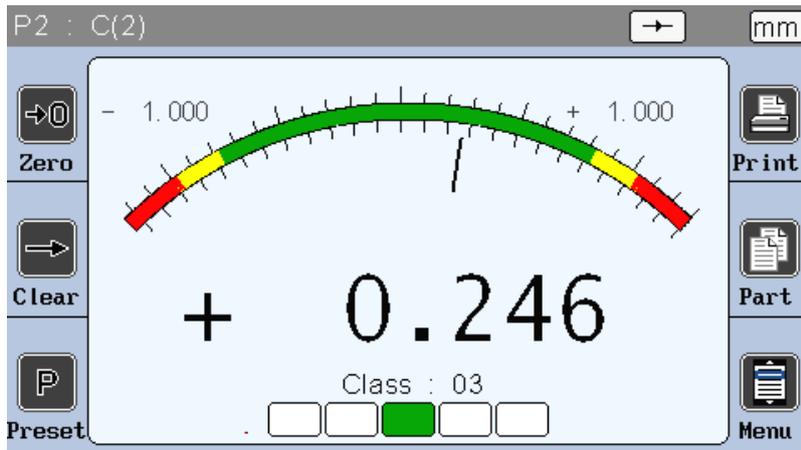
This screen allows to set up a sorting of the part according to their size. Up to 16 classes can be programmed.



The class has an important utility, because it allows the user to sort the parts according to their position in the tolerance interval. The top bar of the display, which is normally blue is grey on the picture bellow, because grey is the color which was defined for this interval of measurement.

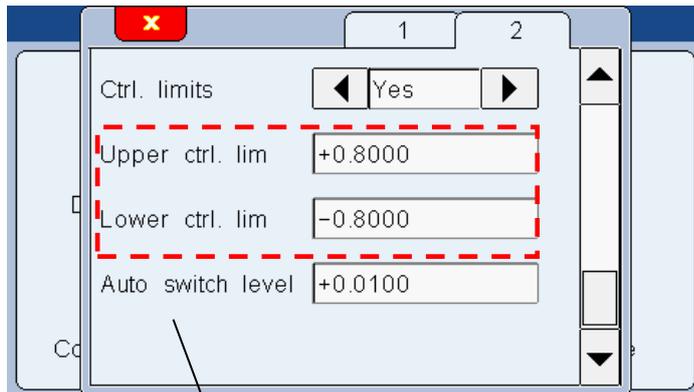


Grey color because of the class parameters.



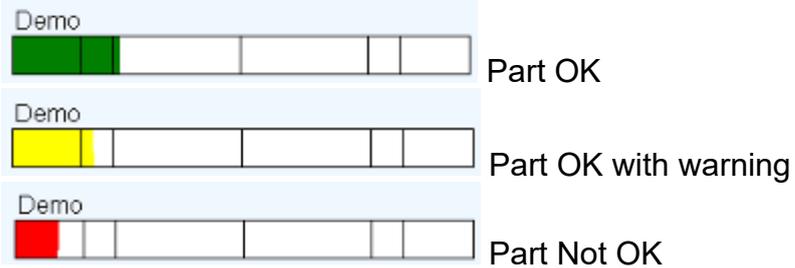
7.1.4. Part 4 control limit

This screen allows to display or not the control limits (warnings) and to define them. Control limits are warning that informs the user is the measure becomes too close to the tolerance limits. (Yellow colour on the bargraph)



This part is hidden if « no » has been selected

Example of characteristic displayed with control limits

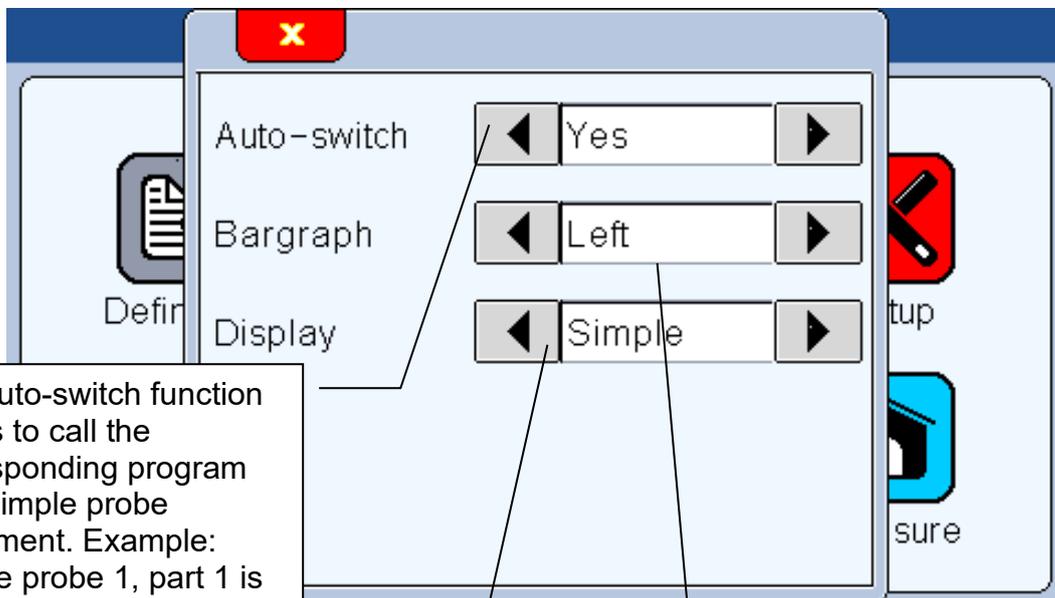


7.2. DISPLAY



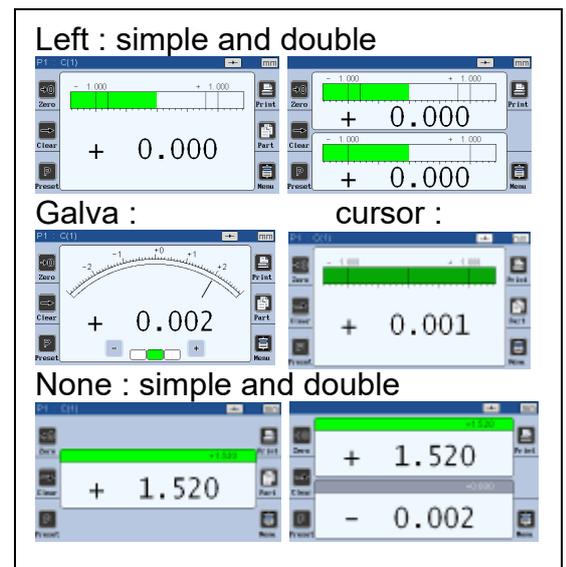
After clicking on this button, the below window appears.

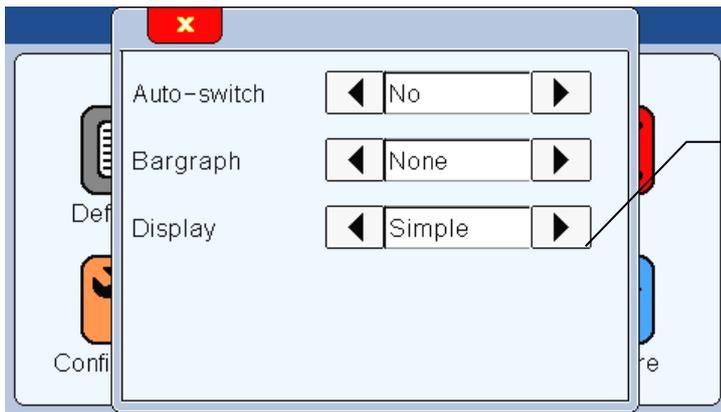
This window allows to define if 1 or 2 measures are displayed on the screen and on which format. (Needle = galva, horizontal bargraph or value only)



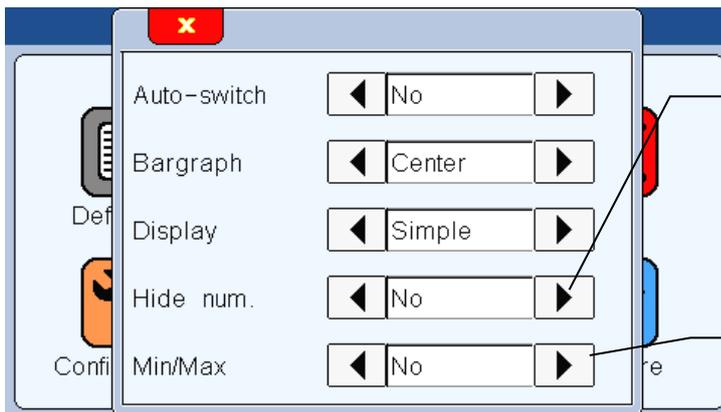
The auto-switch function allows to call the corresponding program by a simple probe movement. Example:
 - Move probe 1, part 1 is displayed.
 - Move probe 2, part 2 is displayed.

The +/- keys appears on the needle indicator (galva) and allow to move the needle like with the screw on an old analog display.

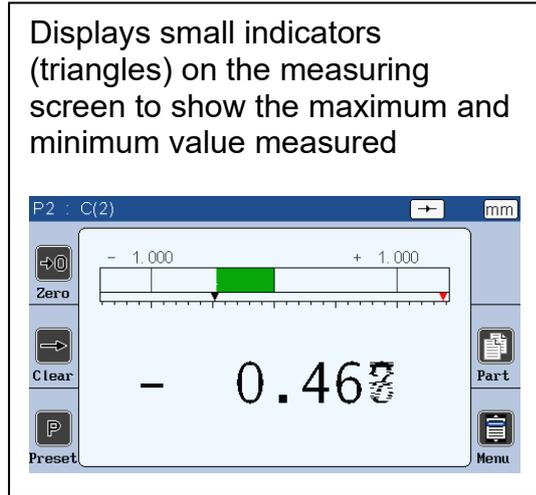




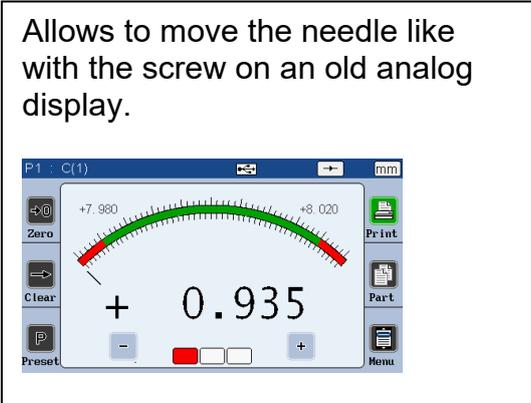
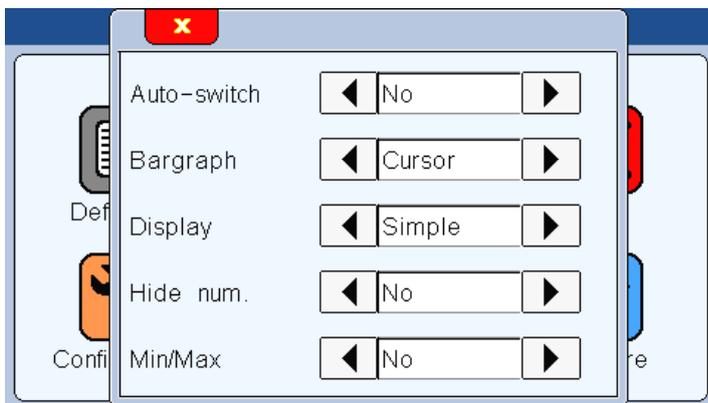
Allows to display 2 probes on the measuring screen (except in GALVA mode)



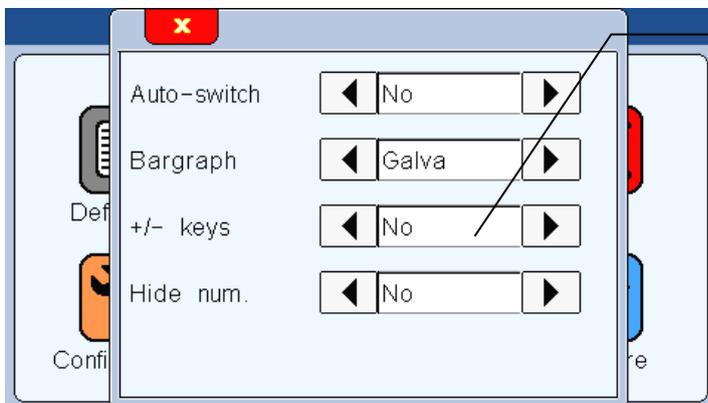
Allows to remove the value of the measurement on the measuring screen, only the bargraph appears.



Displays small indicators (triangles) on the measuring screen to show the maximum and minimum value measured



Allows to move the needle like with the screw on an old analog display.



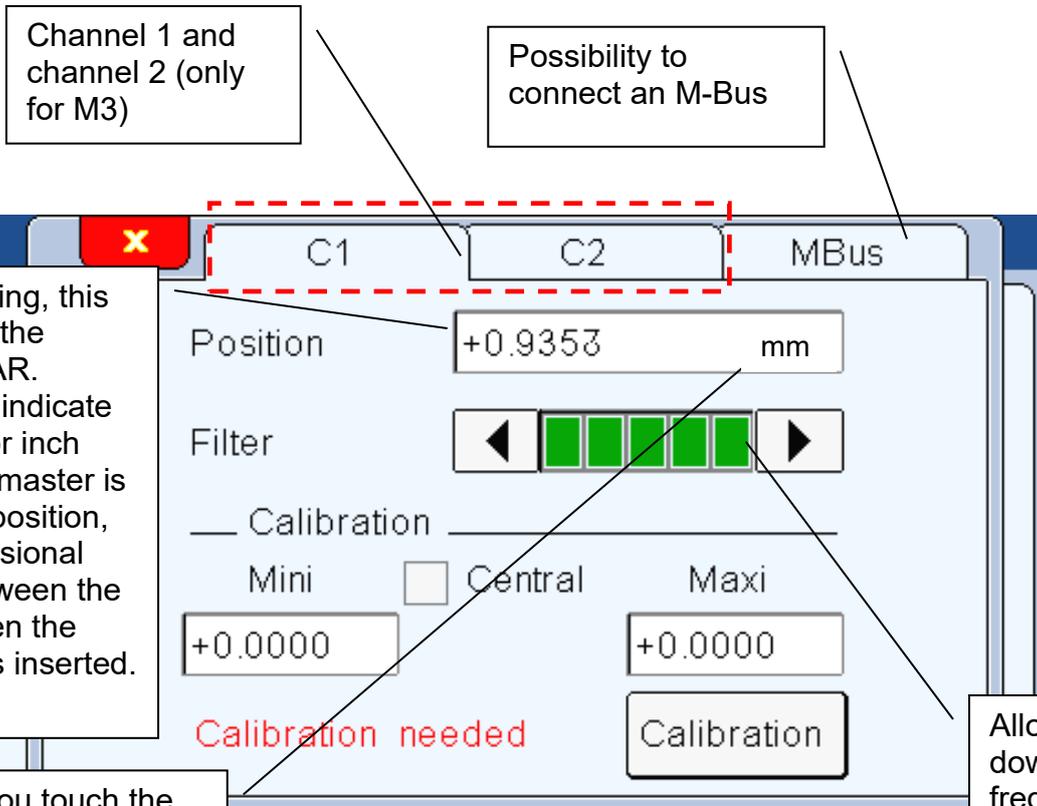
7.3. SETUP



Setup

After clicking on this button, the below window appears.

From this window you can calibrate each channel. (the M1/M3 must be calibrated with 2 masters).



Channel 1 and channel 2 (only for M3)

Possibility to connect an M-Bus

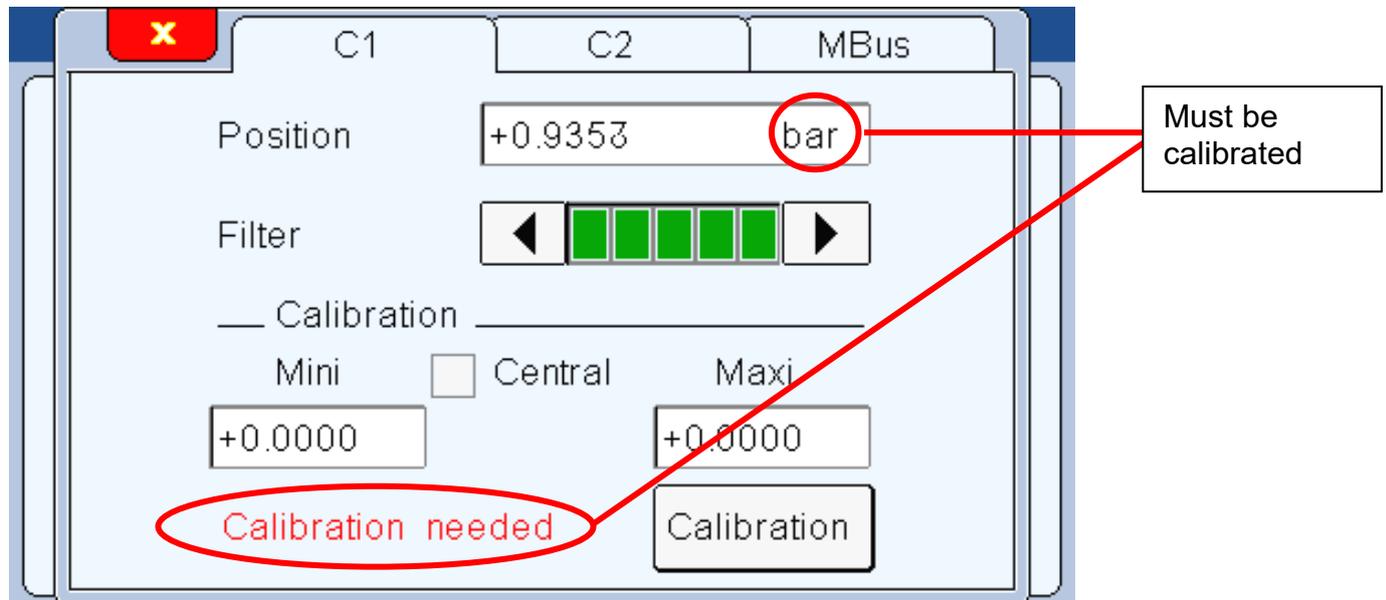
Before mastering, this field indicates the pressure in BAR. After it should indicate 0.00000 mm or inch when the min master is in measuring position, and the dimensional difference between the 2 masters when the MAX master is inserted.

If you touch the unit, it can switch to BAR and mm or inch (only available after calibrating) The optimal pressure is 2.7 BAR with at the nominal value, for having the best linearity.

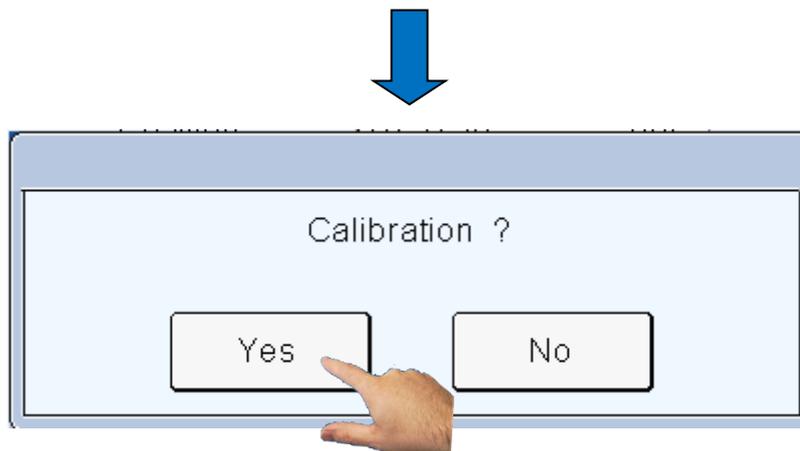
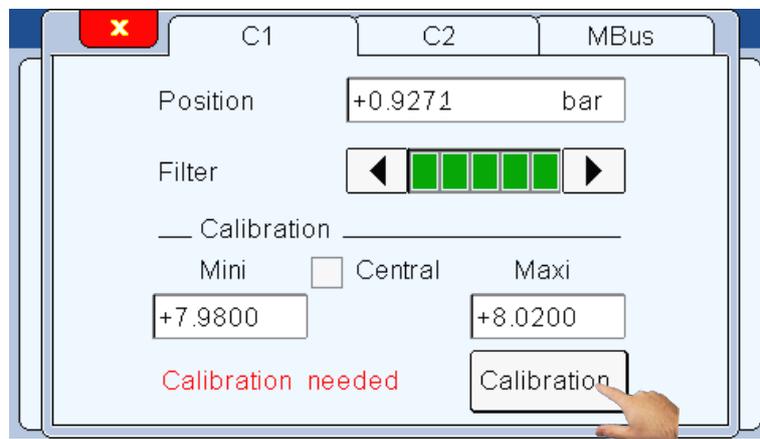
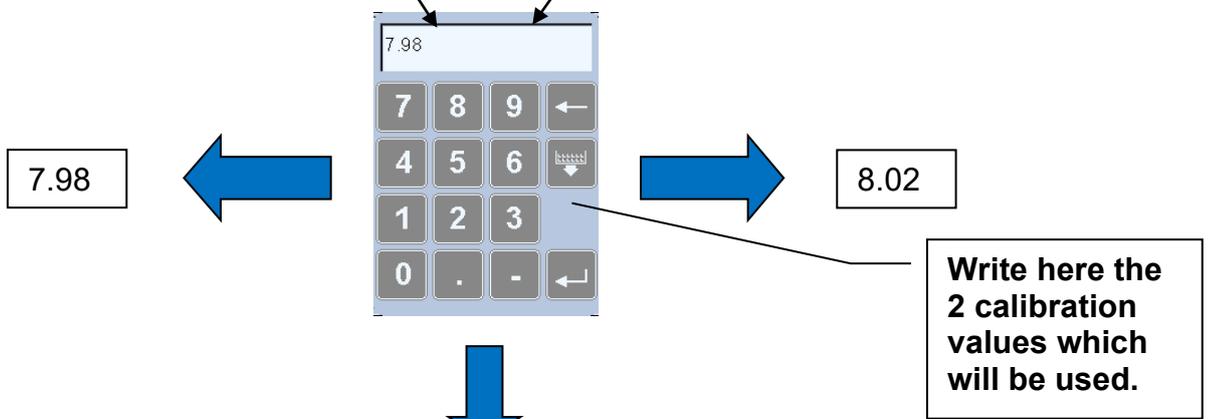
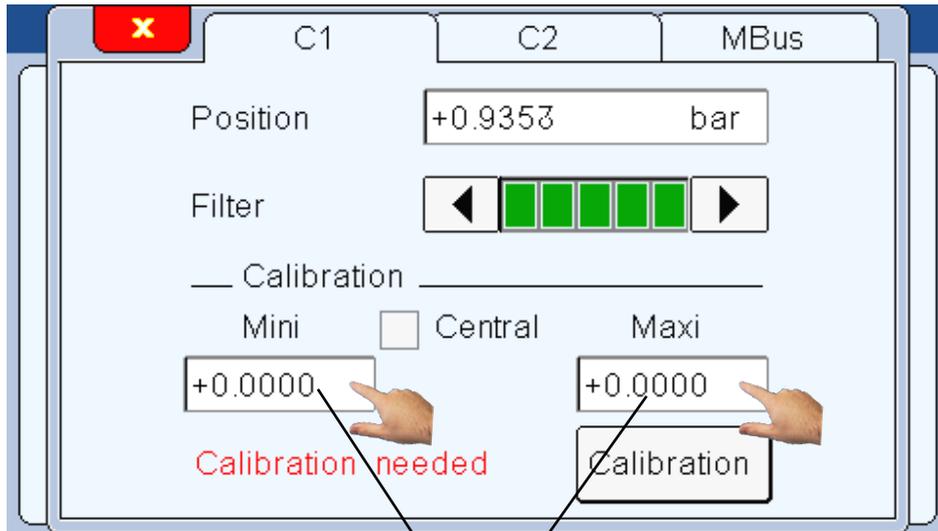
Allows to slow down the refresh frequency of the display (**running average**). It can be useful to limit the blinking of the last digit, and for runout measurement on large parts.

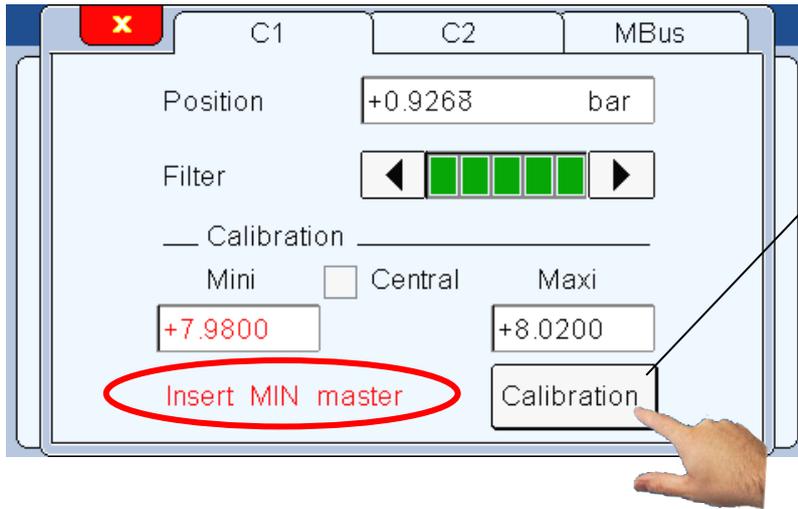
7.3.1. Calibration of the air gage

7.3.1.1. Calibration in 2 points

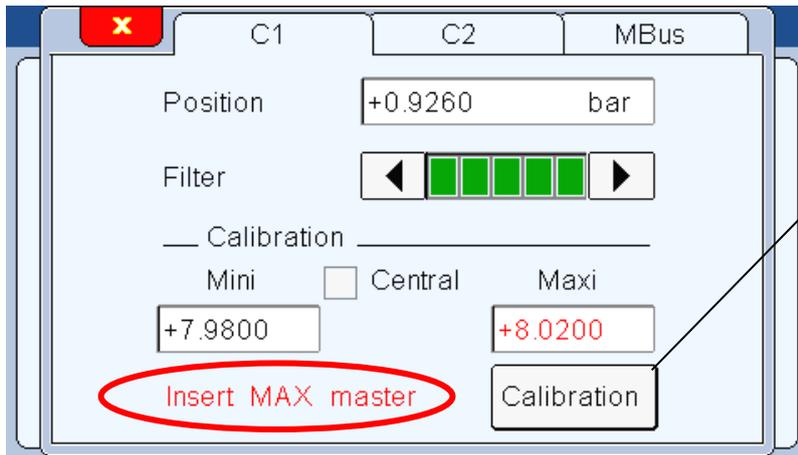


The air gage probes cannot be used without a special calibration. This calibration requires at least 2 master sample of the size of the tolerance limit for the part to measure.

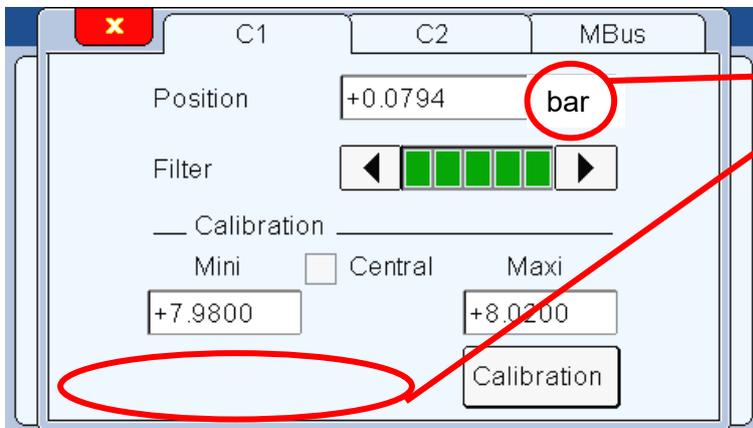
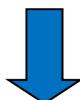




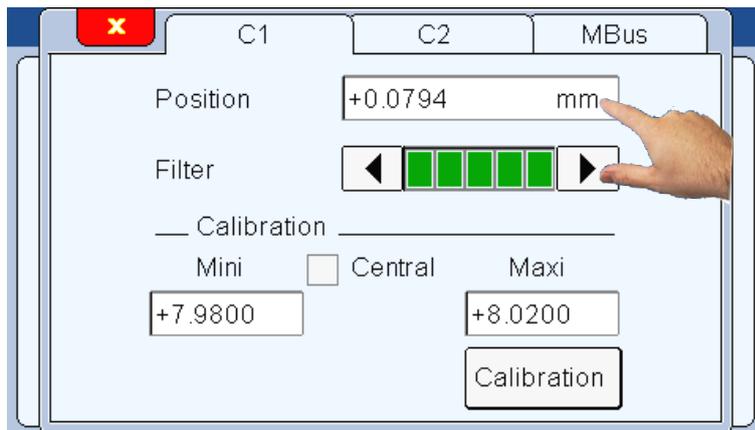
After placing the min master, push « calibration »



The same manipulation is done here, but with the max master, and the final push on « calibration »



The probe is now calibrated



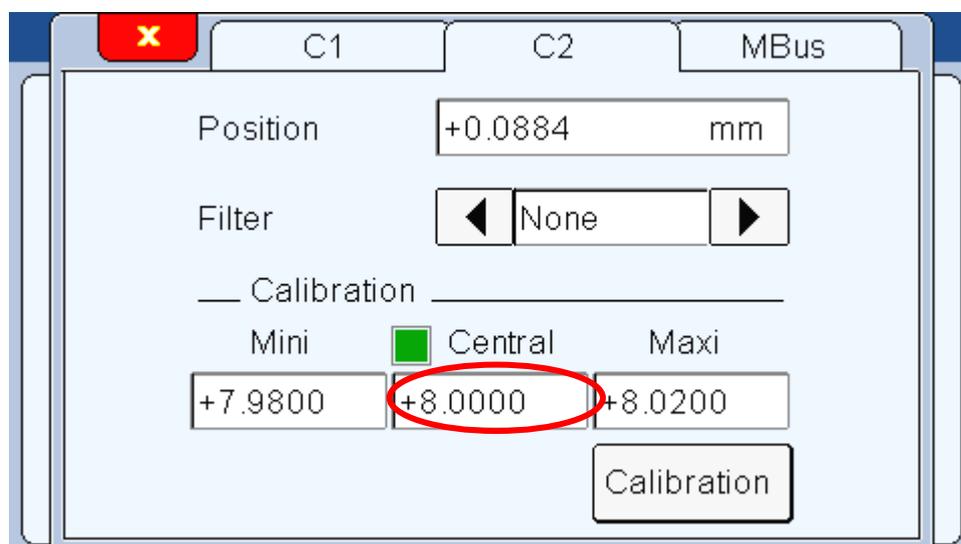
After calibration is it possible to check the pressure. For this you need to click on the unit “mm”, the unit will then become BAR for few seconds.

This feature allows for example to check if the restrictor installed on the air input is the right one. The ideal pressure at the nominal should be 2.7 BAR. If you are too far from this value, for example 1.5 BAR, you should change the restrictor for a bigger one. Using the wrong restrictor affects the linearity. For a simple sorting Go/NoGo, the results will be correct, but if you need to have the real value and/or to use the class sorting functionality, you need to use the most adapted restrictor. (see chap 3.3.1).

7.3.1.2. Calibration in 3 points

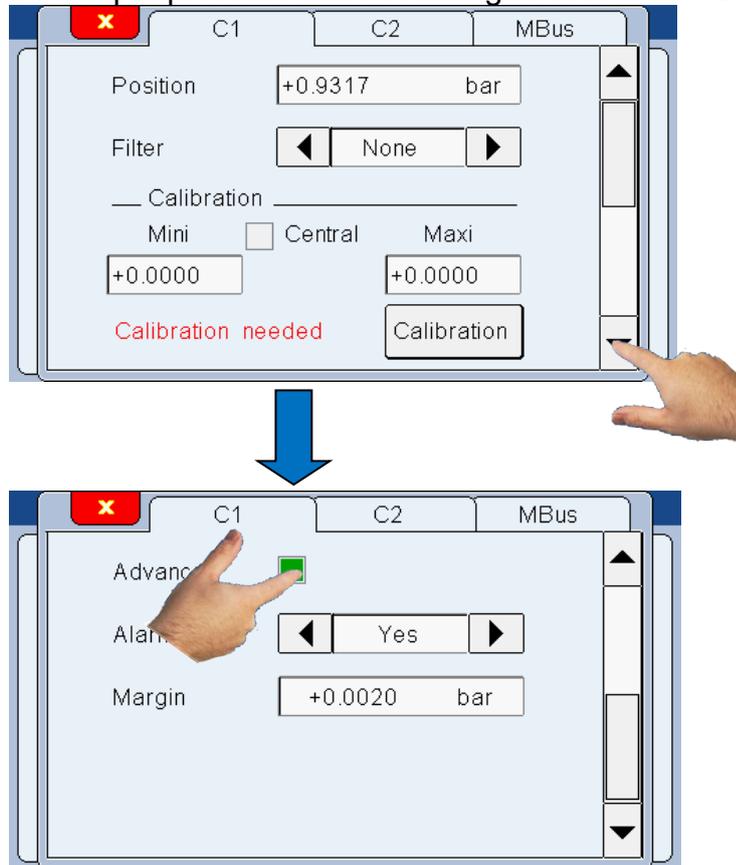
There is the possibility to use 3 points to calibrate the measure. When the button “central” is selected, a third master point is asked. The calibration process stays the same, with one manipulation added.

This feature can be interesting when controlling a part with large tolerances.



7.3.1.3. Advanced mode

The advanced mode of the calibration menu allows to control the pressure and verify if the input pressure has not changed over a defined level since the calibration.



In measuring mode, if the input pressure has changed over the limit, a popup windows appear informing the operator, and asking the recalibrate, or check the air network.

7.3.2. M-Bus modules

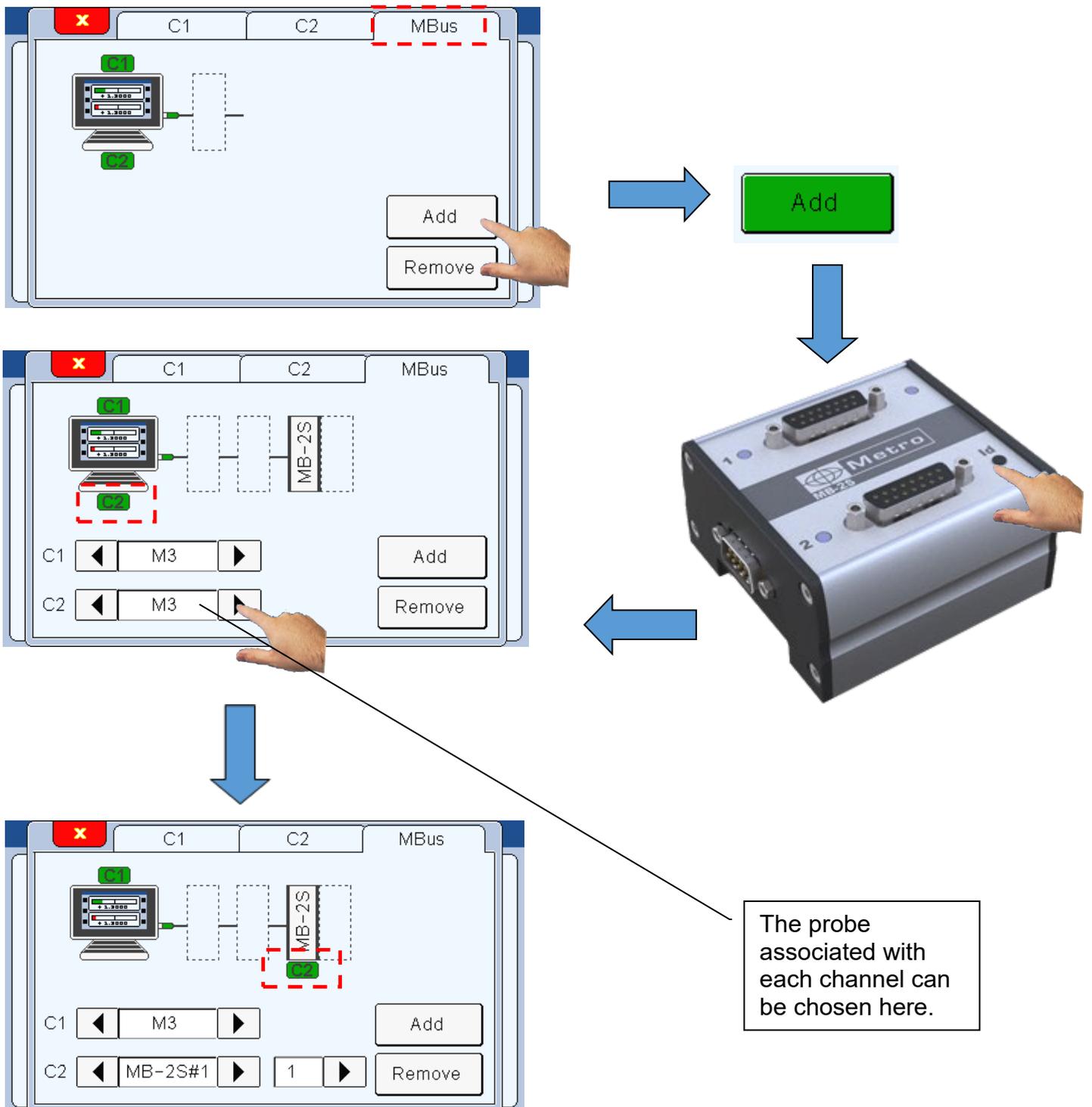
External M-Bus modules can be connected to the M1/M3 thanks to the following screen.

It allows to mix 2 different probes on the same display with the multiplexer modules, or to use input/output modules.

Multiplexer modules

The same process is made to connect all the multiplexer modules

Example : M1/M3 with MB-2S module (for Heidenhain probes) on the channel 2.



After being connected, A Multiplexer module must be configured from the C1 or C2 pages of the setup menu (according to the channel with which the probe is linked).

The main multiplexer modules are listed below :



MB-2S Heindenhein



MB-2T TTL



MB-AG (Air Gage)



MB-8I inductif



MB-1D for digimatic instrument



MB-1R Port RS232

Input/output modules



MB-IO



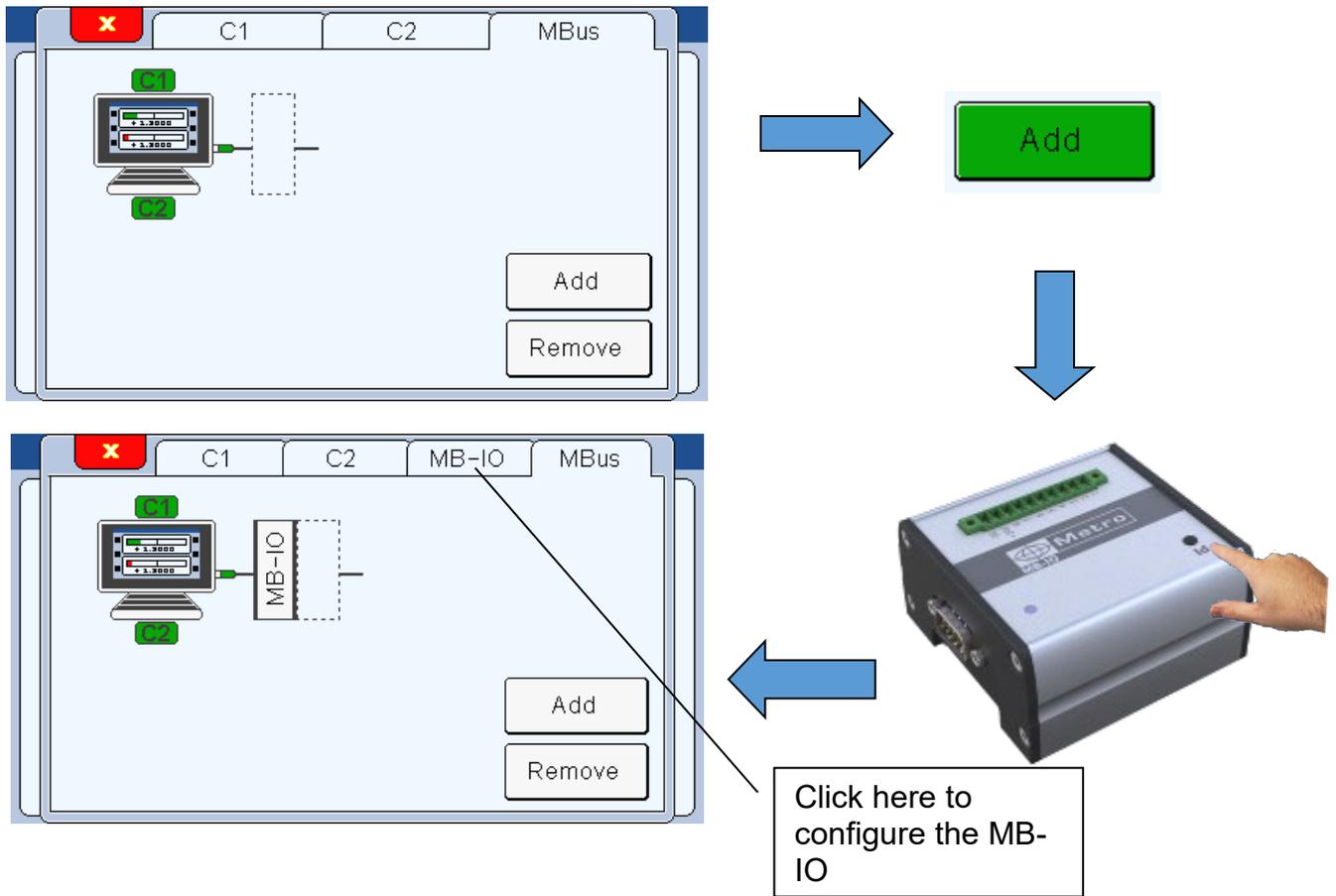
MB-RO



MB-RL

The connection of an input/output module is made with the same way than a multiplexer.

Up to 4 MB-IO can be connected.
Example: connection of a MB-IO module on the M3.



The different options for the MB-IO configuration are explained in detail in chapter 14 optional M-Bus Modules

Modules accessoires



MB-TP

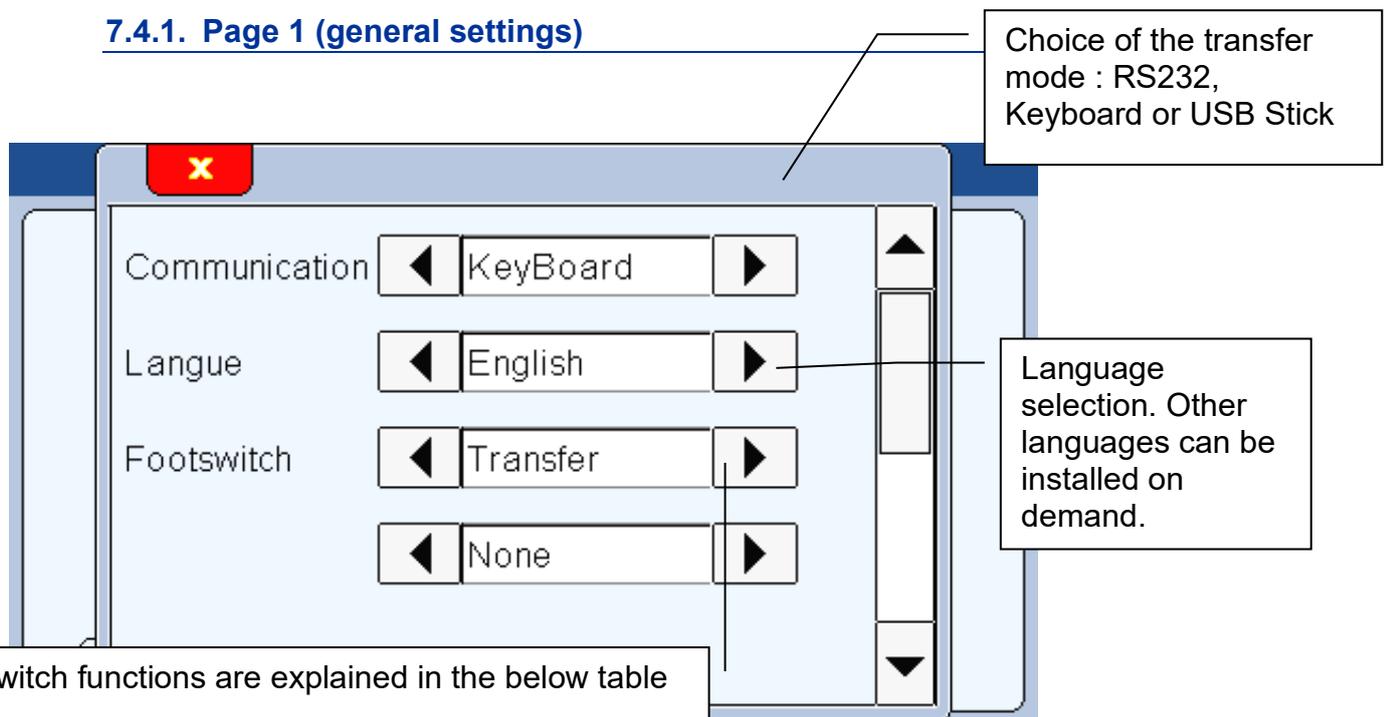
In the chapter M-Bus (Chap 14) all the functionalities and applications of the MB-TP are explained.

7.4. CONFIGURATION



After clicking on this button, the below window appears.
This window allows configuring the general settings of your M1/M3

7.4.1. Page 1 (general settings)



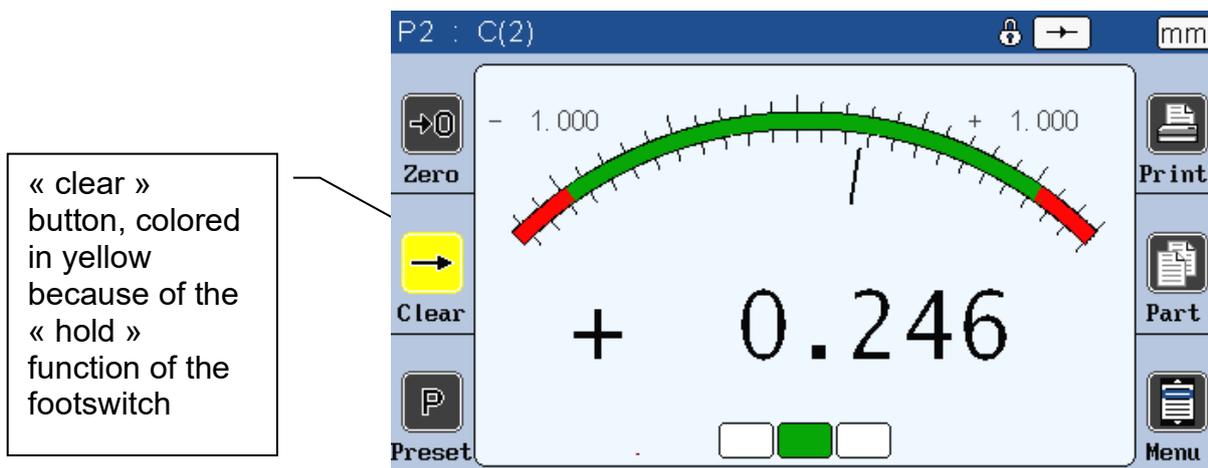
Footswitch functions are explained in the below table
When 2 functions are programmed, a pressure on the footswitch makes them happen one after each other.

Communication function	Description
Keyboard	The M1/M3 is detected as a keyboard when connected to a computer with a USB connection, without installing any specific driver or software. Then, when you transfer the measurement (from the touch screen, MB-IO or the footswitch), the displayed value will appear on your PC where your cursor is positioned. (For example, on an Excel cell), the same way you would type with your standard keyboard.

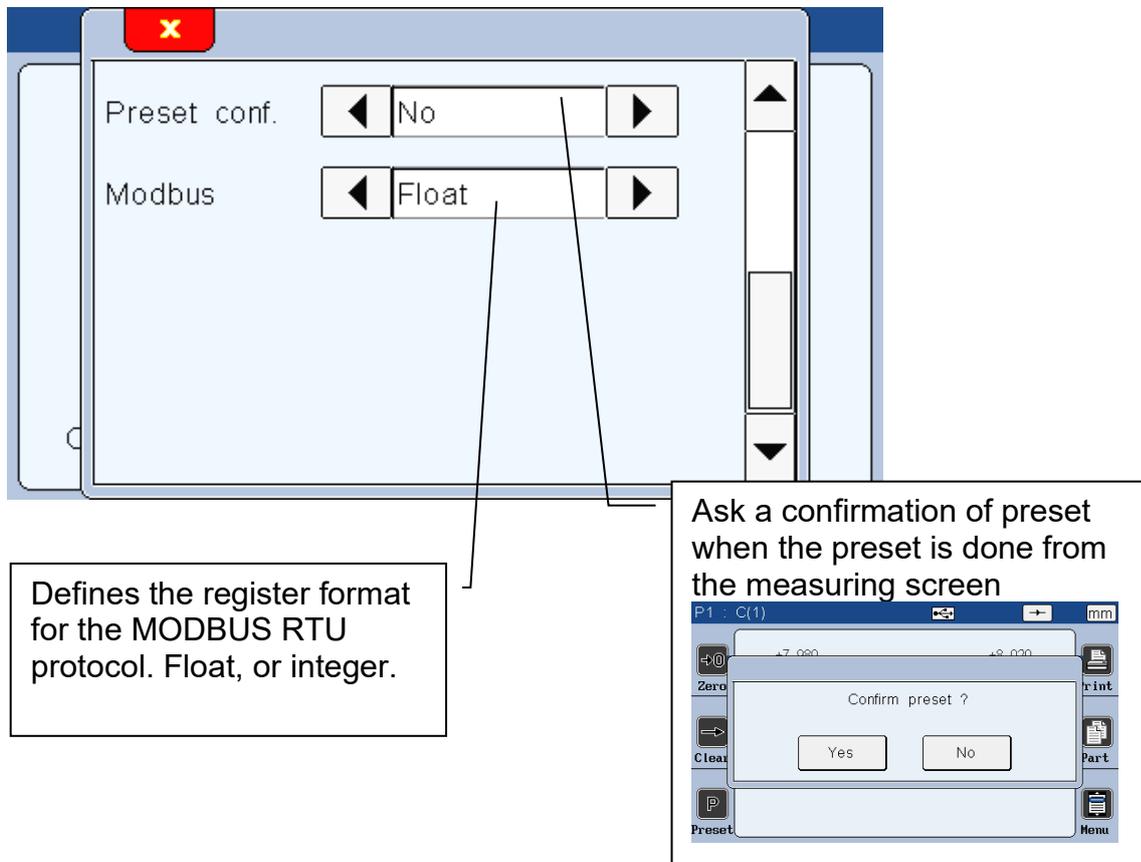
USB stick	A “output.csv” file will be created on the connected USB stick, and each time you press the “Print” button of the measuring screen, a line will be added on the file. If you use a QR code reader to input a manufacturing order number, the “OUTPUT.CSV” file takes the name becomes “manufacturingordernumber.csv”
RS232	PLC export or any other external system

Footswitch function	Description
None	No function
Preset	Calibration
Transfer	Send the measurement to the RS232 or USB
Init Dyn	Start dynamic measurement (min, max...)
Zéro	Set the displayed value at zero
Part	Change the active part (part 1 / part 2)
Hold	Freeze the measuring screen, the “clear” button becomes yellow when the screen is frozen
Screenshot	generate a BMP file on the USB stick when the footswitch is pressed.
IO Output	Allows the control of the various outputs of the I/O module by the footswitch. The function is to be defined in the I/O module as well.

The “clear” icon is yellow while the hold function is activated:



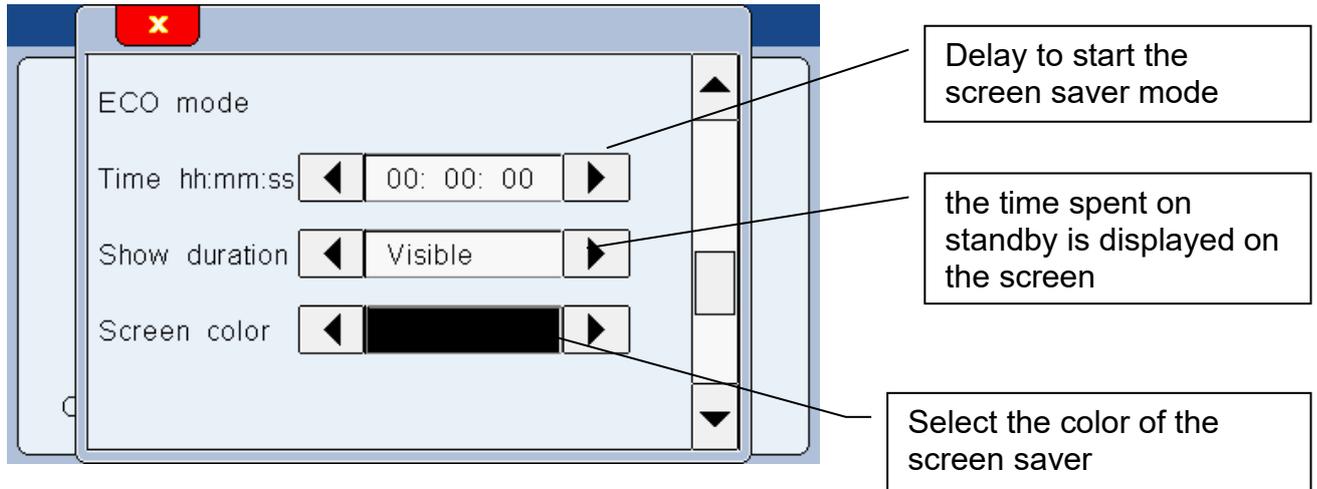
7.4.2. Page 2 (general settings)



7.4.3. Page 3 (ECO mode)

This page allows the configuration of an ECO mode, for the screen (screen saver mode) and to reduce the air flow with the MB-RO module.

- Setting of the screen saver mode

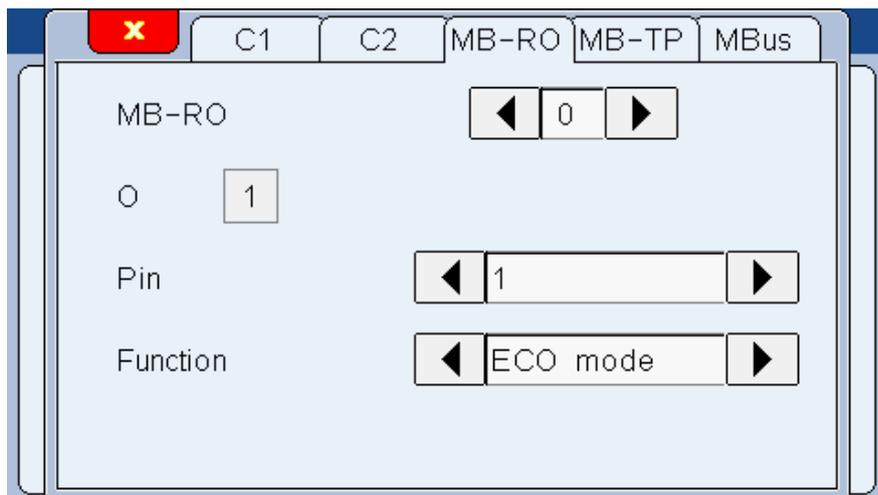


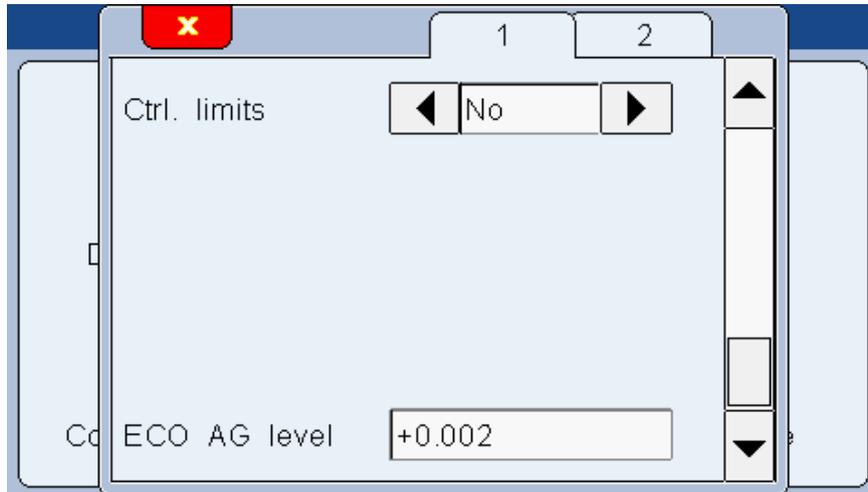
Getting out from the screen saver mode is possible by touching the screen or moving probes.
 If time is set to 00:00:00, the saver mode won't be activated.

- ECO-Mode with the MB-RO.

This ECO mode operates in “pair” with the “ECO” configuration of the MB-RO module in the Set up menu/M-Bus. (see chapter on the MB-RO), and allows the air flow to be controlled. (Standard, or ECO = reduced).

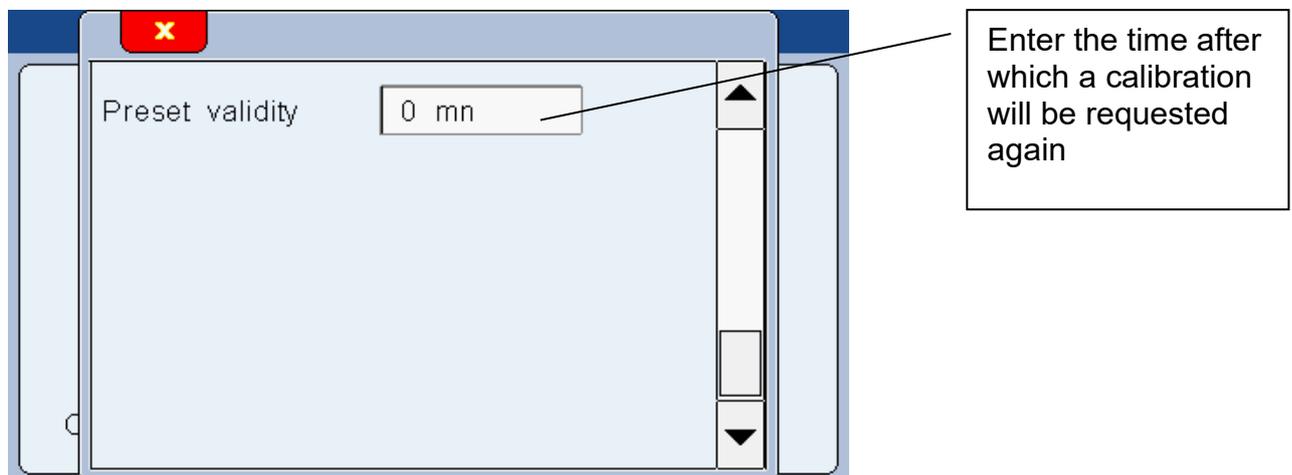
It is mandatory to activate the ECO mode in the Set up menu/M-Bus of the MB-RO **AND** to indicate an AG wake-up threshold, in the Definition menu (page 4)





Thus the MB-RO modules “control” the air pressure of the preparation either in standard mode (measurement) or economy (no measurement, or action). And the indication of a wake-up threshold switches the air flow to standard mode, when for example the operator places a part back on the gage.

7.4.4. Page 4 (calibration renewal period)



If 0 is entered, then no calibration will be proposed.
 If the value is upper 0, the Preset button becomes red after the indicated period, and invites you to calibrate. Press the Preset button, and select if yes or no you want to calibrate.

7.5. LOCK



After clicking on this button, the below window appears.
This screen allows to lock by password some functions of the M3

Protection ◀ Active ▶

Password 0000

Visible ◀ ▶

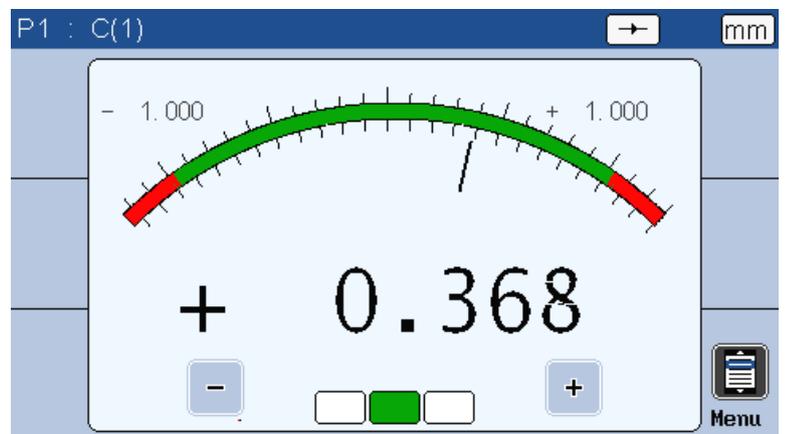
Visible ◀ ▶

Visible ◀ ▶

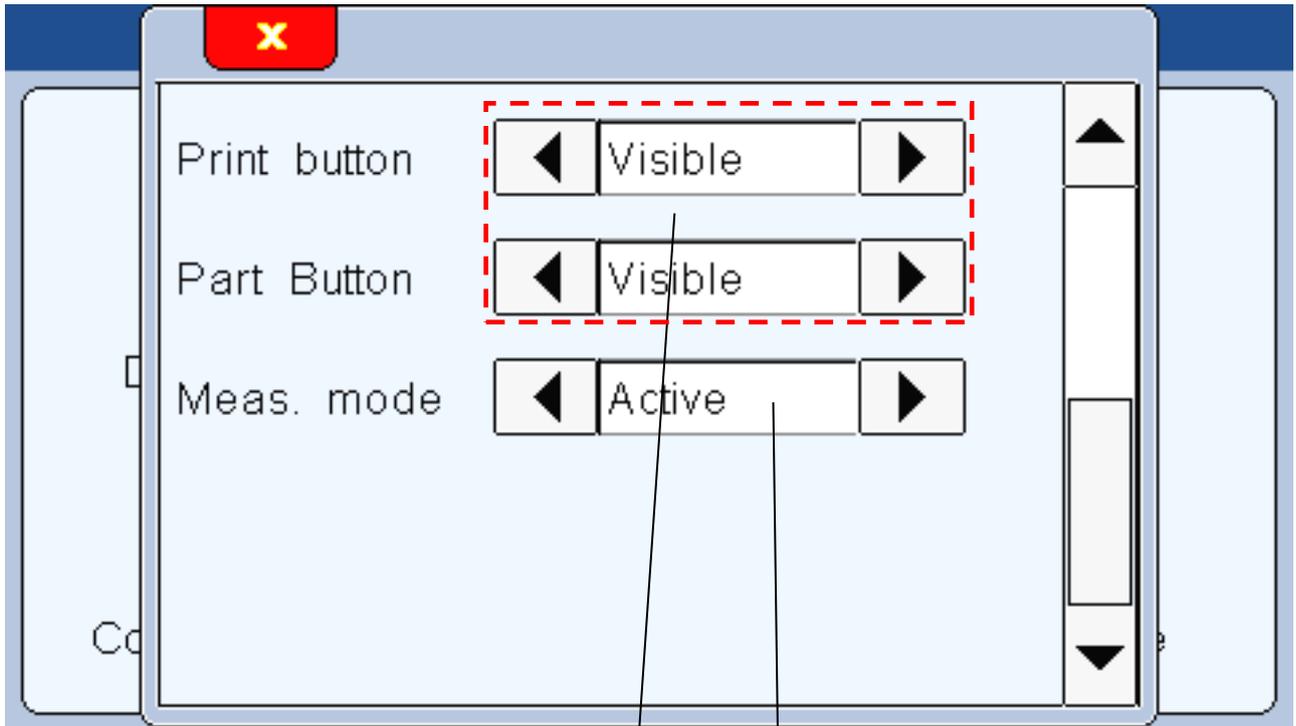
Modification of the password. By default: 0000

If « locked », a password will be asked to access to the icon desktop

Allows to remove the corresponding buttons from the measuring screen.
It is recommended to remove the button to make the interface as easy as possible for the user



Example of a measuring screen without all the buttons.



Allows to remove the corresponding buttons from the measuring screen.

Allows to lock the measuring mode (maxi, mini, maxi-mini, average...)



7.6. MEASURE



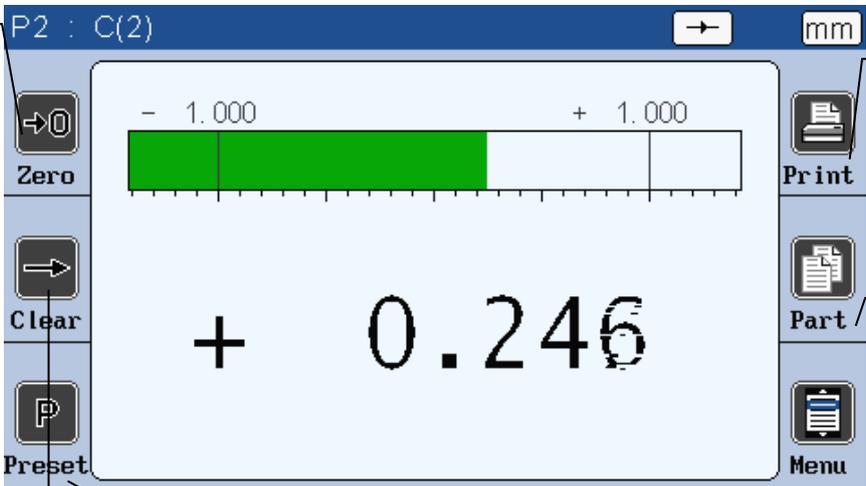
After clicking on this button, the measuring screen appears.
Please read the chapter 8 for the presentation of the measuring screen.

8. MEASURING SCREEN

The M1/M3 starts on this screen.

The measuring screen allows seeing the characteristics of the part that has to be controlled. A needle/bargraph indicator allows seeing the characteristic in function of the tolerance of the part (see chap. 7.1 for tolerances modification).

8.1. LATERAL BUTTON FUNCTIONS



The screenshot shows the measuring screen interface. At the top, it displays 'P2 : C(2)' and 'mm'. The main display shows a tolerance range from -1.000 to +1.000 with a green bargraph indicator. The current measurement is '+ 0.246'. On the left side, there are three buttons: 'Zero' (with a red '→0' icon), 'Clear' (with a green '→' icon), and 'Preset' (with a 'P' icon). On the right side, there are three buttons: 'Print' (with a printer icon), 'Part' (with a document icon), and 'Menu' (with a list icon).

Absolute or relative mode (allows to make a « zéro » at a defined position. If the relative mode is selected, the button become red)

Zero (red icon)

To come back to the absolute mode, press on the « clear » button

Start dynamic measurement (Min, Max...) clear the zero function
This icon can become yellow in case of a hold function (refer to 7.1.3, the footswitch connector)

Clear (green icon)

When they are pushed, the button becomes green for one second:

Measurement transfert (RS232 or USB or USB stick)

Change manually the active part (part 1 or part 2)

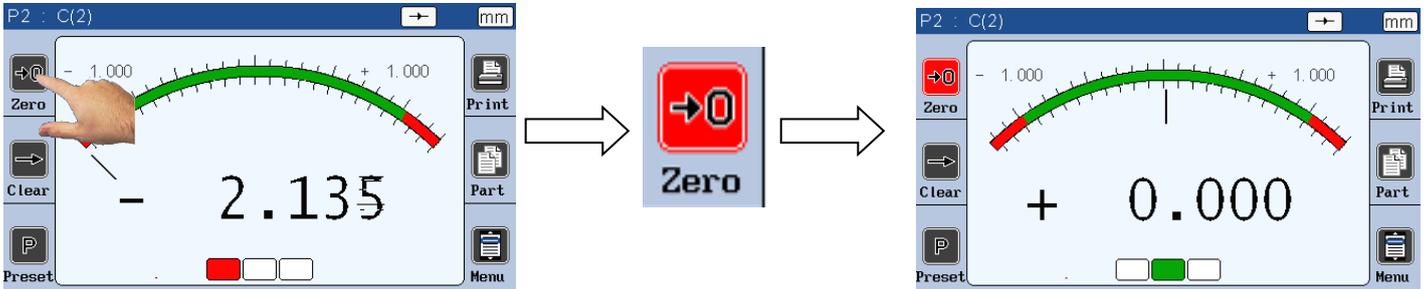
Go to the icon desktop

Calibration/Preset. After pressing this button, the displayed value will take the master value.

Zero :



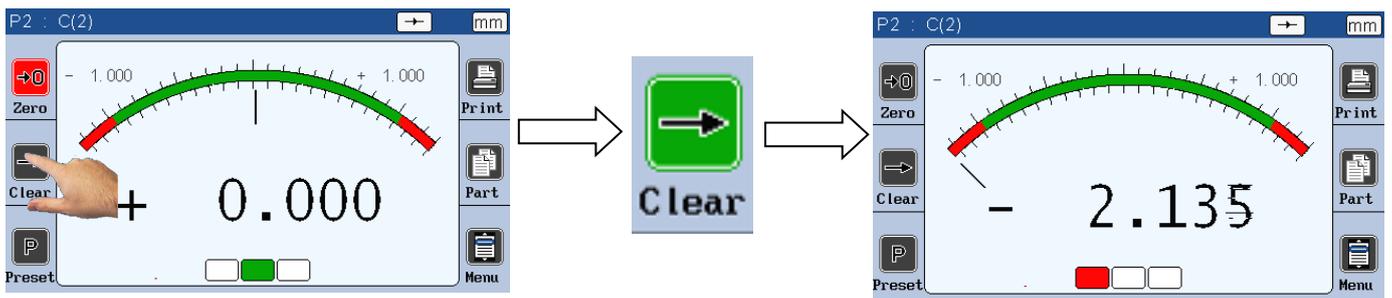
This button is used to set the current measured value to 0, it's the relative mode



Clear :



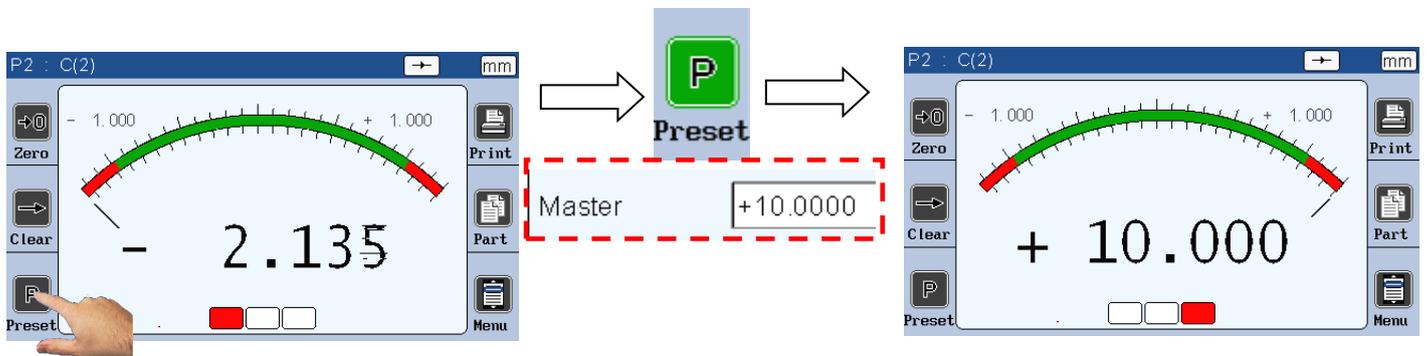
This button allows to cancel the zero button, and to switch again to absolute mode



Preset :

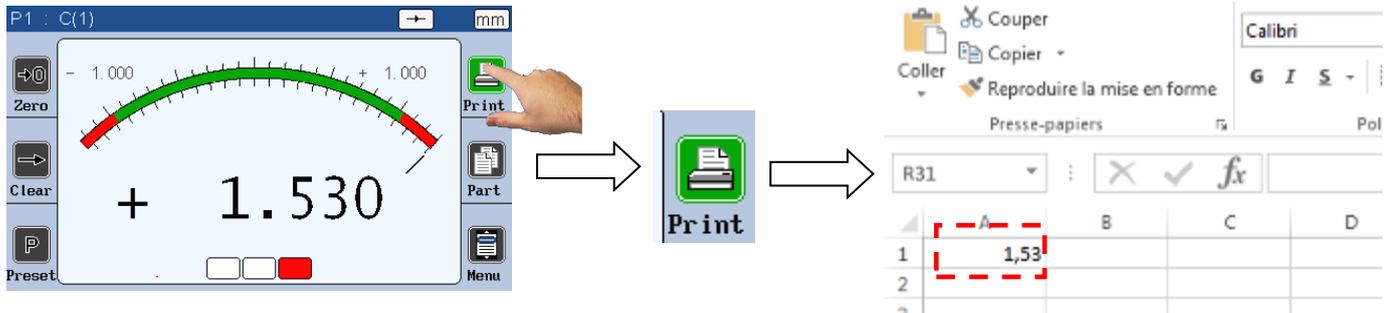


This button allows to set the current measure value to the master value

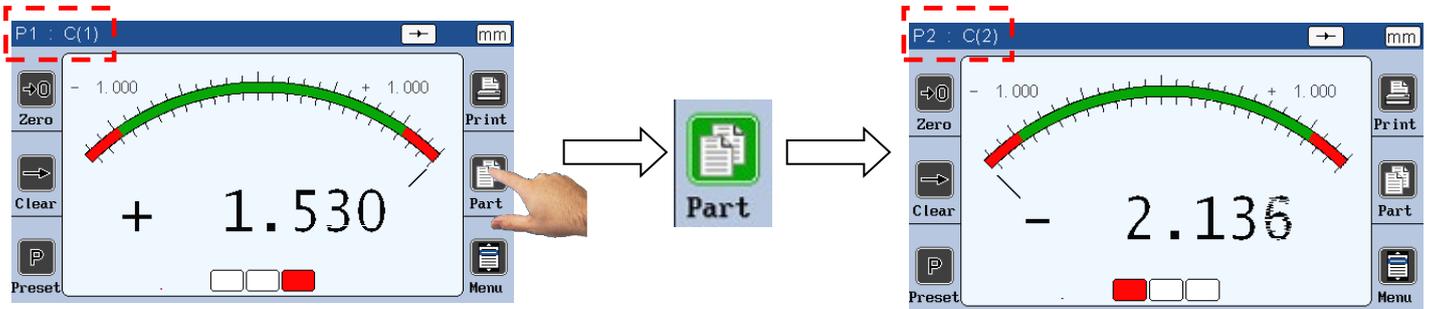




The print function allows to transfer the measured value to a computer.

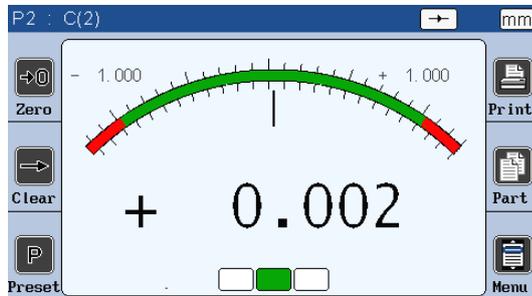


This function is used to change the displayed part

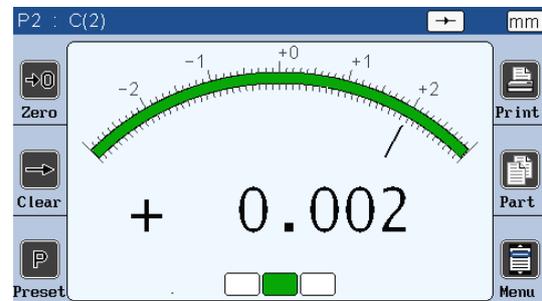


8.2. CHOICE OF THE NEEDLE INDICATOR STYLE

If the M1/M3 is configured with the needle indicator (mode Galva, see chap. 7.2), it is possible to change manually the type of scale.



Automatic

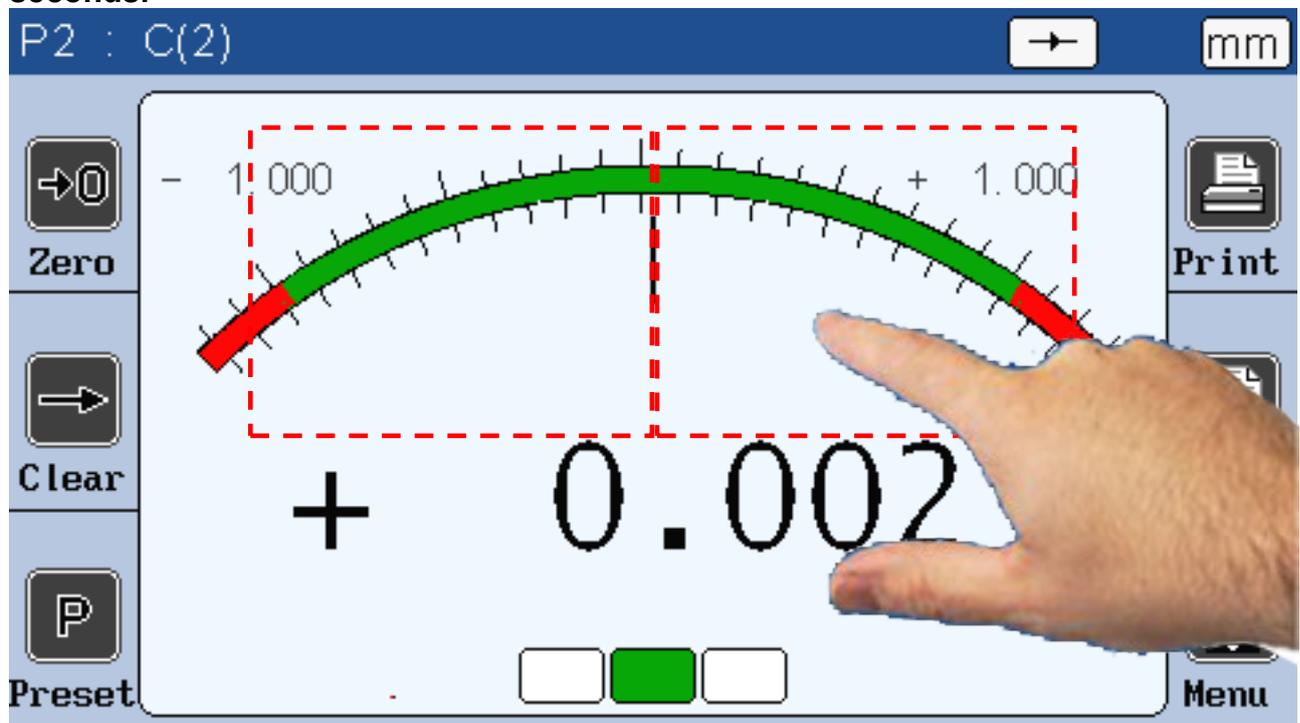


Manual

The automatic needle scale adapts automatically with the part tolerances.

The manual needle has fixed scales and allows to use the +/- option (see chap 7.2)

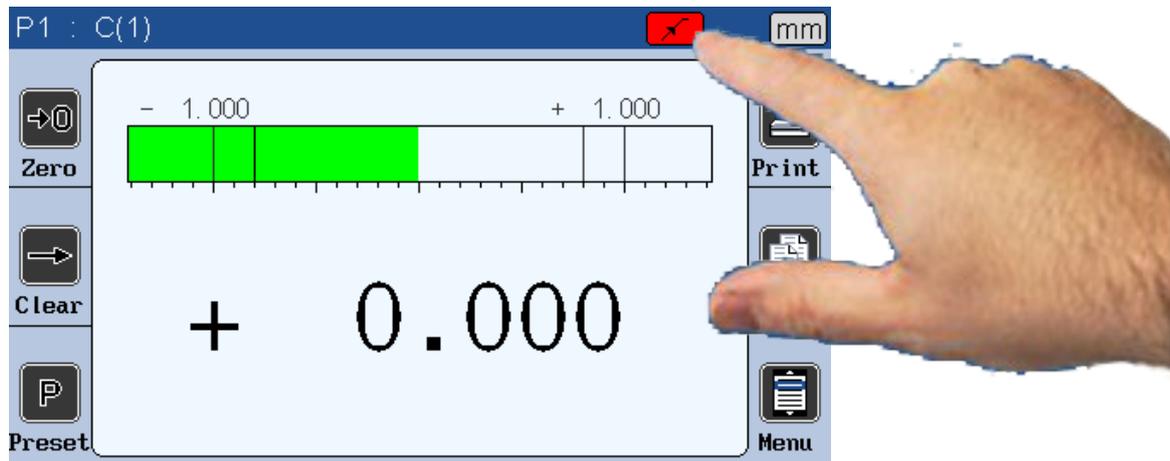
You can change the scale type by touching the area as on the picture bellow **for 2 seconds**.



8.3. Temporary dynamic mode

As explained on the chapter 7.1, the characteristic is defined either as « static » (direct) or « dynamic » (Max, Min ...)

If a characteristic has been adjusted as static, it is nevertheless possible to change temporarily to a dynamic mode, directly from the measuring screen.



To change the measuring mode, press on the icon as shown on the above picture.

	Static	
	Max	
	Min	
	Max-Min	
	Average	(only adapted on an automatic fixture)
	Median	The displayed value is calculated with the formula $(MAX-MIN)/2$.

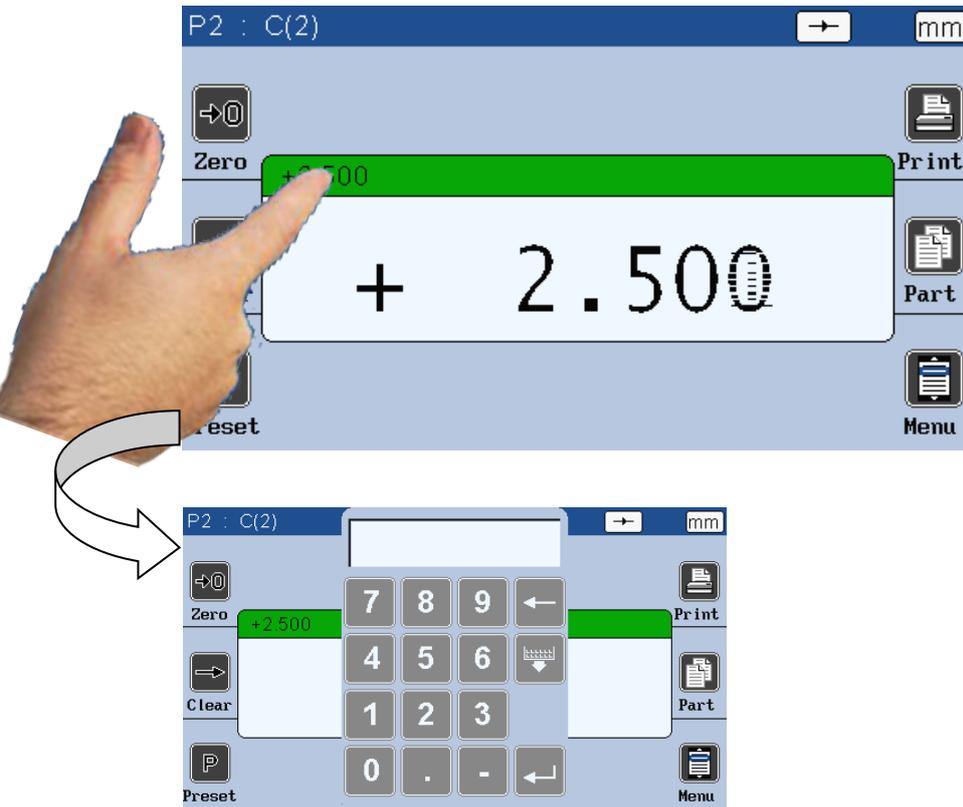


When a dynamic mode has been selected, press on the **Clear** button or on the footswitch (if configured as « init dyn » (see chap 7.4)) to start recording.

8.4. Display mode without tolerance

This mode allows to display only the numerical value, without tolerance indication.

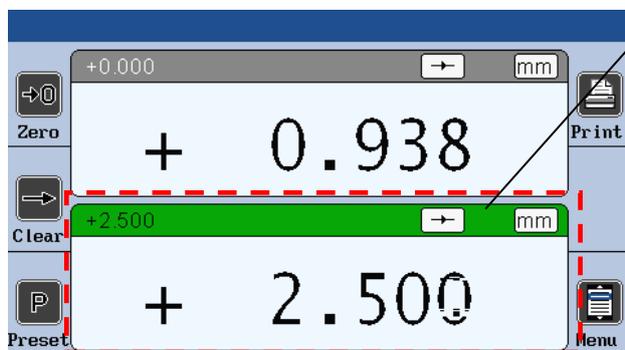
It is also possible to change the preset value (calibration) directly from this screen. Press on the value as shown on the below picture, an input the new value with the keyboard.



If the double display mode is selected, the 2 characteristics can move together, but only 1 is active.

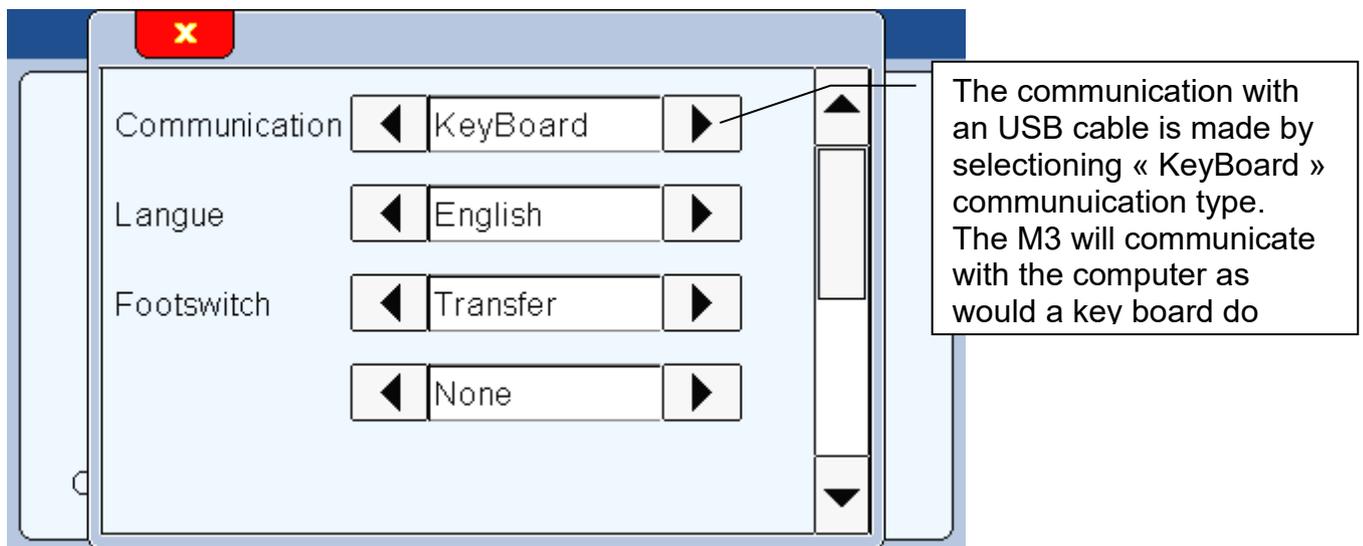
The lateral buttons have an effect only on the active characteristic.

For selecting the active characteristic, press on it and the top of the box will become green.



The lateral button have an effect only on the active characteristic

9. USB COMMUNICATION



If you select the “Keyboard/USB” communication, the M3 will be detected has a keyboard when connected to a computer, without installing a specific driver or software.

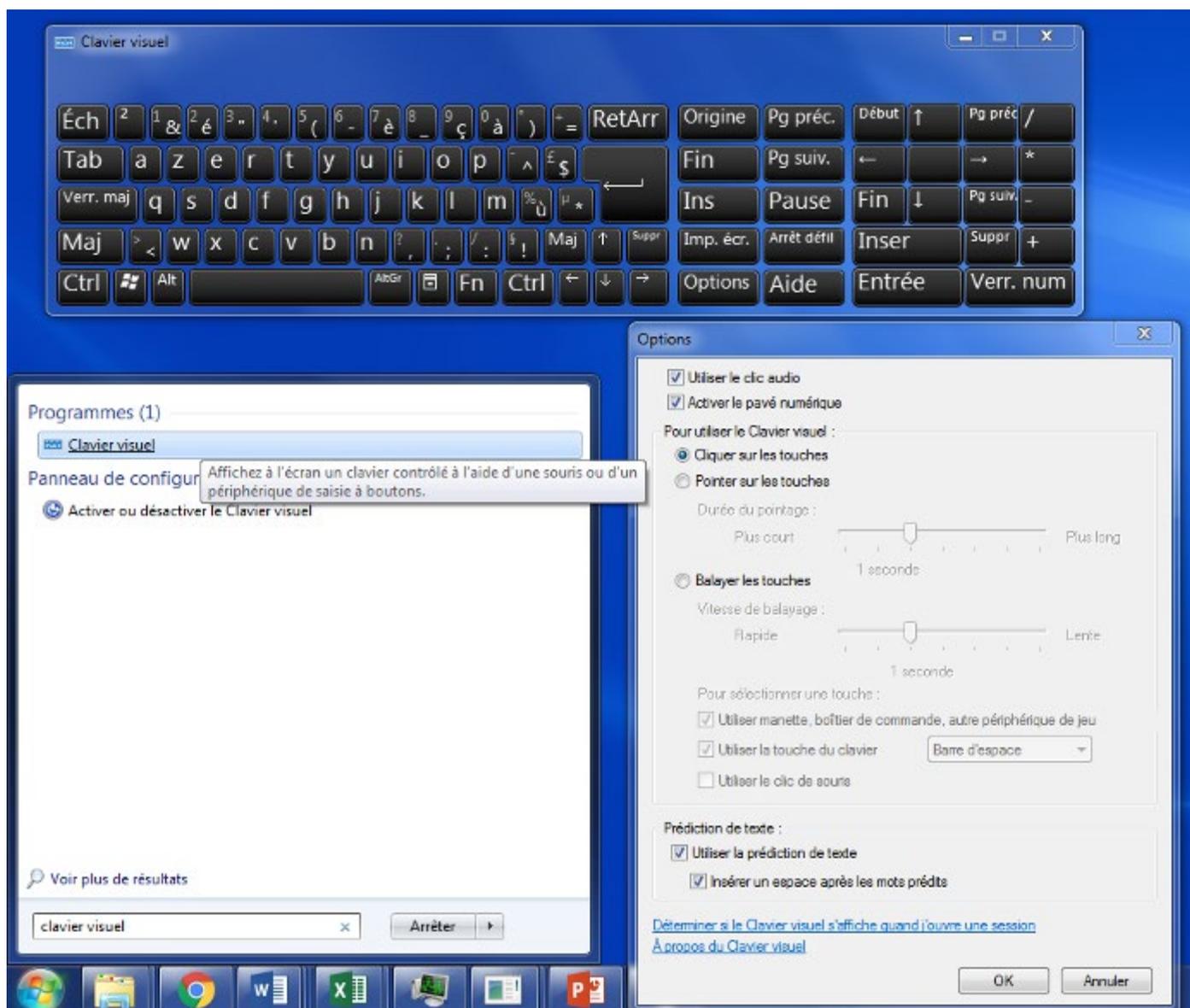
Then when you transfer the measure (with screen, through IO or footswitch), the displayed value will appear on your PC when your cursor is. (For example on an Excel cell), in the same way than you would have typed with your standard keyboard.



1	5,13	
2	5,09	
3	5,07	
4	5,06	
5	5,16	
6	5,12	
7	5,19	

Example of a table completed by the M3

A problem appears sometimes while the data is transferring with a USB cable. The M3 display acts like a keyboard, so, in order to write numbers, the “num lock” key must be activated. If your keyboard doesn’t have the “num lock” key, you can still find it by writing “visual keyboard” in the windows search bar, and activate it. If even there the “num lock” key doesn’t appear, the option key allows to access to a menu from which you can activate the “num lock”.



10. RS232 COMMUNICATION

The M1/M3 can communicate with an ASCII protocol allowing to master and configure all the functions.

For connecting the M3 to a PC or a PLC, you must use a cable Metro ref 45160, sold separately.



10.1. Commands generalities

All the commands must be ended by a « CR » character. (ASCII code 13/ \$0D).

The commands can be sent grouped by separating with a « ; » (max 500 characters).

The display is refreshed only once after reception of the « CR » character.

The value of the measure are written seee.ddddd which means sign, integer, decimal

10.2. Command list

10.2.1. General Informations

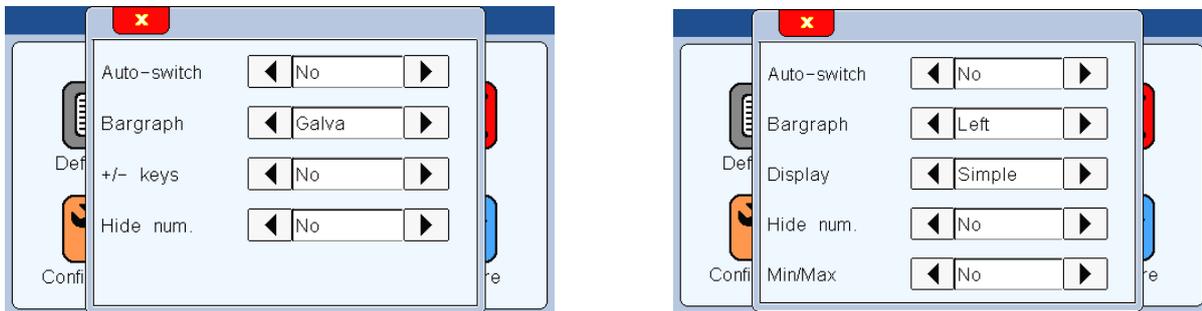
Opening screen			
Rubric	Read. command	Write command	Comment
Software version	VER?		ie : V3.30
Device serial number	SN?		ie : M32214522
Device reference	PN?		ie : 13040

10.2.2. Window PART

Window « Part » (Command by characteristic with "n" = 1 or 2 (number of the characteristic))			
Rubric	Read. command	Write command	Comment
		CFG_ENTER	Locks characteristics display update while display settings are changed
		CFG-LEAVE	Unlocks characteristics display update after display settings are changed
Resolution	nRES?	nRES=x	x=1 to 5 (number of decimals)
Unit	nUNIT?	nUNIT=x	x=0(mm)
			x=1 (inch)
			x=2 (µm)
			x=3 (DMS) degree_min_sec
			x=4 (DEG) decimal degree
Dynamic mode	nDYN?	nDYN=x	x=0 (static)
			x=1 (maxi)
			x=2 (mini)
			x=3 (maxi-mini)
			x=4 (average)
Formula	nFM?	nFM=x	x=0 (C1)
			x=1 (C2)
			x=2 (-C1)
			x=3 (-C2)
			x=4 (C1+C2)
			x=5 (C1-C2)
			x=6 (-C1+C2)
			x=7 (-C1-C2)
			x=8 3 points C1
			x=9 C points C2
			x=10 (taper)
x=11 (half taper)			
Specific to taper mode	nND?	nND=x	x=space between nozzle (taper)
Direction	nDIR?	nDIR=x	x=0 (sans)

			x=1 (internal)
			x=2 (external)
Upper tolerance	nUT?	nUT=seee.ddddd	
	nUTD?	nUTD=sdddDmmMssS	DMS display
Nominal	nNM?	nNM=seee.ddddd	
	nNMD?	nNMD=sdddDmmMssS	
Lower tolerance	nLT?	nLT=seee.ddddd	
	nLTD?	nLTD=sdddDmmMssS	
Master	nMT?	nMT=seee.ddddd	Standard case
	nM1?	nM1=seee.ddddd	In case of dual master (for taper)
	nM2?	nM2=seee.ddddd	In case of dual master (for taper)
Activate control limits	nLIMIT?	nLIMIT=x	x=0 (inactive)
			x=1 (active)
Upper control limit	nUCL?	nUCL=seee.ddddd	
	nUCLD?	nUCLD=sdddDmmMssS	
Lower control limit	nLCL?	nLCL=seee.ddddd	
	nLCLD?	nLCLD=sdddDmmMssS	
Reference	nREF?	nREF=xxxxxxxx	xxxxxxxx = part ref
Class		CLASS CNT nn cc	Number of characteristic sort classes nn : char. number (start from 1) cc : number of class
		CLASS SET nn cc Vmin Vmax (DD in option)	One of the characteristic sort classes nn : char. number (start from 1) cc : class number VMin: Value min (see.ddddd) Vmax:Value max (see.ddddd) DD (option) color number (between 0-15)
	CLASS GET nn CNT → cc (answer)		Number of characteristic sort classes nn : char. number (start from 1) → cc : number of class
	CLASS GET nn cc → Vmin Vmax DD (answer)		Config of one of the characteristic sort classes nn : char. number (start from 1) cc class number (start from 1) → VMin: Value min (see.ddddd) → Vmax:Value max (see.ddddd) → DD Color number (between 0-15)

10.2.3. Window DISPLAY



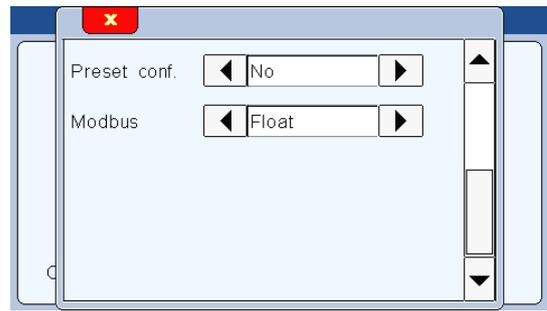
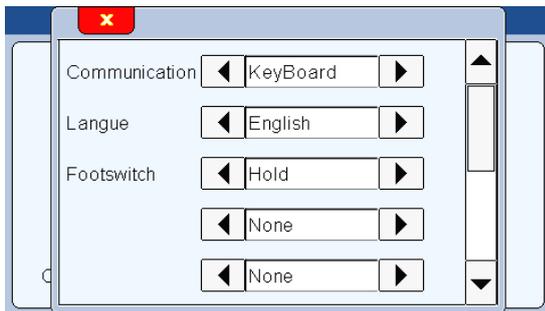
Window "display"			
Rubric	Read. command	Write command	Comment
		CFG_ENTER	Locks characteristics display update while characteristics display settings are changed
		CFG-LEAVE	Unlocks characteristics display update after characteristics display settings are changed
Auto switch	AUTO?	AUTO=x	x=0 (manual) x=1 (auto)
Bargraph	BAR?	BAR=x	x=0 (horiz. Bar origin left) x=1 (horiz. Bar origin center) x=2 (needle) x=3 (galva) x=4 (non = value only, no tolerance)
Display	DISPL?		x=0 (display 1 characteristic on the screen) x=1 (display 2 characteristics on the screen)
		DISPL=x	x=1 (display 1 characteristic on the screen) x=2 (display 2 characteristics on the screen)

10.2.4. Window SET UP

Window "SET UP"				
Rubric	Read. command	Write command	Comment	
AG		AGI	Air Gage Channel Calibration Initialization	
		AGL=1 or 2	Selecting the channel to calibrate	
		AGF=	Filter level of the channel (Requires that AGI then AGL=n has been executed previously)	
		AGN=	Min value of the master (Requires that AGI then AGL=n has been executed previously)	
		AGC=	Central value of the master in option (Requires that AGI then AGL=n has been executed previously)	
		AGA=	Max value of the master (Requires that AGI then AGL=n has been executed previously)	
			AGS	End of calibration configuration + display of the configuration window (Requires that AGI then AGL=n has been executed previously)
		AGG?		Air Gage Gain 0=channel calibration is done with 2 or 3 masters 1=channel calibration is done with one gain and one master
		AGGn?		Gain used on channel n

		AGGn=x.xxxx	Sets the gain of channel n if the 1 master calibration is active and the AGI command has been issued to unlock the gain modification protection. Returns the programmed value or "LOCKED" if locked or "NOT SETABLE3 if 2/3 points
		AGE	Locks gains modification protection: "LOCK" when locked

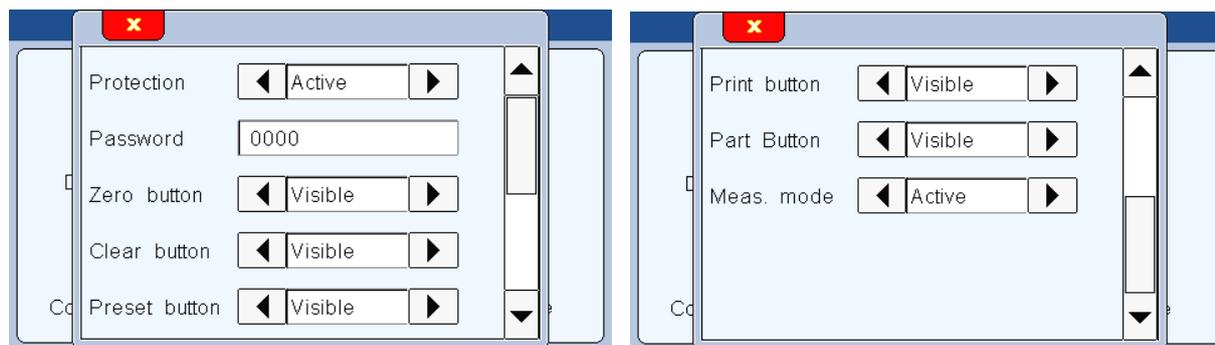
10.2.5. Window CONFIGURATION



Window "Configuration"			
Rubric	Read. command	Write command	Comment
Transfert	PRINT?	PRINT=x	x=0 (Keyboard)
			x=1 (USB)
			x=2 (RS232)
			x=3 (MBNET)
Langue	LANG?	LANG=x	x=0 (French)
			x=1 (English)
			x=2 (German)
			x=3 (Spain)
			x=4 (Italian)
			x=5 (Hungarian)
			x=6 (Czech)
			x=7 (Swedish)
			x=8 (Portugaise)
			x=9 (Romanian)
			x=10 (Turkish)
			x=11 (Slovenian)
			x=12 (Serbian)
			x=13 (Japanese)
			x=14 (Chinese)
			x=15 (Indonesian)
			x=16 (Vietnamese)
			Footswitch
x=1 (Preset) → calibration			
x=2 (Zero)			
x=3 (change Part reference)			

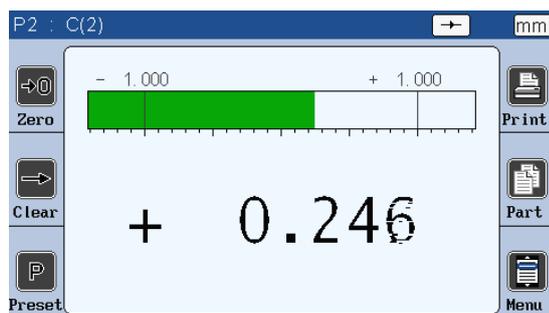
		x=4 (start dynamic measurement)
		x=5 (stop)
		x=6 (screen shot)
		x=7 (IO output)
		x=8 (no function)
Footswitch status	FOOTV?	0= released 1= triggered

10.2.6. Window « Lock »



Window "Lock"			
Rubric	Read. command	Write command	Comment
Protection	LOCK?	LOCK	Lock
		UNLOCK	Unlock
Code	PASS?	PASS=xxxx	xxxx = password with 4 figures

10.2.7. Measuring screen



Measuring screen			
Rubric	Read. command	Write command	Comment
Zero		ZERO	Switch to relative mode
		ZERO 1	switch the characteristic 1 to relative, returns ZERO 1 DONE
		ZERO 2	switch the characteristic 2 to relative, , returns ZERO 2 DONE
		ZERO ALL	switch the characteristic 1 & 2 to relative, returns « ZERO n DONE »
Clear zero		ABS	Switch to absolute mode
		ABS 1	switch the characteristic 1 to absolute, , returns ABS 1 DONE

		ABS 2	switch the characteristic 2 to absolute, returns ABS 2 DONE
		ABS ALL	switch the characteristic 1 & 2 to absolute, returns « ABS n DONE »
Clear		CLR	Start dynamic measurement
Preset		PRESET	Calibration
		PRESET 1	Calibration char. 1, returns PRESET 1 DONE
		PRESET 2	Calibration char. 2, returns PRESET 2 DONE
		PRESET ALL	Calibration char. 1 or 2, returns « PRESET n DONE »
Print			Measurement transfer : If 1 characteristic mode, transfer the value with the format :+000.00000<CR> If double characteristic mode, transfer the value with format : +000.00000,+000.00000<CR>
		?	
		1	Transfer the characteristic 1, format = +000.00000<CR>
		2	Transfer the characteristic 2, format = +000.00000<CR>
Char. Status	nETA ?		
Char. value	nMAX? nMIN? nMOY? nMED?		Value max since the last clear
			Value min since the last clear
			Value average since the last clear
			Value median since the last clear
Periodic transfer activated		Xnnnn	Activate the transfer of characteristics value to RS232 port every nnnn*100ms, the value 0 stop the transfer.
Part	G?	G1	Part 1
		G2	Part 2
M3 power off		OFF	Shut down the M3
Reset the M3		RST	Reset the unit (remove the configuration, calibration etc)
Factory reset		FCTRST	Deep reset
Gives a manufacturing order number	OFA?	OFA=xxxxxxxxxxx	The manufacturing order number appears on the top bar of the measuring screen, and then when exporting on USB, the export file will have the name xxxxxxxxxxx.csv. Max 12 characters
Active screen	AKTIV?		1=measuring screen displayed otherwise 0

10.3. Summary table of function additions according to software/hardware version

Software version	P/N	Screen or function concerned	Added functions
3.30	All	Set up\MB-IO or MB-RO	Module state active ECO mode Pilot of an output with the footswitch
	13010 1301T 1301M	Setup	Bargraph to position inductive probes (METRO/TESA/MAHR)
	13040 11040		2 masters even if no taper nor half taper
	All	RS232	nSTATE? Characteristic state ACTIV? Activ screen PRESET1/2/ALL specific characteristic calibration ZERO1/2/ALL switch the specified characteristic to relative ABS/1/2/ALL switch the specified characteristic to relative
	13040 11040		AGG? Calibration with an AG Gain or not AGGn? Gain used AGGn=x.xxxx Gain programming channel n AGE locks gains modification protection
3.28	1301S 1301MPS		Variants for SOLARTRON and MARPOSS probes
3.26	11040 13040	Factory Setup	Possibility of replacing the 2/3 points calibration of an Air Gauge channel by only 1 coefficient in the case where only 1 master is available
	13040	Measure	- if a probe is in default (detected only at start-up, same as red LED on MB-AG), the measurement screen banner turns red - In simple display, the P1 banner turns red if probe 1 is in default, same for P2 with probe 2 - In dual display, the banner turns red as soon as one of the probes is in default.
	All	Setup	- On the MB-2S external inputs, the multiplier coefficient of each channel is replaced in the settings by the filter level - Support of MB-2S IP2000 (IP200 before : limitation of the interpolation)
3.25	All	Modbus	Function 6 in modbus (one word writing)
3.23	All	Modbus configuration	Transfer MB-NET via modbus (register #10)
3.22	All	RS232 QR code	Commands CFG_ENTER et CFG_LEAVE to prohibit the refreshing of the measurement screen while configuring the characteristics
3.21	All HW2+	Setup	Support MB-AG v1.10 (0.00001)
		Export USB	GO/ NOGO USB stick
3.20	All	Setup\MB-NET	- Window setup MB-NET - « MB-NET » in Mbus setup screen
		Setup\MB-IO	Function "preset duration"

3.15	11040 13040	Setup	Formula half taper
3.10	All	Measure configuration	Numerical value replaced by "-----" if obsolete preset
3.04	All	Definition	Limite control self-configurable (menu definition/limCtrl)
3.01	All HW2+	Measure definition	Management of DMS (degree minute second) for the tolerance
		Setup\MBus	Display MBus menu, tab A-B instead of C1-C2
3.00	All HW2+	Start up	Display of hardware and software version on the start-up screen
		Modbus	The life_word modbus increments by 1 at the frequency of 10 Hz
		RS-232	- Command RST => param_init(false) - Command FCTRST => param_init(true) - Collection of command CLASS :
		Setup	- MB-1D compatibility adds on. Filter mode included for the 1D. (not for the 4D or 8D) - Management of the MB-1A
		Configuration	- Implementation of the usb host on the new inductive hardware, ip2000 and ttl. - Feature Beep, buzzer - feature Hour with timestamp of files on USB stick - Function screen shot to USB stick Name of the screen capture image file containing a number starting from 0 (each time the display is started) and which increases with each image taken if there is no RTC in the product
	Setup	Text A, B instead of C(1), C(2)	
	11040 13040	Measure definition	6 digits resolution

11. DATA EXPORT ON USB KEYS

The M1 and M3 offer various possibilities for data export.
From the software version 2.1 new functionalities have been added offering the possibility to export with advanced functions to USB keys or network.

The key must be empty of files and formatted in FAT, it must not have a partition.
For saving the data on the USB key, you must configure the menu CONFIGURATION
→ COMMUNICATION → USB Key

Then, when the transfert is triggered (by footswitch, touch of the PRINT button, by an input action or Modbus), a file will be created on the USB key.

11.1. Standard mode :

As a standard a file named “output.csv” is created on the USB key with the following format:

Characteristic	1	2		COMMENT
Name	P1 : C(1)	P2 : C(2)		<i>Name of the characteristics (PART x – CHANNEL x)</i>
Upper tol.	+0.02100	-0.00700		<i>Upper tolerance</i>
Nominal	+20.00000	+20.00000		<i>Nominal value</i>
Lower tol.	+0.00000	-0.02000		<i>Lower tolerance</i>
Measure	+20.00012	+19.99350	GO	<i>Data #1 + indication GO</i>
Measure	+20.00011	+19.99340	GO	<i>Data #2 + indication GO</i>
Measure	+20.00010	+19.99980	NG	<i>Data #3 + indication NG</i>

11.2. Advanced mode :

It is possible to connect a QR code reader (METRO ref ACS-AFF-003), and to input a manufacturing order number on the display.

After scanning the QR code corresponding to the manufacturing order number, the number will appear on the top bar of the measuring screen, and the output csv file will get the name of the scanned name. Then each time you scan a new number, after saving the first part, a file is created on the USB key.

The command to encode the QR-code is : OFA=xxxxxxxxxxxx

Example :

Standard screen before scanning manufacturing number:



After scanning the following QR code, corresponding to the command

OFA = ORDER 12345



The screens become like this:



Then when you press the PRINT button the first time, a file is created on the USB key with the name: ORDER 12345.csv

12. CONFIGURATION OF THE UNIT WITH QR CODES

The M1/M3 displays offers the possibility to be configured by a simple scan of QR code. You should use the QR Code reader Metro reference ACS-AFF-003.

This will simplify the configuration and reduce risks of errors. It takes less than 2 seconds to configure the display with a QR code scan.

List of commands :

All the RS232 commands listed on the table chapter 10 - RS232 communication can be encoded on a QR code.

Additionally, to this, specific commands are reserved for the calibration procedure of the M1/M3.

12.1. Calibration commands:

It is possible to launch a calibration procedure with the QR code:
The QR code must be encoded according to the following layout:

Instructions	Corresponding QR Code
<pre>AGI; // Initialisation AGL=1; // Configuration of input 1 AGF=1; // Filter level (from 0 to 5) AGN=20.00000; // Value of the MIN master AGC=20.01000; // value of the CENTRAL master (optional) AGA=20.02090; // Value of the MAX master AGS // End of calibration configuration + display of the configuration window</pre>	

If you want to configure 2 channels, same principle but you should insert the commands to calibrate the channel 2 :

Instructions	Corresponding QR Code
<pre>AGI; // Initialisation AGL=1; // Configuration of input 1 AGF=1; // Filter level (from 0 to 5) AGN=20.00000; // Value of the MIN master AGC=20.01000; // value of the CENTRAL master (optional) AGA=20.02090; // Value of the MAX master AGL=2; // Configuration of input 2 AGF=2; // Filter level (from 0 to 5) AGN=19.9807; // Value of the MIN master AGA=19.9932; // Value of the MAX master AGS; // End of calibration configuration + display of the configuration window</pre>	

12.2. Advanced configuration

The previous chapter shows how to configure the calibration. It is possible to go further and configure the whole device.

The goal of the configuration by QR code is generally to save time and limit configuration errors when the air gage is changed often on the display. Before sending a new configuration to the display, it is recommended to start sending a reset command, so that all the previous parameters will be reset the default; because the QR code we only modify the encoded parameters. Other parameters will remain the same.

This command is : RST

After sending this command, you must start the configuration by the general parameters, then configuration of the characteristics, and at the end sending the calibration commands as described on the previous chapter.

12.3. Example of QR code configuration

The following example shows a complete configuration of the unit with QR code.

We use 2 air gages (1 plug and 1 ring) mounted on a plate, for pairing (diameter 20H7 and 20g6).

We must calculate and display the difference between the diameter 20H7 and the diameter 20g6.



Instructions	Corresponding QR Code
<pre> RST; // Reset all the previous parameters. CFG_ENTER; // Locks characteristics display update while characteristics setting 1RES=4; // Change the resolution to display 4 digit (0.1µm) 1REF=PAIRING; // Change the characteristic name to PAIRING 1UT=+0000.0402; // Upper tolerance 1NM=+0000.0000; // Nominal 1LT=+0000.0068; // Lower tolerance 1MT=+0000.0068; // Master value 1FM=5; // Formula = C1-C2 BAR=1; // Bargraph type = horizontal with left origin DISPL=1; // Display type = simple (only 1 bargraph) CFG_LEAVE; // End of lockdown AGI; // Initialisation of air gage calibration AGL=1; // Configuration of input 1 AGF=0; // Filter level (from 0 to 5) AGN=20.0000; // Value of the MIN master AGA=20.0209; // Value of the MAX master AGL=2; // Configuration of input 2 AGF=0; // Filter level (from 0 to 5) AGN=19.9807; // Value of the MIN master AGA=19.9932; // Value of the MAX master AGS; // End of calibration configuration + display of the configuration window </pre>	

After this configuration, a popup window appears asking :

“DEACTIVATE CALIBRATION ?” YES / NO

Press yes and the previous calibration will be erased, then the window for calibrating the display opens. You just need to finish the calibration procedure by placing the MIN and MAX masters for C1 and C2.

Then go the measuring screen, place the master diam 20.0000 mm on C1 and diam 19.9932mm on C2, then press PRESET.

The value changes to 0.0068.

The display is ready to measure.

You can then scan a manufacturing order number if requested to export the data, as describes on the chapter “DATA EXPORT ON USB KEYS”.

13. MODBUS RTU Protocol

This protocol allows to connect the M3 to a compatible PLC. A maximum of 256 register can be read.



Example of a RTU Modbus communication with an automate Pro-Face. This example can be download from our website www.metro-fr.com

Trame Modbus RTU

Adr	Code	Data	CRC16
-----	------	------	-------

Address: always equal to 1

Code: the M3 supports codes « 3 » by reading and « 16 » by written

Data: 1 to 256 register

CRC16: verification code on 2 octets

The following functionality are available:

- Reading of the position of 2 probes
- Instant reading of the value of 2 characteristics
- Preset
- Reading / programming of the tolerances, of the master value, the formula...

Register are compounded by one or a couple of 16 bits words.

Function	Address	Size (word)	Value
Preset (W)	0	1	1
Start a dynamic measure (W)	1	1	1
Active program (R/W)	4	1	0 or 1
Life word (change each 100ms) (R)	6	1	0 or 1

Stop	7	1	1
Active M3	8	1	1 = measure screen 0 = menus

Register by characteristic: from 100 to 188 for the characteristic 1 and from 200 to 288 for the characteristic 2

Formula (R/W)	100	1	0 = C1 1 = C2 2 = -C1 3 = -C2 4 = C1 + C2 5 = C1 - C2 6 = -C1 + C2 7 = -C1 - C2 8 = 3 points for C1 9 = 3 points for C2 10 = taper 11 = half taper
Maxi of a dynamical cote (R)	101	2	
Mini of a dynamical cote (R)	103	2	
Lower control limit (R/W)	105	2	
Upper control limit (R/W)	107	2	
Active class	109	1	1 à 16
Unit	110	1	0 = mm 1 = inch 2 = μm 3 = DMS (deg min sec) 4 = DEG (decimal deg)
Control limit activated	111	1	0 = no 1 = yes
resolution	112	1	1 to 5 (decimal)
State of the characteristic	113	1	0 = good 1 = < Lower tol 2 = > Upper tol 3 = lower tol < c < lower limit 4 = upper limit > c > upper tol 5 = error
Type of the characteristic	114	1	0 = Static 1 = Maxi 2 = Mini 3 = Maxi-Mini 4 = Average 5 = Median
Nominal	115	2	
Lower tolerance	117	2	
Upper tolerance	119	2	
Master value	121	2	
Measure	123	2	Displayed value

Mini class 1	126	2	
Mini class 2	128	2	
Mini class 3	130	2	
Mini class 4	132	2	
Mini class 5	134	2	
Mini class 6	136	2	
Mini class 7	138	2	
Mini class 8	140	2	
Mini class 9	142	2	
Mini class 10	144	2	
Mini class 11	146	2	
Mini class 12	148	2	
Mini class 13	150	2	
Mini class 14	152	2	
Mini class 15	154	2	
Mini class 16	156	2	
Maxi class 1	158	2	
Maxi class 2	160	2	
Maxi class 3	162	2	
Maxi class 4	164	2	
Maxi class 5	166	2	
Maxi class 6	168	2	
Maxi class 7	170	2	
Maxi class 8	172	2	
Maxi class 9	174	2	
Maxi class 10	176	2	
Maxi class 11	178	2	
Maxi class 12	180	2	
Maxi class 13	182	2	
Maxi class 14	184	2	
Maxi class 15	186	2	
Maxi class 16	188	2	

probe 1	7000	2	
probe 2	7002	2	

14. OPTIONNAL M-BUS MODULE

14.1. MB-IO module

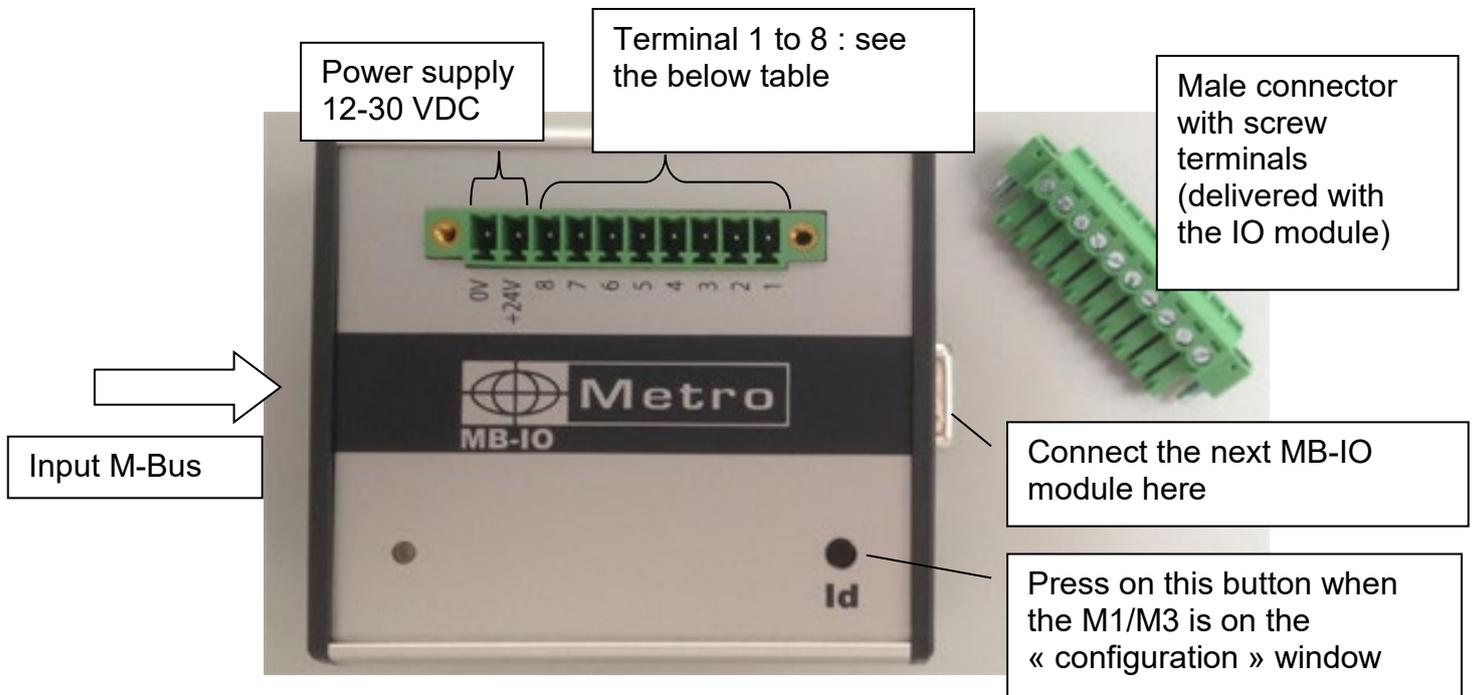
As an option, it is possible to connect up to 4 M-Bus modules with 8 inputs/output isolated by opto-coupler. (ref MB-IO)

The 8 outputs are similar to the « open collector PNP » type. They can be used with an external power supply 12 to 30 VDC maximum. The maximal output current drained by each output is 50mA

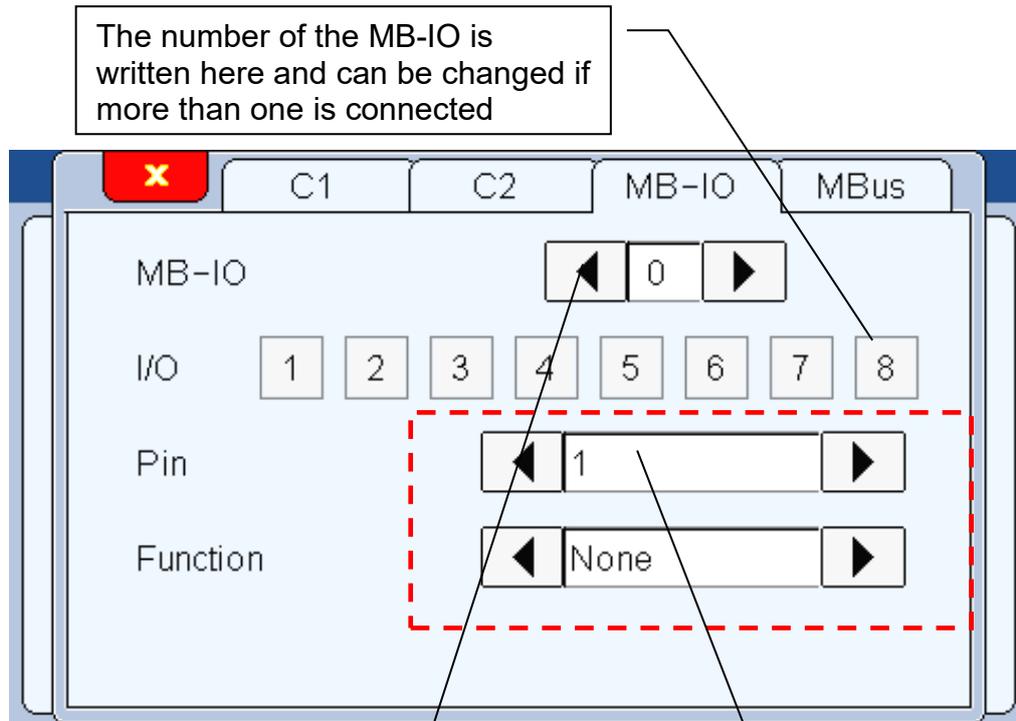
The 8 inputs represent a 2.2kOhms load connected to the 0 volt.



Connection principle :



After adding the MB-IO module according to the process described in chapter 7.3.2, the configuration of the channels is done by clicking on the MB-IO tab



These buttons are used to output a 24VDC signal on specific port of the MB-IO to check the installation.

At the opposite, if you input a 24VDC on a terminal, the corresponding button becomes green.



The function of each port of the MB-IO can be set with this 2 menus. The first one is for the number of the Pin, the second one defines the associated function

List of available functions :

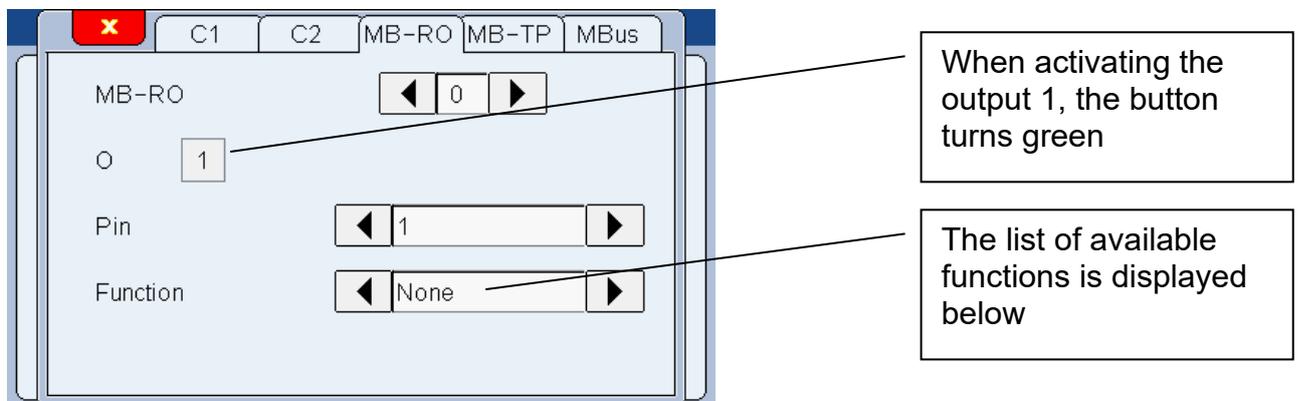
Function	I/O		Description
Transfer	Input		Print, transfer the measured value
Preset	Input		Set the display value to the master value
Zero	Input		Set the display value to 0
Clear	Input		Reset the dynamical measure
Init Dyn	Input		Start a dynamical measure
State characteristic	Output	High/Low	Output a signal if the characteristic is in the tolerance
Lower control limit	Output	High/Low	Output a signal if the part is below the lower control limit
Upper control limit	Output	High/Low	Output a signal if the part is in above the upper control limit
Out Tol -	Output	High/Low	Output a signal if the part is below the lower tolerance
Out Tol +	Output	High/Low	Output a signal if the part is above the upper tolerance
Part status	Output	High/Low	Output a signal if the part is in the tolerances
Class	Output	High/Low	Output a signal on a defined port for each class
Stop	Input		Hold the measure
characteristic	Input		Change the displayed characteristic
Touchscreen	Input		Disable the touch screen function
ECO mode	Output	High/Low	Control of the automatic pressure reduction, requires a regulator ref ACS-PNE-004 and the cable 45186
Footswitch	Output	High/Low	Trigger the active or inactive status of the module depending on the state of the footswitch (pushed/released) OR Trigger the active or inactive status of the module according to the impulse given by the footswitch (toggled pushed/toggle released). It is then possible, for example, to control the regulators via a footswitch
Activ	Output	High/Low	Indicate if the measurement screen is displayed, in this case the measurements and the associated states are valid

14.2. Module MB-RO (relay Output)



The MB-RO module works like the MB-IO, but with only 1 relay output. (The MB-IO output are managed via optocouplers)

It must be powered by the 24VDC. The adapted power supply is delivered together.



The MB-RO allows to manage the ACS-PNE-004 regulator to save air when measuring by air gage.



ACS-PNE-004 pour tampons pneumatique avec fonction d'économie d'air.

After identifying a MB-RO module, 2 actions are possible:

A- Test the output by touching the button (the button turns green when the output is activated)

B – Assign a function from the menu “Function”. If no function is attributed, you can use the MB-RO directly on a sequence thanks to the instructions “activate / deactivate output” (see the corresponding chapter about the sequences mode)

Depending on the function chosen, additional parameters can be required on the window.

Function	Description
None	No function is assigned
Eco Mode	Control of the automatic pressure reduction, requires a regulator ref ACS-PNE-004 and cable 45186
Footswitch	Trigger the active or inactive status of the module depending on the state of the footswitch (pushed/released) OR Trigger the active or inactive status of the module according to the impulse given by the footswitch (toggled pushed/toggle released). It is then possible, for example, to control the regulators via a footswitch
Activ	Indicate if the measurement screen is displayed, in this case the measurements and the associated states are valid
Characteristic status	Indicate if the characteristic is within the tolerances
Ctrl limit -	Indicate if the characteristic is under the lower control limit (too small)
Ctrl limit +	Indicate if the characteristic is above the upper control limit (too

	large)
+ No go	Indicate if the characteristic is under the upper tolerance limit
-No go	Indicates if the characteristic is above the lower tolerance limit
Part status	Indicate if the part is within the tolerances (so if the 2 characteristics are good)
Class	Indicate if the part belongs to the class defined on this port

Pinout of the M12 connector:

1 : 24VDC

2: NC

3: GND

4 : Out

You need therefore a M12 male connector (code A). **You can use the Metro cable ref 45186 (length 1.5m)**

14.3. Module MB-RC (4 buttons command)

The MB-RC module is a box with 4 programmable buttons and is useful when a single footswitch is not enough.
You can connect it to the output of a module.



Identify it from the MBUS menu and assign a function to each button. The list is available below:

Fonction	Description de la fonction
Aucune	
Transfer	Transfer the measured value
Preset	Replaces the current measurement value with the master value
Zero	Set the displayed value to zero
Clear	Reset the dynamic measure
Init Dyn	Start a dynamic measure
Hold	Freeze the measurement screen of the characteristic 1 or 2
Characteristic	Set the characteristic 1 or 2
Touch screen	Deactivate the touch screen function

14.4. MB-RL module

Please refer to the chapter 7.3 (Setup) to connect a M-Bus module

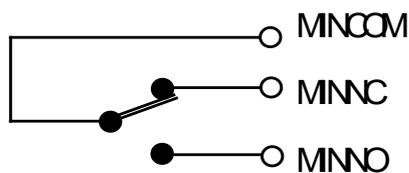


The MB-RL module has been designed for retrofitting old Monocote displays equipped with the optional relay board.

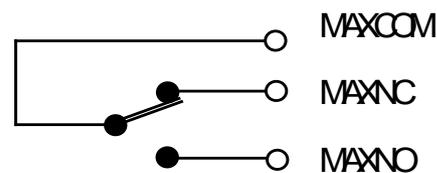


The external M-bus module has the same pinout (SUBD-15) than the relay board of the Monocote display, so there is no need to change the wiring of the existing installation.

The MB-RL has two independent and isolated relays indicating the position of the displayed measurement by comparison with the tolerances. Each relay provides a contact that is normally open in case the measurement is within the tolerances (MINNO and MAXNO) and a contact that is normally closed (MINNC and MAXNC). The commons of each relay (MINCOM and MAXCOM) are independent, so that the user is as free as possible.



RELASTOLERANCE MIN



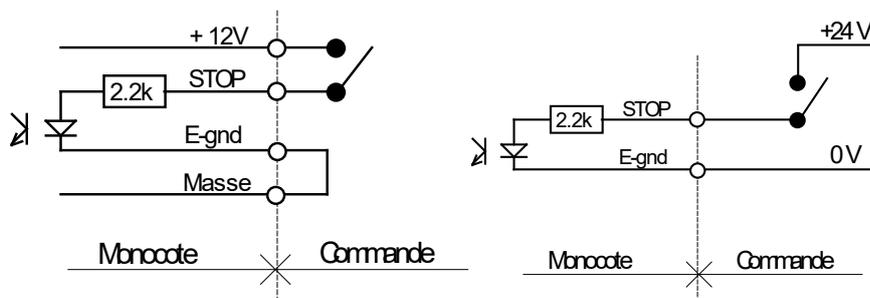
RELASTOLERANCE MAX

Four inputs isolated by opto-couplers enable to operate the M3 by remote control. They are active at the logical level 1 (+12 to + 24 Volts) that must be maintained at 1 for 50 milliseconds minimum. The command is effective when the input comes back to zero, except for the input STOP that stays active as long as the logical level 1 (+12 to + 24 Volts) is maintained.

- **INITDYN** : This input controls the initialisation of memories for the dynamic measurement. It must be used every time the dynamic measurement starts, when the part to be measured is already in place under the probes. This command has the same function as the button “CLEAR” of the measuring screen.
- **STOP** : This input stops the measurement (and freezes the screen) as long as it is maintained at the logical level 1.
- **ZERO** : This input controls the zero reset of the display. The display then indicates the variations of the measurement in comparison with this origin. This command has the same function as the button “ZERO” of the measuring screen
- **PRINT** : This input controls the sending onto the communication port of the displayed measured value. This command has the same function as the button “PRINT” of the measuring screen
- **PRESET** : External command of calibration according the selected working mode. This command has the same function as the button “PRESET” of the measuring screen

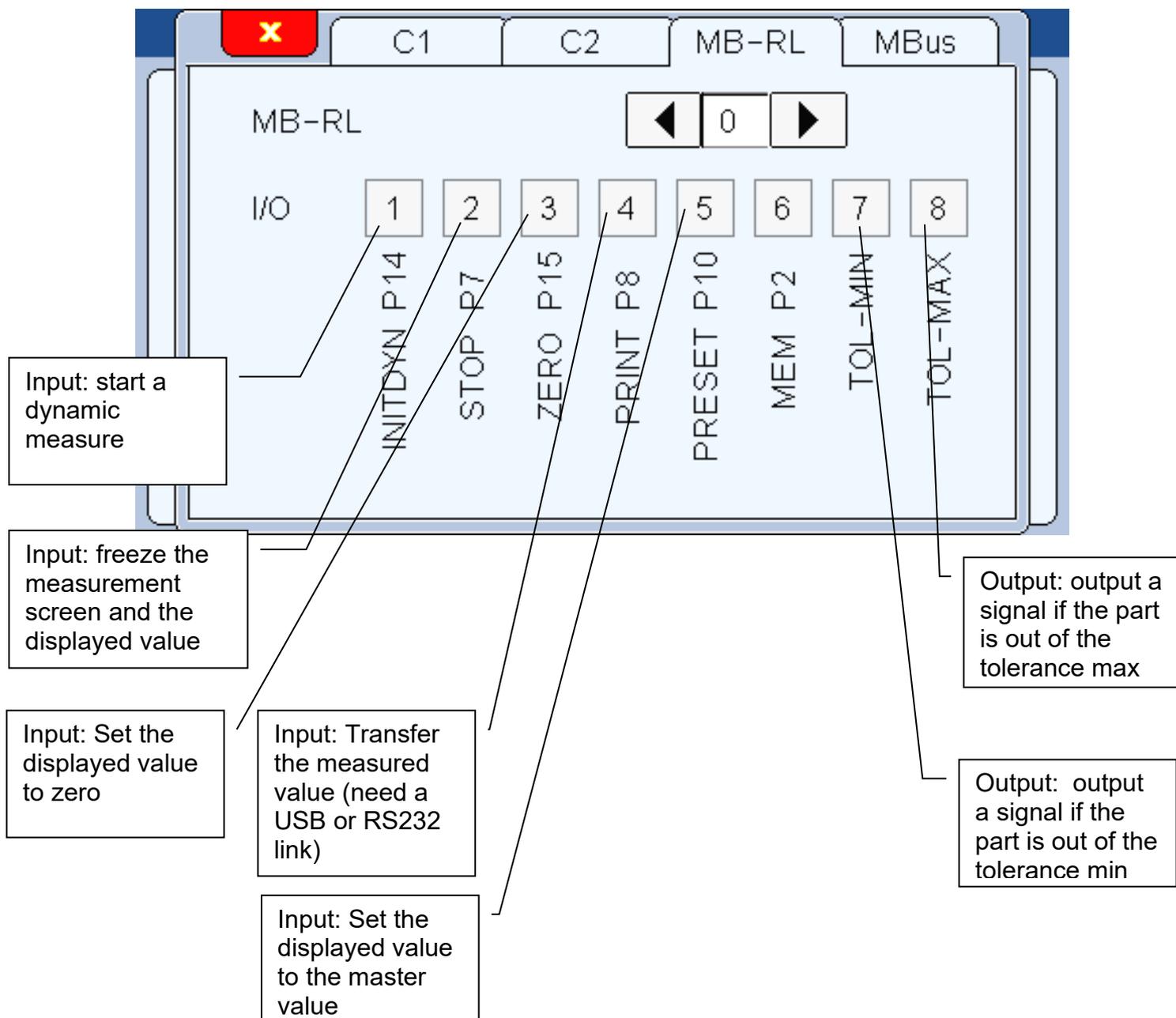
SUB D connector (15 pins) : pin assignment

Borne	Signal	Sens	Description
1	+5 V	output	Power supply to activate the inputs
2	Not connected		
3	MINNC	-	Mini tolerance relay contact 1A 48V
4	MINCOM	-	Common of mini tolerance contacts
5	MINNO	-	Mini tolerance relay contact 1A 48V
6	E_GND		Input ground
7	STOP	input	Stop mode
8	PRINT	input	measurement transfer
9	Ground	-	Supply ground
10	PRESET	input	External calibration
11	MAXNC	-	Maxi tolerance relay contact 1A 48V
12	MAXCOM	-	Common of maxi tolerance contacts
13	MAXNO	-	Maxi tolerance relay contact 1A 48V
14	INIDYN	input	measurement initialisation
15	ZERO	input	Command for display reset to zero



Command example: with internal supply (not isolated) and with an external supply (isolated).

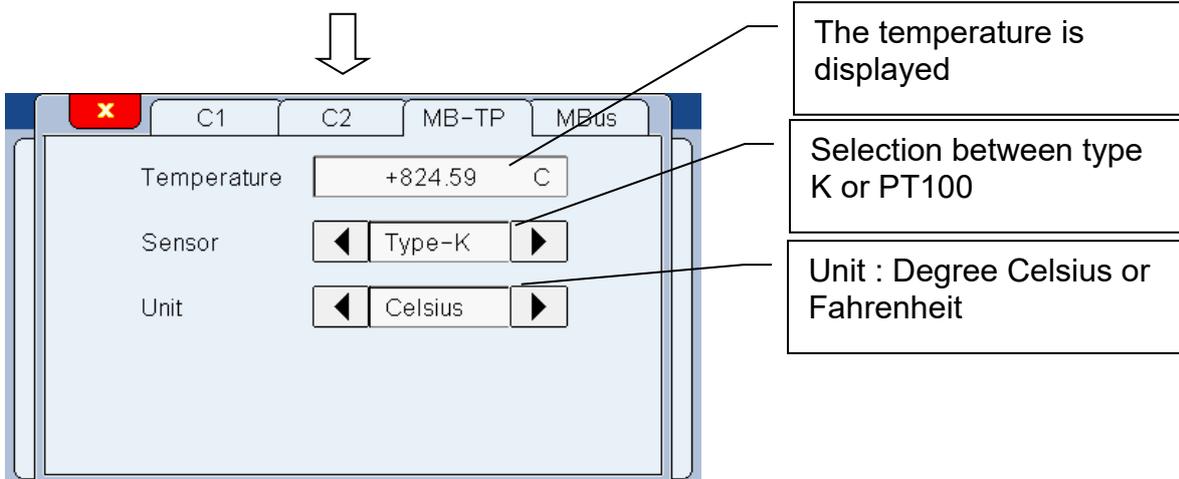
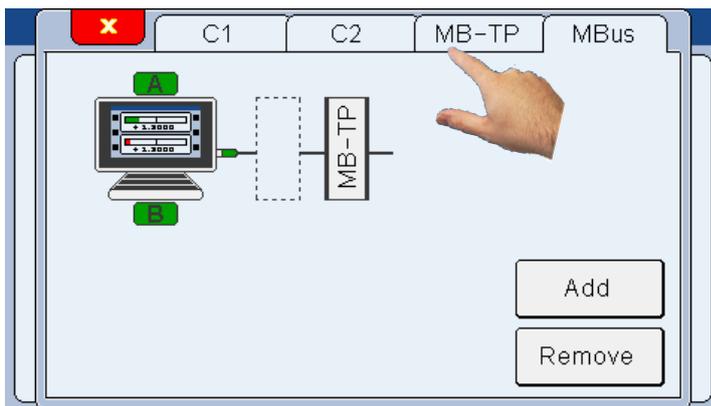
The following screen appears on the M3 when a MB-RL is connected. There is a function for each of the 8 ports, and these functions can't be changed.



14.5. MB- TP Module – for temperature compensation

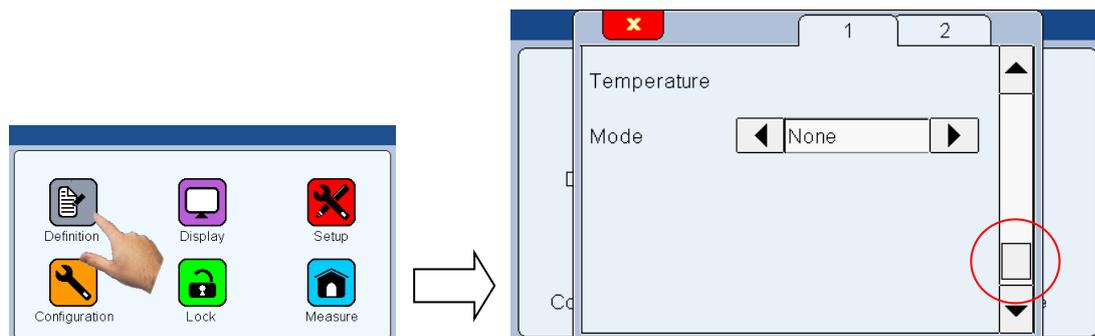
The MB-TP module allows to use an isolated thermocouple type K (hot junction) or PT100 sensor.
2 functions are then available: alarm or compensation.

14.5.1. Identification and configuration of the Temperature module MB-TP



14.5.2. Configuration of the temperature mode

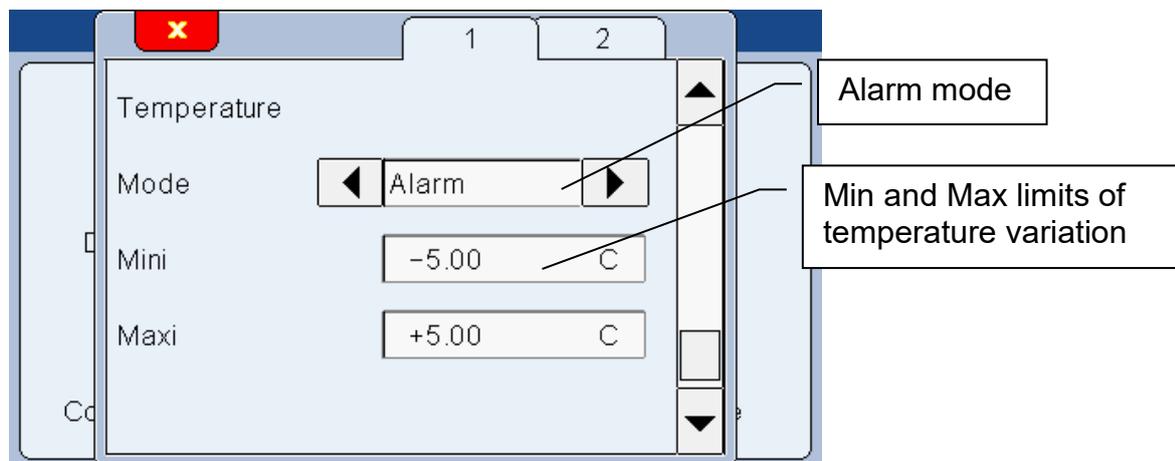
After the identification described on the previous chapter, a new window is available from the last page of the menu DEFINITION.



As a standard, the temperature mode is deactivated. You can now choose between:

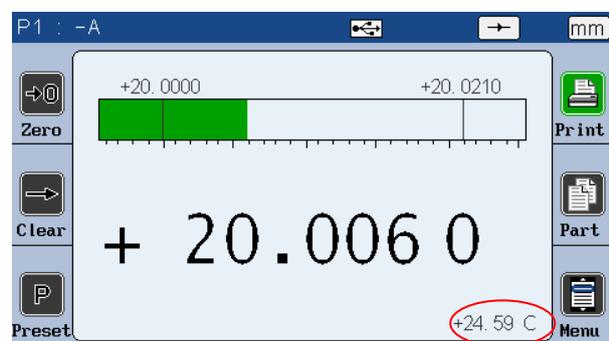
a – Alarm mode

When selecting the Alarm mode, it is required to define the temperature variation acceptability, with a MIN and a MAX, in the chosen unit.

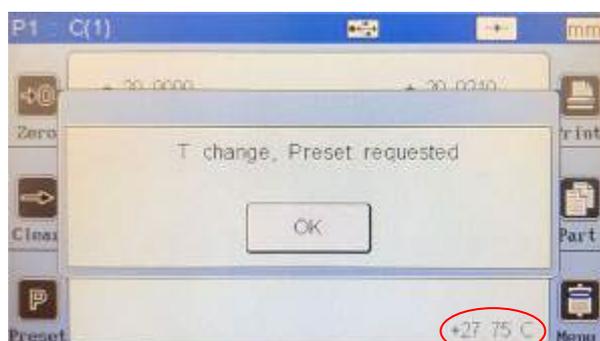


Here we selected +/- 5°C of allowed temperature variation.

From the measuring screen : After a PRESET, the actual temperature is recorded, and the monitoring starts.

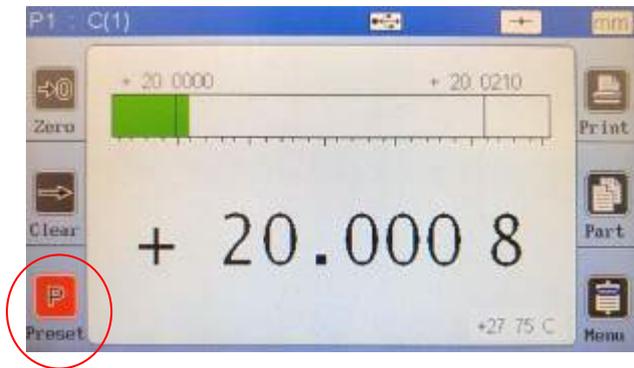


Temperature OK = no alarm



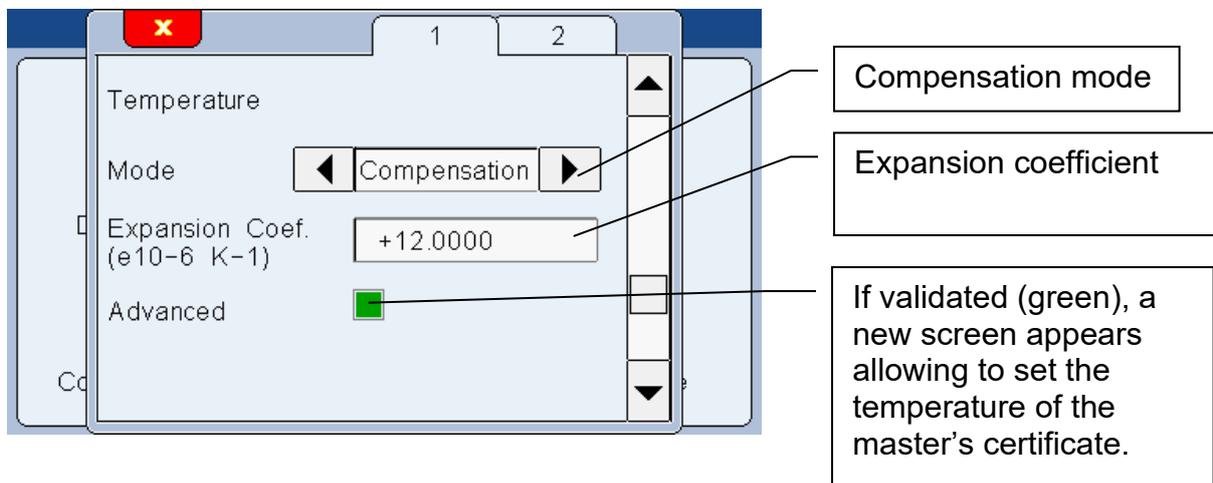
Temperature increased = alarm

After validation with the OK button, the Preset button becomes red until you make the preset :



The PRESET button becomes black again after preseting. The new reference temperature has now been moved to the actual temperature.

b – Temperature compensation mode

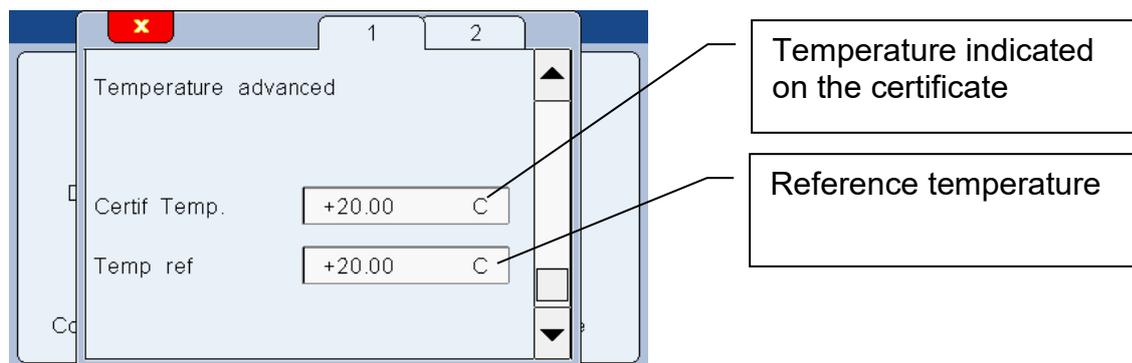


When the « compensation mode » is activated, it is requested to enter the expansion coefficient. As an information, on the below table you can see the coefficients of the main materials (source Wikipedia):

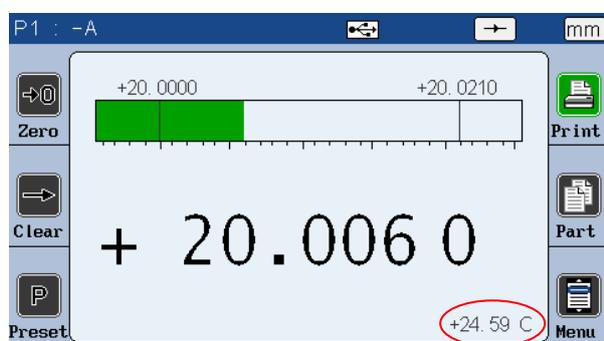
Material	α in $10^{-6}/K$ at 20 °C
Aluminium	23
Brass	19
Stainless steel	17.3
Copper	17
Gold	14
Nickel	13
Iron or Steel	11.1
Carbon steel	10.8
Platinum	9
Glass	8.5
Tungsten	4.5

The compensation is done assuming that the master part has been measured at 20°C.

If it is not the case, select the option “advanced” and a next page appear, allowing to enter the temperature of the master during the measurement according to its certificate:



When the configuration has been done, you can go to the measuring screen.



From the PRESET, the reference of temperature is done. If the temperature increases, the part becomes bigger. With the compensation, the measurement shall not change, or at least mostly limit the temperature effect, depending on the accuracy of the defined coefficient.

If you are using the advanced mode, you need to enter the temperature of the certificate, and the reference temperature.

For example, if you enter a certificate temperature of 20° and a reference temperature of 30°, when you PRESET, the displayed value will represent the size of the master at 30°.

The compensation temperature function is an advanced functionality of M3. It is recommended to make trials and comparative measurements to validate the process before using it in production.

The MB-TP module is compatible with PT100 sensors and hot junction isolated Thermocouple type K. Both of these sensors can be purchased at Metro.

14.5.3. Principle of compensation in measurement mode – use cases

The temperature compensation allows to compensate the temperature's expansion of a part and to estimate what its size will be after cooling.

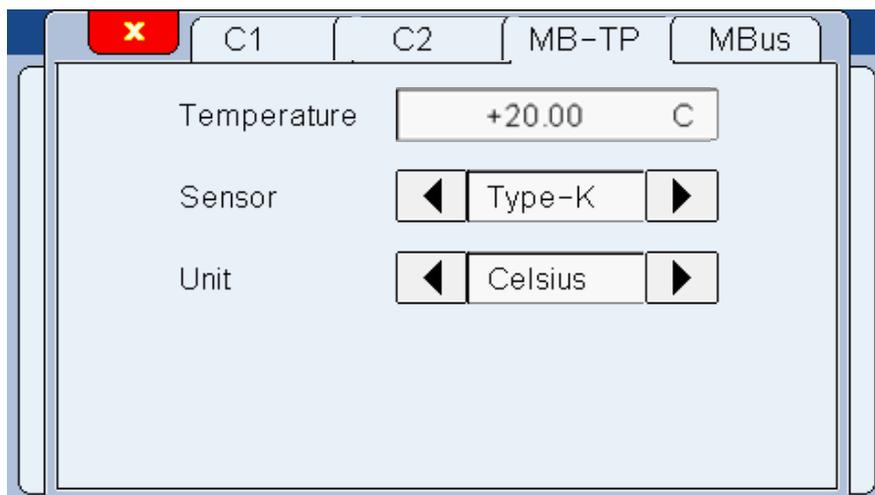
In the following example, we will consider the measurement of a 50mm mild steel ring. We have a mild steel master, the certificate gives it at 50,000 mm at 20°C. We will display on the screen the compensated characteristic and the "normal characteristic" which uses the same probe but with the compensation mode deactivated for comparison

14.5.3.1. Activating compensation

The setting of the compensation needs 2 steps

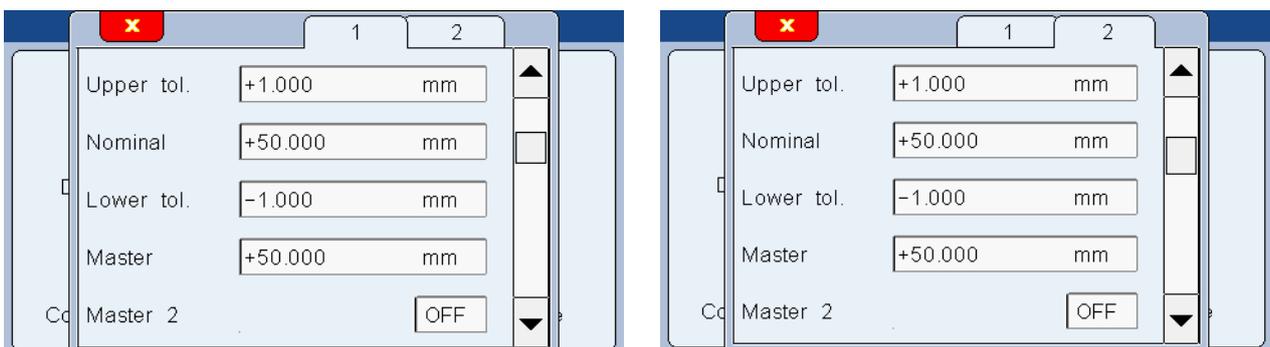
Add a temperature source

To measure the temperature, you can use an MB-TP module. Connect the module to the M3 and define the settings of the MB-TP

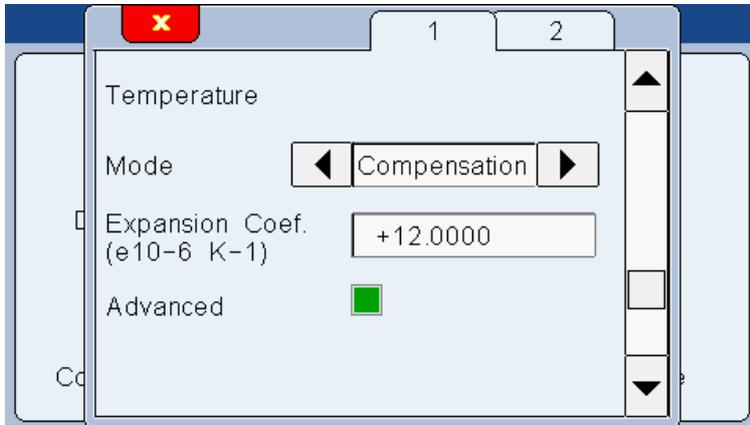


Specify the master and nominal value and the temperature source for the characteristic to be compensated

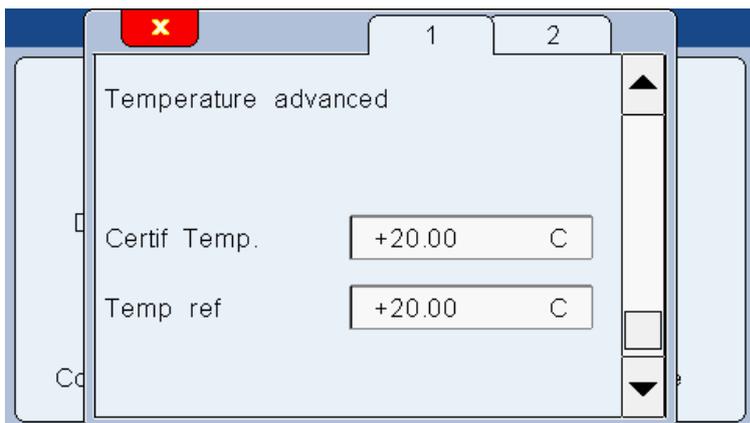
The master's dimension is 50 mm, we specify the nominal and master values for each characteristic. The nominal value shouldn't be zero.



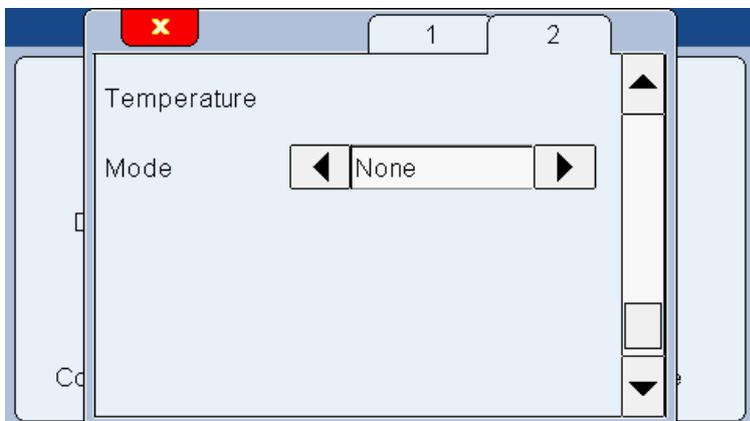
The channel 1 indicate the compensated characteristic. Our part is made of mild steel, we enter the coefficient of expansion 12.0



Then we tick the advanced mode to enter the reference temperature of the master, given by the certificate,

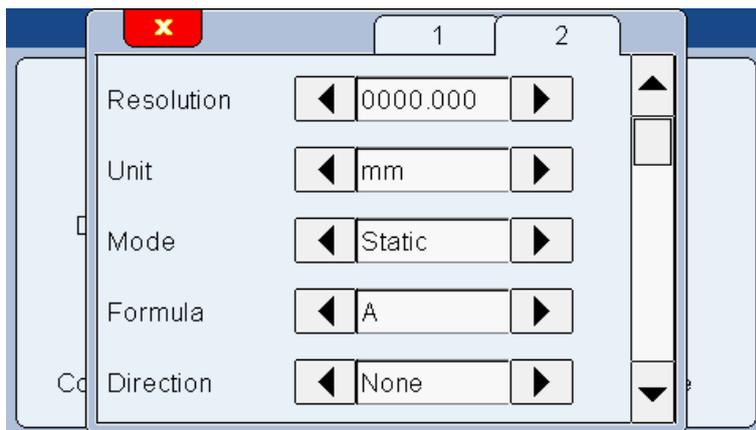
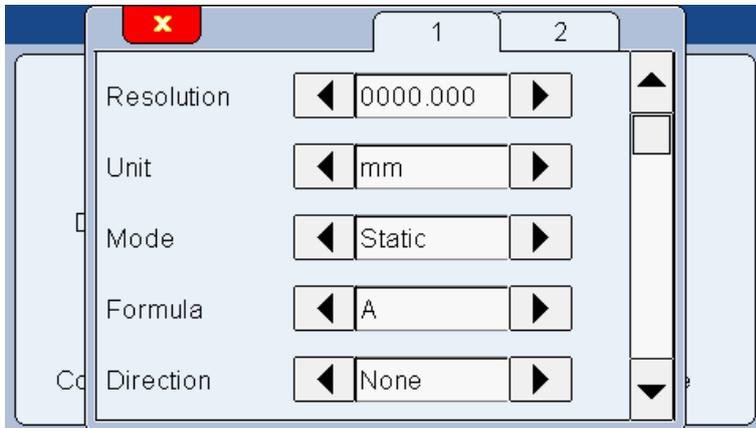


In the channel 2 the compensation mode is not activated, so we select "none"



Specific setting of the page 1 for our use cases

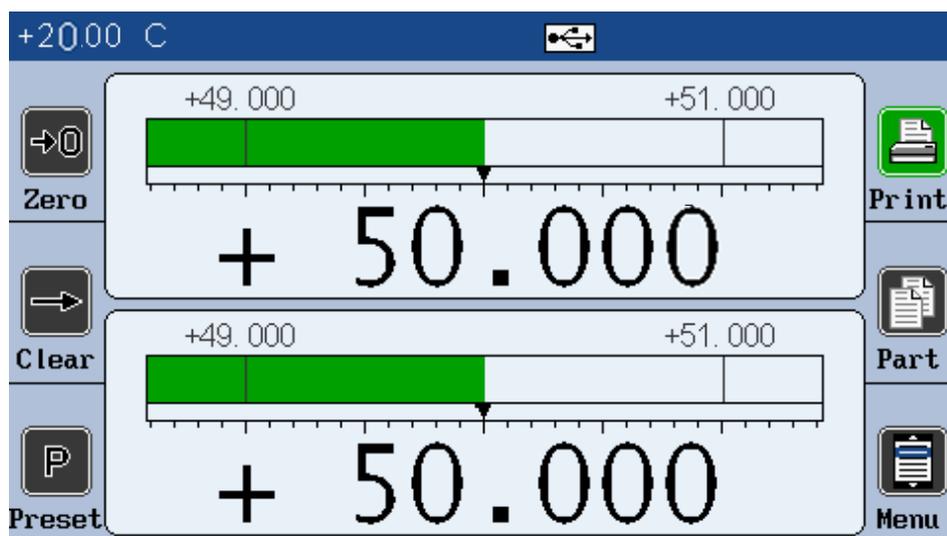
We specify the formula to be entered for each characteristic. In our example, we compare the normal characteristic and the compensated characteristic of the channel A. Then we fill in Formula A in both tabs.



14.5.3.2. Use cases

Use case 1 : Measure of a part at 50°C, calibration at 20°C

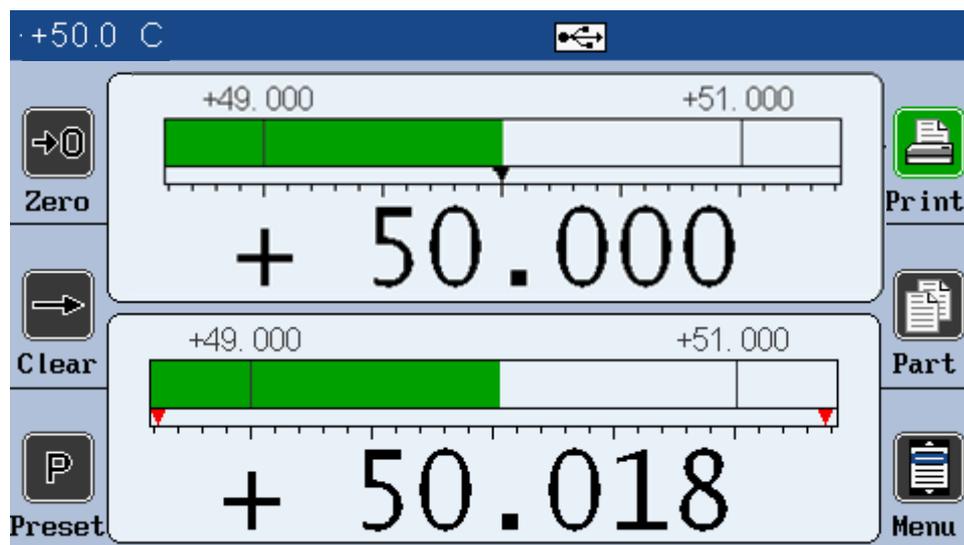
The masters of the « normal characteristic” and the “compensated characteristic” are given at 50.000mm
 We set the temperature at 20°C and we calibrate :



Both characteristics display 50.000 mm at 20°C, this is the expected result.

We heat the part at 50°C.

We expect an expansion of 18µm ($50 * 12E-6 * (50-20) = 18 \mu\text{m}$)



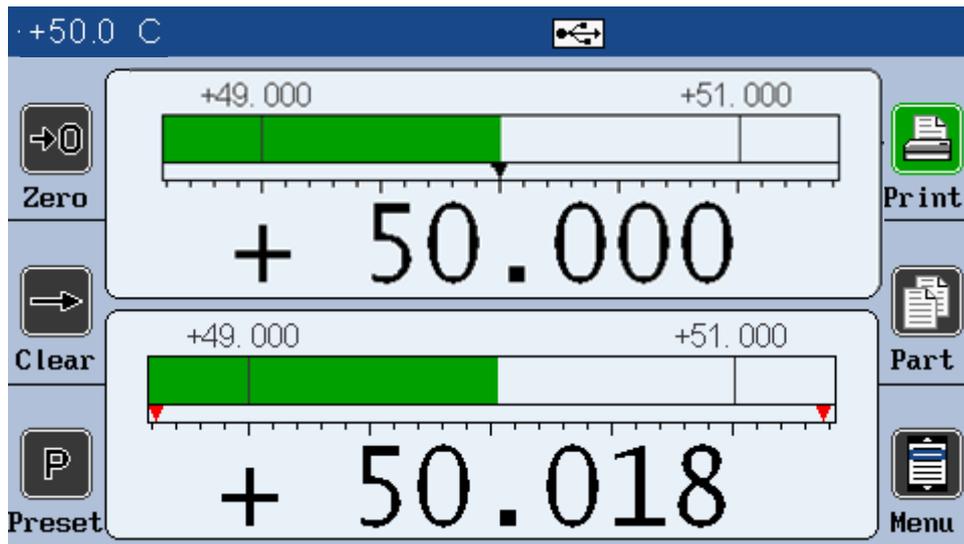
The « compensated characteristic », stayed at 50.000mm thanks to the compensation. (50.000mm is the dimension of the part at 20°C)

The « non-compensated characteristic/normal characteristic », which measures the part at 50°C, measures a gap of 18µm.

Use case n°2 : calibration at 50°C, measure of a part at 50°C, verification at 20°C

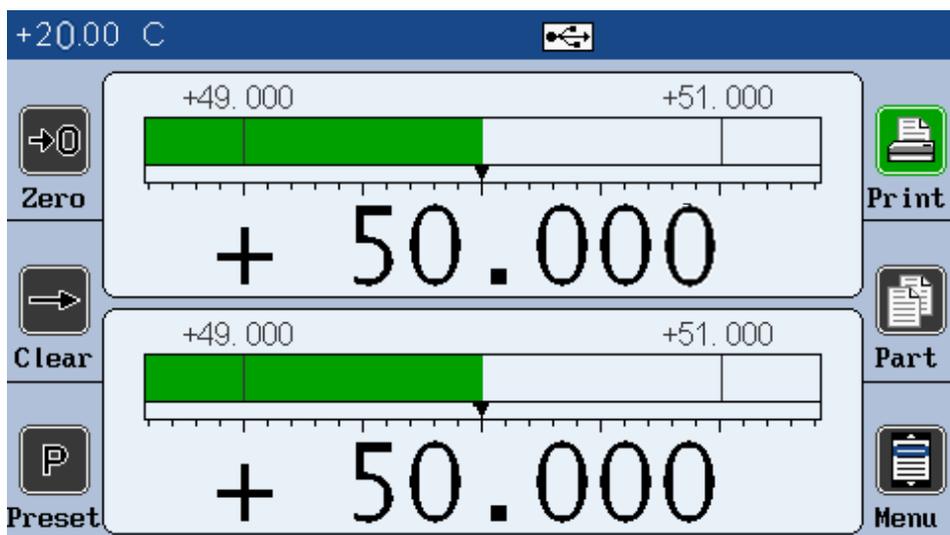
In this case, we specify the master of the “normal characteristic” at 50.018mm
 The compensated characteristic keeps the master at 50.000mm

We heat the master at 50°C, and we calibrate at 50°C



The » compensated characteristic », stays at 50mm, thanks to the master compensation during the calibration phase.

If we let everything cool down to 20 degrees, we find:



15. FACTORY RESET

15.1. Factory setting restauration

This function allows to come back to the factory setting.

Warning: At the end of this procedure, all the parameters of your M3 will be reset (tolerances, masters, formulas...)

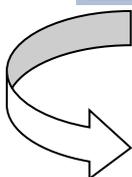
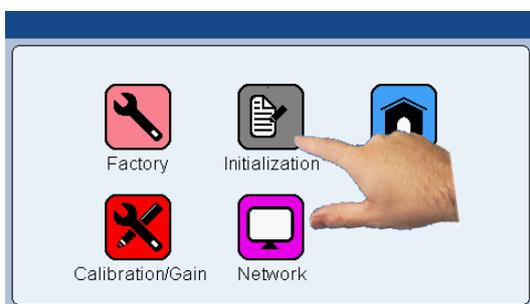
To Reset the M3 to its factory settings, please follow the process bellow.

- 1 – Shut down the M3
- 2 – Start the M3
- 3 – When the splash screen appears, press on the Metro logo
- 4 – A desktop with 3 icons appear.
 - 4a – Press on « initialization »
 - 4b – Confirm YES or cancel NO
- 5 – Press Home to come back to the measuring screen

3



4a



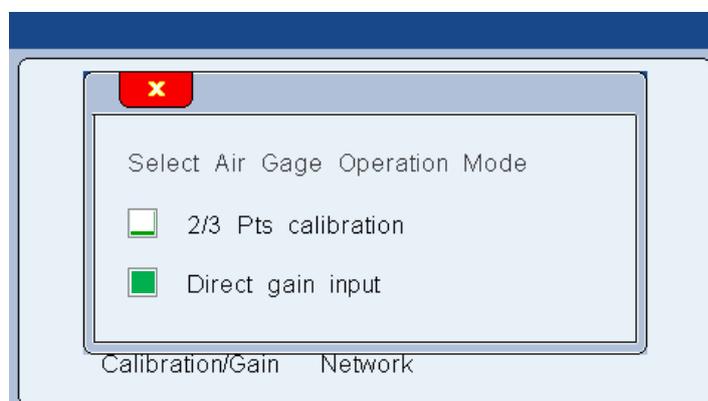
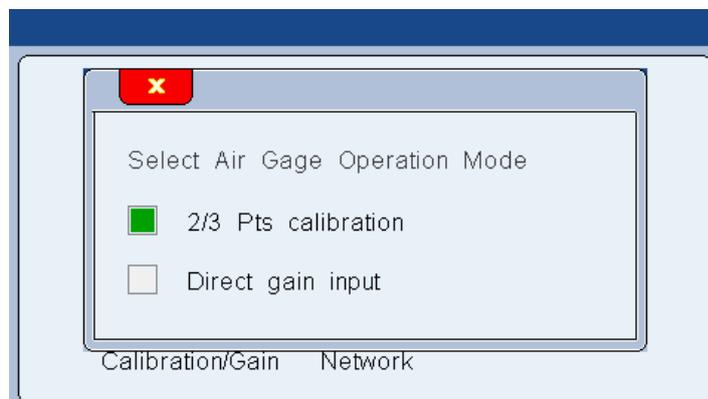
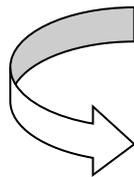
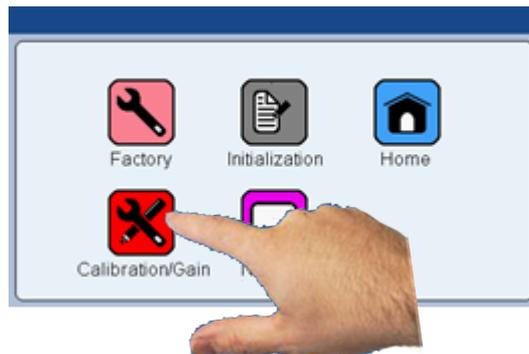
4b



15.2. Calibration and calibration gain input

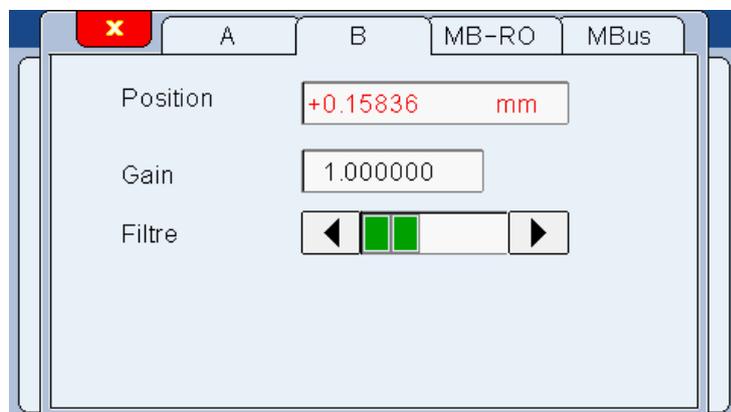
When the factory screen appears, tap the Metro logo

By using the Calibration/Gain icon you can choose the default calibration mode of the Air Gage channels. Either a calibration with 2 or 3 masters, either a direct entry of the gain of your air gage



The green square indicates the selected mode: either 2 or 3 points calibration; or calibration based on a single calibration value and a gain coefficient.

Thus in the menu SETUP->Channel A and/or B, the gain field must be entered.



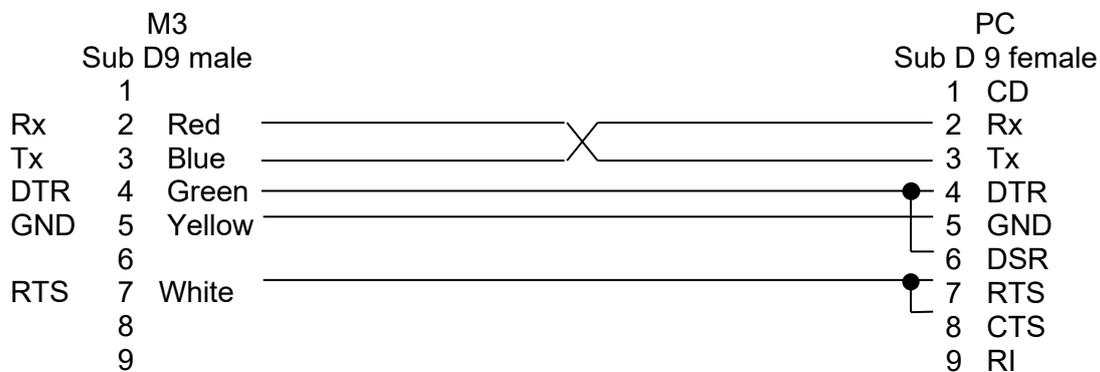
16. FIRMWARE UPDATE

It is possible to update the M3 firmware

For this you need a RS232 cable ref 18060.

It is possible to use a RS232/USB convertor if your computer is not equipped with a serial port.

If you do not have a Metro cable ref 18060, you can make your own cable by following this schematic



The firmware update requires to use the « METRO_ProductUpdateTool » software that can be download (free) from our web site Metro www.metro-fr.com (support-download, password = metro)

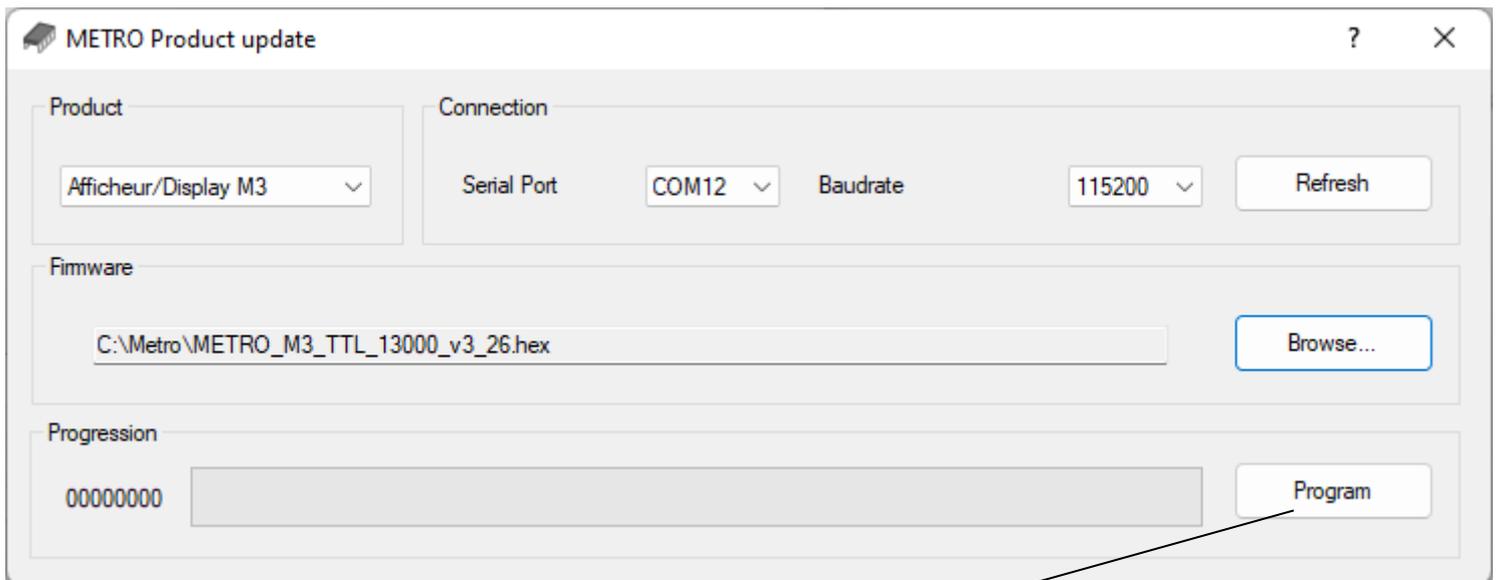
Procedure:

- 1 – Connect the M3 with the cable Metro ref 18060 to the computer
- 2 – Start the M3
- 3 – Configure the « METRO_ProductUpdateTool » » software according to the below pictures.



Select product display M3

-Fill in the Serial Port from the drop-down list.
-Select Refresh if the desired port does not appear on the list
-Go get the update file
-Click on Browse



The selected file is ready to be send. Click on program

4 – It takes nearly 5 min depending on the Baud rate selected. During the update, the screen becomes blurred.

A pop up box appears when the firmware is installed, validate with OK

5- The M3 restart automatically.

6- Reset the M3 by following the procedure on the chapter 15.1

17. TROUBLE SHOOTING

17.1. The measurement with an air gage is not linear

The linearity of the measurement depends mainly on the pressure.

It is important to have an input pressure of 3BAR (0.3MPA), and to have 2.8 BAR with a nominal part (Check and adjust the pressure from the SET UP menu by pressing Position the bar unit is displayed and the adjustment can be made. After 10s the unit returns to that of the measurement (cm / inch...)). If the pressure with a nominal part is too low, a larger nozzle must be fitted and vice versa.

17.2. The measurement with an air gage is drifting

There can be several causes:

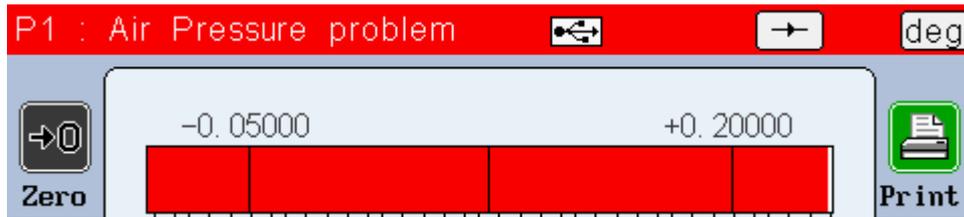
- When the air starts to circulate in the air gage, a temperature variation occurs, which generates a dimensional variation depending mainly on the size of the air gage. It is therefore recommended to allow air to circulate in the air gage a certain time before calibrating, in order to allow it to stabilize in temperature.
- If the air gage is dimensionally very close to the part and the part is covered with oil for example, the air will remove the oil slowly and the measurement will drift slowly.
- It is important to use the regulator provided by Metro. Using a standard regulator will cause variations in measurements synchronous with the variations in pressure on your air network.

17.3. Stabilization of the measurement with an air gage is very slow

- check the point 17.2 (the measurement drifts)
- There are 2 types of wiring. The wiring with integrated nozzle allows faster stabilization of the measurement, but your air gage must be designed like this. Metro can provide you with a turnkey solution. If the cycle time is important, we have solutions to accelerate.
- The length of tubes between the air gage and the M1/M3 AG module is very important and has an impact on the stabilization time. The longer the pipe, the longer it will take for the measurement to stabilize.

17.4. The upper band of the display unit is red

This means that the pressure sensor is damaged, the module or the display unit must be returned to Metro.



17.5. The auto-switch does not work

If you use the auto switch mode → BASIC, in the DISPLAY menu then the automatic change threshold in the DEFINITION P4 menu (chap 7.1.4): Auto change threshold must be adapted. It is set by default to 0.1mm. This value is sometimes too low, especially in the case of measurement with air gages.

17.6. The M1/M3 screen blurs or freeze when I connect the communication cable

There are 2 similar RS232 cables.

- The 45160 is used for communication to a PC or PLC.
- The 18060 allows you to update the device.

If a 18060 cable is connected to the M1/M3, the screen might blur.

17.7. I do not achieve to detect the M-BUS modules

An MBUS cable (81213-1.5 supplied with the M1/M3) must be used to connect the modules to the M1/M3.

17.8. I'VE LOST MY PASSWORD

Initialization of the display must be done. See chap.15

With the RS232 command "PASS" it is possible to change the password.