Instructions manual

Series FLOMID

Sensor FLOMID-FX
Converter MBC1

The art of measuring

R-MI-FIMBC1 Rev.: 0 english version

PREFACE

Thank you for choosing a product from Tecfluid S.A.

This instruction manual allows the installation, configuration, programming and maintenance. It is recommended to read it before using the equipment.

WARNINGS

- This document shall not be copied or disclosed in whole or in any part by any means, without the written permission of Tecfluid S.A.
- Tecfluid S.A. reserve the right to make changes as deemed necessary at any time and without notice, in order to improve the quality and safety, with no obligation to update this manual.
- Make sure this manual goes to the end user.
- Keep this manual in a place where you can find it when you need it.
- In case of loss, ask for a new manual or download it directly from our website www.tecfluid.com Downloads section.
- Any deviation from the procedures described in this instruction manual, may cause user safety risks, damage of the unit or cause errors in the equipment performance.
- Do not modify the equipment without permission. Tecfluid S.A. are not responsible for any problems caused by a change not allowed. If you need to modify the equipment for any reason, please contact us in advance.

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SENSOR FLOMID-FX

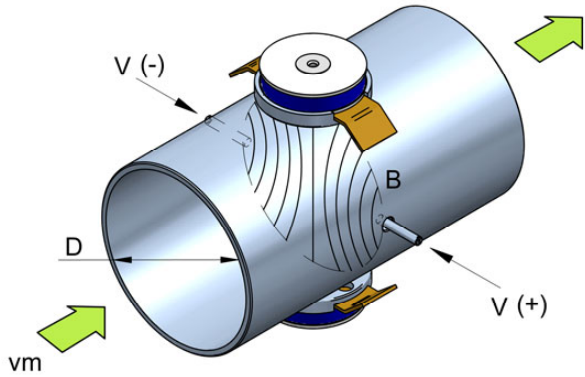
MBC1 CONVERTER

1 WORKING PRINCIPLE

The FLOMID electromagnetic flowmeters converter are based on Faraday's induction law.

When an electrically conductive liquid flows through a magnetic field, perpendicular to the flow direction, it induces a voltage V proportional to the liquid velocity.

Two electrodes in contact with the liquid and positioned perpendicularly to the magnetic field, sense this voltage V.



$$V = B \cdot v_m \cdot D$$

Where:

V = Measured voltage in the electrodes
B = Magnetic field
v_m = Average liquid velocity
D = Pipe diameter

2 RECEPTION

The FLOMID electromagnetic flowmeters are supplied conveniently packaged for their protection during transportation and storage, together with their instructions manual for installation and operation.

All the instruments are supplied tested in our flow rigs, obtaining the gain factor Fc of each sensor.

2.1 Unpacking

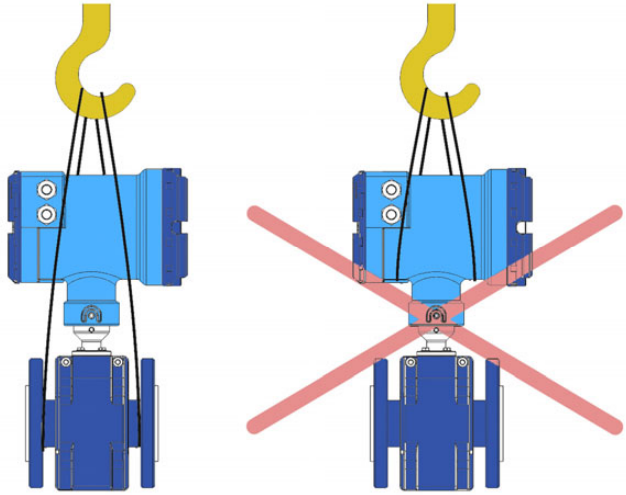
Unpack the instrument carefully, removing any remains of the packing from the inside of the sensor. Do not remove the grease from the neck that couples to the electronics housing.

2.2 Storage temperatures

Sensors linings of:	PTFE and PVDF	-20ºC ..... +60ºC
	PP and EBONITE	-5ºC ..... +50ºC

3 HANDLING

It should always be done with care and without knocks.
The large diameter sensors have rings for holding the elevation elements. If the flowmeter is held using slings, these should hold on the sensor and not on the electronics housing (see drawing).



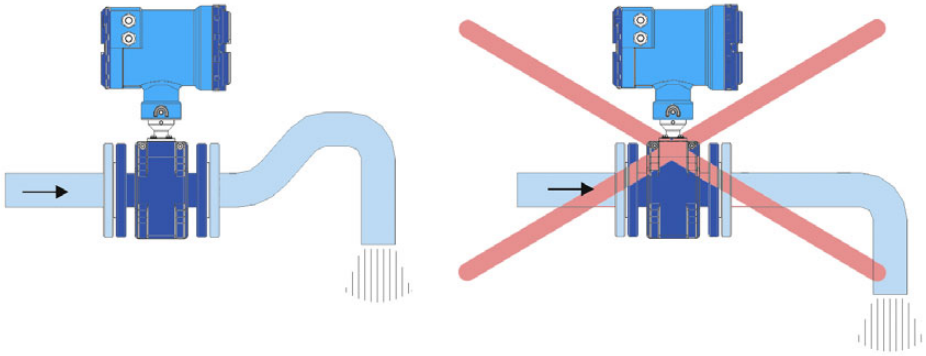
4 INSTALLATION

This should be made in a point that guarantees that the pipe is always completely full.

Avoid high points of the pipes where air pockets usually form, or pipes with falling flow where vacuums can form.

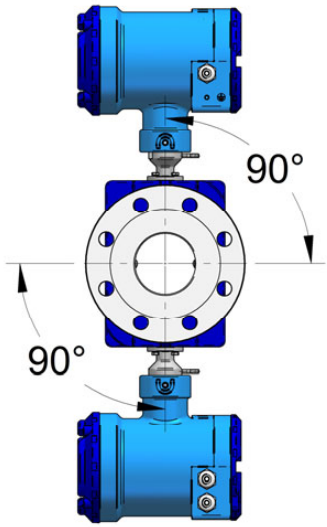
Partially full pipes can produce important reading errors.

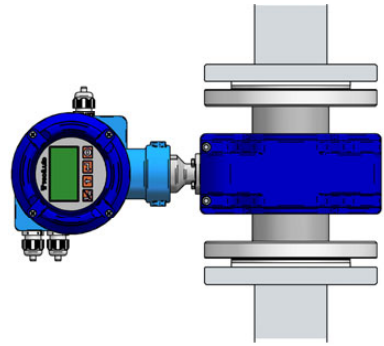
Flow rate measurement with open discharge makes it necessary to install the flowmeter in a pipe section with a siphon which avoids stagnation of air in the sensor.



4.1 Sensor position

The most adequate position is with the electrodes in a horizontal plane. In this way, deposits of particles on the electrodes are avoided.



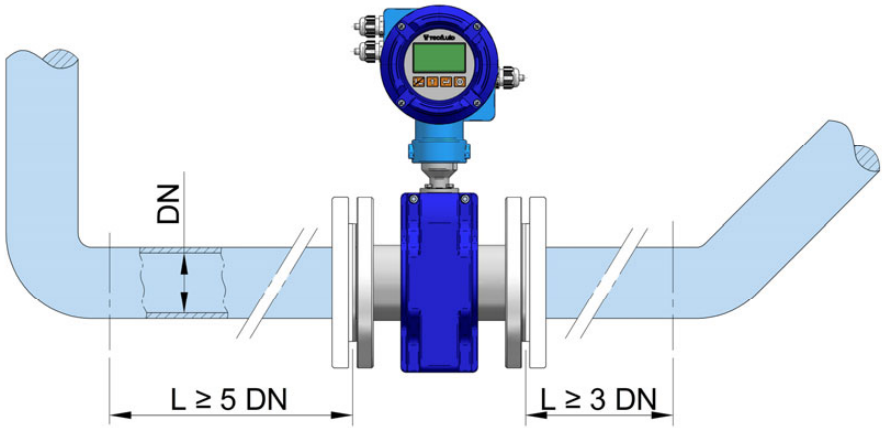


4.2 Straight pipe sections

They are necessary before and after the sensor. The minimum distances are the following:

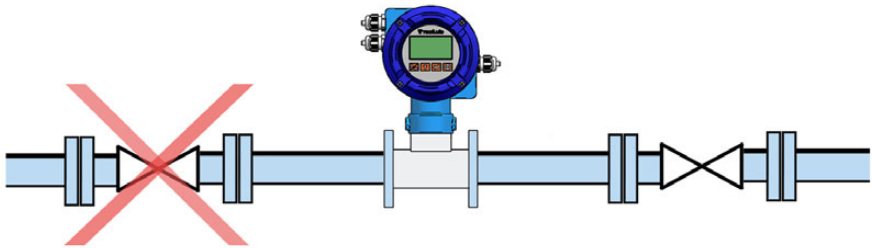
Upstream	5 DN
Downstream	3 DN

In installations with turbulent flow it may be necessary to increase these distances.



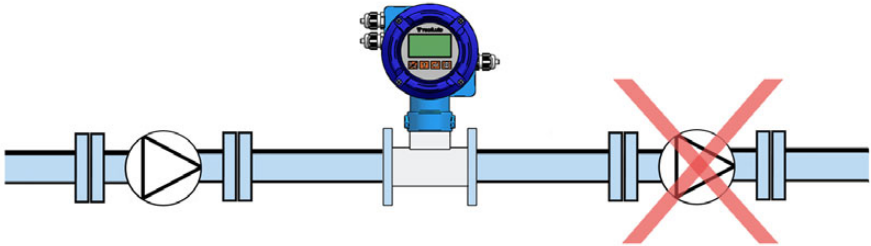
4.3 Valves

Control valves or shut-off valves should always be installed downstream from the sensor to assure that the pipe is always full of liquid.



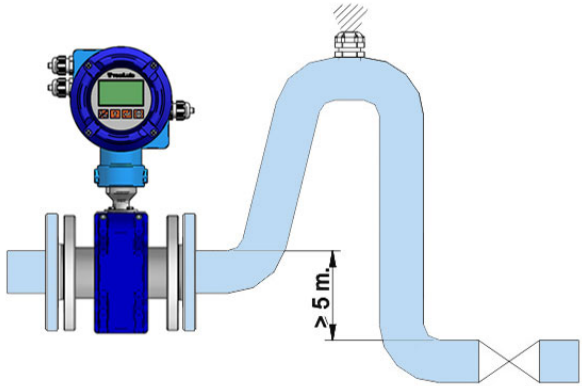
4.4 Pumps

Pumps should be mounted upstream from the sensor to avoid the suction of the pump (vacuum) that could damage the sensor liner.



4.5 Aeration

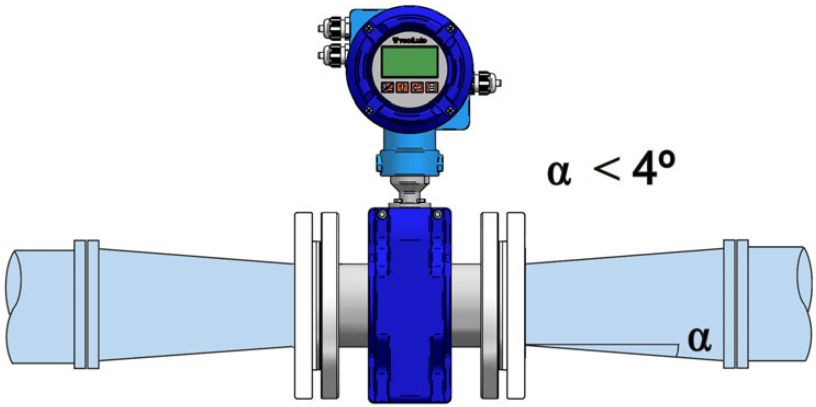
If there is a point where the level difference is higher than 5 m an air inlet valve should be installed after the sensor to avoid a vacuum effect that could damage the sensor liner.



4.6 Reduction of DN

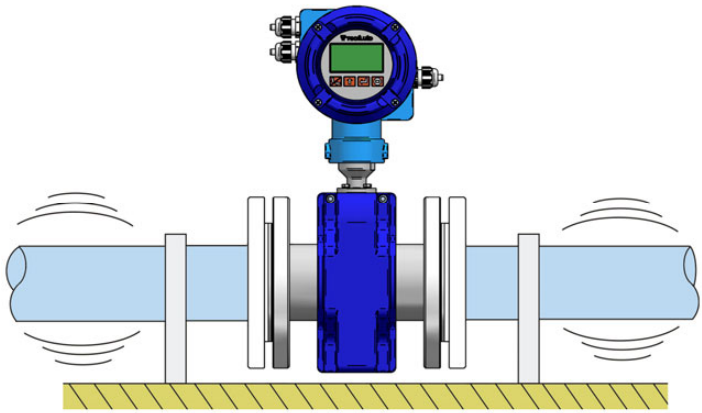
In installations where, due to reasons of the flow rate to be measured, a sensor of a smaller DN than the pipe DN must be mounted, the reduction must be done with an angle smaller than 4º to avoid turbulences that can give false readings.

If the angle cannot be so small, straight pipe sections indicated in 4.2 point must be kept.



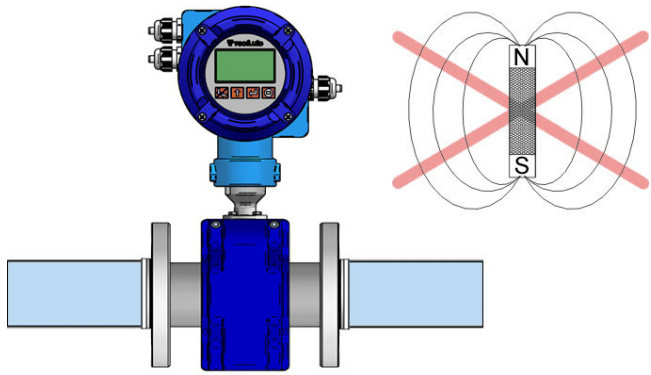
4.7 Vibrations

Vibrations of the pipes should be avoided by anchoring the pipe before and after the sensor. The vibration level should be less than 2.2 g in the range of 20 -150 Hz according to IEC 068-2-34.



4.8 Magnetic fields

Strong magnetic fields close to the sensor should be avoided.



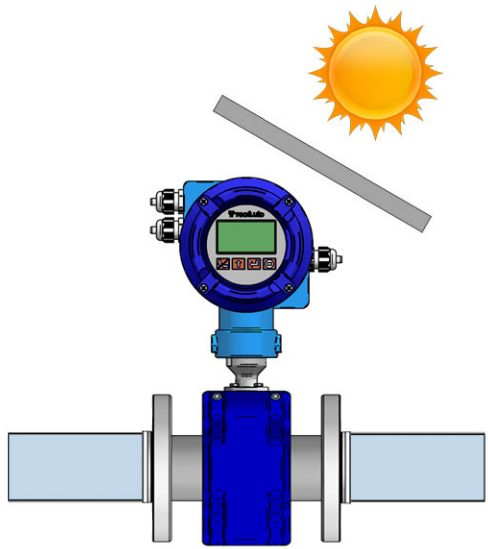
4.9 Temperature

In open air installations it is recommended to install a protection to avoid direct sun light on the flowmeter.

With thermally insulated pipes DO NOT insulate the sensor. High temperatures can damage it.

NOTE: High o very low temperatures shorten the battery life.

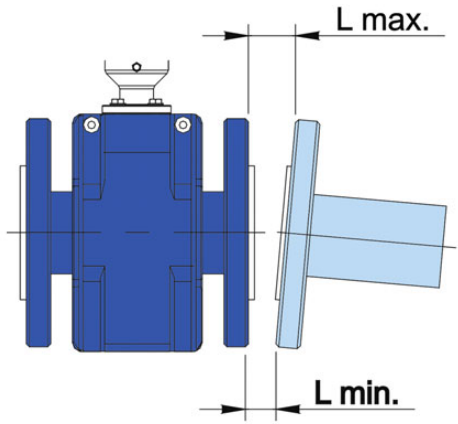
The maximum liquid temperatures are shown on page 48.



5 MOUNTING

5.1 Parallelism

The maximum parallelism error must be less than 0.5 mm (Lmax—Lmin ≤ 0.5 mm).

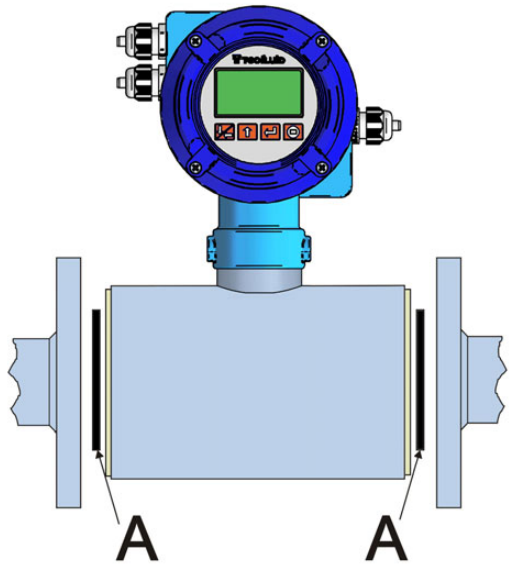


5.2 Gasket position

In the wafer sensors, to avoid leakage of liquid inside the sensor, it must be ensured that the rubber gasket (A) of the figure is well centered, so that it presses directly on the plastic of the sensor.

The standard material of the supplied gasket is NBR. Other materials can be supplied on demand.

The sensors for connection other than wafer, are supplied without gaskets.



5.3 Sensor earth connection

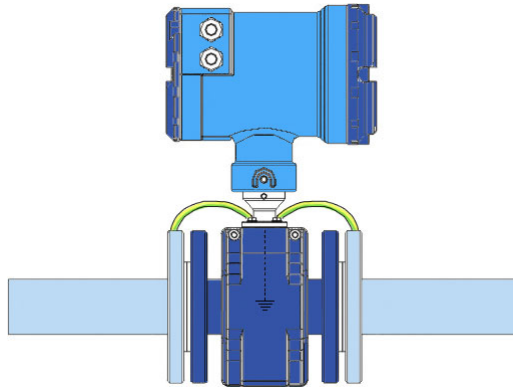
To obtain correct operation the sensor should have its functional earth connected to a point that is in direct contact with the liquid whose flow rate wants to be measured.

The earth cables should assure a good electrical contact. To obtain this, they should be well screwed down and with a good contact on both sides of the sensor. It is important to eliminate paint or coverings that act as insulation of the connection.

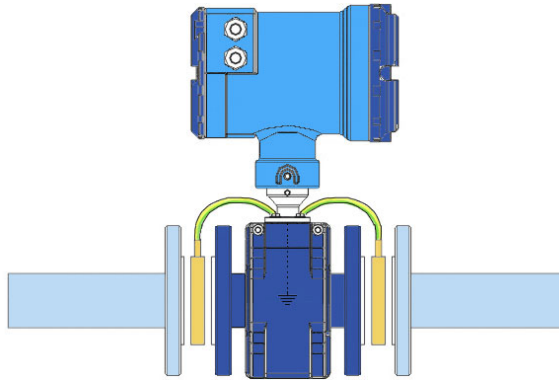
The functional earth connection should be used exclusively for the sensor given that parasitic signals caused by other electrical equipment connected to this earth can cause malfunction of the sensor.

The connection of the functional earth should be made as follows:

a) In the case of metallic pipes without internal lining connect the earth cables to the counter flanges.



b) In the case of metallic pipes with internal lining or plastic pipes, connect the earth cables to the earthing rings, supplied on request.

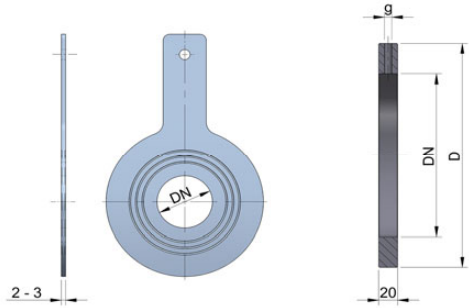


The earth rings are necessary when installing in non-metallic pipes or in metallic pipes with internal insulating liner (PTFE, PVDF, PP, EBONITE, etc.).

Earthing rings are supplied in two versions:

Metallic, disk in stainless steel EN 1.4404 (SS 316L), for liquids compatible with this material.

Plastic, with an electrode to make the contact with the liquid. The materials (plastic and metal) depend on the working liquid.



Metallic Plastic

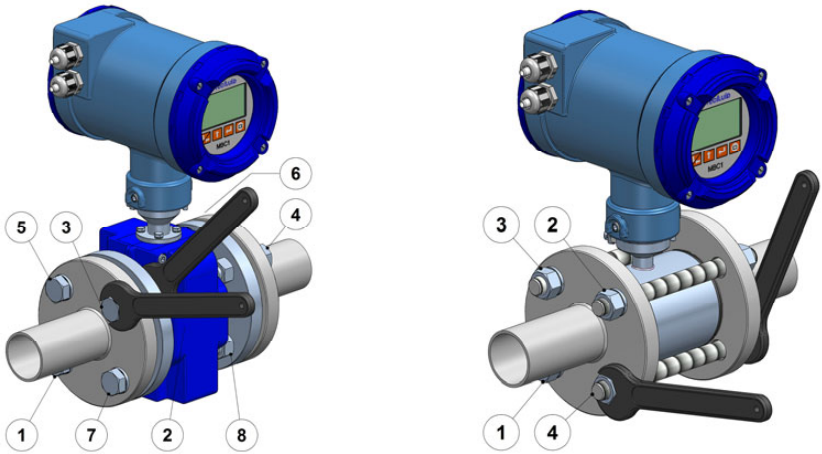
Dimensions in mm

5.4 Tightening

The tightening torque of the fastening screws of the flanges should not exceed 32 Nm for maximum working pressures of 16 bar.

This tightening torque is applicable for wafer sensors (FLOMID-0FX), and with flanges (FLOMID-2FX) for a pressure value of 16 bar.

The maximum value of the torque depends on the sensor nominal pressure (PN).



The tightening of the flange bolts should be done uniformly, following the sequence indicated in the drawings according to the number of flange bolts.

6 MAINTENANCE

It is recommended to clean the electrodes in installations where incrustations or appreciable sedimentations can occur.
Cleaning can be done using liquid detergents and medium hard brushes.

MBC1 CONVERTER

1 INTRODUCTION

The MBC1 converter unit can be used with the different FLOMID and FLOMAT series of electromagnetic flow sensors. The electronic circuit is based on the most advanced technology in digital signal processing, in order to obtain accurate and reliable measurements.

This converter is completely autonomous since it can work with batteries. If desired, it can also work with an external power supply that allows to have digital outputs and Modbus communication.

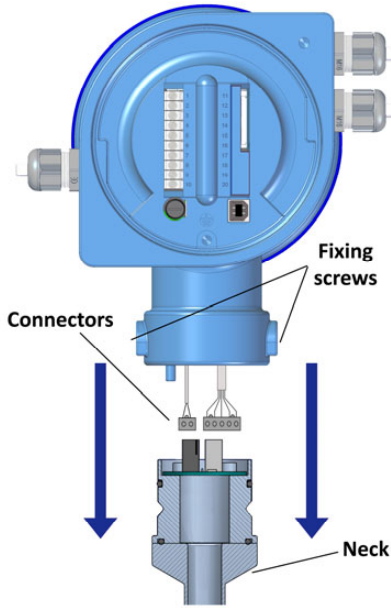
The device provides the following features:

- Coil excitation by means of pulsed signal to obtain a negligible zero offset.
- Empty pipe detection.
- Digital outputs programmable as pulses proportional to flow rate or as flow rate or status alarms (only with external power supply).
- SD card with programmable activity register (datalogger).
- Easy exchange with other sensors.
- Graphic display with intuitive menus.
- Adjustable front cover in order to make display reading easier, depending on installation.
- Modbus RTU communication (only with external power supply).

2 INSTALLATION

2.1 Sensor connection

The converter provides two cables to be connected to the sensor. Once connected, slide the converter along the sensor neck until the stop. Tight the two fixing screws.



2.2 Electrical connection (for external power supply)

In case the MBC1 converter is used with external power instead of batteries, it is provided with a terminal strip. To make easy the connection, the description of the terminals is marked on the label on the back cover of the equipment.

For the electrical installation it is recommended to use multiple conductor cables with individual cable sections in the order of 0.25 to 0.5 mm^2 in order to make it easier to connect.

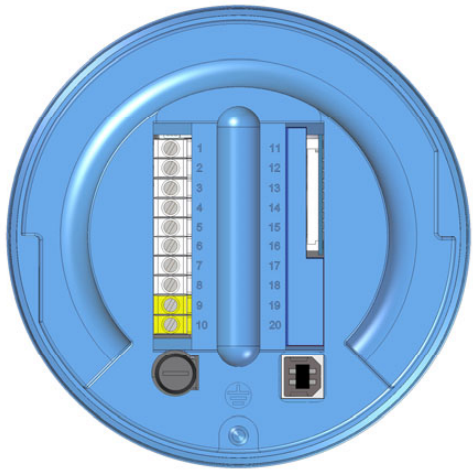
Before starting the installation, check that the cable glands are the right size for the cables to be used. This will guarantee the instrument will stay watertight. The cable glands used are for cables with outside diameters between 3.5 and 10 mm.

To connect the cables, peel the outside insulation to free the inner cables. Then pass the cables through the cable glands and screw down in the corresponding positions of the terminal strip as indicated in the following point.

Grip carefully the cables with the cable glands to maintain the degree of protection.

Incorrect installation of the cable gland or inadequate cable placement can cause irreparable damage to the converter.

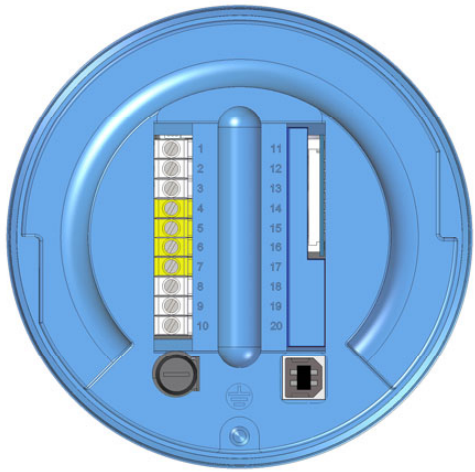
2.2.1 External power supply wiring



Before starting the installation of the equipment, check that the supply voltage available is the same as marked on the label of the converter.

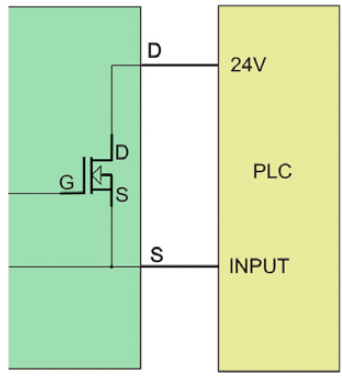
Terminal	
9	-
10	+

2.2.2 Digital output wiring



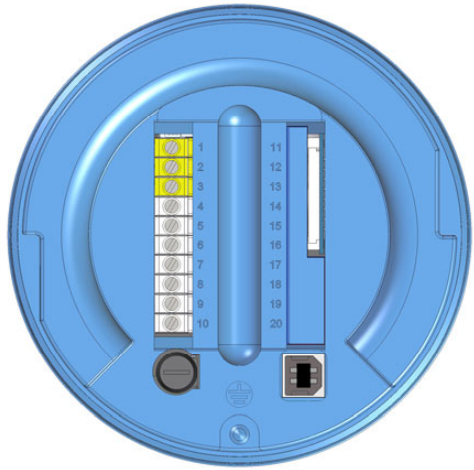
Terminal	
7	Source output 1
6	Drain output 1
5	Source output 2
4	Drain output 2

Outputs are N-channel MOSFET transistor isolated from the rest of the circuit and potential free. (see characteristics on page 48).



Example of the connection of the alarm output to a PLC (PNP input)

2.2.3 Modbus wiring



The recommended cable is a hose with three cables plus a shield. These cables must have a characteristic impedance of 120 Ω.

Terminal	
1	A
2	B
3	Ground (GND)

It is recommended to connect the shield to ground only at one end.

The cable connection between the MBC1 converter and a Master is the following:

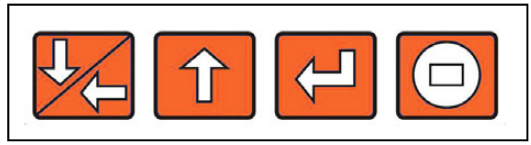
MBC1 converter	Master
Terminal A	A/D-
Terminal B	B/D+
GND	G/Reference

The instrument has a jumper on the control board (J7) that connects the 120 ohm termination resistor needed when it is at one end of the Modbus line.

3 CONVERTER INTERFACE

The MBC1 converter has a graphic LCD and a keyboard with 4 push buttons.

The keyboard has four keys to introduce the values of installation and programming. Two of these keys are used also as cursors.



The following figure shows the functionality of the converter keys.

(Down / Left) To switch between flow rate, totalizer and flow rate / total screens.
To change to the digit on the left.
Into the menu, to scroll down.

(Up) To switch between flow rate, totalizer and flow rate / total screens.
To increase the digit.
Into the menu, to scroll up.

(Enter) To validate the data.
To enter into installation and programming modes of the converter.
To exit from an informative text.

(Escape) To return to the previous menu.
To exit from a screen without validating data. To enter in working mode. To activate the screen.

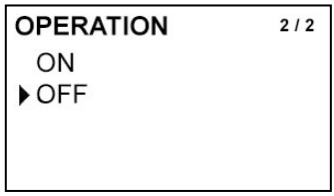
4 OPERATION

The converter is supplied in OFF mode. Most components are off and consumption is minimal.

The first time the instrument is used, it must be put in ON mode.

If the equipment has external power, the working screen will appear directly.

If the equipment is powered by batteries, the display will be off, and by pressing the (Escape) key for one second, the working screen will appear.

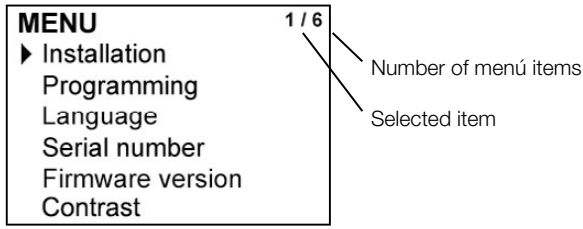


Select the "ON" option and press the (Enter) key. The instrument will be ready for use.

To return to the OFF mode, see point 6.7 on page 25.

5 MAIN MENU

To access the main menu of the converter, press the (Enter) key. The following screen appears:



The "Installation" option allows to configure the instrument, in order to obtain a correct indication. It is explained in Chapter 6 of this manual.

The "Programming" option allows to program all parameters of the converter, as explained in Chapter 7 of this manual.

“Language” option selects the language in which all menus will be displayed.

The options "Firmware Version" and "Serial Number" are informative and are discussed in Chapters 8 and 9 of this manual.

Finally, "Contrast" option allows to regulate the contrast of the information on the screen, to adapt it to the ambient light of each installation.

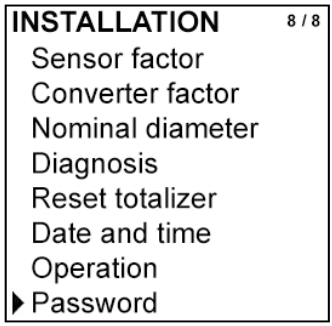
5.1 Passwords to access the menus

It is possible to program a different password for the “Installation” menu and for the “Programming” menu.

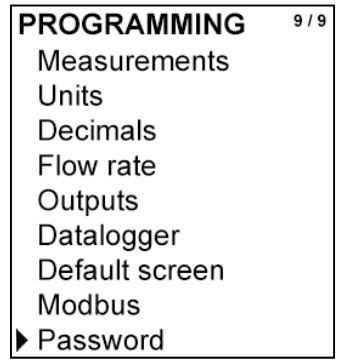
By default, the equipment is factory configured with the passwords disabled.

To change any of these passwords, it is necessary to enter the corresponding menu and once inside, access the submenu "Password".

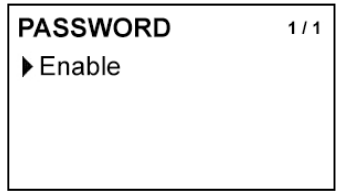
To change the access password of the installation menu, select "Installation" on the main menu and then "Password".



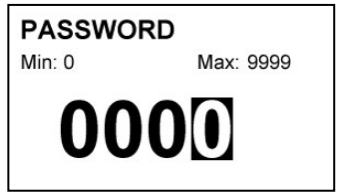
To change the access password of the programming menu, select "Programming" in the main menu and then "Password".



When the "Password" option is selected, a screen that indicates the password status for this menu appears.

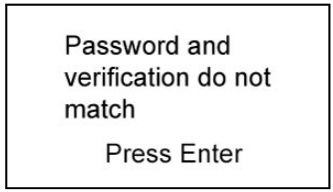


Selecting “Enable”, the screen to enter the new password appears.

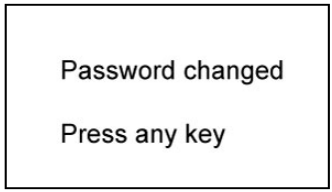


Once entered, the new password is asked again to avoid possible inadvertent error.

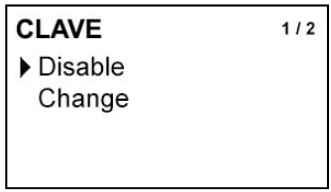
If the re-entered password does not match the first one, the following error message appears and the process should be carried out again.



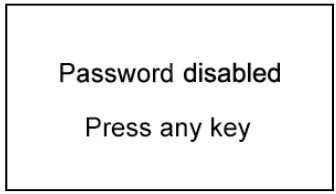
If both passwords match, the following information message is displayed.



If the password needs to be changed or disabled, the procedure is the same. Once entered the "Password" menu, the following screen appears:



If “Change” is selected, the equipment will ask for a password again. If “Disable” is selected, the following message will appear:

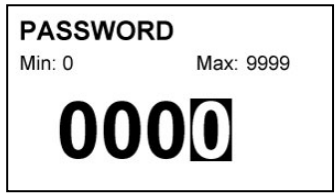


6 INSTALLATION PARAMETERS

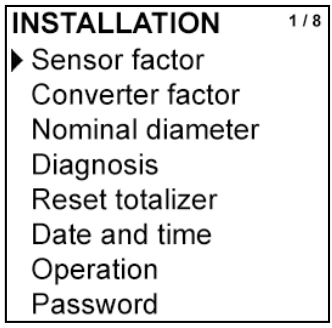
Press the (Enter) key in order to enter the main menu.

Again with the (Enter) key, select “Installation”.

If the instrument has a password enabled, it must be entered to access the menu. For more details about the password, see point 5.1 on page 20.

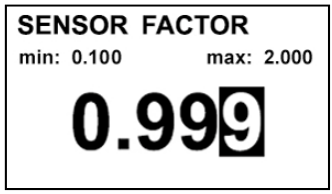


Once in the “Installation” menu, the first screen allows to choose between the different options.



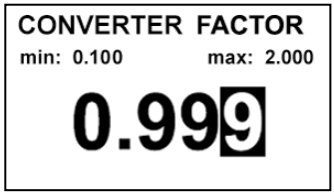
6.1 Sensor factor

In this screen the sensor factor is shown. It should coincide with the **Fc** parameter on the sensor label.



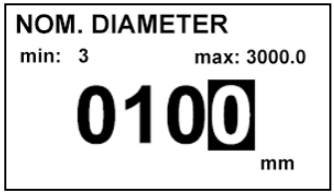
6.2 Converter factor

The electronic converter factor is shown. It should coincide with the **Fe** parameter on the converter label.



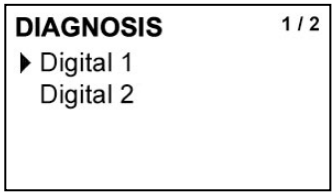
6.3 Nominal diameter

The value of the nominal diameter is always the internal diameter of the sensor.

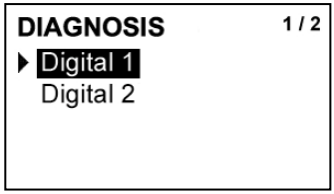


6.4 Diagnosis

It allows to test the digital outputs.



Pressing the key (Enter) when Digital 1 or Digital 2 are selected, this output will be activated or deactivated. When the output is activated, the text is shown as inverse.

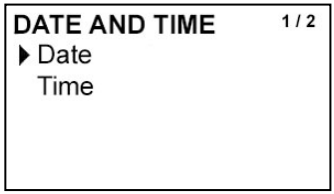


6.5 Reset totalizer

This screen allows to return the totalizer to zero.

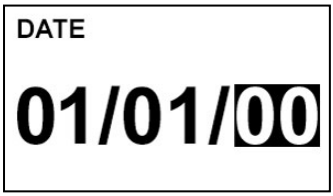
6.6 Date and time

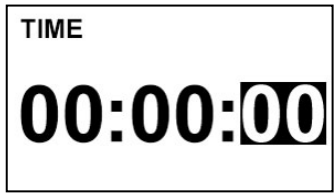
This screen allows to set the date and time. This data is necessary for the registration of values in the SD card (datalogger).



To set the date, the format is day / month / year, where the year is two figures to add to 2000.

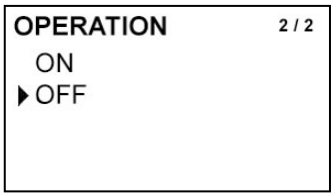
The format of the time is hour: minutes: seconds





6.7 Operation mode (only with battery power supply)

It is used to return the instrument to OFF mode.



If "OFF" is selected, the screen will be turned off and the instrument will cease to be operative. Consumption will become the minimum.

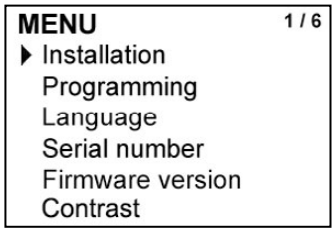
The OFF mode is used to minimize battery consumption in periods when the equipment will not be used.

To exit the OFF mode, see point 4 on page 19.

7 CONVERTER PROGRAMMING

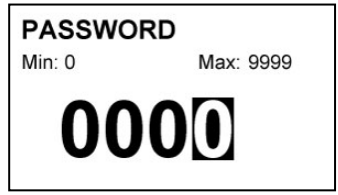
By programming the converter the display and outputs of the instrument can be configured.

Press the (Enter) key to enter the main menu. The following screen will appear.

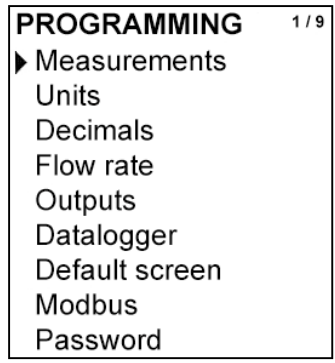


With the keys (Down / Left) and (Up), select Programming, and then validate with the key (Enter).

If the instrument has an enabled password, it must be entered to access the menu. For more details about the password,, see section 5.1 on page 20.

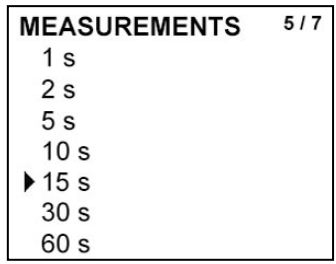


Once in the “Programming” menu, the first screen allows to choose between the different options.



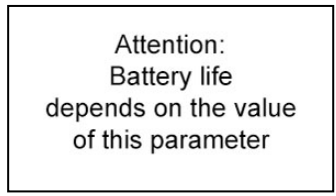
7.1 Time between measurements

It allows to choose how often the converter performs a measurement.



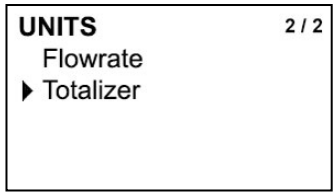
This parameter is very important to determine the battery life. The longer the time between measurements, the longer the battery life.

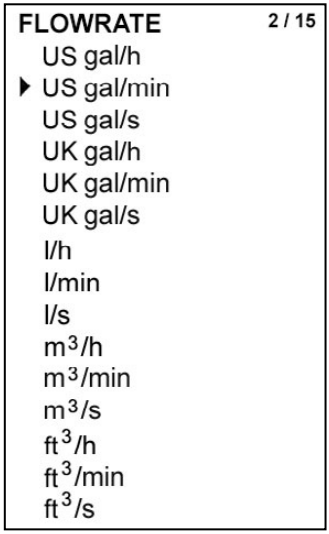
To notify it, an informative screen appears. Press any key to return to the menu.

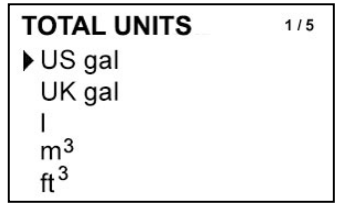


7.2 Units

In this screen the flow rate and the totalizer can be chosen independently.

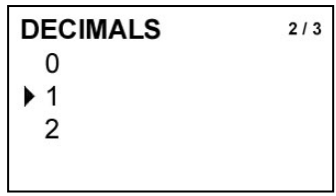






7.3 Flow rate decimals

In this screen the number of decimals for the flow rate indication can be selected.



To select the number of decimals it must be taken into account that the instrument has 5 digits for flow rate indication. If two decimals have been selected, these will be seen whilst the flow rate is not higher than 999.99. Above this value the indication will automatically change to one decimal, and when the flow rate is higher than 9999.9 the indication will be done without decimals.

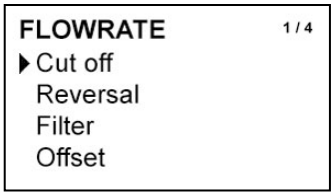
If one decimal is selected, the flow rate indication will have a maximum of one decimal until 9999.9. Above this value the indication will be done without decimals.

If indication without decimals is selected, the flow rate will always be shown without decimals.

For the selection of the flow rate units and the number of decimals it must be taken into account that an indication with an excess of decimals may give the sensation of instability of the reading. As a general rule it can be considered that the reading should not have more than a total of 5 digits (integer + decimals).

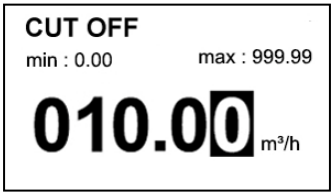
7.4 Flow rate

This screen displays a submenu to modify different aspects related to flow reading, such as cut off, reversal flow, filtering and offset.



7.4.1 Cut off

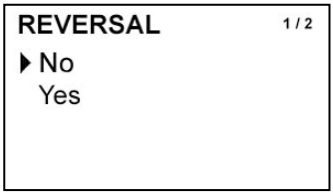
A cut off flow rate can be programmed, that means, the flow rate below which the flow rate indication will be zero. This can avoid reading errors in the lower zone of the scale.



7.4.2 Reversal flow rate

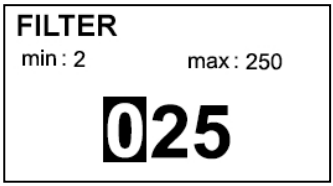
The MBC1 is a bi-directional converter. The flow rate changes its sign automatically when the flow is reversed. If after the converter has been installed it is necessary to reverse the flow rate sign, in this screen it can be done by selecting the option REVERSAL– Yes.

NOTE: The totalizer increases only when the flow rate is positive.



7.4.3 Damping

The MBC1 converter has an adaptive filter (damping) to provide stable flow rate and analog output readings in the presence of continuous flow rate fluctuations.



The configuration of this filter can be very useful in the cases where the flow rate readings have some instability (due to air bubbles, solids in suspension, etc.

Only the flow rate indication of the display is affected by the filter. The digital outputs and the totalizer act according to the non-filtered flow rate. Selecting a filter with a longer or shorter integration time will provide more or less stable readings and will also affect the response time to small variations of flow rate.

The number of samples can be selected with a minimum value of 2 samples and a maximum value of 250 samples. For example, with 15 samples, the display will indicate the flow rate reading of the average flow rate over the last 15 flow rate samples measured.

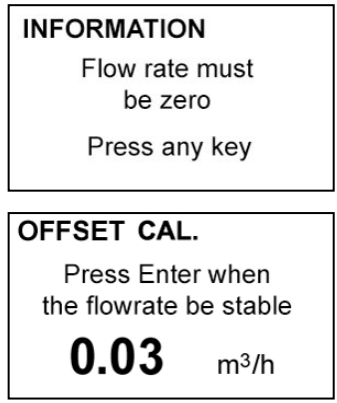
For liquid velocities below 1 m/s, the filter is always operational. For velocities from 1 m/s, when there is a sudden variation of flow rate, the filter should react as fast as possible to give a correct reading of the new value. For this reason, the filter controls the deviation of the instantaneous flow rate with respect to a reference for each reading. If this deviation exceeds 0.2 m/s, the filter stops acting, indicating the instantaneous value, and starting the filtering process again.

7.4.4 Offset

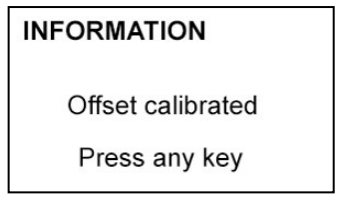
In order to obtain a perfect linearization of the instrument, it is recommended to make an adjustment of the zero offset each time an installation is performed, and if it is possible to stop the flow rate.

The flow rate must be zero, that is, the liquid inside the pipe where the flowmeter is installed should be completely stopped. Furthermore, a completely full pipe is necessary in order to make an effective adjustment.

When the option Offset is selected, the following screen is shown:

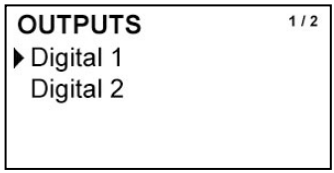


When the flow rate is stable, press the key (Enter) and the instrument will save the value.

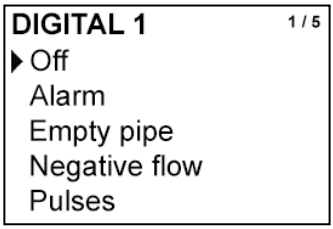


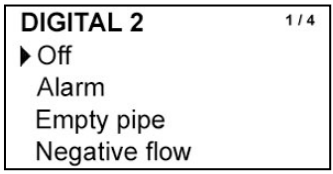
7.5 Digital outputs (only with external power supply)

This screen allows to program the two digital outputs of the instrument.



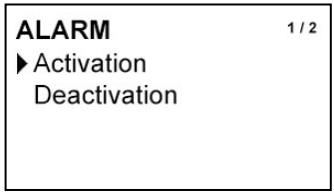
By selecting one of the two outputs, the options for each of them appear on the next screen.

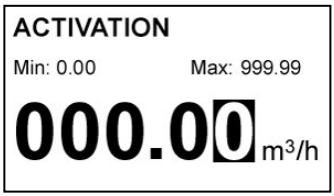


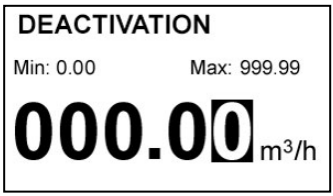


7.5.1 Flow rate alarm

If Alarm is selected, the flow rate at which the outputs will change its status and the level of hysteresis can be programmed. By level of hysteresis we understand the difference between activation and deactivation of the output. To avoid that an alarm output is continuously moving from activate to deactivate status, the points of activation and deactivation should be programmed.

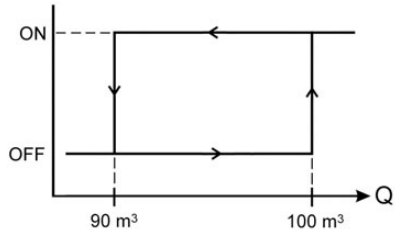






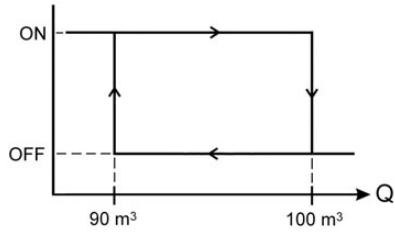
Example 1

If the output is programmed to activate at 100 m^3/h and to deactivate at 90 m^3/h, when the flow rate is zero the output will be deactivated. When the flow rate reaches a value of 100 m^3/h the output will be activated and it will not return to deactivated state until the level falls below 90 m^3/h.



Example 2

If the output is programmed to deactivate at 100 m^3/h and to activate at 90 m^3/h, when the flow rate is zero the output will be activated. When the flow rate reaches a value of 100 m^3/h the output will be deactivated and it will not return to activated state until the level falls below 90 m^3/h.



7.5.2 Empty pipe

In this case, the output will change its status when the flowmeter detects empty pipe.

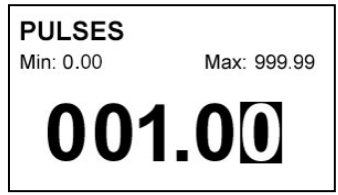
7.5.3 Negative flow rate

The output will change its status when the flow rate changes its sign.

7.5.4 Pulses

This option is only available on the digital 1. It allows to connect the converter to a PLC or remote totalizer. The number of pulses per unit of volume can be programmed.

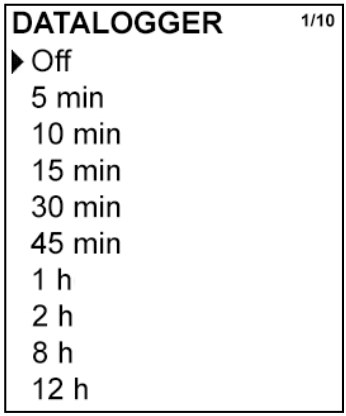
Note: The pulse output will be active only when the flow rate is positive. Otherwise, the output will be permanently zero.



7.6 Datalogger

The converter has an SD card module to store the progress of the different variables of the equipment.

The time interval between writes on the card can be programmed.

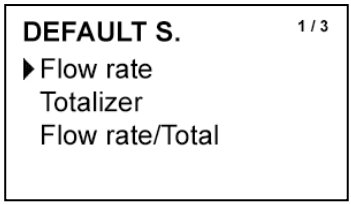


The flow rate recorded on the SD card is the filtered flow value.

For more details about the SD card, see point 11.2 on page 36.

7.7 Default screen

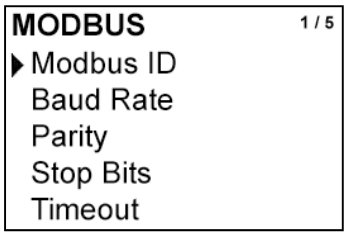
Flow rate, totalizer or flow rate and totalizer screens can be programmed as a default. Thus, the converter presents this screen when a power failure occurs or when returning from the Installation or Programming menu.



7.8 Modbus (only with external power supply)

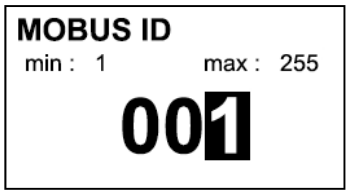
It allows to configure the necessary parameters to establish a Modbus RTU communication with the instrument.

The following menu will appear.



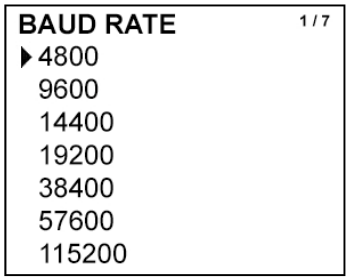
7.8.1 Slave address

In this screen the slave address can be assigned to the converter. This address must be unique, that is, no other slave devices in the bus can have the same number.



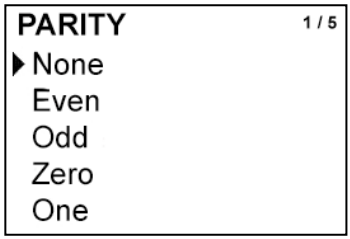
7.8.2 Baud rate

It determines the data transmission speed. All the devices in the bus have to be configured with the same baud rate.



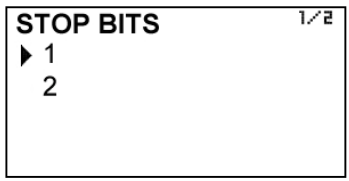
7.8.3 Parity

It is used to detect communication errors. All the devices in the bus have to be configured with the same parity .



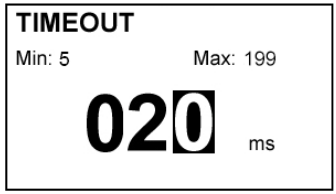
7.8.4 Stop bits

It allows to choose the number of stop bits. All the devices in the bus have to be configured with the same number of stop bits.



7.8.5 Timeout

It is the minimum time between frames. Default value is 20 ms. In this screen a different value can be programmed.

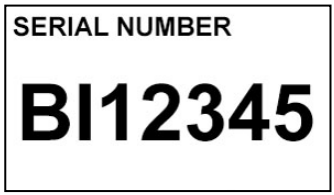


Once the previous steps are done, a communication with a master can be established.

Detailed information on the protocol can be found in the R-IT-MBC1COM instructions manual, that can be downloaded from Tecfluid S.A. website.

8 SERIAL NUMBER

In this section the converter serial number is shown.

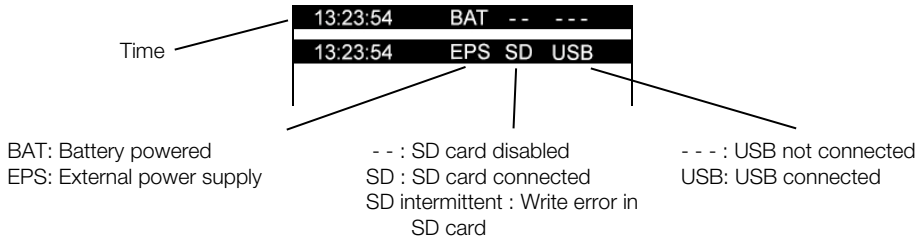


9 FIRMWARE VERSION

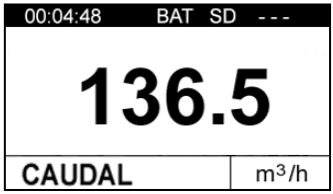
From the main menu, if “Firmware version” is selected, the screen will show this data and the corresponding date.

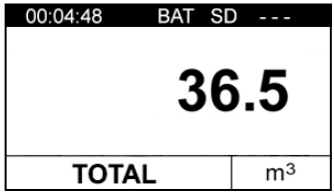
10 WORKING SCREEN

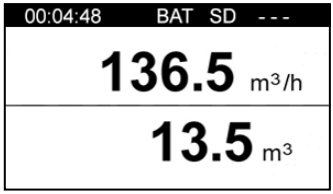
When exiting the menu, the display shows the default screen. The upper part of this screen shows the following data.



To scroll between the three operating screens, press the key (Down / Left) or (Up).

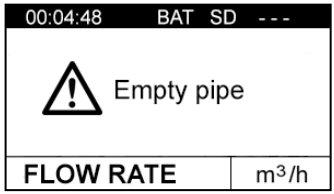






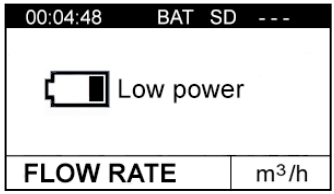
10.1 Empty pipe

When the converter detects empty pipe, it will stop reading and it will display the message on the screen.



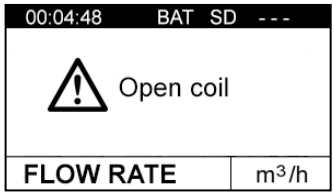
10.2 Low voltage

When the converter detects that the supply voltage is too low for the correct operation of the equipment, whether it is powered by batteries or by an external source, it will flash the message.



10.3 Open coil

When the converter detects that it is not correctly connected to the sensor, it will display the message.



11 MAINTENANCE

For external cleaning, a humid cloth can be used, and if necessary with a little neutral soap. Solvents or other aggressive liquids which could damage the housing material should not be used.

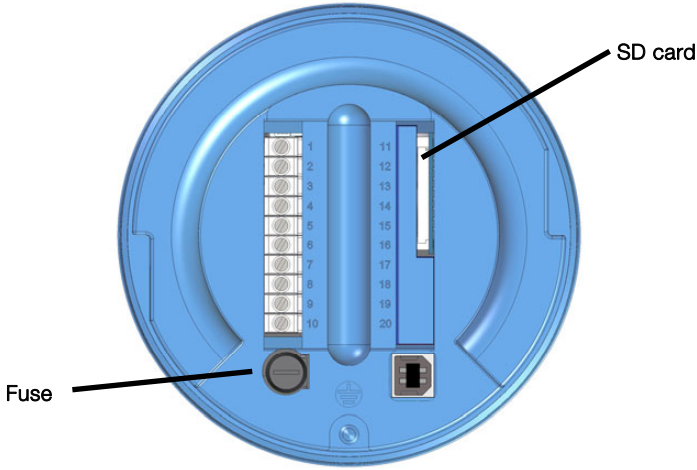
11.1 Fuse

In the event that the fuse blows, this should be replaced with a slow blow “T” fuse, size Ø5 x 20 mm and value 250 mA. See image on point 11.2.

11.2 SD card

The SD card is located at the back of the converter.

To get access, unscrew the back cover.



Before removing the SD card, it is recommended that it is disconnected. To do this, go to datalogger menu and select off (see page 32).

To remove the card press on it.

Once removed, copy the file into another device.

Place again the card into the adapter.

Specifically the data that are stored in one writing are the following:

- Date
- Time
- Average flow rate
- Flow rate units
- Total volume
- Totalizer units
- State of digital output 1
- State of digital output 2
- Status

The resulting file has CSV format, which can be viewed directly with a spreadsheet.

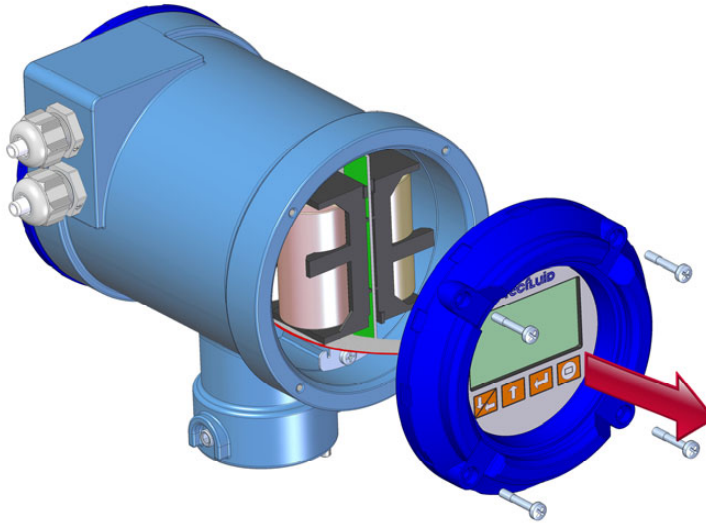
11.3 Battery replacement

Before replacing the batteries, disconnect if there are all the cables from the rear terminal block.

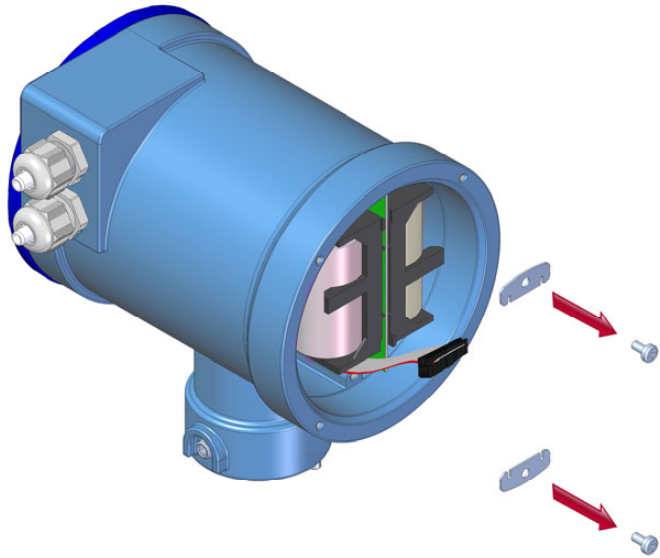
Once disconnected, access the operating mode menu and select OFF (see point 6.7 on page 25).

To make the replacement, proceed according to the following points:

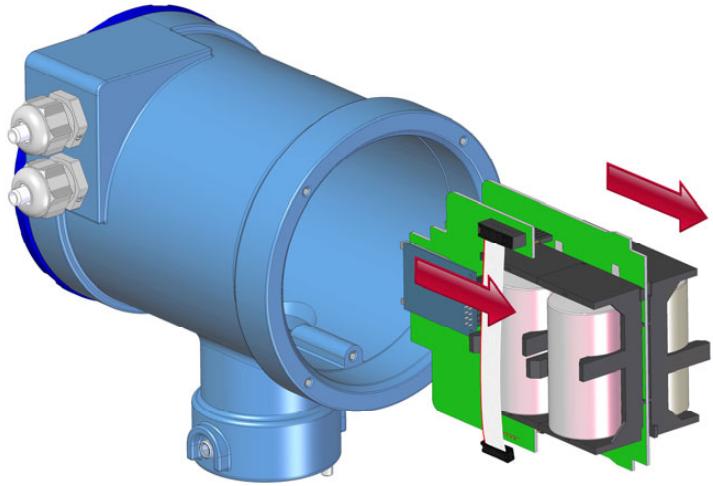
- Remove the four screws from the front ring and remove it.



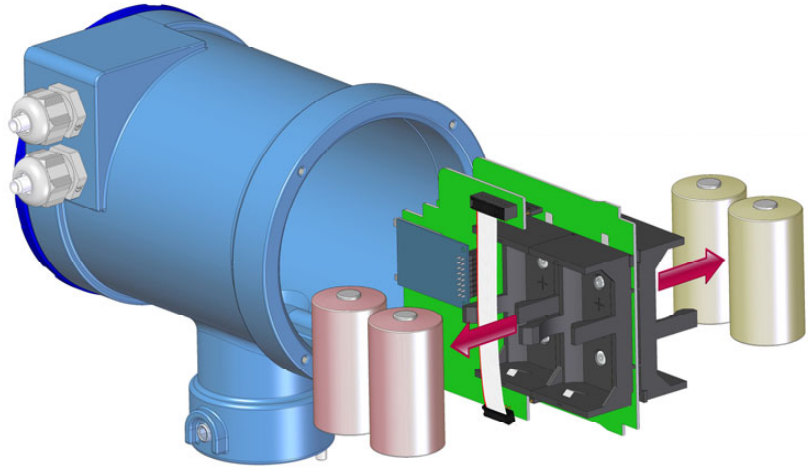
- Disconnect the flat cable.
- Remove the two screws and support plates.



- Slide out the electronic block.



- Remove the batteries.



- Replace them with the new ones and proceed in the same way in reverse order to assemble the components again.

NOTE: If two batteries are placed instead of four, they will always be in the same battery compartment, that is, both batteries on the same side.

12 ASSOCIATED SOFTWARE WINSMETER MBC1

Most of the steps explained in the previous sections, can be done through the associated software, which allows to work in a more comfortable and intuitive way.

Such software can be downloaded from the “Downloads” section of the Tecfluid S.A. www.tecfluid.com/downloads

12.1 USB cable connection and software installation

Extract the files from the Winsmeter MBC1.zip to a new system folder.

Execute the Setup.exe file and follow the steps for the installation.

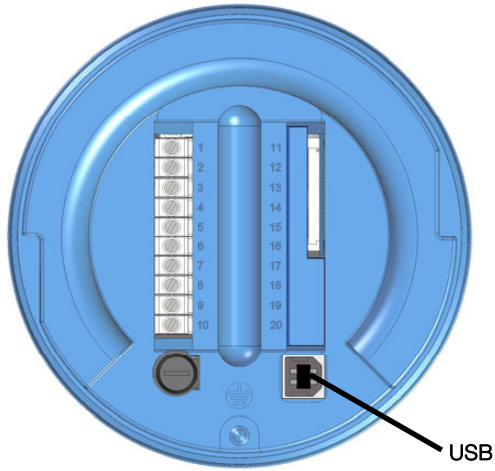
In order to connect the converter to a computer an USB cable is required. This cable is type A at one end and type B at the other, and it is readily available on the market.

The ends of the cables can be seen in the picture.

NOTE: If the USB cable is connected to the instrument when it is battery powered, it remains always activated, with a power consumption around 6 mA continuously. If the USB cable remains connected for long periods of time, it can have a negative impact on the battery life.

The first step to make the connection is to open the back cover of the electronic converter.

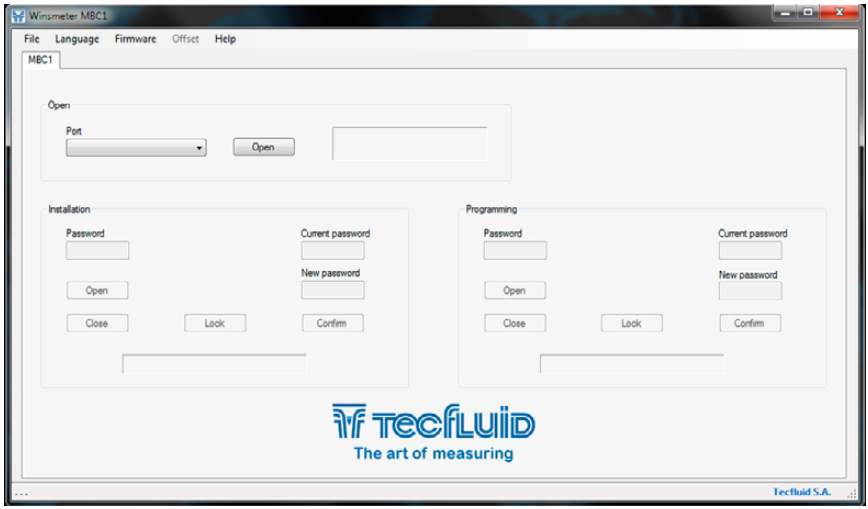
The USB connector is located on the bottom right.



Connect the USB cable at one end to the converter and at the other to the computer where the software is installed.

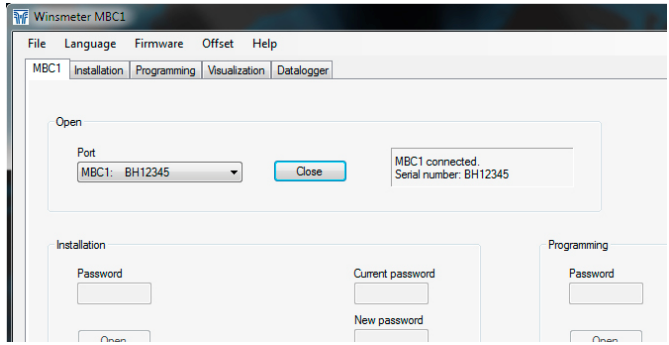
Power on the electronic converter.

Execute the program WinsmeterMBC1 following the sequence Start – Programs – Tecfluid S.A. - WinsmeterMBC1.

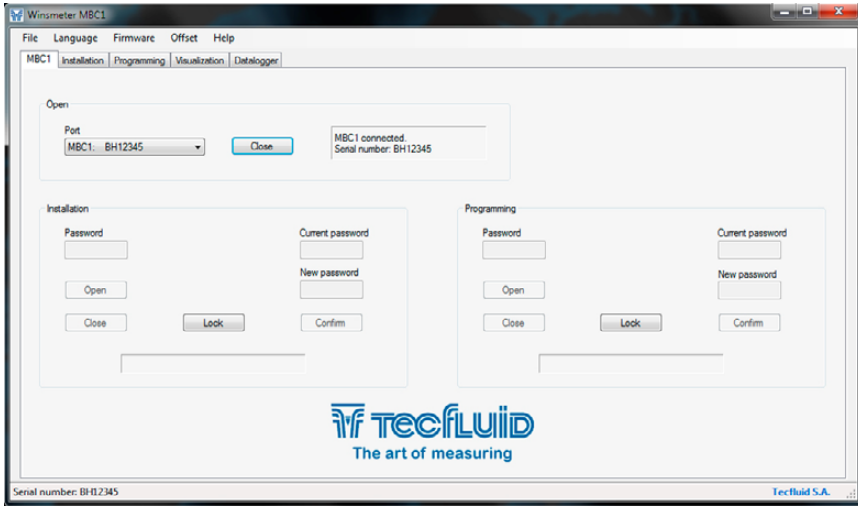


12.2 Port connection

In the "Port" section, choose the appropriate port for the converter. This will appear with the name of the port followed by MBC1 and its serial number. Then click "Open".



Once the port is open, buttons "Lock" are activated.



12.3 Password

The MBC1 converter can be locked so that programming data can be modified only with previous password access.

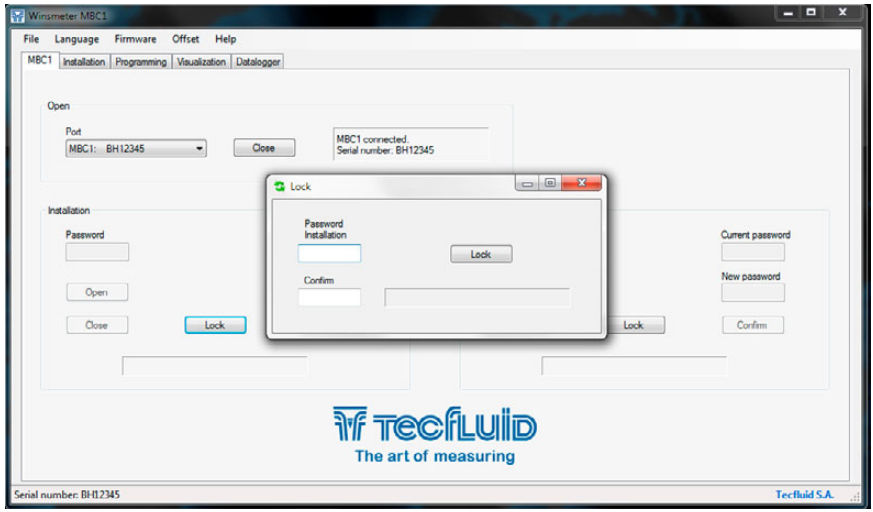
When the converter is locked, data can be read but not modified.

By default the device is unlocked. All data can be modified by means of the program Winsmeter MBC1.

To set a password access to a section ("Installation" or "Programming"), the section must be unlocked. To do this, simply press the "Lock" button in the desired section.

Each section can be locked or unlocked independently. Passwords are equally independent for each section.

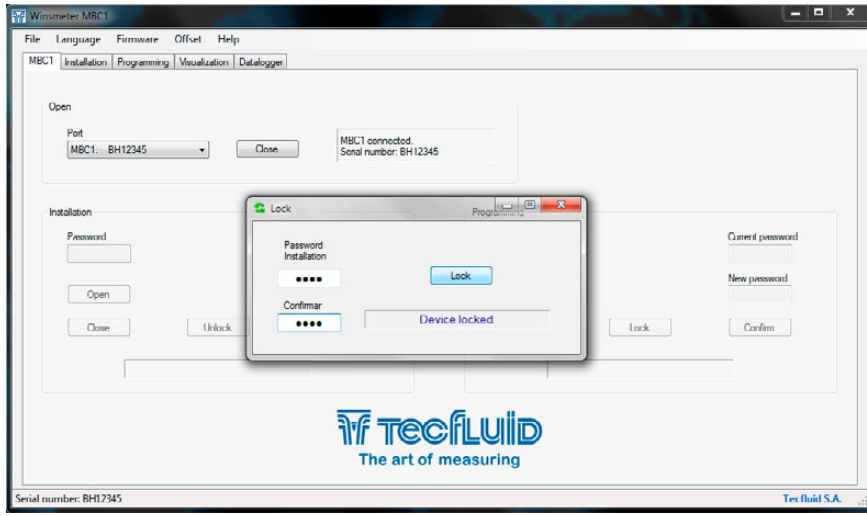
Once done, the following window will appear:



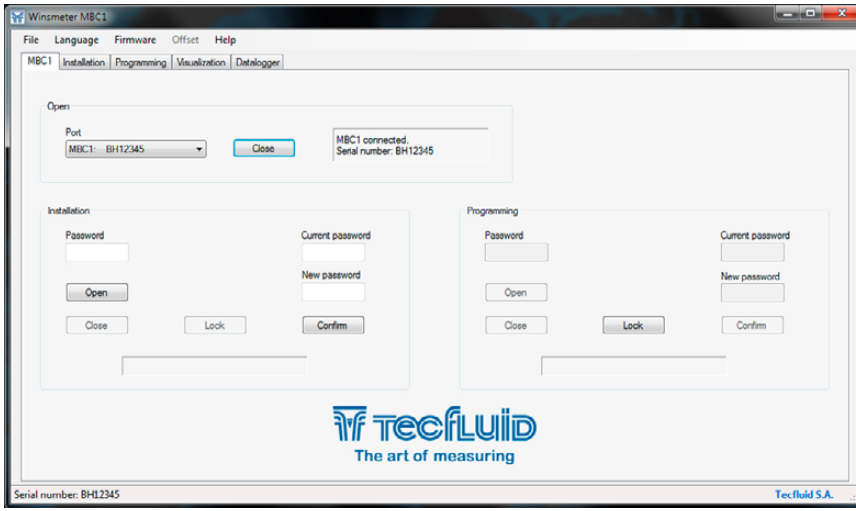
In the “Password” textbox a 4 numeric digit code should be entered, and in the “Confirm” textbox, the code is confirmed to avoid unintentional errors.

Once the password is confirmed, press the “Lock” button and the section (“Installation” or “Programming”) will be locked.

The text “Device locked” will appear, and the program returns to the home screen.



After accessing back to the port and pressing the “Open” button, the screen shows the textbox to enter or change the locked passwords.

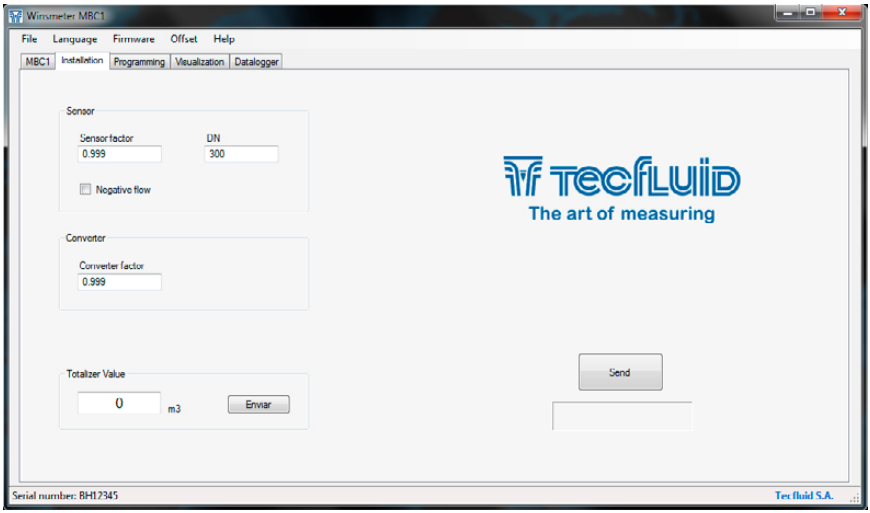


To unlock the section it is necessary to write the correct password and press “Enter” or the “Open” button. The text “Installation enabled” or “Programming enabled” will appear at the bottom of the section

Once a section is enabled, pressing the corresponding button “Unlock”, the section will be unlocked.

12.4 Access to “Installation”

To enter to “Installation” window, press the corresponding tab.



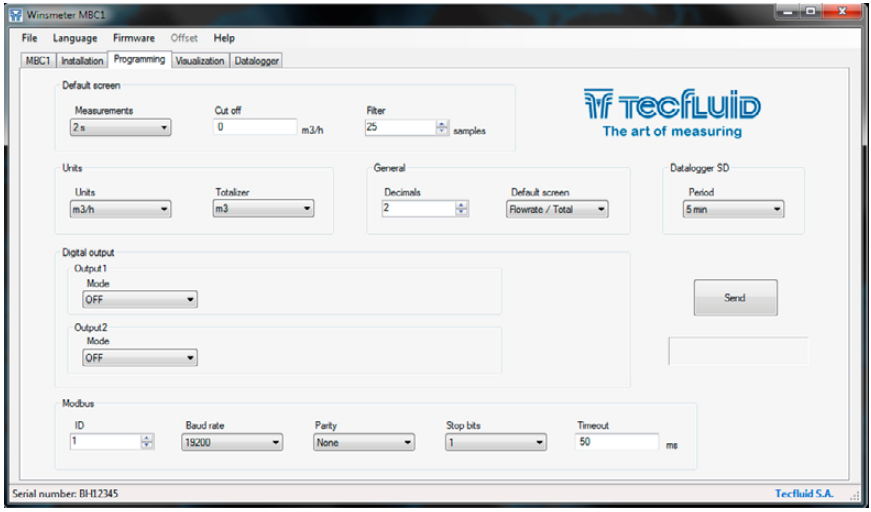
Changing the parameters of this window, the functions of the equipment that affect the measurement can be programmed.

Once the changes have been made, press the "Send" button to save all data into the device memory.

The message "Saving program" will appear for two seconds on the converter screen. The installation data will be stored in the memory of the converter. The date and time will be synchronized with those of the computer.

From the "Installation" screen the value of the totalizer can also be changed, and reset it to zero. The value change of the totalizer is made by a particular "Send" button for this function.

12.5 Access to “Programming”



To enter the Programming window, simply press the corresponding tab.

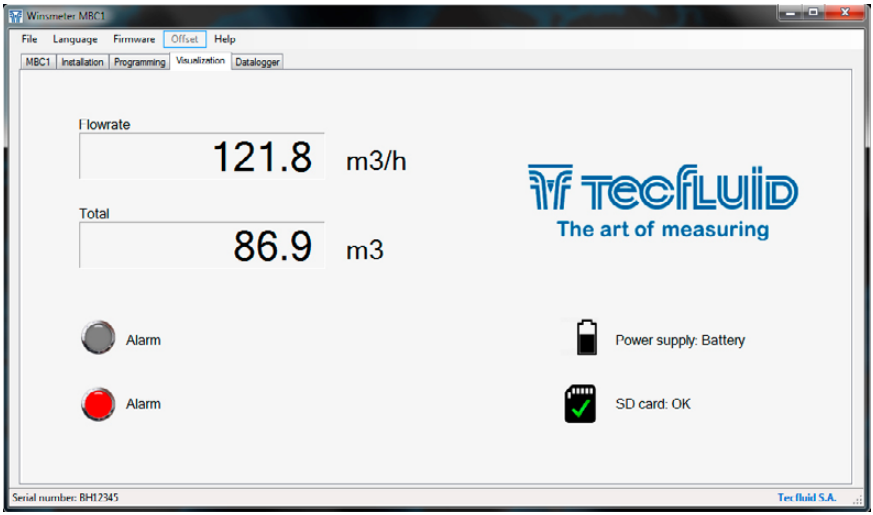
Changing the parameters in this screen, the different functions of the equipment can be programmed.

Once the changes are made, press the “Send” button to save all data into the device memory.

The message "Saving program" will appear for two seconds on the converter screen. The programming data will be stored in the memory of the converter.

12.6 Visualization

When the communication with the computer port is established (see section 12.2), the tab "Visualization" opens. This tab lets you view real-time flow rate and totalizer, as well as the status of the digital outputs.



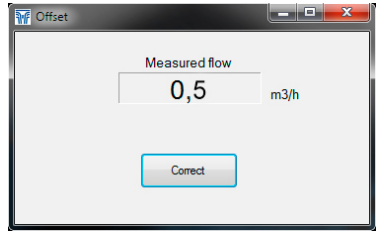
It is an intuitive tool to verify that the instrument has been installed and programmed correctly.

12.7 Zero flow drift adjustment

In the case that there is a zero flow drift (Offset), it is convenient to make an adjustment.

IMPORTANT: The flowmeter is delivered with the zero flow adjusted. Do not make a new adjustment if it is not a really necessary case. An improper adjustment can impact on incorrect flow values.

The adjustment is made by accessing to “Offset” menu. The following window will appear:



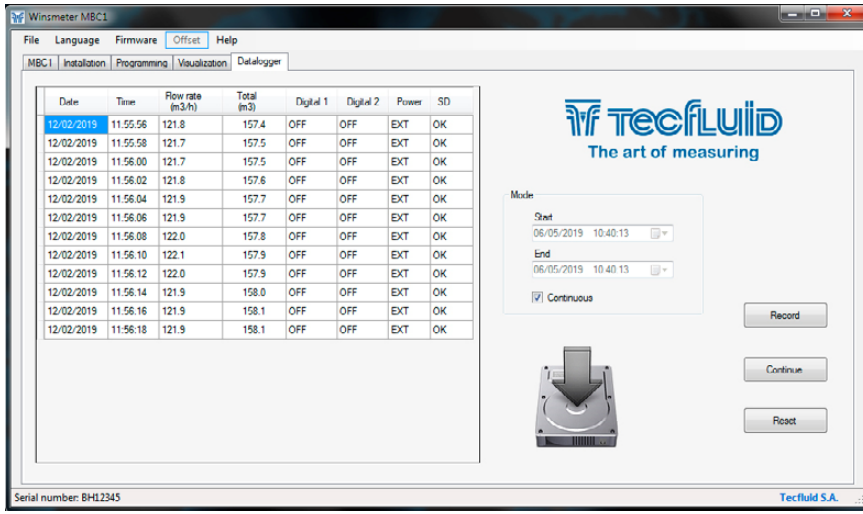
To correct the offset, the flow rate in the installation should be zero, that is, the liquid inside the pipe where the flowmeter is installed must be completely stopped. In addition, it must be ensured that the pipe is completely full of liquid so that this adjustment become effective.

Under these conditions, the flow measured by the instrument will appear in the "Measured flow" box. If this flow has an important zero drift, the text "Very high offset" will appear.

To correct the offset, press the button "Correct".

From this moment, the box "Measured flow" should indicate a value close to zero. The offset is already corrected. To conclude, close the window.

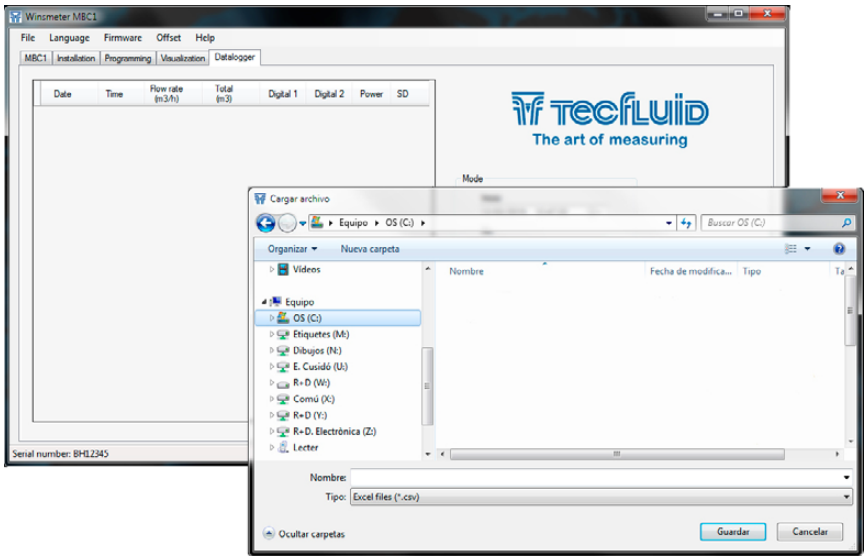
12.8 Datalogger



In this window the process of the different variables of the equipment can be registered in a file.

The time between samples, as well as the start and end time of the record can be selected.

When the "Register" button is pressed, the screen that allows to name the file and select its location appears.



The created file has CSV format, which can be viewed directly with a spreadsheet.

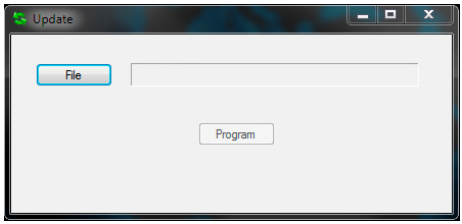
12.9 Firmware updates

New firmware updates can be published in the website. These updates contain improvements or bug fixes that make that the equipment operates at best conditions.

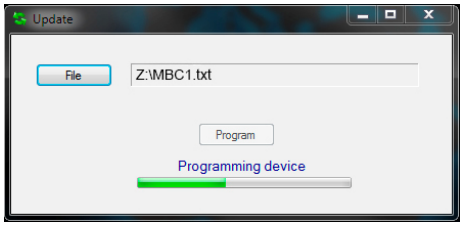
The updates can be downloaded from the following link of Tecfluid S.A. website:

www.tecfluid.com\downloads

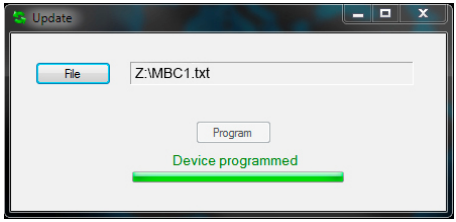
To update the device, go to menu “Firmware” - “Update”, and a screen with the button “File” will appear. Pressing this button the file explorer can be accessed. The downloaded file has to be searched there.



Once the file is selected, press the “Program” button. A message “Programming device” will appear.



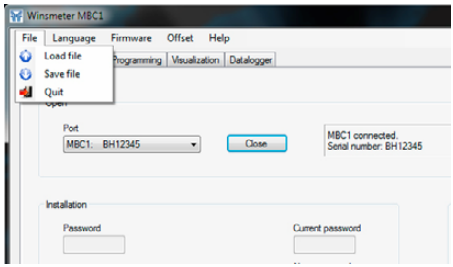
Progress bar will indicate the process, after which the message “Device programmed” will appear.



From this moment, the MBC1 converter already has the new version of Firmware.

12.10 Configuration file

A device configuration backup can be made by saving data into a file. To do this, go to menu “File” - “Save file”.



The file is saved in the same folder where the Winsmeter MBC1 software is located.

In the same way, a configuration data file can be loaded into the device. To do this, go to the menu “File” - “Load file”, and the file explorer will appear. The file has to be searched there.

The filename is the serial number and the extension is INI.

NOTE: When the configuration is saved into a file, the stored data are those in the device memory. These data may be different from those shown on the Winsmeter program. To ensure that the data match press the "Send" button in the "Programming" tab.

IMPORTANT: The USB connection is used only for the configuration and commissioning of the device. In no case it is intended to be used continuously, as a normal mode of operation in an industrial environment.

12.11 Default values

From the menu “Firmware”, if the “Installation” window is enabled, the submenu “Default values” can be accessed. It is useful to return the instrument to factory values.

13 TECHNICAL CHARACTERISTICS

Accuracy

±0.5% reading value for $v \geq 0,4$ m/s

$\frac{\pm 0.2}{v\ (m/s)}$ % reading value for $v \leq 0,4$ m/s

Repeatability

±0,14 % VFE. Time between measurements of 15s and a filter of 250 samples.

Velocity range

0,1 ...10 m/s

Temperature

Process temperature:

PP:	-10ºC … +80ºC
PTFE, PVDF:	-20ºC … +120ºC
Ebonite:	-20ºC … +90ºC

Ambient temperature: -20ºC … +60ºC

Minimum conductivity

20 µS/cm

Power supply

Internal batteries type D 3.6V 19 Ah

Battery life (with a time between measurements of 15 seconds):

2 batteries, 5 years
4 batteries, 10 years

External: 12 ... 30 VDC

Digital outputs (only with external power supply)

2 isolated outputs, configurable as pulse output or status output

MOSFET transistors N channel galvanically isolated from the rest of the circuit and potential free. I_{max}: 200 mA

Pulse output:

Maximum frequency	: 5 Hz
Minimum frequency	: 0 Hz
Pulse width	: 200 ms
Duty cycle	: 50%

Status outputs:

Empty pipe, alarm or inverted flow rate

Totalizer

N. of digits:	8 (2 decimals)**
Digit size:	8 mm
Reset:	by means of keyboard

Flow rate indication

N. of digits:	5 (up to 2 decimals configurable)**
Digit size:	11 mm

** When the available digits are full and the integers overflow a decimal is automatically lost.

Datalogger

By means of data writing into a SD card.

Programmable time interval between writings.

Data stored one writing: Date, time, flow rate, total volume, digital output 1, digital output 2 and status.

General characteristics

Sensor materials:

Exterior:	FLOMID-0FX: Stainless steel
	FLOMID-2FX, 4FX (DN ≤ 80): Aluminium and coated steel
	FLOMID-2FX, 4FX (DN > 80): Coated steel
	FLOMID-1FX, 3FX, 5FX, 7FX: AISI316L
Liner:	FLOMID-0FX: PP, PVDF
	FLOMID-2FX, 4FX: PTFE, Ebonite
Electrodes:	Hastelloy, stainless steel, titanium, zirconium, tantalum

MBC1 converter material: Coated aluminium

Ingress protection:

FLOMID-0FX: IP65

FLOMID-2FX, 4FX: IP68 10 m H_2O

Converter MBC1: IP67

Communication protocols (only with external power supply):

Modbus RTU isolated from the external power supply.

Detailed information on the protocol can be found in the R-IT-MBC1COM instructions manual, that can be downloaded from Tecfluid S.A. website.

14 SAFETY INSTRUCTIONS

The series FLOMID flowmeters are in conformity with all essential requirements of all EC directives applicable to them:

2014/68/EU	Pressure equipment directive (PED)
2014/30/EU	Electromagnetic compatibility directive (EMC)
2012/19/EU	Waste electric and electronic equipment (WEEE).
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS).

The declarations UE of conformity can be downloaded from the section “Download” of the Tecfluid S.A. website. www.tecfluid.com

14.1 Pressure equipment directive

Tecfluid S.A. have subjected the series FLOMID of flowmeters to a conformity assessment method for the pressure equipment directive, specifically according to module H (full quality assurance).

Conformity with the directive is reflected by the CE marking in each pressure equipment and by the written declaration of conformity. The CE marking is accompanied by the identification number of the notified body involved at the production control phase.

The marking of the equipment takes into account the fluid type, the group of fluid and the category, for example: G1 CATI

G	Gases and vapours
1	Group of liquids 1
CATI	Category I

Devices that, due to their size, are not subject to conformity assessment, are considered outside the scope of the directive and therefore they have not the CE mark according to pressure directive. These devices are subject to applicable sound engineering practice (SEP).

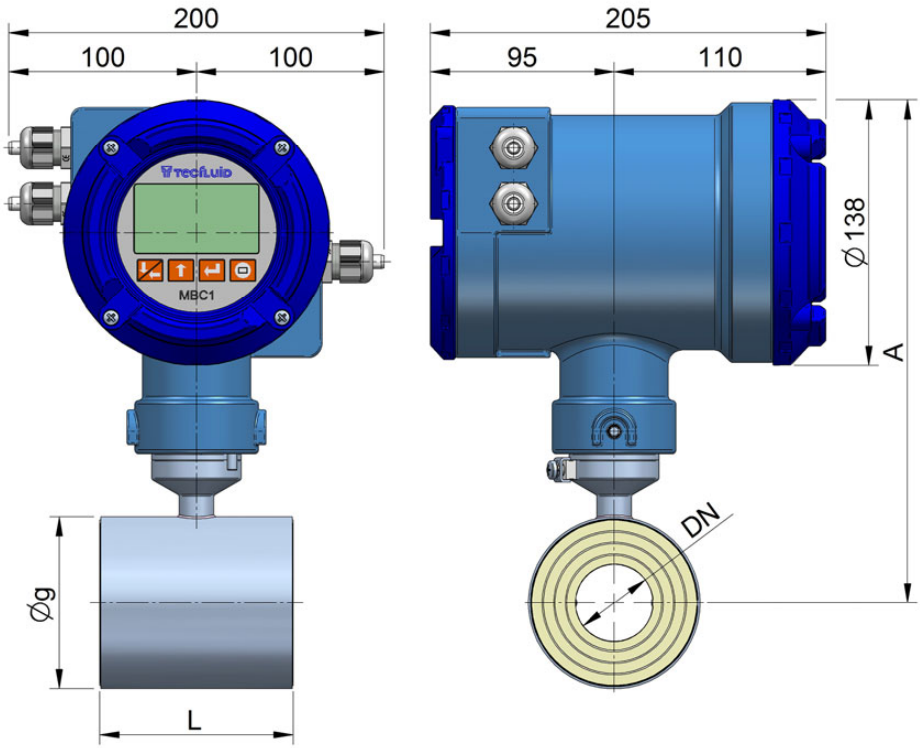
This equipment is considered as being a pressure accessory and **NOT** a safety accessory as defined in the 2014/68/EU directive, Article 2, paragraph 4.

14.2 Certificate of conformity TR CU (EAC marking)

Tecfluid S.A. have subjected the series FLOMID of flowmeters to a certification procedure according to the technical regulations of the Customs Union of the Eurasian Economic Union (EEU).

This Certificate is an official document confirming the quality of production with the standards on the territory of the Customs Union, particularly regarding safety requirements and electromagnetic compatibility.

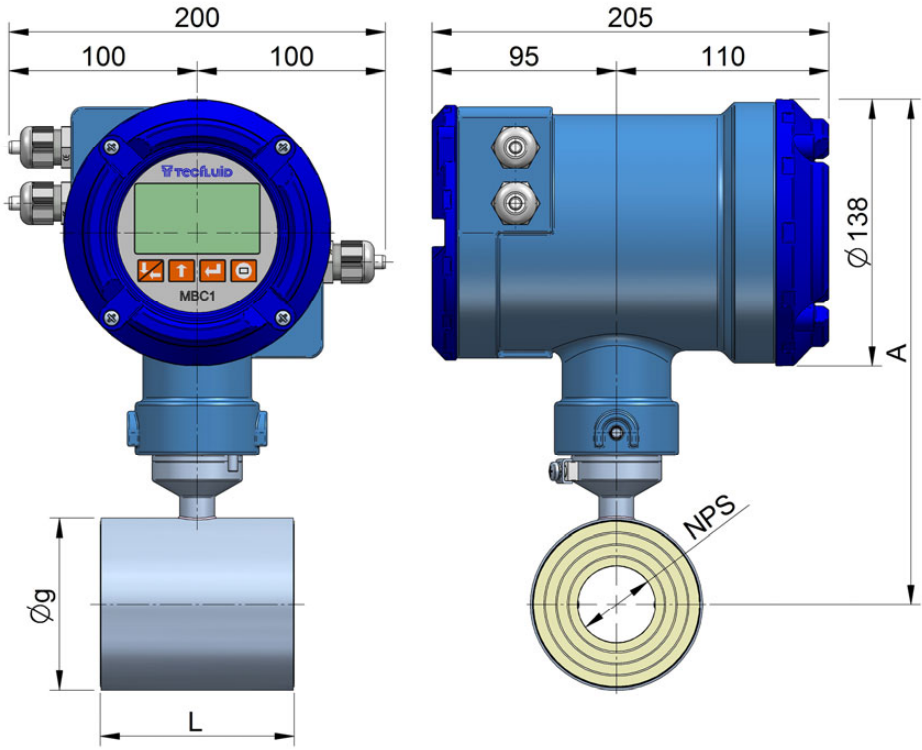
15 DIMENSIONS



FLOMID-0FX (EN 1092-1 wafer mounted)

DN	PN	g	L	A	Weight (kg)
25	16	73	80	252	4.1
32		84	80	258	4.2
40		89	100	261	4.4
50		108	100	270	4.7
65		129	120	281	5.4
80		141	120	287	5.7
100	10	154	165	293	6.5
125		192	165	310	10.4
150		218	165	323	11.8

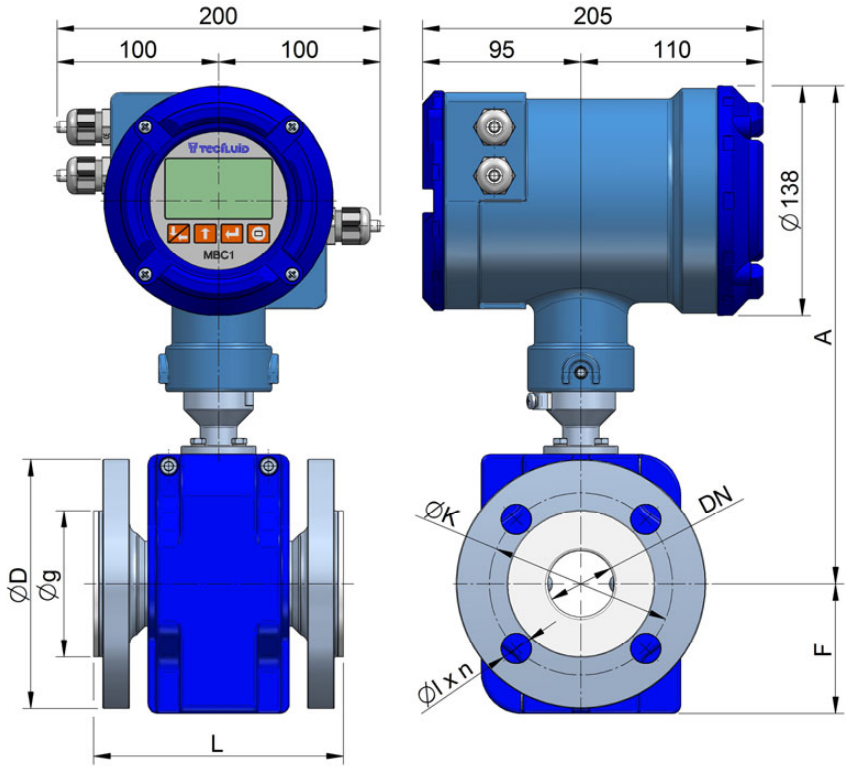
(All dimensions in mm)



FLOMID-0FX (ASME B16.5 150# wafer mounted

NPS	Class	g	L	A	Weight (kg)
1"		63	65	248	4.0
1¼"		73	80	252	4.1
1½"		84	80	258	4.2
2"		89	100	261	4.4
2½"	150#	108	100	270	4.7
3"		129	120	281	5.4
4"		154	165	293	6.5
5"		192	165	310	10.4
6"		218	165	323	11.8

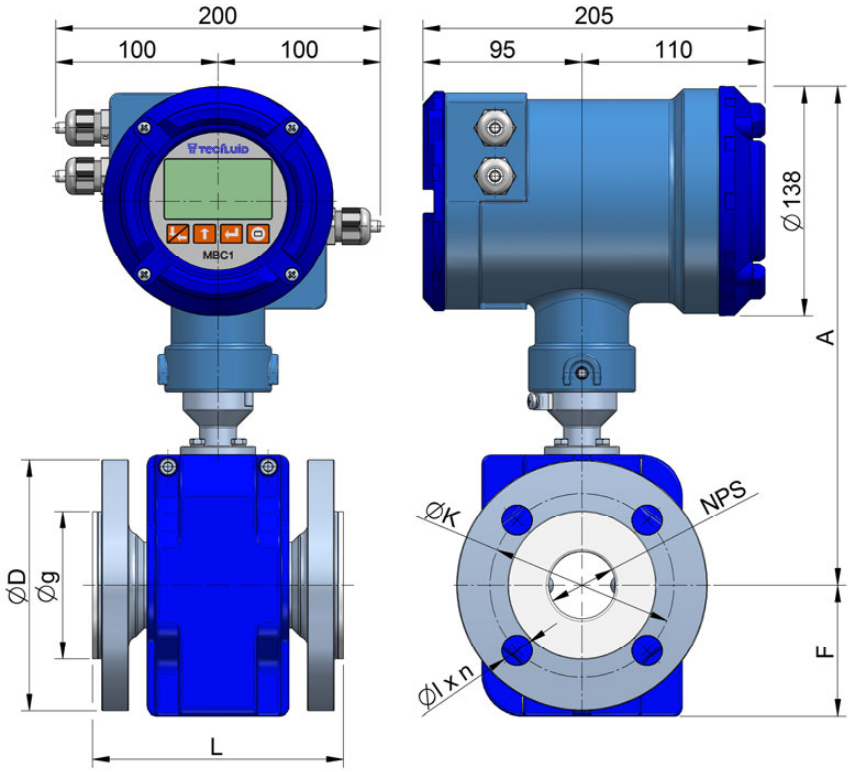
(All dimensions in mm)



FLOMID-2FX (EN 1092-1 flanges)

DN	PN	D	K	l x n	g	L	A	F	Weight (kg)
25		115	85	14 x 4	68	150	292	71	7,0
32		140	100	18 x 4	78	160	300	78	8,5
40		150	110	18 x 4	88	160	300	78	9,0
50		165	125	18 x 4	102	200	326	105	10,5
65	16	185	145	18 x 8	122	200	326	105	12,0
80		200	160	18 x 8	138	200	326	105	14,0
100		220	180	18 x 8	158	250	320	110	18,0
125		250	210	18 x 8	188	250	332	125	20,0
150		285	240	22 x 8	212	300	347	143	23,0
200		340	295	22 x 8	268	350	376	170	34,0
250		395	350	22 x 12	320	400	404	198	48,0
300		445	400	22 x 12	370	500	421	223	56,0
350	10	505	460	22 x 16	430	500	454	253	65,0
400		565	515	26 x 16	482	600	471	283	79,0
450		615	565	26 x 20	532	600	526	309	88,0
500		670	620	26 x 20	585	600	551	335	101,0

(All dimensions in mm)



FLOMID-4FX (ASME B16.5 150# flanges)

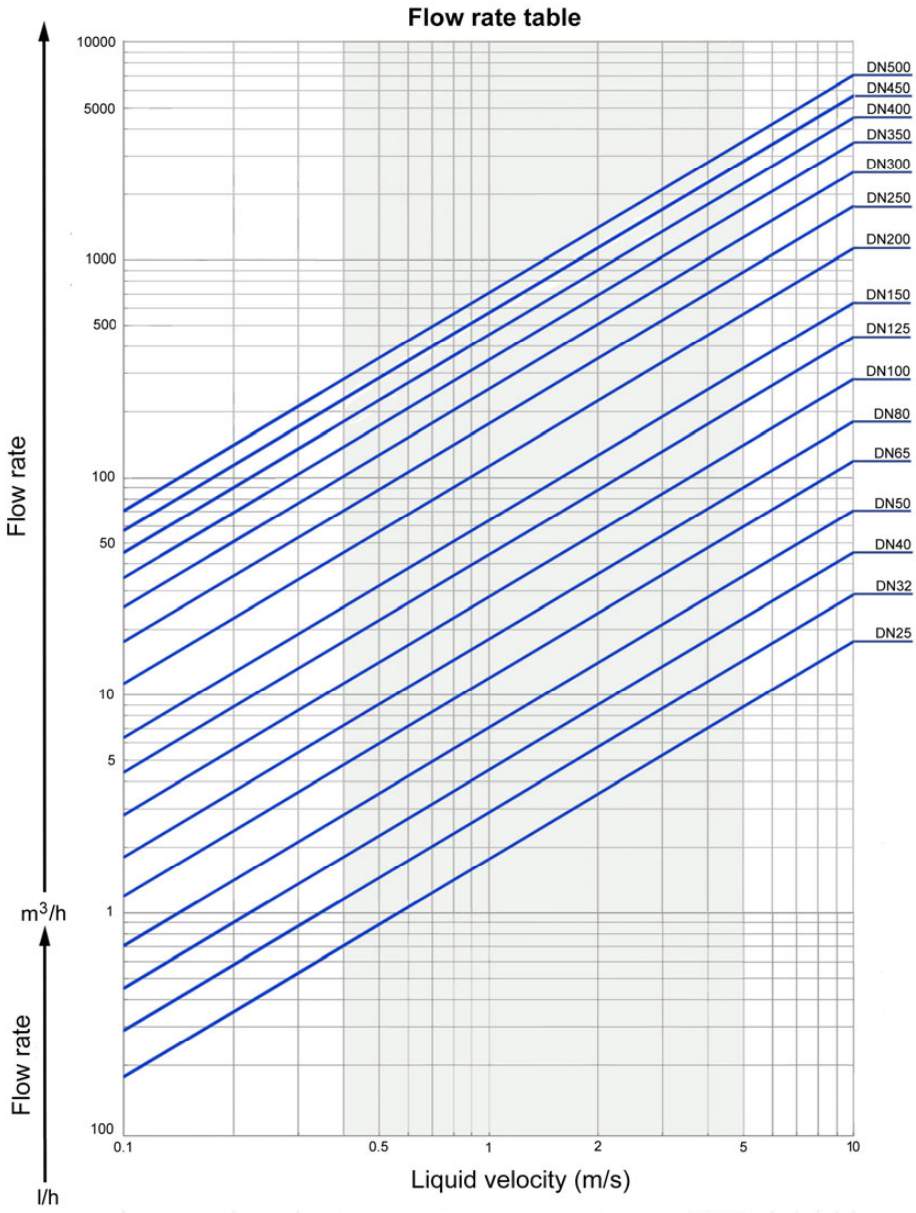
NPS	Class	D	K	l x n	g	L	A	F	Weight (kg)
1"	150#	110	79.4	5/8" x 4	50.8	150	292	71	7,0
1¼"		115	88.9	5/8" x 4	63.5	160	300	78	8,5
1½"		125	98.4	5/8" x 4	73.0	160	300	78	9,0
2"		150	120.7	¾" x 4	92.1	200	326	105	10,5
2½"		180	139.7	¾" x 4	104.8	200	326	105	12,0
3"		190	152.4	¾" x 4	127.0	200	326	105	14,0
4"		230	190.5	¾" x 8	157.2	250	320	115	18,0
5"		255	215.9	7/8" x 8	185.7	250	332	128	20,0
6"		280	241.3	7/8" x 8	215.9	300	347	140	23,0
8"		345	298.5	7/8" x 8	269.9	350	376	173	34,0
10"		405	362.0	1" x 12	323.8	400	404	203	48,0
12"		485	431.8	1" x 12	381.0	500	421	243	56,0
14"		535	476.3	1 1/8" x 12	412.7	500	454	268	65,0
16"		595	539.8	1 1/8" x 16	469.9	600	471	298	79,0
18"		635	577.9	1 1/8" x 16	533.4	600	526	318	88,0
20"		700	635.0	1 1/8" x 20	584.2	600	551	350	101,0

All dimensions in mm

16 TROUBLESHOOTING

Problem	Probable cause	Solution
It apears the empty pipe screen instead of the working screen	Pipe is empty	Make sure that the pipe is completely full, for example, installing the flowmeter in a vertical pipe with upwards flow
	The functional earth is not connected	Connect the functional ground of the flowmeter to a metallic point of the installation in contact with the liquid
	Isolation of the electrodes	Clean the sensor electrodes
	Electrode cable disconnected	Connect the cable between the sensor and the electronic converter
	Liquid with very low conductivity	The flowmeter is not adequate for the application
The flow rate is unstable	Dirt on the electrodes	Clean the sensor electrodes
	The product contains air or non-conductive particles in suspension	Verify that the flowmeter is adequate for this application
The indicated flow rate is 0	Coil cable disconnected	Connect the cable between the sensor and the electronic converter
	The flow rate is smaller than programmed as CUT OFF	Decrease the value of the cut off (see page 28)
The instrument indicates a value when there is not flow	The sensor is damaged due to electrodes corrosion Electrode material not adequate for the liquid	Change the sensor
	The functional earth is not connected and the empty pipe option is OFF	Connect the functional ground of the flowmeter to a metallic point of the installation in contact with the liquid
The displayed flow rate is higher than expected	The electrodes are immersed but the pipe is not completely full	Make sure that the pipe is completely full, for example, installing the flowmeter in a vertical pipe with upwards flow
Display is off	Blown fuse	Change the fuse
	Not enough current from the power supply	Change the power supply
	Deactivated screen	Press (Escape) to turn the screen on
	Instrument in mode OFF	Press (Escape) to turn the screen on and select ON
	Empty batteries	Change the batteries (see page 37)

ANNEX A


Flow rate table
Flow rate
m3/h
Flow rate
l/h
10000
5000
1000
500
100
50
10
5
1
100
0.1
0.5
1
2
5
10
Liquid velocity (m/s)
DN500
DN450
DN400
DN350
DN300
DN250
DN200
DN150
DN125
DN100
DN80
DN65
DN50
DN40
DN32
DN25

WARRANTY

Tecfluid S.A. guarantee all the products for a period of 24 months from their sale, against all faulty materials, manufacturing or performance. This warranty does not cover failures which might be imputed to misuse, use in an application different to that specified in the order, the result of service or modification carried out by personnel not authorized by Tecfluid S.A., wrong handling or accident.

This warranty is limited to cover the replacement or repair of the defective parts which have not damaged due to misuse, being excluded all responsibility due to any other damage or the effects of wear caused by the normal use of the devices.

Any consignment of devices for repair must observe a procedure which can be consulted in the website www.tecfluid.com, “After-Sales” section.

All materials sent to our factory must be correctly packaged, clean and completely exempt of any liquid, grease or toxic substances.

The devices sent for repair must enclose the corresponding form, which can be filled in via website from the same “After-Sales” section.

Warranty for repaired or replaced components applies 6 months from repair or replacement date. Anyway, the warranty period will last at least until the initial supply warranty period is over.

TRANSPORTATION

All consignments from the Buyer to the Seller´s installations for their credit, repair or replacement must always be done at freight cost paid unless previous agreement.

The Seller will not accept any responsibility for possible damages caused on the devices during transportation.

Tecfluid
The art of measuring

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Quality Management System ISO 9001 certified by

Pressure Equipment Directive certified by Lloyd's Register

ATEX European Directive certified by