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MC 608 Converter

TD 210-0-ENG 🇬🇧

Installation Manual

$C\epsilon$

<table>
<tr><td>⚠</td><td colspan="1"># IMPORTANT WARNING</td></tr>
</table>

⚠	IT IS VERY IMPORTANT THAT ALL PERSONNEL WORKING WITH THE EQUIPMENT HAVE READ AND UNDERSTAND THE INSTRUCTIONS AND DIRECTIONS PROVIDED IN THIS MANUAL AND THEY FOLLOW THE INSTRUCTIONS AND DIRECTIONS BEFORE TAKING THE EQUIPMENT INTO USE. THE MANUFACTURER ACCEPTS NO LIABILITY FOR THE CONSEQUENCES OF MISUSE BY THE OPERATOR.

The operator shall bear responsibility for the suitability of the device for the specific purpose:

1. Improper installation and operation of the devices (systems) will cause warranty to be void

2. The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited direct, indirect, incidental, punitive and consequential damages.
Installation, connection, commissioning and service must be carried out by personnel who are qualified and authorized to do so.
Installation personnel must ensure that the measuring system is correctly connected in accordance with the connection diagram.
For applications involving high working pressures or media that can be dangerous to people, surroundings, equipment or other in the event of pipe fracture, recommends taking precautions such as special placement, shielding or installation of a safety guard or safety valve prior to installation of the sensor.

This device contains electrical components with an electrical current therefore installation, services and maintenance must be carried out by expert and qualified personnel, aware of all necessary precautions. Before opening any internal parts, please shut off the power supply.This manual refers to a flowmeter in compliance with EN 50082, -2 (immunity) AND EN50081-2 (emissions), belonging to class A.

The flowmeter is composed of metal and plastic parts, all of which must be in compliance with local norms and requirements concerning their trash disposal.

<div style="background:gray;text-align:center">READ AND KEEP THESE INSTRUCTIONS IN A SAFE PLACE</div>

We want you to save time and money!
We assure that by reading the entire manual
you will have a correct installation and
enjoy the product in complete safety.

⚠ WARNING!

	RISK OF ELECTRIC SHOCK ANY OPERATIONS INDICATED BY THIS SYMBOL, MUST BE CARRIED OUT EXCLUSIVELY BY QUALIFIED TECHNICAL PERSONNEL .
DANGEROUS ELECTRIC CURRENT	

⚠ WARNING!

	VITALLY IMPORTANT INFORMATION AND POINTS TO OBSERVE. PLEASE SEE THE ASSOCIATED DOCUMENTS

NOTE

	INFORMATION AND PARTICULARLY IMPORTANT POINTS TO OBSERVE

CE/EMC/Standards

$$C\,\epsilon$$

The manual describing this flowmeter complies to the following safety rules:

• EMC Directives 89/336/EEC AND 93/68/EEC; EN 61326-1 (1997), A1(1998), A2 (2001), A3(2003)

• Low Voltage Directives 73/23/EEC and 93/68/EEC

• It belongs to class A.

It is also essential to read the start up manual accompanying the flowmeter and contained in the packaging.

Manufacturer's design and safety statement

• Responsibility for the choice of lining and electrode materials as regards abrasion and corrosion resistance lies with the purchaser; the effect of any change in process medium during the operating of the meter should be taken into account. Incorrect selection of lining and/or electrode could lead to a failure of the meter.

• Stresses and loading caused by earthquakes, traffic, high winds and fire damage are not taken into account during meter design.

• Do not install the meter such that it acts as a focus for pipeline stresses. External loading is not taken into account during meter design.

• During operation do not exceed the pressure and/or temperature ratings indicated on the data label or in this Operating Manual.

Battery operation:

• RS485, 4…20 mA outputs must be always feed by an external 24V power supply complying with Low Voltage Directive (LVD) in order to be considered safe.

• Lithium batteries are primary power sources with high energy content. They are designed to meet the highest possible safety standard. They may, however, present a potential hazard if they are abused electrically or mechanically. This is in most circumstances associated with the generation of excessive heat, where increased internal pressure may cause the cell to rupture.

Thus the following basic precautions should be observed when handling and using lithium batteries:

     - Do not short-circuit, recharge, overcharge or connect with false polarity

     - Do not expose to temperature beyond the specified temperature range or incinerate the battery

     - Do not crush, puncture or open cells or disassemble battery packs

     - Do not weld or solder to the body of the battery, or the battery packs

     - Do not expose contents to water

• Lithium batteries are regulated under United Nations Model Regulations on Transport of Dangerous goods, UN document ST/SGAC. 10-1, 12th revised edition, 2001. UN no. 3091 class 9 covers lithium batteries packed with or inside the equipment. UN no. 3090 class 9 covers transportation of batteries on their own.

Thus the following basic precautions should be followed when transporting lithium batteries:

     - Transport only in special packaging with special labels and transportation documents.

     - Exercise caution in handling, transportation and packaging in order to prevent short circuiting of the batteries.

     - The gross mass of the package is limited according to the type of transportation. In general a gross mass below 5 Kg is acceptable for all forms of transportation.

1. PRELIMINARY NOTES

The main parts composing the electromagnetic flowmeter are:

A. The sensor – is installed in the pipes using flanges or threaded attachments or clamp attachments

B. The converter – may be installed on the sensor (in compact version), or nearby (in remote version) connected by two cables.

Electromagnetic water meters have many important advantages over their mechanical counterparts: outstanding long term stability, maximum process rilability, no maintanace – to name just a few. As a result, these meters can deliver precise and reliable measurements for many years.

NOTE

Electromagnetic flowmeters are specifically designed to work under few basical conditions:

1. Liquid must be conductive
2. Full pipe conditions at any time
3. Recommended inlet and outlet distances

Please see below paragraphs for more detailed indications on the correct installation.

2. GENERAL PRECAUTIONS

The correct lifting method is shown in the figure on the right, while the one shown in the figure on the left should be avoided; more importantly **DO NOT** lift the flowmeter by its converter but by holding it on its sides.

f. 1

f. 2

f. 3

In addition:

DO NOT move the flowmeter with the lifting device without the original packaging or without the help of an appropriate support, offering the same stability.

3. INSTALLATION OF THE SENSOR

3.1 IDENTIFYING DATA PLATE

The plate located on the sensor carries the following data:

MODEL	MUT 2200EL	
PART N°	WAC 276	
DN	8"	PN 16
Temp.	80°	IP 68
ELECTRODES	H-C	
LINING	PTFE	
KA	+2.6428	
KB	-007641	
ITEM		

STD Flange A150
Made in Italy

• MODEL:
• PART N°: part number identifying the instrument (identification number for tracing identity)
• DN: nominal diameter [inches or mm]
• PN nominal pressure [bar]
• Temp.: maximum temperature of the fluid to process
• IP: degree of international protection
• ELECTRODES: material composition of the electrodes
• LINING: internal lining material
• KA: calibration coefficients
• ITEM: other particular guidelines

f. 4

3.2 DIRECTION OF THE LIQUID IN THE SENSOR INDICATED BY THE ARROW

In the sensor, if the liquid flows:

• in the same direction of the arrow (enter by – and exit by +), the flow is positive, the display will show reading with no sign;
• in the opposite direction to that indicated by the arrow (enter by + an exit by –), the flow is negative, the display will show reading with negative sign;

	From – to +	–	➔ direct flow	–	➔ digit without sign
FLOW	From + to –	–	➔ inverse flow	–	➔ negative digit

3.3 INSTALLATION INSTRUCTIONS

IMPORTANT NOTE

THE SENSOR MUST ALWAYS BE
COMPLETELY FULL WITH LIQUID
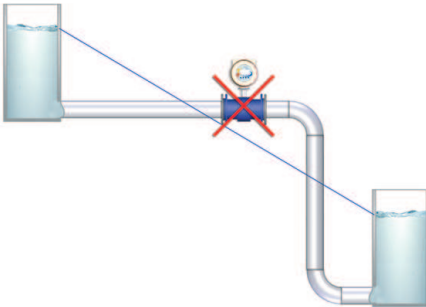AT ANY TIME!

3.3.1 POSITIONING IN RELATION TO THE PLANT

For an efficient working condition, please carefully follow indications in figure 5.
The flowmeter must remain below the hypothetic blue line (piezometric level line) which connects the two levels of liquid to measure.
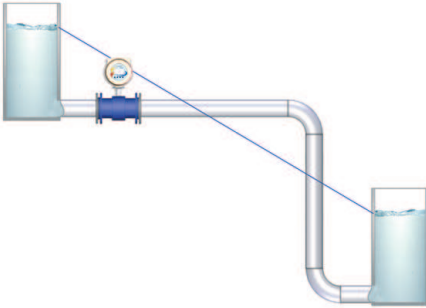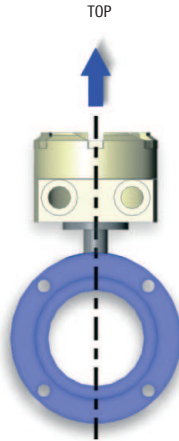

f. 5

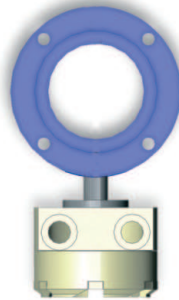Avoid placing the flowmeter above the piezometric level line.

f. 6

3.3.2 POSITIONING IN RELATION TO THE FLOW

With installations in horizontal pipes, the converter (or the junction box in the separate version) must be placed on the upper part.

TOP

f. 7

In case of obstruction, follow the guidelines as explained in the lower figures:
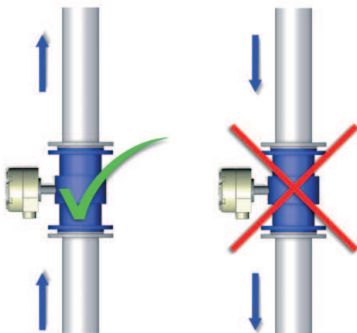

f. 8

Avoid following positions:
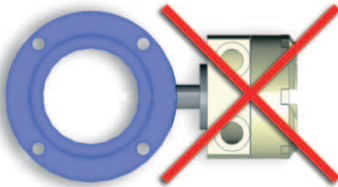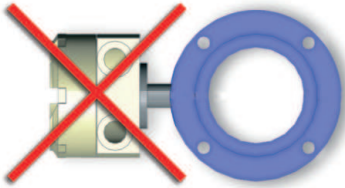
f. 9

Recommended installation is in vertical/inclined pipe with upward flow direction, to minimize the wear and deposits in the sensor. Avoid installation in vertical pipes with free outlet.

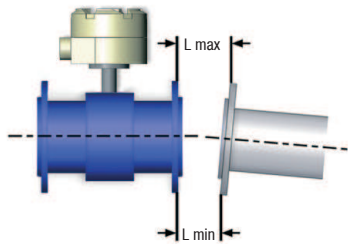f. 10

3.3.3 IMPORTANT BONDING INDICATIONS

Use elastic pipe fittings in case of a not adequate distance between sensor and pipe. Do not attempt to bring the pipe to the sensor by tightening the bolts.
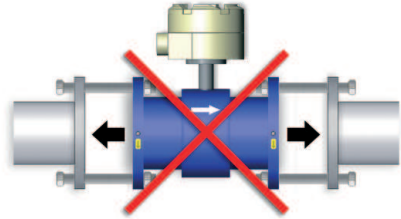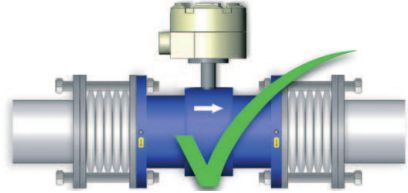
f. 11

Max. Permissible deviation of pipe flange faces 0.5mm

L max. - L min. ≤ 5 mm.

L max

L min

f. 12

8

3.3.4 CHARTS OF MAXIMUM ALLOWABLE TORQUES

Standard bolts must be well lubricated and tightened evenly around the gasket. Leakage/damage to the flowmeter or piping may arise if bolts are overthightened. Carefully follow the indications given by the charts, check carefully the correct centering of the sensor before securing the flanges and then proceed following the steps indicated below:
Step 1. approx 50% of maximum torque;
Step 2. approx 80% of maximum torque;
Step 3. approx 100% of maximum torque given in the chart.

f. 13

All values are theoretical and calculated for optimum conditions and use with carbon steel flanges.
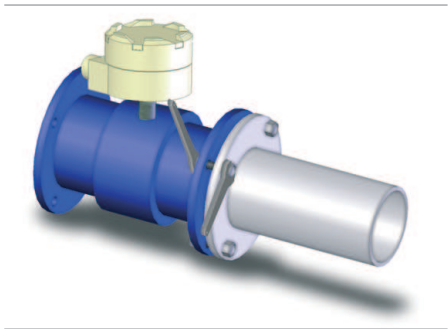
MUT 1100 PBT+ FIBERGLASS

Sensor	Max operative pressure		Flanges pipes		Max allowable torques	
	[bar]	[psig]	flange	class	[Nm]	[ftlb]
DN 40	≤10	≤145	DN 40	PN 16/40	25	13
DN 50	≤10	≤145	DN 50	PN 16/40	35	19
DN 65	≤10	≤145	DN 65	PN 16/40	35	19
DN 80	≤10	≤145	DN 80	PN 16/40	35	19
DN 100	≤10	≤145	DN 100	PN 16/40	45	24
DN 125	≤10	≤145	DN 125	PN 16/40	65	35
DN 150	≤10	≤145	DN 150	PN 16/40	85	45
DN 200	≤10	≤145	DN 200	PN 16/40	100	53
1 1/2"	≤10	≤145	1 1/2"	150/300	25	13
2"	≤10	≤145	2"	150/300	35	19
2 1/2"	≤10	≤145	2 1/2"	150/300	35	19
3"	≤10	≤145	3"	150/300	35	19
4"	≤10	≤145	4"	150/300	45	24
5"	≤10	≤145	5"	150/300	65	35
6"	≤10	≤145	6"	150/300	85	45
8"	≤10	≤145	8"	150/300	100	53

3.3.5 IMPORTANT GUIDELINES FOR CORRECT INSTALLATION

For a correct working condition please follow the important guidelines shown in the following figures. A wrong installation cannot guarantee a good measurement.
To achieve most accurate flow measurement it is essential to have minimum straight lengths of the inlet and outlet pipes as shown (DN: sensor nominal diameter)

• For partially filled pipes or pipes with downward flow and free outlet, the flowmeter should be located in a U-tube, respecting the upward and downward lengths between the bends.
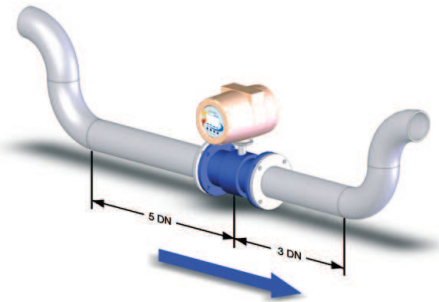
f. 14

• In case of a "T" connection between two different pipes, please respect 10DN distance upstream the flowmeter.
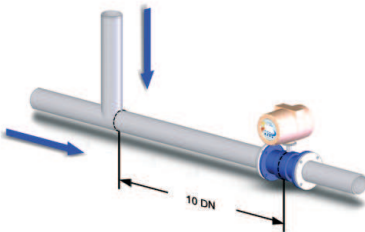
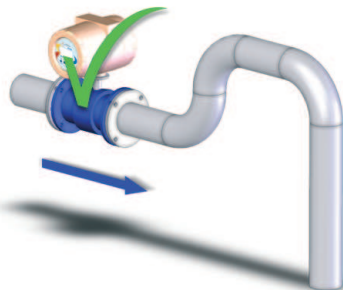f. 15

• Keep 5 meters between the axis of the flowmeter
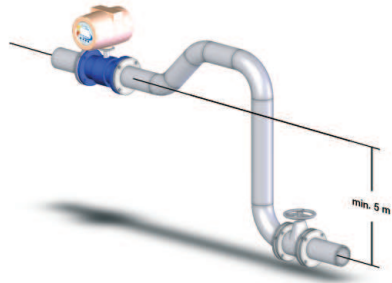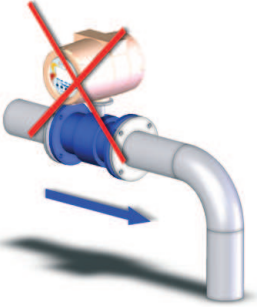
f. 16

RECOMMENDED INSTALLATIONS (✓)
TO AVOID (✗):

IMPORTANT NOTE

THE SENSOR MUST ALWAYS BE COMPLETELY FULL WITH LIQUID AT ANY TIME!

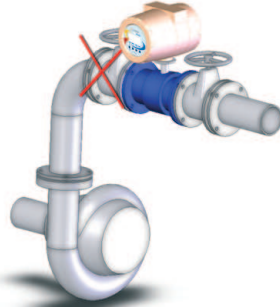• This installation keep the sensor full with liquid

f. 17

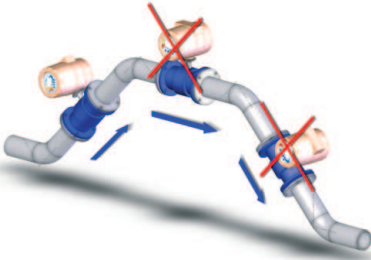• This installation **DOES NOT** guarantee a full pipe condition.

f. 18

• The position on the left is correct, the other two **ARE NOT**.

f. 19

• **DO NOT** place the sensor close to any variation in the route of the flow.

f. 20

• **DO NOT** place any gate valve directly connected upstream the sensor.
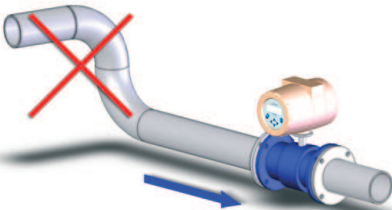

f. 21

• Always install the sensor downstream the pump and **NEVER** upstream to avoid vacuum.
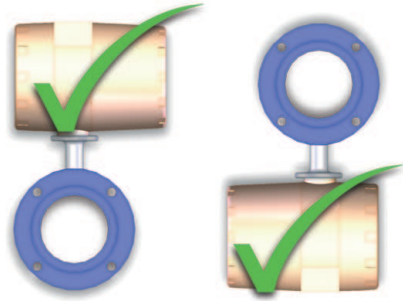

f. 22

• **DO NOT** install the sensor in vertical pipes with free outlet or at the highest point in the pipe system

f. 23

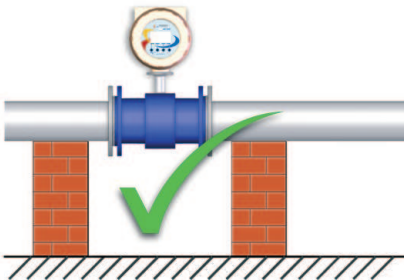• **DO NOT USE** the sensor as a support to the pipe.

f. 24

• Pipe should give the support to the flowmeter

f. 25
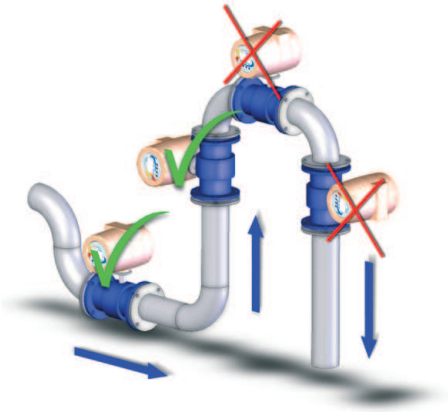
• Below installation methods are strongly recommended.

f. 26

• **AVOID** any of the following positions.

f. 27

12
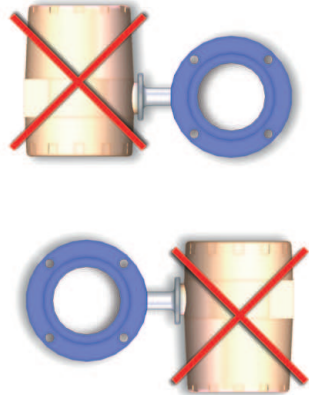
BURIAL INSTALLATIONS

• Remote sensor is protected to IP68/NEMA 6P and can be buried. The use of pea gravel, at least 300mm (12inches) all around the sensor, is recommended. This provides some drainage and prevents dirt from solidifying on the sensor.
It also helps locate the sensor should excavation be necessary. Before covering the pea gravel with earth, we suggest using electrical cable identification tape above the gravel. Remote sensor cable should be run through a plastic conduit of 50mm (2 inches) minimum.

Protective cover
Fill with an adequate quantity of material
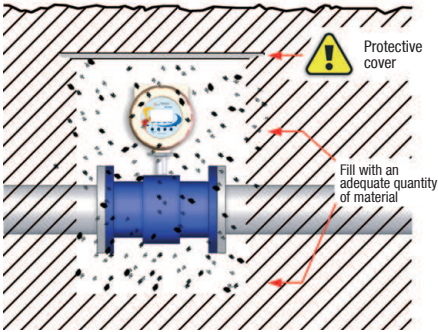
f. 28

3.3.6 IMPORTANT GENERIC INDICATIONS FOR A CORRECT INSTALLATION

• Install suitable antivibrational protection if any vibration arise.
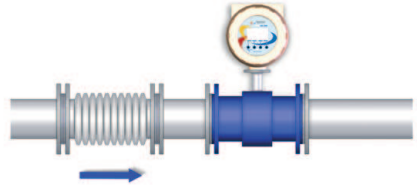
f. 29

• **DO NOT** expose the flowmeter to vibrations and/or movement, which may affect its performance and duration.

AVOID ANY EXCESSIVE VIBRATIONS

f. 30

• **AVOID** exposure of the flowmeter to strong or nearby magnetic fields.

f. 31

13

• Protect the flowmeter if exposed to direct sun radiations.

f. 32

f. 33

ENVIRONMENTAL TEMPERATURES

TEMPERATURE OF PROCESS

f. 34

IMPORTANT NOTE

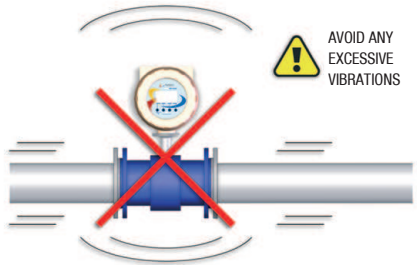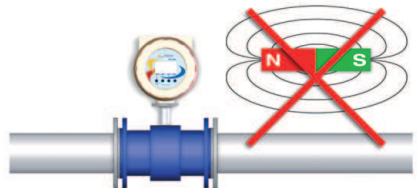**NOTE FOR CONNECTION OF ATEX APPROVED FLOWMETERS**

CABLING REQUIREMENTS IN POTENTIALLY EXPLOSIVE ATMOSPHERES (ATEX).

Lay the cables as required by standard EN 60079-14, in particular providing for mechanical protection thereof by, for example, rigid or flexible conduit pipes or the shelter of simple housing.

• For a normal and efficient working of the flowmeter:
  - The environmental temperature should be limited on a range between (-25 ÷ +80) °C, (-13 ÷ +176)°F;
  Temperature of the motherboard available in the converter Menu → Others → time/date
  - The temperature of the liquid should be limited on a range between (-25 ÷ +80)°C, (-13 ÷ +176)°F for compact version, (-25 ÷ +200)°C, (-13 ÷ +392)°F for remote version .

14

4. POTENTIAL EQUALIZATION

• Liquid potential equalization or grounding is accomplished with the built-in grounding electrode (so called 3rd electrode). The 3rd electrode electrically bond the liquid to the meter to provide a stable and accurate measurement.

IMPORTANT NOTE	NOTE
THE SENSOR MUST ALWAYS BE GROUNDED! Wrong ground connection can lead to a wrong measurement	The flowmeter is equipped with a grounding electrode (3rd electrode). Grounding rings are not necessary!

BOLTS FOR GROUNDING CONNECTIONS
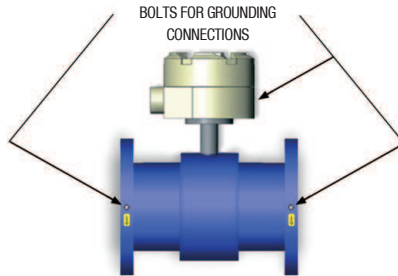
f. 35

• The sensor body must be grounded using grounding/bonding straps and/or grounding rings to protect the flow signal against stray electrical noise and/or lightning. This ensures that the noise is carried through the sensor body and noise-free measuring area within the sensor body
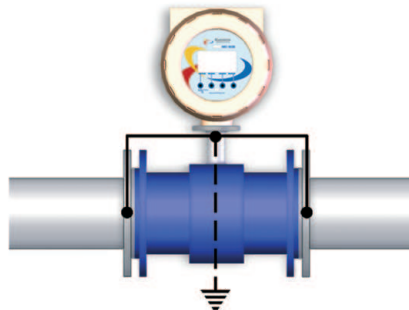
f. 36

•On plastic pipelines and lined metal pipes, OPTIONAL grounding rings can be used at both ends to ensure a good potential equalization. Grounding rings are not included in the delivery.
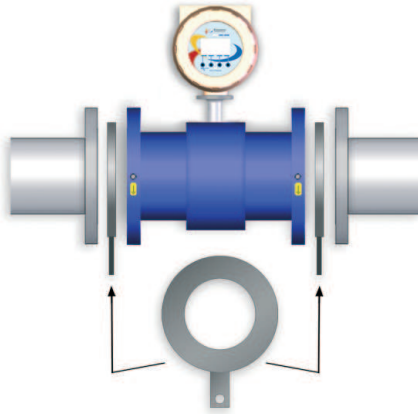
• Special attention for meter installation in cathodic protected pipeline.
Isolate the meter from the pipeline by mounting isolation Sleeves and Washers on the flange bolts and connect a wire between the pipelines, dimensioned to manage the cathodic current and environmental influence. Use grounding rings on both ends.
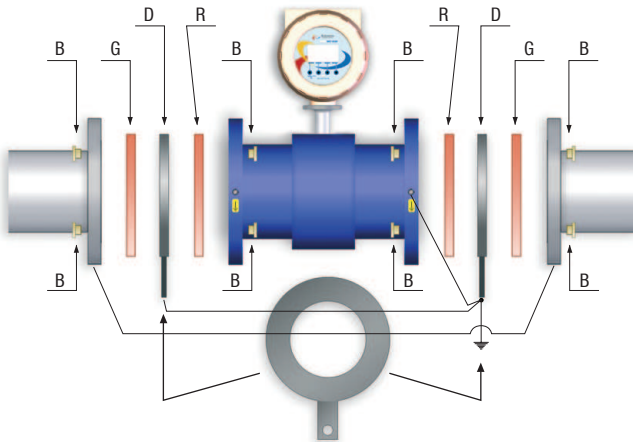
REFERENCES

B	Insulating washers
G	Insulating gaskets
D	Metallic grounding ring
R	Sensor insulating lining

5. NEGATIVE PRESSURE IN THE PIPE

Avoid high vaccum conditions in the pipe, these can damage the lining of the flowmeter and move the electrodes from the correct position.

6. CONVERTER MC 608

6.1 INSTALLATION

6.1.1 IDENTIFYING DATA PLATE

The data plate located on the converter displays the following information:

f. 39

• MODEL: converter model
• IP: degree of converter protection
• PART N°: serial number identifying the instrument
• Temp.: minimum/maximum temperature of working conditions
• POWER S: voltage supply or battery powered (MC608B)
• HZ: frequency of voltage supply
• COUPLING: serial number identifying the sensor coupled to converter
• OPTIONAL: other modules that may be added

6.1.2 COMPACT VERSION

Figure 40 represents the converter MC 608 in the compact layout.

• MC 608A
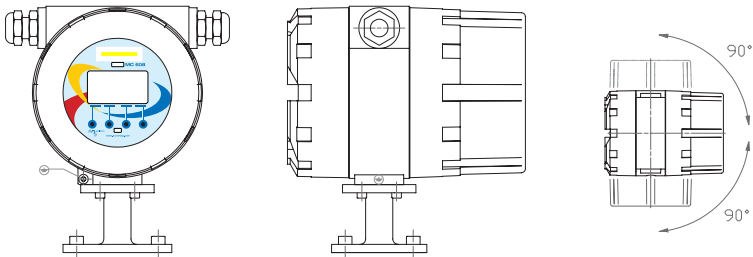
• MC 608B
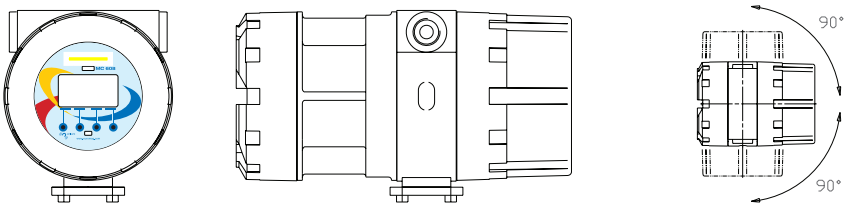
f. 40

When the converter is purchased in compact version all the electrical connections are already performed by the manufacturer.

Before running the converter, proceed with the out puts connection needed. For safety reasons wire the power supply only after having connected the outputs.

The converter can be rotated to a 90° angle by loosening the bolts on the lower part of the converter attached to the sensor neck. Once the new position of the converter is secured, close the bolts tight to ensure the converter on the sensor.

⚠ WARNING!	
⚡ DANGEROUS ELECTRIC CURRENT	WHILE TURNING THE CONVERTER POSITION, DO NOT PULL THE CABLES COMING FROM THE SENSOR.

Avoid strong vibrations on the converter, use remote version in case vibrations may occur.

NOTE	
👆	The cables are provided only with remote versions

MC608 converter may be either wall mounted or installed on a pole, using the tools supplied with remote version as shown in the figure.

The COUPLING value in the converter plate, shows the part number of the sensor to be connected.
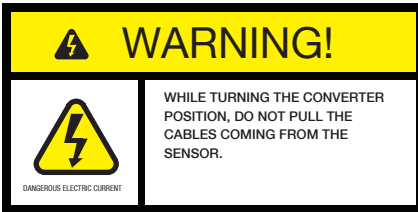Such information is also set in the converter, please check Menu → Others → system info.

To ensure smooth functioning, always use the signal cables included in the delivery by the manufacturer.

6.1.3 REMOTE VERSION

⚠ WARNING!	
⚡ DANGEROUS ELECTRIC CURRENT	ONLY SKILLED TECHNICAL PERSONNEL MAY HAVE ACCESS TO THE JUNCTION BOX

Figure 41 shows converter MC 608 in a remote version.

Cables coming from the sensor should be connected on the junction box located below the converter.

⚠ WARNING!	
⚡ DANGEROUS ELECTRIC CURRENT	ALL WORK ON THE ELECTRICAL CONNECTIONS MAY ONLY BE CARRIED OUT WITH THE POWER DISCONNECTED AND JUNCTION BOX OF THE CONVERTER PROPERLY CLOSED. TAKE NOTE OF THE VOLTAGE DATA ON THE NAMEPLATE!

• MC 608A

• MC 608B

f. 42

NOTE

| | THE JUNCTION BOX ON THE SENSOR IS DESIGNED TO BE IP68 PROTECTED ONLY WHEN PROPERLY CLOSED AND TIGHTENED. THE MANUFACTURER ACCEPTS NO LIABILITY OF AN IMPROPER CLOSURE BY THIRD PARTIES. |

6.1.4 ELECTRICAL CONNECTIONS

⚠ WARNING!

| DANGEROUS ELECTRIC CURRENT | ANY WORK DONE ON THE ELECTRICAL JUNCTION BOX OR ELECTRICAL COMPONENTS OF THE DEVICE MUST BE CARRIED OUT BY PROPERLY TRAINED SPECIALISTS |
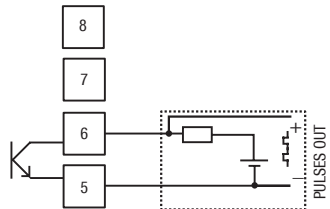
Figure 43 shows the Terminal block.

f. 43

MC608 Pulse Output Connection

1. CLEAN CONTACT TYPICAL CONNECTION
(suggested for battery operation MC608B)
Dataflow TX connection

2. ACTIVE PULSES
(suggested for battery operation MC608B)
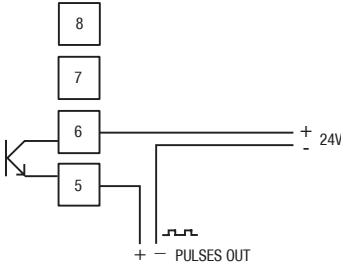
3. ACTIVE PULSES WITH EXTERNAL 24V
(not suggested for battery operation converter)
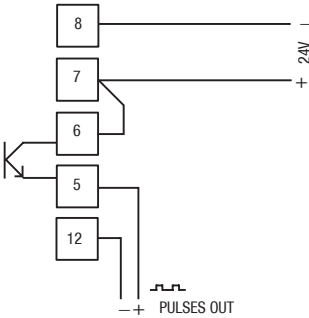
NOTE

TOTAL NUMBER OF THE ON/OFF OUTPUT ABSORPTIONS (CURRENTS) MUST NOT EXCEED 100 mA

6.1.5 RS485 MODBUS Output

The standard interface RS485 is available between clamps 14 – 15 of the block 4 in figure 43.

NOTE

The RS485 output is a MODBUS standard communication port, compatible with any software able to communicate through MODBUS language, please refer to the MODBUS address menu for more information.

6.1.6 ELECTRICAL GROUNDING OF THE CONVERTER CASE

The MC608 case should be grounded. This connection should be carried out by grounding the bolt located in the lower part of the converter.

NOTE

MAKING A PROPER CONNECTION IS NECESSARY FOR AN EFFICIENT WORKING OF THE DEVICE.

6.1.7 CONNECTION TO THE POWER SUPPLY

⚠ WARNING!

ELECTRICAL CONNECTION OF THE DEVICE MUST BE CARRIED OUT BY PROPERLY TRAINED SPECIALISTS

DANGEROUS ELECTRIC CURRENT

Make sure all electrical connections are correctly performed before connecting the unit to the power supply. Check the power voltage on the name plate. The unit may be supplied with voltage:

MC608A
90 … 264 Vac
Or 12 … 24 Vac/dc

MC608B
Battery powered by Lithium battery pack
Or 12 … 24 Vac/dc

6.2 PROGRAMMING OF THE MC608 CONVERTER

• Through the 4 push buttons located on the front mask
of the converter, unscrewing the front panel glass

NOTE	
	RS485, 4…20 mA and frequency outputs must be always feed by an external 24V power supply.

6.2.1 PROGRAMMING

To access the menu from the converter, simply
press on the relevant button below the function.
Enter the Menu by pressing the Menu button.

MENU
• Options
• Counters
• Parameters
• I/O
• Others
• Memory

Follow the below chart for an overview of the available functions.

OPTIONS
Technical units
- *Flow rate volume*
- *Flow rate time base*
- *Counters volume*
- *Pulses volume*
Measurement frequency
- *Measuring time*
Display
- *LCD backlight lev*
- *Backlight off*
- *LCD contrast*
View options
- *Last row*
Full scale flow rate
Language

COUNTERS
T+
P+ (set zero)
T-
P- (set zero)

PARAMETERS
Ka setup
Diameter Setup
Filters setup
- *Flow cut off*
- *Damping*
- *Bypass*
- *Peak cut*
- *Measure average*
Sensor offset
Zero finder
Flowrate alarms
- *Max flow th.*
- *Min flow th.*

I/O
Pulses OUT
- *Pulse volume*
- *Pulse T on*
Frequency OUT
- *Full scale freq.*
Prog. OUT
- *Enabled/disabled*
Prog. IN
- *Enabled/disabled*

OTHERS
System info
Time/date
Reserved
Graph
Simulation
Communication
- *Baudrate RS485*
- *MODBUS address*

MEMORY
Load user copy
Save user copy
Factory settings
Datalogger
- *Show last row*
- *Full erase*
- *Log interval*

6.3 ALPHABETICAL LIST OF FUNCTIONS

In the following tables the functions present in the menu and submenu of converter MC608 are shown in alphabetical order

SUBMENU	MAIN MENU	SUBMENU
backlight off	Options	Display
Baudrate RS485	Others	-
Bypass	Parameters	Filters setup
Communication	Others	-
Counters Volume	Options	Technical units
Damping	Parameters	Filters setup
Datalogger	Memory	-
Diameter Setup	Parameters	-
Display	Options	-
Factory Settings	Memory	-
Filters setup	Parameters	-
Flow cut off	Parameters	Filters setup
Flow rate volume	Options	Technical units
Flow rate time base	Options	Technical units
Flow rate alarms	Parameters	-
Frequency OUT	I/O	-
Full erase	Memory	Datalogger
Full scale flow rate	Options	-
Full scale freq.	I/O	Frequency OUT
Graph	Others	-
Ka setup	Parameters	-
Language	Options	-
LCD backlight level	Options	Display
LCD contrast	Options	Display
Load user copy	Memory	-
Last row	Options	View options
Log interval	Memory	Datalogger

SUBMENU	MAIN MENU	SUBMENU
Measure average	Parameters	Filters setup
Measurement freq.	Options	-
Measuring time	Options	Measurement freq.
Min flow th.	Parameters	Flow rate alarms
Max flow th.	Parameters	Flow rate alarms
MODBUS address	Others	Communication
P-	Counters	-
P+	Counters	-
Peak cut	Parameters	Filters setup
Prog. IN	I/O	-
Prog. OUT	I/O	-
Pulse T on	I/O	Pulses OUT
Pulse volume	I/O	Pulses OUT
Pulses OUT	I/O	-
Pulses volume	Options	Technical units
Reserved	Others	-
Save user copy	Memory	-
Sensor offset	Parameters	-
Show last row	Memory	Datalogger
Simulation	Others	-
System info	Others	-
T+	Counters	-
T-	Counters	-
Technical units	Options	-
Time/date	Others	-
View options	Options	-
Zero finder	Parameters	-

DATA TO BE DISPLAYED

The display is divided into 3 main areas.
Top area with symbols for status information, with battery life indication (MC608B), alarms symbols, and instant reading flowrate.
Middle area with linear graph of the flowrate shown in percentage on the full scale flow rate.
Below area can be selected by the customer, choises are the followings:

• T+ total positive counter
• P+ partial positive counter
• T- total negative counter
• P- partial negative counter
• Date and time
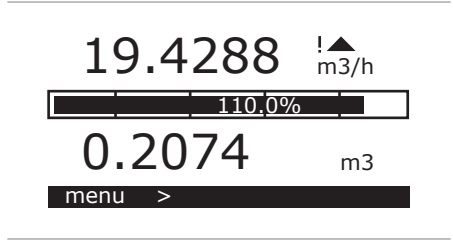
To select the requested value simply click on the button corresponding to the arrow and make your choice, or select Menu → Options → View options → last row

ALARM VISUALIZATION

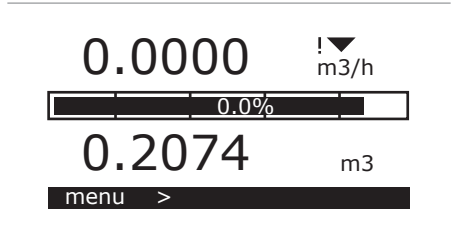There are three different alarms that can be visualized on the display:

• Empty pipe alarm (only available with sensor with the 4th electrodes)

f. 46

• Max flow alarm

f. 47

• Min flow alarm

f. 48
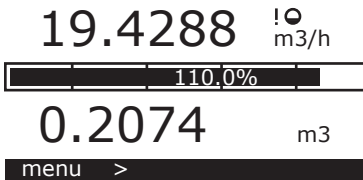
7. MENU DESCRIPTION

7.1 OPTIONS
Technical units
- *Flow rate volume*
- *Flow rate time base*
- *Counters volume*
- *Pulses volume*

Measurement frequency
- *Measuring time*

Display
- *LCD backlight lev*
- *Backlight off*
- *LCD contrast*

View options
- *Last row*

Full scale flow rate
Language

7.1.1 TECHNICAL UNITS

- *Flow rate volume*

Select the volume technical unit for the instant flow rate

- *Flow rate time base*

Select the time base for the instant flow rate

- *Counters volume*

Select the volume technical unit for the counters

- *Pulses volume*

Select the volume unit for the pulses

7.1.2 MEASUREMENT FREQUENCY

- *Measuring time*

Select measuring time of the system between 16 and 120 seconds in battery powered mode.

⚠ WARNING!

FACTORY SETTING IS 32 SECONDS. ANY REDUCTION OF THIS FACTOR WILL AFFECT BATTERY LIFE WHEN USING MC608B IN BATTERY MODE

7.1.3 DISPLAY

- *LCD backlight lev*

Increase or decrease backlight level

⚠ WARNING!

ANY MODIFICATION OF THIS FACTOR WILL AFFECT BATTERY LIFE WHEN USING MC608B IN BATTERY MODE
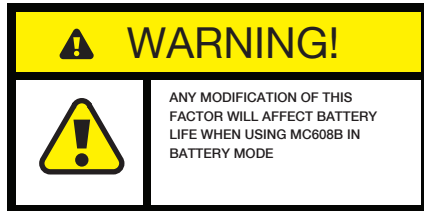
- *Backlight off*

Increase or decrease shut off time of the backlight of the display

⚠ WARNING!

ANY MODIFICATION OF THIS FACTOR WILL AFFECT BATTERY LIFE WHEN USING MC608B IN BATTERY MODE
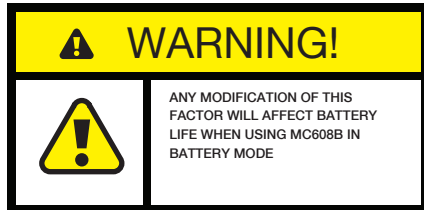
- *LCD contrast*

Modify the contrast value of the display

7.3.4 VIEW OPTIONS

- *Last row*

Defines the default display information with selection

between:

> - T+ total positive counter
> - P+ partial positive counter
> - T- total negative counter
> - P- partial negative counter
> - Date and time

7.1.5 FULL SCALE FLOW RATE

Modify the full scale flow rate. Standard full scale flow rate is calculated based a velocity of 5 m/s. Refer to the below chart for correct selection:

UNIT	EQUIVALENTS
m (2)	
cm3	0.001 dm3
ml	0.001 dm3
dm3	1 dm3
l	1 dm3
dal	10 dm3
hl	100 dm3
m3	1000 dm3
Ml	1000000 dm3
in3, cubic inches	1.63871e-2 dm3
oz UK, fl.oz UK	0.02841 dm3
pt UK, pints UK	0.5679 dm3
qt UK, quarts UK	1.1359 dm3
gal UK, gallons UK	4.545771 dm3
gal US, gallons US	3.785333 dm3
ft3, cubic feet	28.31685 dm3
bbl, std barrel	119.238 dm3
bbl oil, oil barrel	158.984 dm3
hcf, hundred cubic feet	2831.685 dm3
kgl US, kilo gallon US	3785.333 dm3
Mgl US, Mega gallon US	3785333 dm3
g	0.001 Kg
hg	0.1 Kg
kg	1 Kg
q	100 Kg

UNIT	EQUIVALENTS
t	1000 Kg
oz, once	0.028350 Kg
lb, pounds	0.45359 Kg
ton, short ton	907.18 Kg

7.1.6 LANGUAGE

Select the language of the menu between:

> - ENGLISH
> - ITALIANO
> - ESPAÑOL
> - PORTUGUÊS

7.2 COUNTERS

> T+
> P+ (set zero)
> T-
> P- (set zero)

Four different counters are available with MC608 converter. Two positive counters, and two negative counters.
Only partial counters can be set to zero.

7.3 PARAMETERS

  Ka setup

  Diameter Setup

  Filters setup

        • *Flow cut off*

        • *Damping*

        • *Bypass*

        • *Peak cut*

        • *Measure average*

  Sensor offset

  Zero finder

  Flowrate alarms

        • *Max flow th.*

        • *Min flow th.*

⚠ **WARNING!**

ONLY AUTHORIZED PERSONS CAN MODIFY THE KA FACTOR. THE KA FACTOR MUST BE THE SAME OF THE COUPLED SENSOR, CHECK KA FACTOR IN THE NAME PLATE OF THE FLOWMETER

7.3.2 DIAMETER SETUP

Allows diameter modification. In case of Insertion flowmeter, please enter the real internal diameter value of the pipe in this menu.

7.3.1 KA SETUP

It allows to modify the KA cabilbration factor.

7.3.3 FILTERS SETUP

NOTE

Filters should be adjusted only if strictly necessary. Factory settings are already calibrated for a correct working condition.

• *Flow cut off*

In this submenu you will find a value as a percentage of the full scale: if the real flow rate is lower than this value, the instrument will show 0 flow.

NOTE

Should you need to reduce the flow cut off filter, means the velocity of the liquid is below the recommended one for a good measurement.

• *Damping*

Increase the stability of the reading by adding an higher average of the displayed values.

To increase the stability, increase the value in this sub menu

• *Bypass*

In this submenu is entered a value in percentage. Represents a threshold on which the digital filter is NOT calculated. For example:

In case is selected a value of 50%

- IF the flow rate varies 50% more than the previous value

- THEN the flow rate shown will take on a real value

- OTHERWISE the digital filter will be applied, that is to say that the shown flowrate will slowly reach the real value

• *Peak cut*

In this submenu you will find a value as percentage of the full scale. If in the flowrate measurement there are peaks, their value will be limited to the value expressed in this submenu. For example, setting the value 10%, high peaks on the flowrate signal will be cut in order not to exceed the 10% of the full scale.

• *Measure average*

Increase the stability of the reading by enlarging the real measurement filtering.

To increase the stability, increase the value in this sub menu. This filter is not availale on the MC608 software and can be modified only by authorized personnel.

NOTE

Filters should be adjusted only if strictly necessary. Factory settings are already calibrated for a correct working condition. Filter DEFAULT button will recall factory settings.

7.3.4 SENSOR OFFSET

Shows the offset of the flowmeter

7.3.5 ZERO FINDER

This setting is used to perform the instrument zero calibration. Before performing the zero calibration, please make sure that:
1. the sensor is full of liquid
2. the liquid is perfectly stationary
3. the sensor has correct electrical grounding

NOTE

The MC608 has an automatic zero calibration function. Use the zero finder only when strictly necessary

7.3.6 FLOWRATE ALARMS

• *Max flow th.*
Set the maximum value of flowrate in percentage on the full scale value.
This value is factory disabled. Selectable range goes from 5% to 200% of the full scale value.
Select 200% to disable the function

• *Min flow th.*
Set the minimum value of flowrate in percentage on the full scale value.
This value is factory disabled. Selectable range goes from 1% to 5% of the full scale value.
Select a value below 1% to disable the function.

NOTE

When max or min flow th. are enabled, a symbol will appear on the display in case these values will be reached.

7.4 I/0

Pulses OUT

- *Pulse volume*
- *Pulse T on*

Frequency OUT

- *Full scale freq.*

Prog. OUT

- *Enabled/disabled*

Prog. IN

- *Enabled/disabled*

7.4.1 PULSES OUT

- *Pulse volume*

Select the volume of the pulses.

WITH MC608B IN BATTERY MODE, AVOID SELECTION OF VALUES HIGHER THAN 1 SECOND TO SAVE BATTERY LIFE

Pulses volume and duration settings differ between the two models MC608A and MC608B.

- MC608A (powered supply version)

Avoid pulses saturation, this may take to pulses accumulation which will not be provided in real time considering the real flow rate

Parameter calculation (values must be re considered to the technical unit of the converter)
[Vp=liters, Tp=seconds; Q=liters/seconds]
- Given Duration: $Vp > 2Tp / Q$
- Given Volume: $Tp < 2Vp / Q$

- MC608B (battery version)

High frequencies of pulses will affect battery life

Parameter calculation (values must be re considered to the technical unit of the converter)
[Vp=liters, Tp=seconds; Q=liters/seconds]
- $Tp < 10ms$ → $Vp > 10Q$
- $10ms < Tp < 100ms$ → $Vp > 100Q$

- *Pulse T on*

Select the ON time of the pulse on a range included between 0.5 and 10.000 ms (10seconds)

WITH MC608B IN BATTERY MODE, AVOID SELECTION OF LONG TIME OF ON TO SAVE BATTERY LIFE

7.4.2 FREQUENCY OUT

- *Full scale freq.*

Set the maximum frequency corresponding to the full scale flow rate value.
Selectable range: 100 Hz … 10 KHz

7.4.3 PROG OUT

Selectable between different choices:
- Max flow alarm
- Min flow alarm
- Reverse flow alarm

7.4.4 PROG IN

Selectable between different choices:
- External P+ zeroing
- External P- zeroing
- External P+ and P- zeroing

7.5 OTHERS
    System info
    Time/date
    Reserved
    Graph
    Simulation
    Communication
            • *Baudrate RS485*
            • *MODBUS address*

7.5.1 SYSTEM INFO

Shows the system information. These values are not modificable by the end user

7.5.2 TIME/DATE

Shows date, time, motherboard temperature, battery condition (for MC608B battery powered)
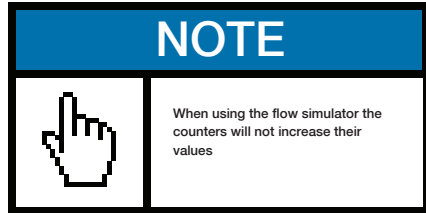
7.5.3 RESERVED

Menu under exclusive use of the manufacturer

7.5.4 GRAPH

Shows the graph of the measured flowrate

7.5.5 SIMULATION

The MC608 has a built in flow simulator to verify and adjust the pulse output to any connected device system.

NOTE

When using the flow simulator the counters will not increase their values

7.5.6 COMMUNICATION

• *Baudrate RS485*
Allows to adjust the RS485 baudrate on a range between 2400 and 57600 bps.

• *MODBUS address*
Allows to adjust the address of the MODBUS communication between 1 and 255.

7.6 MEMORY
    Load user copy
    Save user copy
    Factory settings
    Datalogger
            • *Show last row*
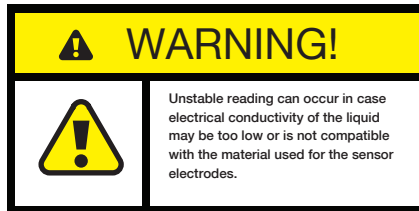   • *Full erase*
            • *Log interval*

7.6.1 LOAD USER COPY

Allows to load customized settings

9. APPENDIX – TROUBLESHOOTING

SYMPTOMS	POSSIBLE REMEDIES
Converter is showing a flowrate even with steady flow.	Check if the sensor and liquid are correctly grounded. Check that the sensor is full with liquid. Electrical conductivity of the liquid is too low or is not compatible with the material used for the sensor electrodes. Perform manual zero finder if requested (Menu – Parameters, sub menu – zero finder)
Flow reading is highly unstable.	Check if the sensor and liquid are correctly grounded. There is air in the pipe, try to avoid the creation of bubbles selecting a more suitable position for the sensor (see installation paragraph). *Only if necessary, set the filters as follows*: • Set Damping to 150 • Reduce peak cut filter • Increase Bypass filter

⚠ **WARNING!**

Unstable reading can occur in case electrical conductivity of the liquid may be too low or is not compatible with the material used for the sensor electrodes.

External pulse totalizer shows results different from what is expected.	Test the output with the internal flow simulator and the converter-pulse counter system simulating a flowrate with System > Simulation.
The display is off and does not turn on.	There is no voltage supply, or the voltage supply is mistaken. Check the power supply voltage on the name plate of the converter. In case of MC608B check the battery life and replace the battery pack.
Liquid flowing an pipe full – but NO reading	Reduce the flow cut off filter (factory settings is 2% of the full scale)

NOTE

Should you need to reduce the flow cut off filter, means the velocity of the liquid is below the recommended one for a good measurement.