



Electromagnetic flow meter FLC-608

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Reference to trademark rights if necessary

Prior to starting any work, read the operating instructions!
Keep for later use!

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1. Introduction

1.1 Conventions

This document must be delivered to the user before machine installation and commissioning. In order to draw the attention of all personnel working with the equipment supplied by Euromisure, the points of particular importance described in this manual are highlighted with graphic signs that will make them easily identifiable.



CAUTION!

... indicates a risk of electric shock!

All operations marked with this sign must be performed exclusively by qualified technical personnel.



CAUTION / WARNING!

...indicates vital information and points to be observed. Please refer to the related documents.



NOTE

...indicates information and points of particular importance to be observed.

1.2 General information



IMPORTANT WARNING!

It is very important that all personnel working with the equipment have read and understood the instructions and indications provided in this manual, and that they follow them prior to using the equipment itself. The manufacturer assumes no responsibility for the consequences resulting from improper use by the worker.

The suitability of the device for particular purposes shall be the worker's responsibility.

The warranty will be considered void in cases of improper installation and use of devices (systems).

- The manufacturer shall bear no responsibility for any damage caused by improper use, improper installation, or tampering of own products. Installation, connection, commissioning, and maintenance must be carried out by personnel who are qualified and authorized for this purpose. The personnel in charge of the installation must make sure that the measurement system is properly connected as per the wiring diagram indicated in this document.
- The manufacturer shall bear no responsibility for any damages or injuries resulting from any misunderstanding of this manual. In order to avoid possible accidents to persons or things caused by incorrect interpretation of the instructions, the user must not proceed with operations and/or interventions on the converter if there are uncertainties or doubts regarding the operation(s) to be performed. We recommend contacting Assistance

Service for clarifications in this regard for more precise instructions.

- The manufacturer will be held responsible only if the converter will be used in its original configuration.

For applications that require high working pressures or use of substances that may be dangerous for people, the environment, equipment, or anything else: in case of pipe breakage, Euromisure recommends to take necessary precautions, such as adequate positioning and protection or installation of a guard or safety valve, before installing the **CONVERTER** in the **COMPACT** version.

The device contains live electrical components; therefore, installation, checks, and maintenance must be carried out by experienced and qualified personnel who are aware of all necessary precautions to be taken. Before opening any internal part, please disconnect the power supply.

1.3 Manufacturer's statement

- Stresses and loads possibly caused by earthquakes, strong winds, fire damage, vibrations and natural disasters were not taken into account in the phase of machine designing.
- Do not install the machine in such a way that it acts as a focus for stresses on the pipes. External loads were not taken into account in the device configuration.
- While the device is working, the pressure, supply voltage, and/or temperature values indicated on the label or in this Operating Manual must not be exceeded.

1.4 Packing verification

At the moment of purchase and/or upon receipt of the product, the buyer is strongly advised to check the quality of the packaging, which must be intact, without visible dents, and completely and correctly closed.

When opening the packaging, also check that the product complies with the information on the packing list in terms of completeness of components/accessories.



NOTE

All WIKA software packages are available on the USB flash drive key that accompanies the product.

1. Introduction

1.5 Preliminary notes

Main parts of the electromagnetic flowmeter are:

- **Sensor** – installed in the tube with the use of flanges and other joints;
- **Converter** – can be installed on the sensor (in compact version) or remotely (in remote version) connected with two pipes.

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Electromagnetic flow meters have many important advantages compared to their mechanical counterparts, such as exceptional long-term stability, maximum process reliability, and zero maintenance. As a result, these sensors can provide accurate and reliable long-term measurements. See the following paragraphs for more detailed information on correct installation.



NOTE

Electromagnetic flow meters are designed specifically to operate under the following basic conditions:

- ▶ the liquid must be conductive;
- ▶ the tube must always be completely full;
- ▶ the input and output distances must be on recommended settings;
- ▶ The grounding instructions must be followed.

1.6 Product identification

Each FLC-608 Converter manufactured by Euromisure has a Standard identification plate (Fig. 1) or OIML (Fig. 2), that displays the following information.

Standard plate:

- **CE conformity mark;**
- **CROSSED-OUT WHEELIE BIN SYMBOL:** it means that the product must be disposed of in according to the legal requirements.
- **MODEL:** converter model;
- **IP:** converter protection class;
- **S/N:** serial number which identifies the device;
- **TEMP:** minimum/maximum temperature of the working conditions;
- **POWER S.:** supply or battery voltage (FLC-608B);
- **Hz:** power supply frequency;
- **COUPLING:** serial number which identifies the sensor connected to the converter;
- **OPTIONAL:** other modules can be added;

WIKAI		Euromisure s.a.s di WIKAI Italia S.r.l. via Borghisani 4 26035 Pieve San Giacomo (CR) - Italy						Made in Italy	
MODEL	FLC-608A	IP	68						
S/N	LCA0448	TEMP	- 20 + 60 C						
POWER S.	100/240 V	Hz	50/60						
COUPLING	LBG0438								
OPTIONAL									

Fig. 1: Standard Identification Plate

OIML plate:

- **CE conformity mark;**
- **CROSSED-OUT WHEELIE BIN SYMBOL:** it means that the product must be disposed of in according to the legal requirements.
- **FLC-2200EL/...:** sensor/converter model;
- **S/N:** sensor/converter serial number;
- **Y:** production year;
- **Size:** diameter of the flange;
- **Q3:** permanent flow rate and ratio;
- **Supply:** voltage and frequency;
- **R49/2013...:** reference certificate;
- **MAP:** maximum allowable pressure;
- **Press Loss Class:** pressure loss class;
- **Env. Class:** environmental class;
- **EMC Class:** EMC class;
- **Inst. Sensitivity:** installation sensitivity class;

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FLC-2200EL / FLC-608		R49/2013-CZ-16.01							
S/N	FSC4552 / RSF4456	MAP	16bar						
Y	2018	Press. Loss Class	Δp10						
Size	DN50 EN1092-1 / PN16	Env. Class	B						
Q3	25m ³ /h R63	EMC Class	E2						
Supply	90-260V - 50Hz	Inst. Sensitivity	U5/D3						

Fig. 2: OIML plate



NOTE

The identification plate must never be removed, damaged or changed. It must also be kept clean from any dirt deposits, as the data contained are the only safe and unambiguous way to recognize the type of converter in your possession.

1.7 Applications

FLC-608 is widely used for purposes in which it is important to measure the flow rate of electrically conductive liquids. Examples of typical applications for the FLC-608 converter are:

- Extraction and distribution points;
- District-level measures;
- Irrigation;
- Wastewater treatment systems;
- Leak detection systems;
- Remote applications without access to electrical grid.

2. Product description

2. Product description

2.1 Operating principle

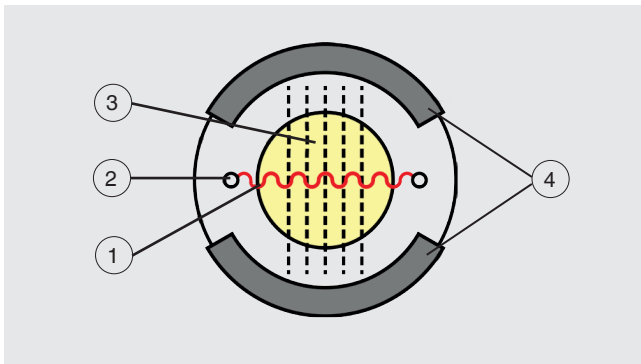
FLC-608 converter has been designed with the aim of fulfillment of all the requirements of modern water management systems, through a flexible and hybrid electronics which, depending on the model, offers various power supply solutions. An electromotive force is induced at the ends of a conducting fluid that moves with velocity v in a magnetic induction field B and can be expressed as:

$$e = kBDv$$

Where:

- B is constant by construction;
- D is constant and represents the distance between the electrodes $E1$ and $E2$ (equivalent to the diameter of the flow meter);
- v is the fluid velocity;
- k is the calibration constant.


The electromotive force «e» is proportional to the speed «v».



- 1 Electromotive force (proportional to the velocity)
- 2 Electrodes
- 3 Magnetic field
- 4 Coils

2.2 Available versions

The FLC-608 converter is available in 5 versions, and can cover all the different types of applications depending on the category of system to be monitored. Specifically, Euromisure produces the converter in the following versions:

FLC-608A	
	Power 12/24 Vac-dc or 90/264 Vac. Aluminium casing.
FLC-608B	
	Battery powered with useful life up to 10 years (maximum diameter DN600 with integrated flow meters). Aluminium casing.
FLC-608R	
	Rechargeable battery powered, with solar panel (maximum diameter DN600 with integrated flow meters). Aluminium casing.
FLC-608P	
	Power at 12/24 Vac-dc. Version with a panel. Polycarbonate casing.
FLC-608I	
	Power at 12/24 Vac-dc or 90/264 Vac with internal back-up battery or rechargeable battery with solar panel. Stainless steel casing.

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2. Product description

2.3 Converter installation types

Depending on the version of the FLC-608 converter, it can be installed in the system in two different ways:

Compact - Fig. 3

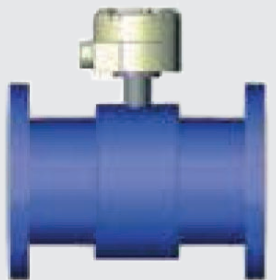


The converter is mounted to the relevant detection sensor.

Remote - Fig. 4



The converter, if powered from the mains (FLC-608A/P/I) can be installed up to 100 m away from the sensor while battery-powered converter (FLC-608B/R) can be installed up to a maximum of 30 m away from the sensor.



2.4 Casing

The FLC-608 converter is protected by suitable casing specifically chosen for each product version. In particular, protective casings can be:

- Solid and reliable casing in aluminium IP68 for FLC-608A/B/R;
- Stainless steel IP54 casing for FLC-608I for remote installations;
- Solid thermoplastic casing for installations in electrical cabinets FLC-608P.

2.5 Power batteries

The FLC-608B and FLC-608R converters are battery-powered via a primary lithium battery as well as a rechargeable lithium battery.

It is therefore necessary to consider that lithium batteries are the primary energy source because of their high-energy density, and are created to meet the highest safety standards. However, they can be potentially hazardous if they are exposed to electrical or mechanical abuse. In many cases, this is associated with excessive heat production in which the increased internal pressure could lead to cell rupture. These basic precautions need to be followed when handling and using lithium batteries:



WARNING! IMPORTANT INSTRUCTIONS

- ▶ Do not short-circuit, recharge, overload or reverse-connect the battery.
- ▶ Do not expose the battery to temperatures higher than those specified, as it will incinerate.
- ▶ Do not crush, puncture or open the cells or disassemble the battery packs.
- ▶ Do not weld or braze the battery body or battery packs.
- ▶ Do not expose the contents to water.

The use of lithium batteries is regulated under the United Nations Model Regulations on the Transport of Dangerous Goods (UN Model Regulations on the Transport of Dangerous Goods), document ST/SG/AC.10/1 Rev. 20.

These are basic precautions that should be followed during the transport of lithium batteries:



IMPORTANT NOTES!

- ▶ Transport only in special packages with labels and special transport documents specific to current regulations.
- ▶ Be careful when handling, transporting and packing the batteries so as to avoid short-circuiting.
- ▶ The batteries comply with the requirements set out in the "UN Manual of Tests and Criteria, Part III, subsection 38.3" for air transport and with the provisions of the ADR regulations for transport by truck/ship.



WARNING! IMPORTANT INSTRUCTIONS

Remove the battery from the transmitter before sending the flow meter to Euromisure in case of maintenance or any intervention under warranty.

2.6 Data safety

All versions of the FLC-608 converter guarantee safety of the collected and processed data as a result of the internal memory (EEPROM) on which the data are saved.

The integrated circulating memory allows the storage of data with 200,000 log lines. The data are kept for more than 6 years with factory settings. When the memory is full, the new data will automatically overwrite the old data.

In order to prevent the loss of saved data, and to be able to better manage it on its management systems, the unit is supplied with a specialized software that allows users to communicate with the electronics of the FLC-608 via IrCOM or RS485 Modbus serial interfaces, that can be connected to any PC, laptop and/or tablet with a Windows Operating System.

Fast download, data management, easy programming and an advanced self-diagnosis system, that automatically perform a wide range of essential checks, make the FLC-608 converter a highly efficient and irreplaceable tool for fluid detection in water management systems.

A multi-level password system also allows controlled access to the data collected and guarantees confidentiality.

2.7 Remote data reading

The GSM module allows data collection on site and remote monitoring via the GSM/GPRS network and permits any client to access all the information easily and without any cost. An additional communication module automatically sends the information via SMS, e-mail (with or without attachment).

2.8 Optional modules

2.8.1 Hart protocol available for FLC-608A

The FLC-608A/I converter can be equipped with an optional module (installable only by the manufacturer) which acquires the Hart connectivity on the 4-20 mA output, granting the access to all quantities measured by the device as well as to the operating parameters. A FLC-608 converter equipped with Hart connectivity has no Modbus connectivity on RS485. For more information on Hart, refer to the relevant documentation.

2.8.2 Optional module Pressure/Temperature for FLC-608A

All the versions of the FLC-608 converter can be equipped with an optional module (installable only by manufacturer) to which one or two wired probes are connected, that allow the device to measure the pressure and temperature of the process. This information, in addition to being stored in the internal data logger, can be directly viewed on the display, is accessible via Modbus / Hart and is transmitted by the GSM module (if installed) in the manner laid out by the same device.

3. Technical specifications

3. Technical specifications

3.1 Overall dimensions

The overall dimensions of single versions of the FLC-608 converters are shown below.

3.1.1 Version FLC-608A (Compact)

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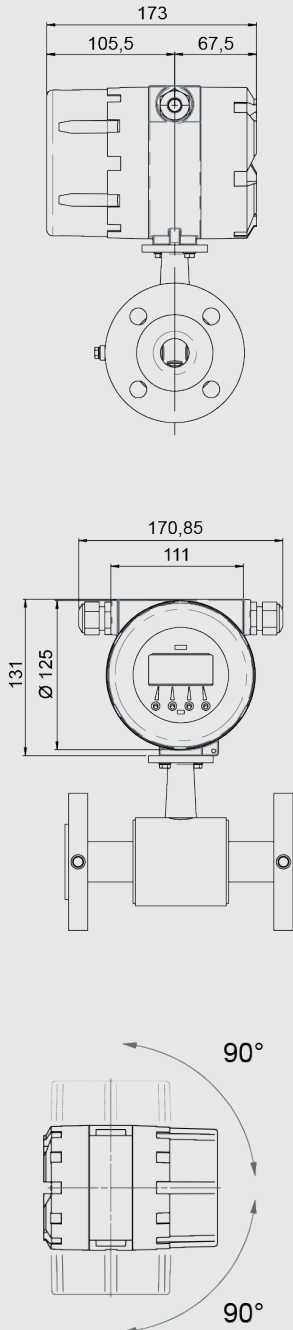


Fig. 5: FLC-608A (Compact) dimensions

3.1.2 Version FLC-608B/R (Compact)

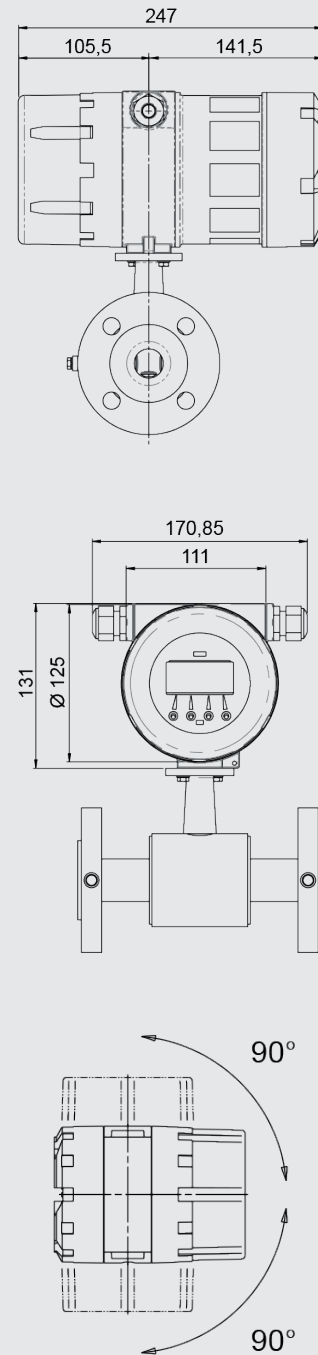


Fig. 6: FLC-608B/R (Compact) dimensions

3. Technical specifications

3.1.3 Version FLC-608A (Remote)

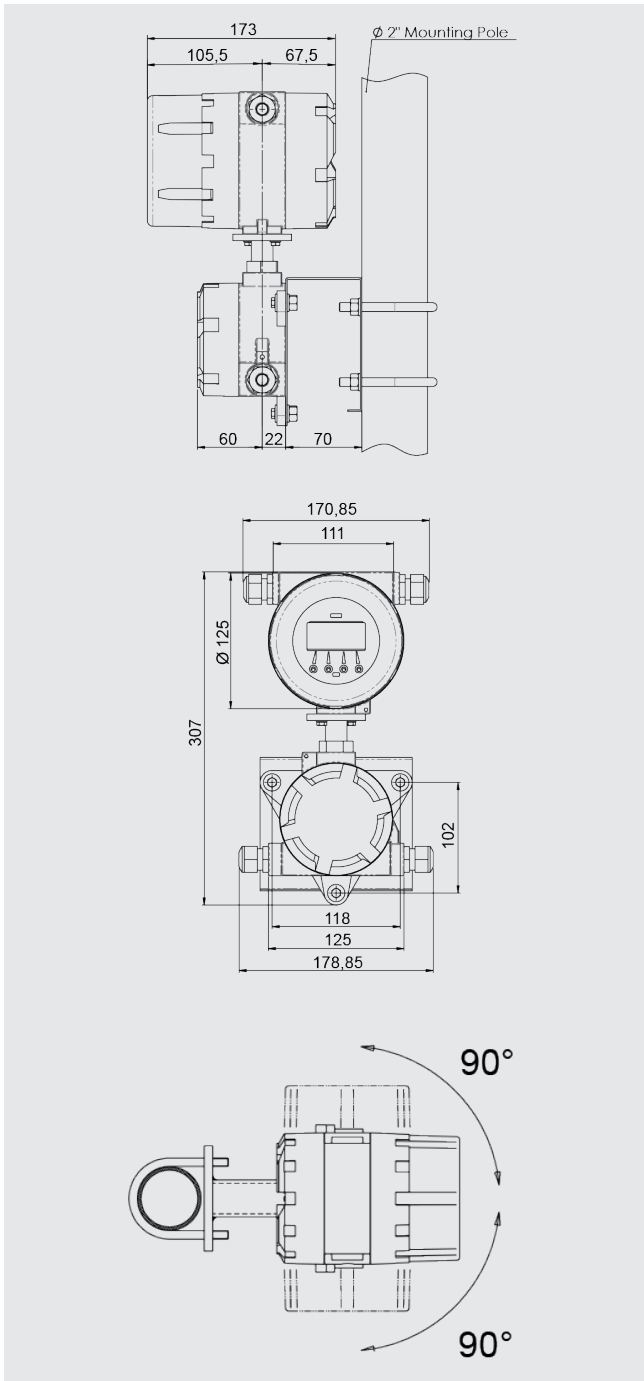


Fig. 7: FLC-608A (Remote) dimensions

3.1.4 Version FLC-608B/R (Remote)

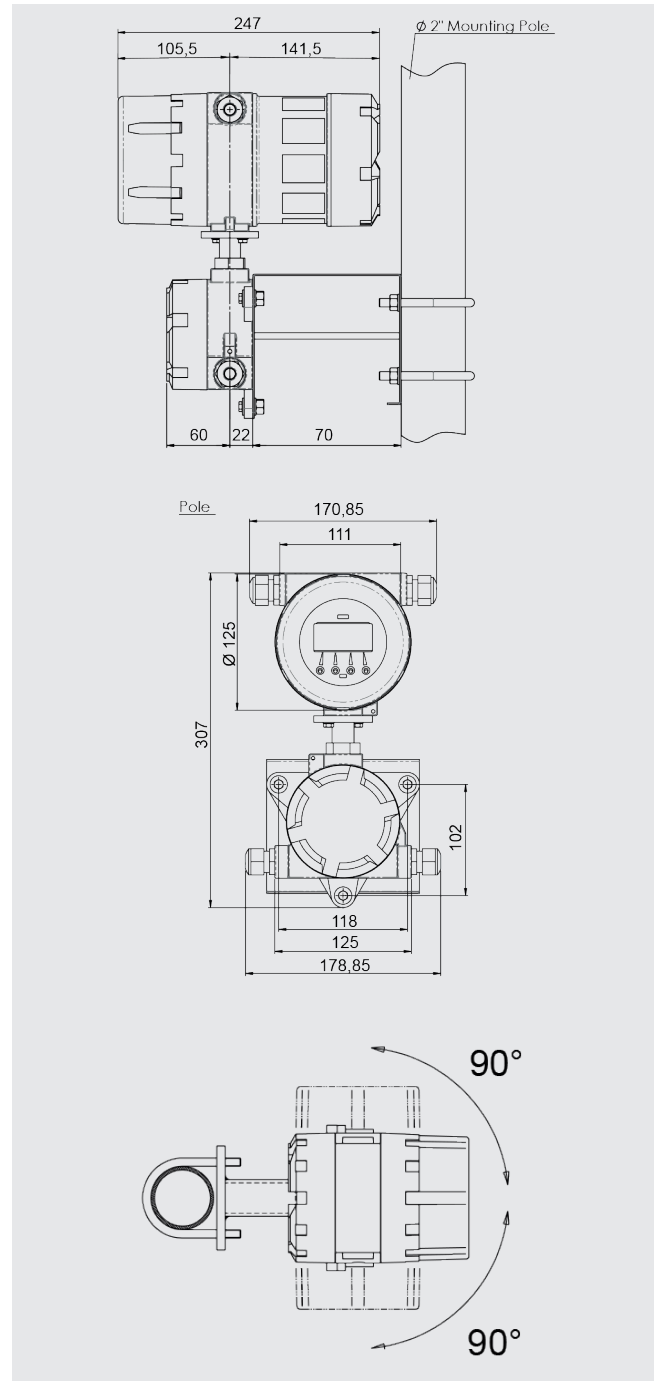


Fig. 8: FLC-608B/R (Remote) dimensions

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3. Technical specifications

3.1.5 Version FLC-608P (Remote)

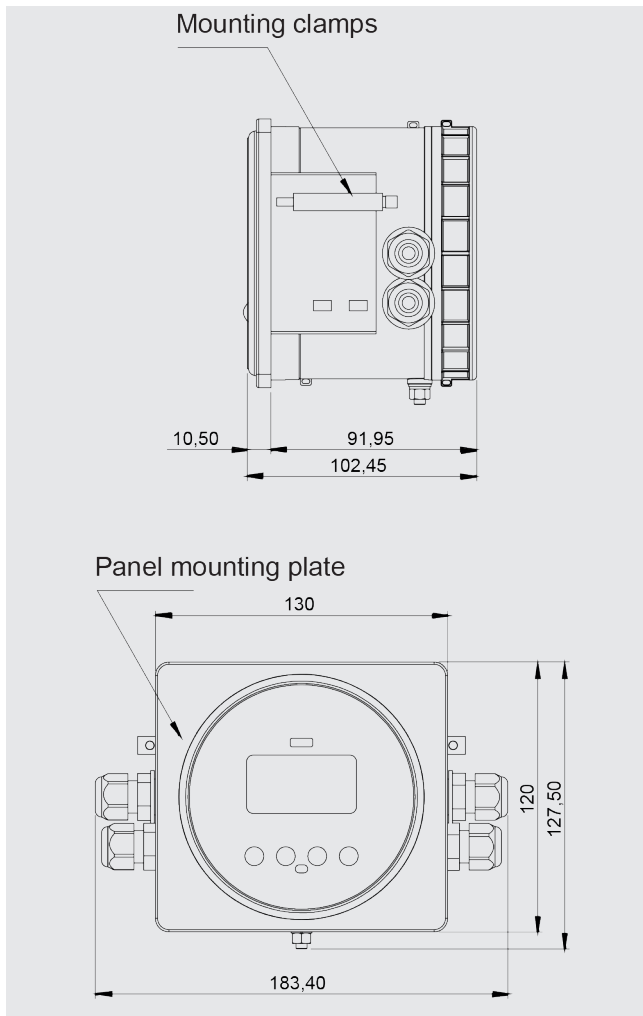


Fig. 9: FLC-608P (Remote) dimensions

3.1.6 Version FLC-608I (Remote)

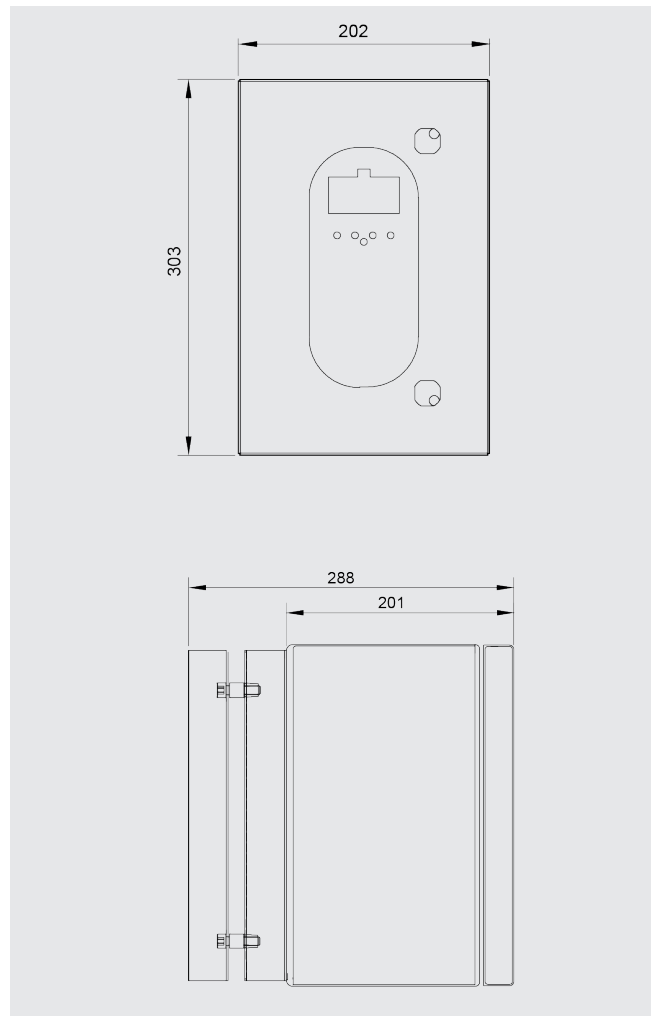


Fig. 10: FLC-608I (Remote) dimensions

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3. Technical specifications

3.2 Certificates and approvals

Marking CE	The device, connected to the relevant sensor, complies with the requirements of the applicable EU directives. These are listed together with the applied standards in the relevant EU Declaration of Conformity.		
	Electromagnetic compatibility Directive 2014/30/UE		
	Harmonised standards:	For all the versions:	EN 61326-1
			EN 55011
			EN 61000-3-3
			EN 61000-4-2
			EN 61000-4-3
			EN 61000-4-4
			EN 61000-4-5
			EN 61000-4-6
			EN 61000-4-8
			EN 61000-4-11
			For GSM versions
	ETSI EN 301 489-7		
ETSI EN 301 489-17			
ETSI EN 301 489-24			
EN 55022			
EN 61000-3-2			
ETSI EN 301 511			
ETSI EN 301 908-1			
ETSI EN 301 908-2			
Electrical safety Directive 2014/35/EU			
Harmonised standards:	For the versions without GSM:	EN 61010-1	
	For GSM versions:	EN 60950-1	
RoHS Directive 2011/65/UE			
Certificates and international standards	ISO 20456	Measurement of fluid flow in closed conduits	
	IEC 60529	Degrees of protection provided by enclosures (IP Code)	
	HART	HART 7 Protocol	
	OIML R49	Water meters intended for the metering of cold potable water	
	NMI M 10	Meters intended for the metering of water in full flowing pipes	
Sensor certifications	Depending on the sensor connected to the FLC-608 converter, other certifications could be applicable; refer to the documentation on the specific sensor for more information:		
	ATEX / IECEx	Directive 2014/34/EU - IEC 60079 - 0, IEC 60079 - 18	
	Use in potable water	DM 174 6/4/2004, NSF / ANSI 61, WRAS, FDA	
	Coating for aggressive environments	ISO 12944-2	

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3. Technical specifications

3.3 General technical features

The table below contains the technical data of the FLC-608 converter in all versions produced by Euromisure.

Features		FLC-608A	FLC-608B	FLC-608R	FLC-608P	FLC-608I
Casing		Aluminium IP68	Aluminium IP68	Aluminium IP68	Technopolymer IP54	SS IP54
Power supply	90...264 Vac	√				√***
	12/24 Vac/dc	√			√	√
	Battery powered. Estimated useful life: up to 10 years		√			
	Rechargeable battery + photovoltaic panel			√		√
Installation	Compact	√	√	√		
	Remote	max 100 m	max 30 m	max 30 m	max 100 m	max 100 m
Consumption		5 W ÷ 10 W				
I/O outputs	Analog output 4-20 mA	√	√ loop powered	loop powered if in battery mode	√	√
	Output AUX 24 Vdc max 30 mA	√	√	**	√	√
	Transistor output for pulses max 1000 Hz duty cycle max 50% only for positive instantaneous flow rate, positive negative (max 500 PPS)	√	√	√	√	√
	Digital programmable output for: ■ Reverse flow; ■ Max flow rate threshold; ■ Min flow rate threshold; ■ Max/min flow rate threshold; ■ Dosing; ■ Interrupted excitation; ■ Empty pipe.	√			√	√
	Digital output in active freq. 0-10 kHz	√		**	√	√
	All the outputs are opto-isolated.					
	* = Optional; ** = Only in rechargeable version; *** = Possibility to have a backup battery					
Serial communications	IrCOM interface	√	√	√	√	√
	RS 485 - MODBUS RTU	√		**	√	√
	Hart* communication	√			√	
	Integrated GSM/GPRS module*	√	√			√
* = Optional; ** = Only in rechargeable version						
Display	Graphic LCD 128 x 64 px; viewable area 50 x 25 mm; white backlight	√	√	√	√	√

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3. Technical specifications

Features		FLC-608A	FLC-608B	FLC-608R	FLC-608P	FLC-608I
Programming	Through 4 onboard buttons Through IRCOM / RS485 interface with relevant software	√	√	√	√	√
Process memory	Memory 4 MB flash, 200.000 data lines	√	√	√	√	√
Metrological certificate	OIML R49-1: 2013 - Class 2	Optional (depends on the connected sensor)				
Temperature fields	<ul style="list-style-type: none"> ■ Environment: -20 ÷ 60 °C (-4 ÷ +140 °F); ■ Liquid: -25 ÷ 80 °C (-13 ÷ +176 °F); ■ Storage: -40 ÷ 70 °C (-40 ÷ +158 °F). 					
Unit of measurement	ml, cl, dl, l, dal, hl, m ³ , Ml, in ³ , ft ³ , gal, bbl, oz, g, hg, kg, q, t, lb, Aft					
Optional modules	GSM/GPRS Pressure (1 input) and temperature (1 input)					
Totalizers	5 (2 positive, 2 negative, 1 NET)					
Alarms and status icons	Status icons displayed and alarms recorded in the data logger					
Self-check	Available alarms: <ul style="list-style-type: none"> ■ Excitation failure; ■ Empty pipe with fourth electrode; ■ Excessive ambient temperature; ■ Overlapping pulses; ■ Measurement error; ■ Insufficient supply voltage. 					
External check	Availability of the field verifier for calibration and on-site electronics status check.					
Software for communication and programming	Commissioning (same setting of the meters) - Data printing for documentation - Data export (in CSV format) - Firmware update - Instantaneous flow rate reading - Reading and writing of non-volatile parameters - Internal data logger download - Display of stored events.					
Signal cables	<ul style="list-style-type: none"> ■ Euromisure cables; ■ CA22 – cables for sensors with four electrodes. 					
Pressure sensor	0...20 Bar; 1/8" GAS male, connector with factory installed fly coupling.					
Temperature sensor	PT500: includes thermowell of 1/4", length 50 mm, diameter 6 mm.					

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3. Technical specifications

3.4 Accuracy

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Reference conditions

Measuring liquid	water
Conductivity	200 $\mu\text{s}/\text{cm}$
Temperature	20 °C / 68 °F
Pressure	1 bar / 14,5 psi
Upstream diameter	$\geq 5 \text{ DN}$
Downstream diameter	$\geq 3 \text{ DN}$

Model	Accuracy class		Graphics
FLC-608A/P/I	Class 02 2	$\pm 0,2 \% \pm 2 \text{ mm/s}$	Fig. 11
FLC-608B/R	Class 05 5	$\pm 0,5 \% \pm 5 \text{ mm/s}$	Fig. 12
FLC-608 connected to insertion sensor	Class 2 2	$\pm 2 \% \pm 2 \text{ mm/s}$	Fig. 13



NOTE

The following accuracy class refers to the measurement conditions during the calibration at the Euromisure test benches:

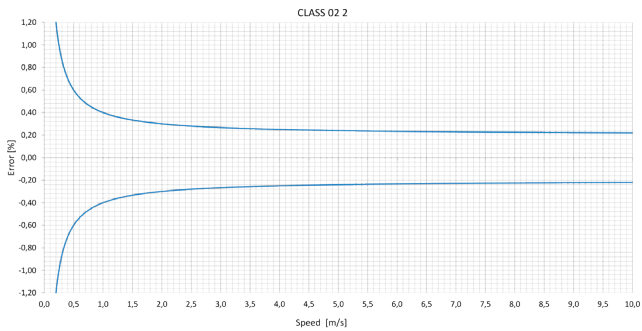


Fig. 11

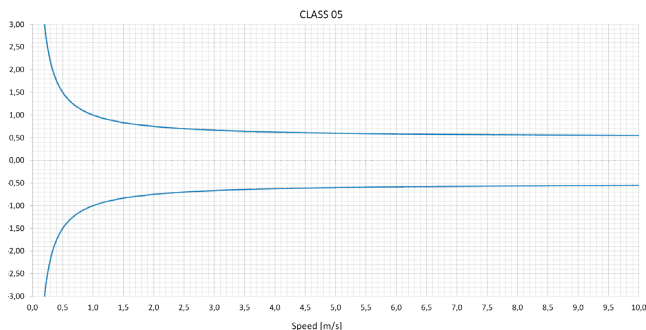


Fig. 12

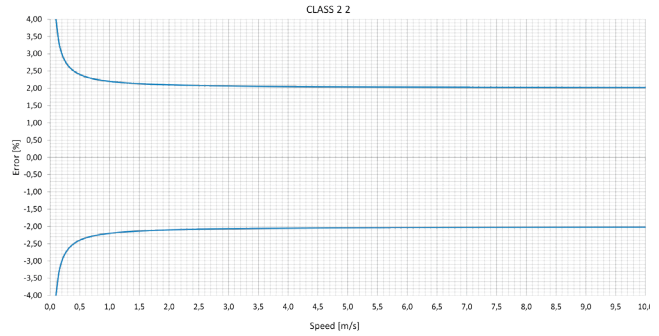


Fig. 13

4. Installation

4. Installation

4.1 Handling



NOTE

Given the small size and the low weight of the FLC-608 converter Remote version, there are no particular precautions/indications that need to be followed in order to carry out its movement and/or installation at the place of use.



CAUTION!

The Compact version of the FLC-608 converter must be carefully moved so as not to cause damage to the sensor and connection flanges. Below you will find a description of the correct and incorrect handling of the compact converter.

The proper lifting method (for transport and installation) of the compact converter is shown in Fig. 14.

The flow meter must be lifted and transported by properly harnessing the device on the side parts of the flow meter, making sure that the slings (ropes, bands, etc.) are fixed to the appropriate eyebolts.



WARNING!

Do not raise the flow meter harnessing the converter (Fig. 15)!!



WARNING!

Do not move the flow meter with the lifting device if it is not in the original packaging (Fig. 16) or without an adequate support that ensures the required stability.

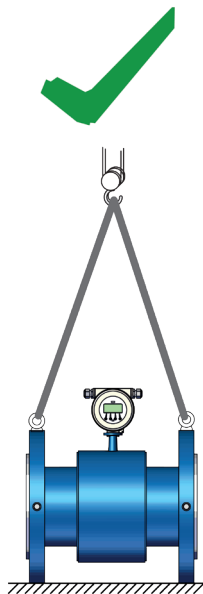


Fig. 14

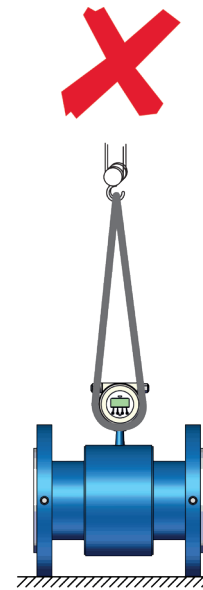


Fig. 15

Fig. 16

4. Installation

4.2 Converter positioning

4.2.1 Compact version: positioning and installation



NOTE

For the correct positioning of the converter in the Compact version, refer to the Installation Manual of the sensors where all correct and incorrect mounting positions are described and illustrated.

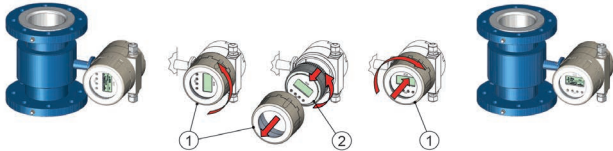


Fig. 17

The converter display can be rotated 90°. Unscrew the front protection cover (see 1, Fig. 17) and remove it. Locate and pull out the converter display unit (see 2, Fig. 17) by $2 \div 3$ cm, rotate it 90° in the most appropriate direction into the new position and insert it again. Put back the front protection cover (see 1, Fig. 17), tighten firmly to ensure sealing closure.



WARNING!

Do not rotate the display unit beyond 90° in order to prevent the cables connected to the sensor from turning. Also, do not pull out the display unit, otherwise voltage can be transmitted and damage to the wires connected to the sensor may occur.

The converter can be rotated 90 degrees. Loosen the two screws on the lower part (see 1, Fig. 17) positioned on the neck of the sensor and rotate the converter up to 90° appropriately. Once the new position is set, tighten the two screws (see 1, Fig. 18) to secure the converter to the sensor.

Fig. 18



WARNING!

Avoid exposing the converter to excessive vibrations. Use the remote version in case vibrations may occur.

4.2.2 Remote version: positioning and installation

The converter in Remote (distant) version can be installed on a pole/tube (Fig. 19) or on a wall (Fig. 20) panel or control panel using the special brackets/flanges that are supplied with the converter.

4.2.2.1 Installation on a tube

The device is designed to be fixed to a 2-inch diameter tube (see 1, Fig. 19). Bolt the brackets (see 2, Fig. 19) to the tube using two threaded hooks (see 3, Fig. 19). Then attach the converter (see 4, Fig. 19) to the clamp.

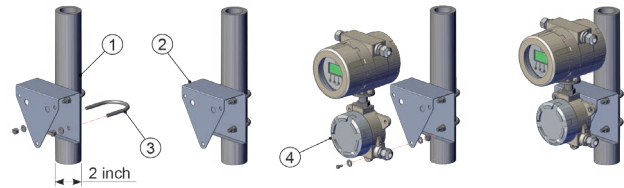


Fig. 19: Installation on a pole/tube

4.2.2.2 Installation on a wall

Bolt the clamp (see 1, Fig. 19) to the wall using the appropriate plug screws. Then attach the converter (see 2, Fig. 19) to the clamp using the screws that are supplied with the converter.

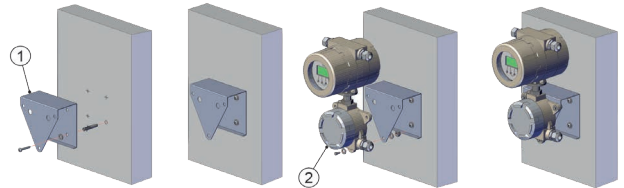


Fig. 20: Installation on a wall



NOTE

The mains powered converters in the REMOTE version (FLC-608A/P/I) can be installed up to 100 meters away from the sensor while battery powered converters can be installed up to 30 meters away from the sensor using the connection cable supplied by the manufacturer.

4.2.3 Relation between conductivity and cable length

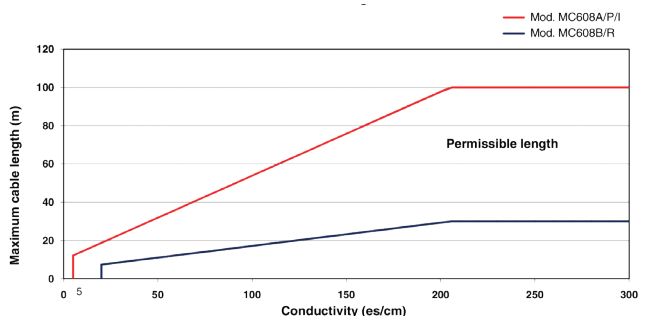


Fig. 21a: Relations between the conductivity of the liquid and the maximum allowed cable length for FLC-608

4. Installation

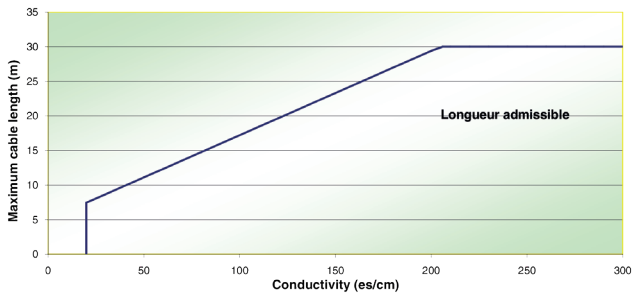


Fig. 21b: Relation between the conductivity of the liquid and the maximum allowed cable for FLC-608B

4.2.4 FLC-608R Compact version: installation of the solar panel

The photovoltaic panel that powers the battery of the FLC-608R converter (Compact version) is installed directly on the device casing using the special brackets which are provided in the special installation kit.

The support brackets allow you to set the panel position in order to optimize solar radiation, which will depend on where it is installed.

The photovoltaic panel is supplied in a separated kit. For the proper installation and operation, please read the instructions in the manual that was provided with the converter.

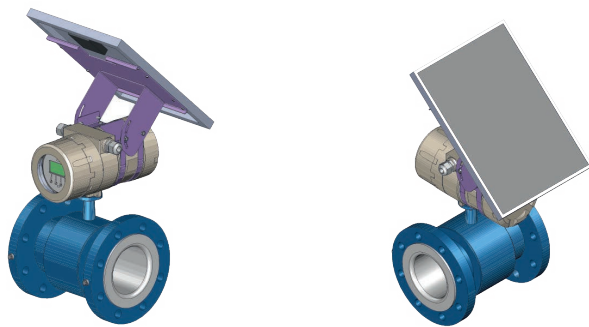


Fig. 22: Compact version of the converter with solar panel

4.3 Electrical connection



NOTE

In order to properly connect electrical elements of the FLC-608 converter to the power supply, and to the junction box (in Remote version), please refer to the wiring diagram shown in paragraph 4.3.1 (Fig. 23).



NOTE

The use of cables not supplied or certified by Euromisure may jeopardize the correct functioning of the system, and it will void the warranty.



CAUTION!

All interventions on electrical connections must be performed only when the device is disconnected from the mains and/or battery.



CAUTION!

All interventions carried out on the electrical junction box or electrical components must be performed by properly trained specialized personnel.

4.3.1 Wiring diagram



CAUTION!

All interventions carried out on the electrical junction box or electrical components must be performed by properly trained specialized personnel.

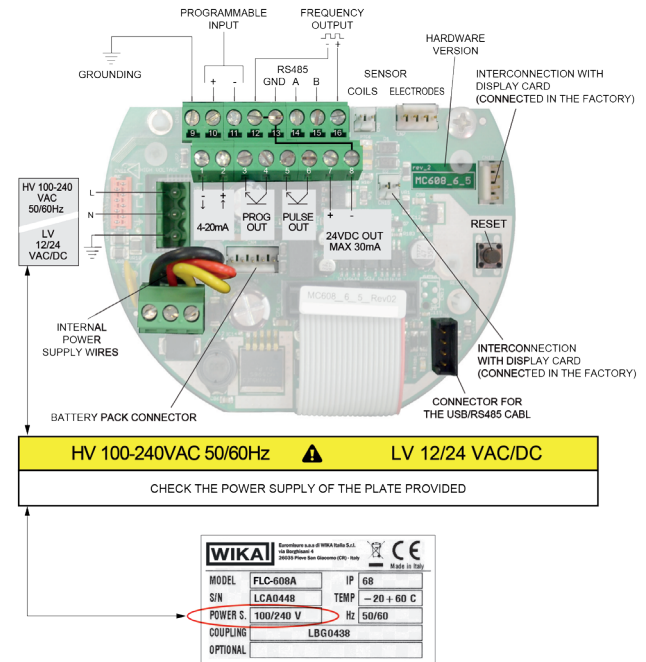


Fig. 23: Electrical wiring

4. Installation

EN



NOTE

The manufacturer has identified all the power cables and signal cables that have to be connected to the terminal block of the junction box (in case of REMOTE version) by marking them with bands (with letters) in order to ease the identification of the correct connection terminals (Fig. 24).

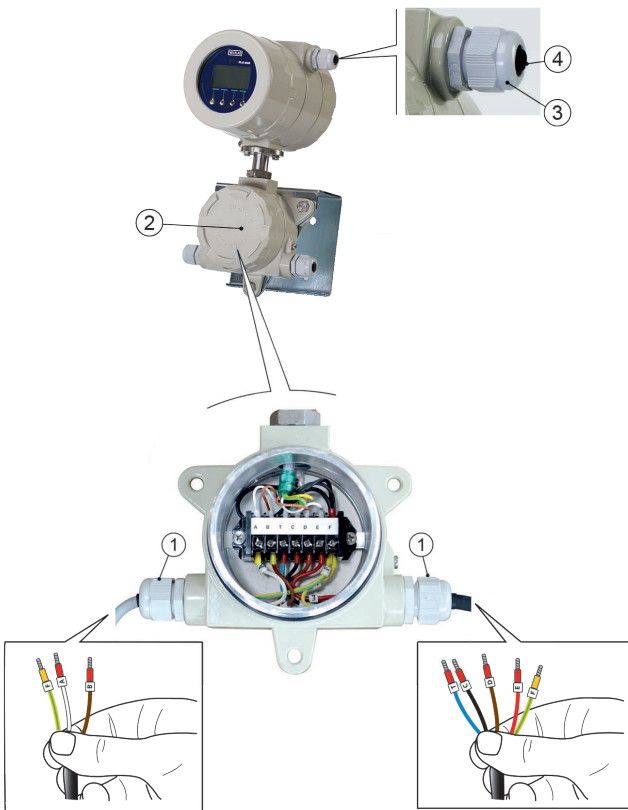


Fig. 24: Cables and connection terminals identification



CAUTION!

When all the necessary cables are connected, be sure to properly tighten the cable glands (see 1, Fig. 24) and the cover (see 2, Fig. 24) so as to guarantee good moisture and water resistance of the cables and electrical/electronic boards if the converter is installed outdoors.



WARNING!

Any unused cable glands (see 3, Fig. 24) must always be closed with the relevant blind rubber sealings (see 4, Fig. 24).



WARNING!

The used cable glands (see 1, Fig. 24) are suitable for multi-wire cables with a minimum diameter of 5 mm up to a maximum diameter of 12 mm (see 4, Fig. 24).



NOTE

The cables supplied by Euromisure are not suitable for being run directly underground and/or underwater, and must not have direct exposure to sunlight. The technician in charge must therefore provide suitable protections such as: corrugated pipes, raceways, or shielded cables.



NOTE

It is recommended to keep the separation cables detached from power cables and/or electromagnetic interference sources.

4.3.2 Connection to the sensor

4.3.2.1 Electrical connections on FLC-608 in compact version

Before starting the converter, make the necessary connections to the outputs. For safety reasons, the power supply or the battery pack connected must be wired only after connecting the outputs.

4.3.2.2 Electrical connections on FLC-608 in remote version (distant)



WARNING!

The access to the junction box is strictly limited to experienced technical personnel.



WARNING!

The cables that protrude from the sensor must be connected to the junction box positioned under the converter.

The FLC-608 converter can be installed on a wall or on a pole by using the brackets supplied with the Remote version as shown in figures 19 and 20.

Be sure to connect the sensor to the converter with S/N shown in the "COUPLING" item on the plate.

This information can also be found in the converter, see **menu -> Other -> System information**. The same information can be downloaded to your laptop with the FLC-608 software.

To ensure regular operation, always use the manufacturer's signal cables that were supplied with the converter.

4. Installation

4.3.3 Connection options I/O

4.3.3.1 Pulse output

Passive transistor output: instrument connected to active input

The connected instrument (PLC/external pulse counter) is an active digital input which supplies voltage required to detect the pulses. The FLC-608 acts as a digital switch (logical level). Voltage 5-30 Vdc; maximum electrical current 50 mA. See fig. 25.

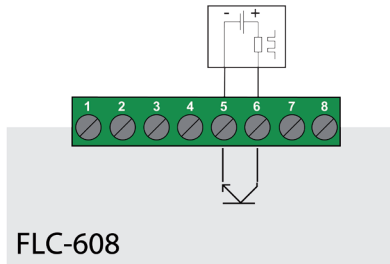


Fig. 25: Instrument connected to active input

Passive transistor output: instrument connected to passive input

The connected instrument (PLC/external pulse counter) is a passive digital input that accepts the voltage provided by the external power supply in use. Voltage 5-30 Vdc; maximum electrical current 50 mA. See fig. 26.

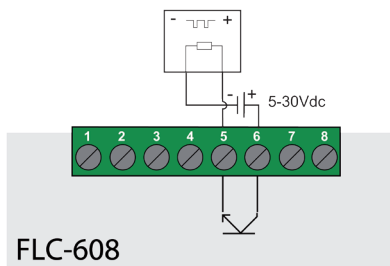


Fig. 26: Instrument connected to passive input

Passive transistor output: active transistor output (FLC-608A/P/I)

The connected instrument (PLC/external pulse counter) is a passive digital input which accepts a 24 V voltage. It DOES NOT have to provide ANY additional voltage. The internal 24 Vdc power supply is used to supply necessary voltage. Voltage 24 Vdc; maximum electrical current 30 mA - See Fig. 27.

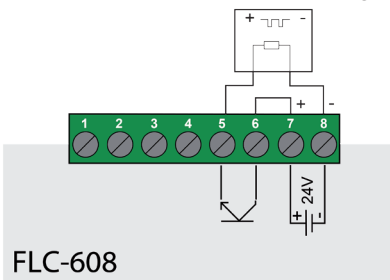


Fig. 27: Active transistor output (FLC-608A/P/I)

4.3.3.2 Programmable output

Passive transistor output: instrument connected to active input

The connected instrument (PLC/external pulse counter) is an active digital input which supplies the voltage required to detect the pulses. The FLC-608 acts as a digital switch (logical level). Maximum voltage: 5-30 Vdc; maximum electrical current 50 mA. See Fig. 28.

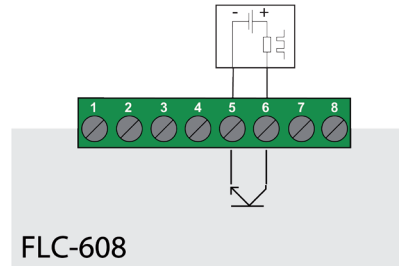


Fig. 28: Instrument connected to active input

Passive transistor output: instrument connected to passive input

The connected instrument is a passive digital input which accepts the voltage provided by external power supply in use. Voltage 5-30 Vdc; maximum electrical current 50 mA. See Fig. 29.

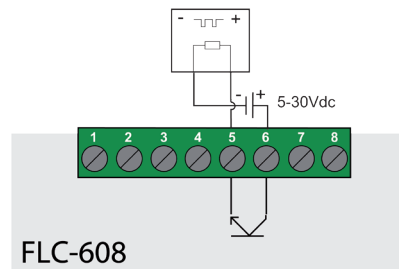


Fig. 29: Instrument connected to passive input

Active transistor output: active transistor output (FLC-608 starting from version 6-3)

The connected instrument is a passive digital input which accepts a 24 V voltage. It DOES NOT have to provide ANY additional voltage. The internal 24 Vdc power supply is used to provide necessary voltage. Voltage 24 Vdc maximum electrical current 30mA. See Fig. 30.

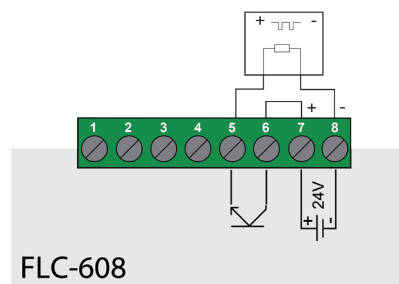


Fig. 30: Active transistor output (FLC-608 starting from version 6-3)

4. Installation

4.3.3.3 Output 4...20 mA

Loop powered

The receiver 4...20 mA connected to the instrument is loop powered, which feeds by itself the current in loop. Loop voltage 24 Vdc; maximum impedance 800 ohm. See Fig. 31.

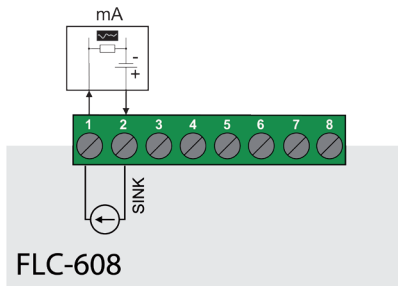


Fig. 31

Active (FLC-608A/P/I)

The receiver 4...20 mA connected to the instrument is a passive milliamp-meter; the internal FLC-608 24 Vdc power supply must be connected as shown in Figure 32. Loop voltage 24 Vdc; maximum impedance 800 Ω.

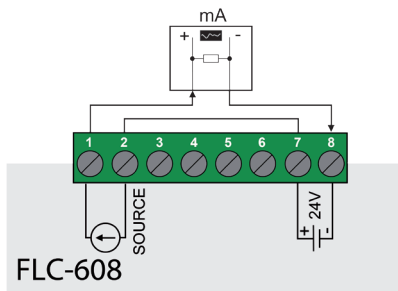


Fig. 32



NOTE

The pulse output and the output 4...20 mA is available only in loop powered mode in converters FLC-608B or FLC-608R.

4.3.3.4 MODBUS RS485 interface

The MODBUS RS485 interface is available between the terminals 13 - 14 - 15 which are positioned in the converter board. (Fig. 33).

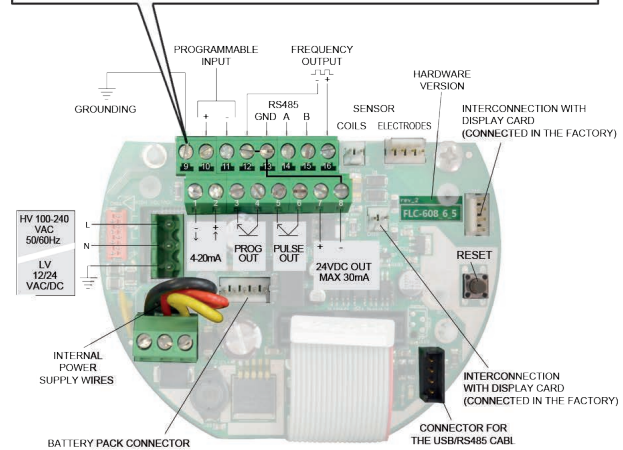
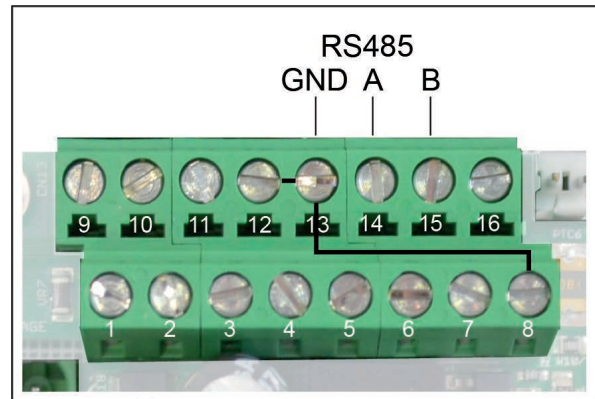


Fig. 33: Output RS485



NOTE

The communication interface RS485 is used in combination with FLC-608 software or with other computer systems compatible with the MODBUS RTU standard; for further information, see the Electromagnetic flow meter FLC-608 Modbus addresses guide (81501377.01 06/2021).

4. Installation

4.3.4 Electrical grounding of the converter

The purpose of grounding is to protect the system from external electromagnetic interference and to set the measurement reference of the meter. To achieve this requirement, a clean earth connection with the lowest possible resistance is required. We recommend using at least one 4mm²/AWG11 cable to make the grounding connections. If the liquid is not electrically connected to the pipes (in plastic or with internal coating) grounding rings are required. Absent or incorrect grounding will result in unpredictable failure (Fig. 34a).

In the FLC-608 Remote version, the sensor and the converter must be grounded using two separate wires (Fig. 34b). Avoid placing the signal and power cables close together to minimize interference.

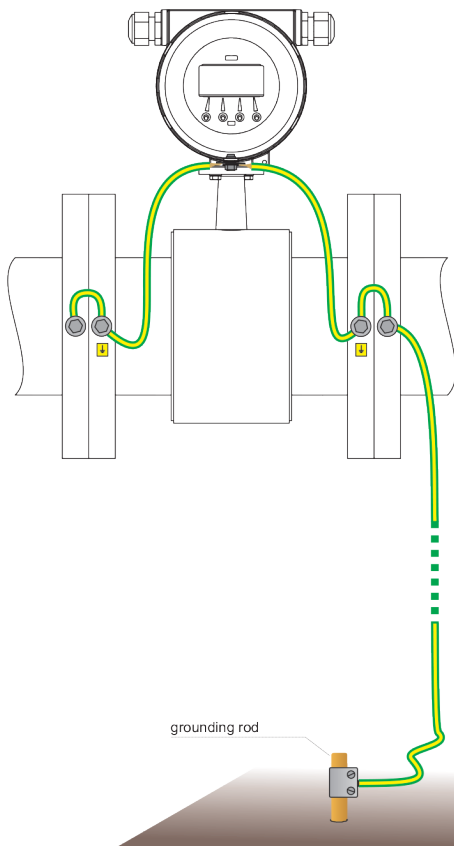


Fig. 34a: Electrical grounding FLC-608 Compact version

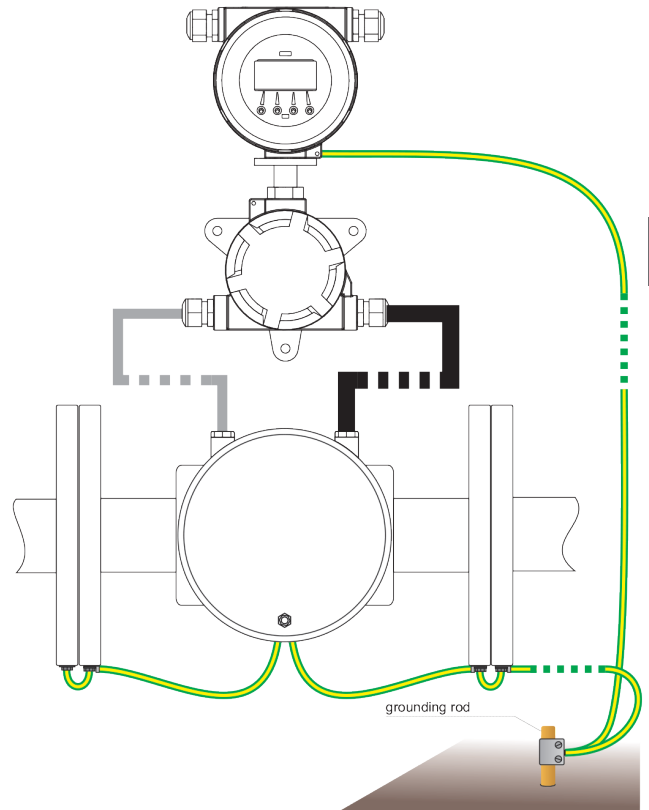


Fig. 34b: Electrical grounding FLC-608 remote version

For a correct device operation it is necessary to carry out a connection in a well-executed manner.

4.3.5 Connection to the power supply



CAUTION!

The electrical connection of the device must be carried out by qualified trained personnel.

Make sure that all electrical connections have been made correctly before connecting the unit to the power supply. Check the supply voltage on the plate. The unit may be supplied with voltage:

Model	Power supply type
FLC-608A	90 ... 264 Vac or 12 ... 24 Vac/dc
FLC-608B	Powered by lithium battery
FLC-608R	Powered by a rechargeable lithium battery (power supply and battery charging is supplied by the solar panel)
FLC-608P	12 ... 24 Vac/dc
FLC-608I	90 ... 264 Vac (with lead backup battery), or 12 ... 24 Vac/dc (with lead backup battery), or powered by a rechargeable lithium battery (power supply and battery charging is supplied by the solar panel)

5. FLC-608 converter programming

5. FLC-608 converter programming

5.1 Converter configuration methods

The configuration of the FLC-608 converter can be performed in three different ways:

- 1) Using 4 buttons positioned on the front display of the converter (see 1), unscrewing the front panel glass (see 2)

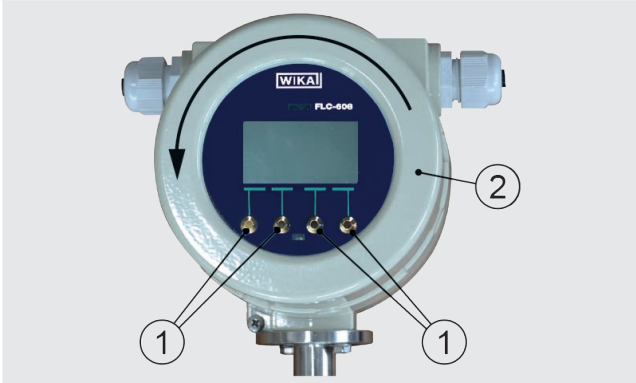


Fig. 35: Configuration buttons

- 2) From the PC using the RS485 MODBUS output (see electrical connections) and the configuration software WIKA FLC-608. The USB cable adapter is available from the manufacturer on request.



Fig. 36: USB-MODBUS cable

- 3) From the PC via the infra-red port located on the front of the converter, above the display, and the WIKA FLC-608 software configuration program using the IrCOM cable available from the manufacturer on request.



Fig. 37: IrCOM Cable

The FLC-608 software is available on the USB flash drive included in the packaging.

5.1.1 Software FLC-608 configuration

Install the FLC-608 software on the PC, run the program, connect the unit to the PC. In case you are using a battery-powered sensor, the activation should be completed as shown in the follow pictures:



ACTIVATION OF THE FLC-608B OR FLC-608R IN BATTERY MODE

Normal operation of the FLC-608B is “sleep mode.” This mode preserves battery life while ensuring the functional operation of the product. To recall the unit for the next programming, use the magnetic key (see 1, Fig. 38) provided only with the FLC-608B or FLC-608R and slide it vertically on the front panel of the converter, to the point marked with: “ACTIVATE” (Fig. 39). As an alternative, push one of the 4 configuration buttons.

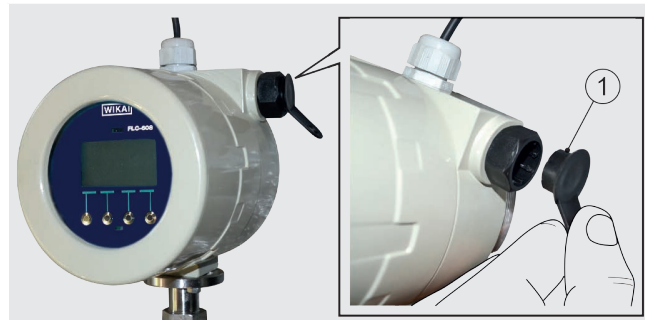


Fig. 38a: Activation Magnet FLC-608B/R

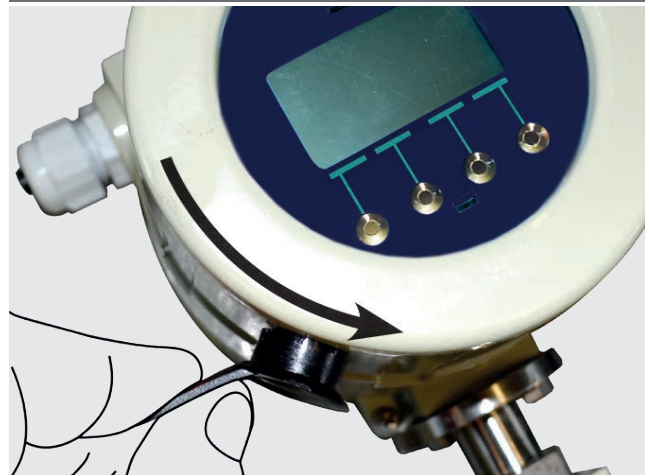


Fig. 38b: Activation of the FLC-608B/R



WARNING!

You may need to change the input port (see 4, Fig. 40). Use the COM PORT command of the software to select the correct input. It is usually the port with the highest number.

5. FLC-608 converter programming

Select the communications RS485 (see 1, Fig. 40) or infra-red (see 2, Fig. 40) and click the button CONNECT (see 3, Fig. 40).

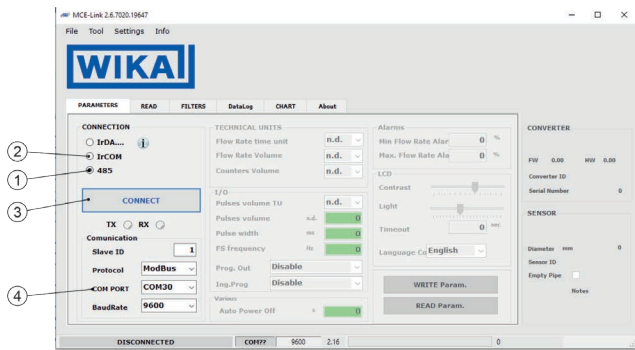


Fig. 40: Connection Window WIKAI FLC-608

It is possible to change the display language of the software menu by following this path: “Settings” > “Change Language” and choosing one of the available languages (Fig. 41).

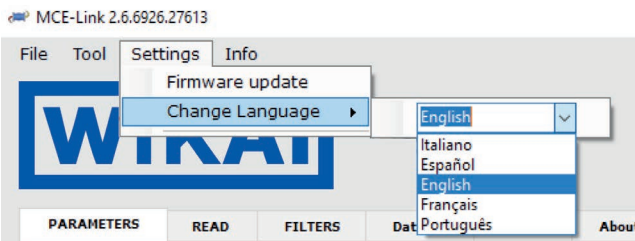


Fig. 41: Language change

5.1.2 Converter Password

The converter has been created with three different protection levels:

- Level 1: 608111
- Level 2: 709222
- Level 3: 231042

The passwords can also be changed. To change the password, go to the menu and select “memory” > “sett. password”.

Figure 42 shows the main screen of the WIKAI FLC-608 software properly connected to the converter. By accessing various pages, it is now possible to view the data and modify the operating parameters.

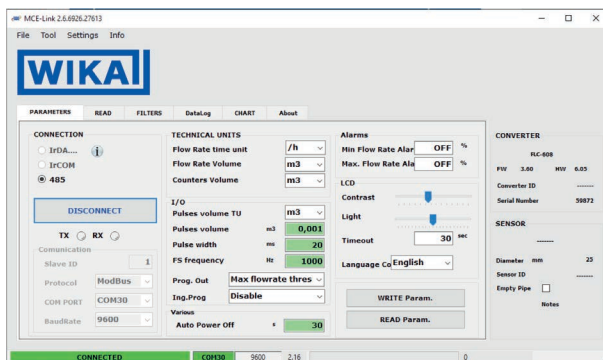


Fig. 42: Main screen

5.2 Programming

As already described in the previous paragraph, the converter can be programmed by connecting the instrument to a PC on which the “MCE-Link” configuration software is installed or by directly using the four buttons on the front of the converter. To access the menu from the converter, unscrew the protection cover (see 1, Fig. 43) and press the button function positioned under the item “MENU” (see 2, Fig. 43)

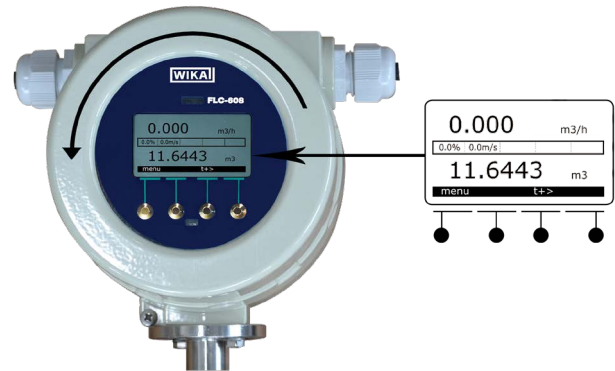


Fig. 43: Access to the Menu

5.2.1 Data display description

With reference to Figure 44, the converter display is divided into 3 main areas:

- The top area (see 1, Fig. 44) contains the status information symbols, with indicators of battery life (FLC-608B and FLC-608R), power supply (FLC-608A) or power supply and battery recharge (FLC-608R), as well as the alarm symbols and instantaneous reading of the flow rate.
- The central area (see 2, Fig. 44) contains a linear graph of the flow rate expressed as a percentage of the full scale.
- The bottom area (see 3, Fig. 44) can be selected by the client and possible options are:
 - ▶ T+ total positive counter.
 - ▶ P+ partial positive counter.
 - ▶ T- total negative counter.
 - ▶ P- partial negative counter.
 - ▶ NET – Net totalizer.
 - ▶ **Date, time, temperature and pressure indicator** (the latter available with optional module).

To choose the required value simply click the button that corresponds to the arrow and choose the value, or select the menu -> Preferences -> Display -> Last line.

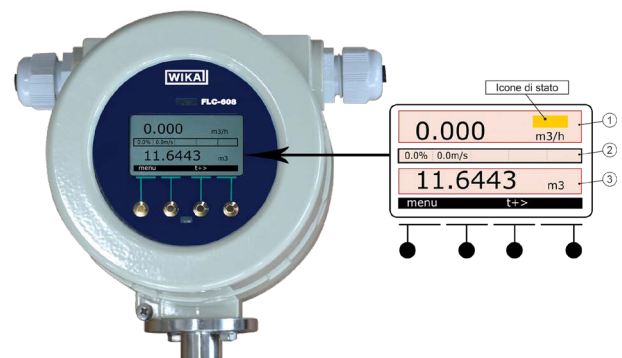














Fig. 44: Display description

5. FLC-608 converter programming

5.2.2 Status icons identification and description

The icons shown on the display offer the user immediate information on the power supply status and on the possible problems that may occur during the operation. It is therefore very important to know in advance the meaning of each symbol.

EN

Power supply icon status	
	Main power supply
	Battery power supply (remaining)
	Battery charging (rechargeable version)
Alarm status icons	
	Flow rate > MAX threshold
	Flow rate < MIN threshold
	Excitation failure
	Measurement error
	Empty pipe
	Accumulation pulses alarm
	Board temperature alarm (shown in the measurement unit set)
	Low voltage alarm
Communication status icon	
	Data connection in progress

5.2.3 Device programming/configuration menu

The following list shows the first-level items of the converter configuration menu:

MENU:

- PREFERENCES
- COUNTERS
- PARAMETERS
- I/O
- OTHER
- MEMORY

Every first-level item allows access to their own submenu.

The complete menu of the available functions is shown in the following table.

OPTIONS (See par. 5.3.1)	TECHNICAL UNITS	Flow rate unit
		Flow rate time base
		Counters unit
		Pulses unit
		Specific weight
		Temperature unit
	MEASUREMENT FREQ	Measuring time
	DISPLAY	LCD backlight level
		Backlight off
		LCD contrast
	VIEW OPTIONS	Last line
	PRESSURE ZERO	
	TAG	
	FULL SCALE FLOW RATE	
	LANGUAGE	
COUNTERS (See Par. 5.3.2)	T+	
	P+ (ZERO SET UP)	
	T	
	P- (ZERO SET UP)	
PARAMETERS (See Par. 5.3.3)	KA ADJUSTMENT	
	DIAMETER SETUP	
	FILTERS SET UP	Flow cut off
		Damping
		Bypass
		Peak cut off
		Measure average
	LINE FREQUENCY	
	ZERO FINDER	
	FLOW RATE ALARMS	MAX flow rate threshold
	MIN flow rate threshold	
EMPTY PIPE THRESHOLD		


5. FLC-608 converter programming

I/O (See Par. 5.3.4)	PULSES OUTPUT	Pulse quantity	OTHER (See Par. 5.3.5)	SYSTEM INFO	EN		
		Pulses time ON		TIME/DATE			
		Reverse flow rate		RESERVED			
		Active pulses output		GRAPH			
	FREQUENCY OUTPUT	Full scale frequency		SIMULATION			
		Active frequency output		COMMUNICATION		Baud rate RS485	
	PROGRAM. OUTPUT	Enabled / disabled		MEMORY (See Par. 5.3.6)		LOAD USER COPY	MODBUS address
		Reverse flow					Data connection
		Max flow rate threshold					
		Min flow rate threshold				SAVE USER COPY	
		Max/min flow rate threshold	FACTORY SETTINGS				
		Dosing	DATALOGGER		Show last row		
		Excitation failure	PASSWORD SET UP		Complete deletion		
		Empty pipe			LOG interval		
		All alarms			NEW BATTERY		
		PROGRAM. INPUT	Enabled / disabled				
	Resetting p+						
	Resetting p-						
	Resetting p+/p-						
	P reset and block						
BATCHING							
PROGRAMMABLE OUTPUT LOGIC							

5.3 Menu items description

The description of all menu items already listed in a schematic way in paragraph 5.2.3 as follows:



5.3.1 Menu Preferences

MENU → PREFERENCES	
TECHNICAL UNITS	
Flow rate unit	Allows to select volume technical unit for instantaneous flow rate
Flow rate time base	Allows to select time base for instantaneous flow rate
Counters unit	Allows to select volume technical unit for the counters
Pulses unit	Allows to select volume unit for the pulses
Specific weight	Allows to insert the specific weight of the liquid in use
Temperature unit	Allows to change wanted temperature unit
MEASURE INTERVAL	
Measuring time	Valid only for battery-powered versions FLC-608B/R; allows to select the measuring time of the system among 10/15/30/45/60/120/180/240/300/360/420/480 seconds.
	 WARNING! Factory set time is 45 seconds. Any reduction of this factor will affect battery life when using the FLC-608B in battery mode.

5. FLC-608 converter programming

MENU → PREFERENCES

SCREEN

LCD backlight level	Valid only for battery-powered versions FLC-608B/R; allows you to set the display backlight.  WARNING! Any increase in this factor will affect battery life when using the FLC-608B or FLC-608R.
Backlight OFF	Allows to increase or reduce time to the screen turning off.  WARNING! Any increase in this factor will affect battery life when using the FLC-608B or FLC-608R.
LCD contrast	Allows you to adjust the contrast value of the screen

VISUALISATION

Last line	Allows to define the display default information with following options: <ul style="list-style-type: none"> ■ T+ : Total positive counters ■ P+ : Partial positive counters ■ T- : Total negative counters ■ P- : Partial negative counters ■ NET : Net totalizer ■ Board date time/temperature ■ Process temperature/pressure (with optional module)
-----------	---

PRESSURE RESETTING

	This menu can be used to reset the pressure value in case of electronics with integrated pressure module.
--	---

TAG

	This menu can be used to insert a displayable TAG number on the converter main screen.
--	--

FUL SCALE FLOW RATE

Allows to change the full scale flow rate. The standard full scale flow rate is calculated by considering a speed of 10 m/s.
Here below you will find possible units of measurement for full scale and the corresponding conversions in "m³" and "kg."

UNIT	EQUIVALENTS	UNIT	EQUIVALENTS
ml	1e-6 m ³	gal USA, gallons USA	3,78541 m ³
cl	1e-5 m ³	bbl oil, oil barrel	158,984 m ³
dl	1e-4 m ³	oz US, fluid ounce US	0,02957 m ³
l	0.001 m ³	g	0,001 Kg
dal	0.01 m ³	hg	0,1 Kg
hl	0.1 m ³	kg	1 Kg
m ³	1 m ³	q	100 Kg
MI	1,000 m ³	t	1000 Kg
in ³ , cubic inches	1,63871e-5 m ³	lb, pound	0,45359 Kg
ft ³ , cubic feet	28,31685 m ³	acre-foot	1233,4818 m ³

LANGUAGE

	Allows to choose one of the following menu languages: <ul style="list-style-type: none"> ■ ENGLISH ■ ITALIANO ■ ESPAÑOL ■ PORTUGUÊS ■ FRANÇAIS
--	--

5. FLC-608 converter programming

5.3.2 Menu Counters

MENU → COUNTERS	
T+	Total positive counter
P+	Partial positive counter, resettable to zero
T-	Total negative counter
P-	Partial negative counter, resettable to zero
NET	Net counter: difference between T+ and T-

Various counters with the FLC-608 converter are available: two positive (total and partial) and two negative (total and partial). Only partial counters can be set to zero. To set the counters to zero from the FLC-608 software, access the screen “READ” and press the button “ZERO” (see 1, Fig. 45) that refers to the partial counter that you want to reset. The same screen also displays a linear bar (see 2, Fig. 45) which shows the percentage of the instantaneous flow rate in relation to the full scale capacity set in the converter. The same screen also displays in a special box (see 3, Fig. 45) of the converter: the current “Date” and “Time.” In an additional module, external temperature or system operating pressure data are available.

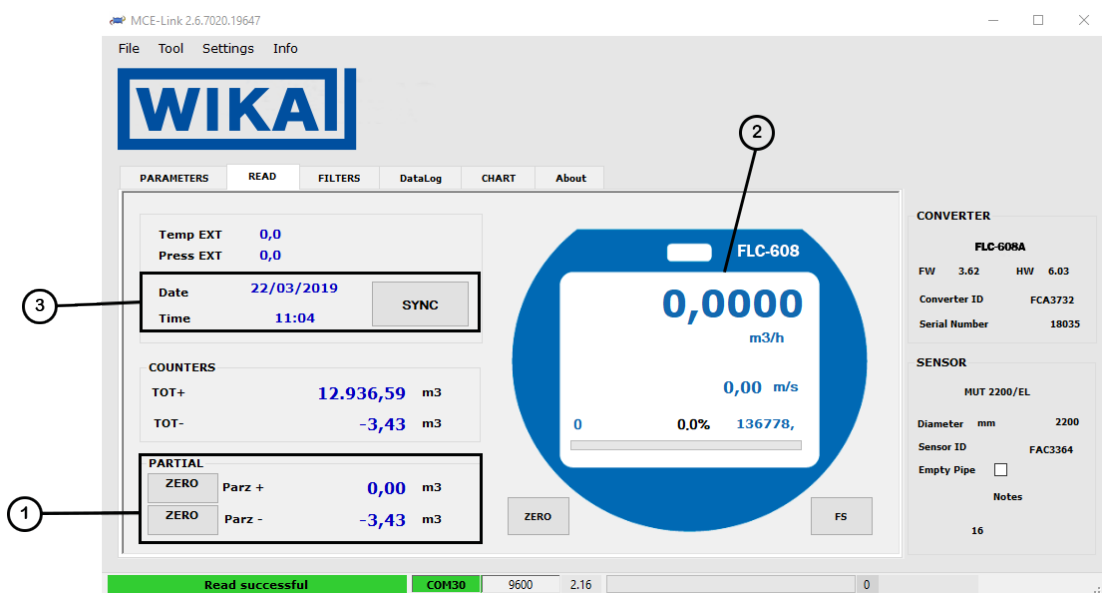


Fig. 45: Display menu counters

5.3.3 Menu Parameters

MENU - PARAMETERS	
KA ADJUSTMENT	
	It allows the adjustment of the calibration factor KA.
	<p>CAUTION!</p> <p>Changes to the KA factor can only be made by authorized persons. The KA factor must be the same as the coupled sensor; check it on the flow meter plate.</p>
DIAMETER ADJUSTMENT	
	It allows the diameter adjustment. In case of insertion flow meter, please enter the real inner diameter value of the pipe in this menu.

5. FLC-608 converter programming

MENU - PARAMETERS

FILTER SETUP

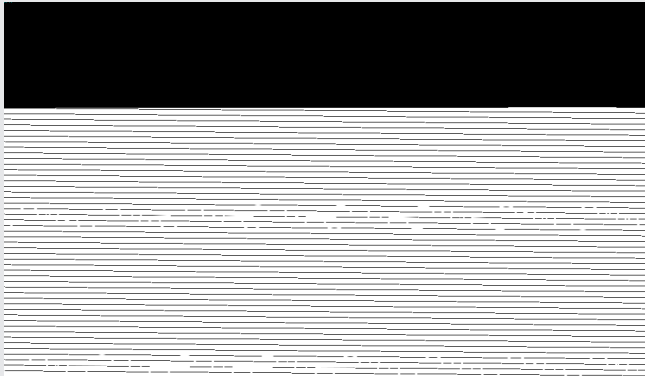
	<p>(i) NOTE Filters should be adjusted only if strictly necessary. Factory settings are already calibrated for proper operating conditions.</p>
Flow cut off	<p>In this sub-menu you will find a value expressed as a percentage of full scale: if the actual flow rate is less than this value, the device will show a flow equal to 0.</p> <p>(i) NOTE Should you need to reduce the flow cut-off filter, it means that the speed of the liquid is lower than the recommended one necessary for precise measuring.</p>
Damping	<p>Indicates the number of mediated samples which are used to obtain instantaneous flow rate shown on the display and transferred to the 4-20 mA outputs and frequency. To increase the stability, increase the value in this sub menu.</p>
Bypass	<p>A value expressed in percentage is inserted in this sub-menu. It represents a threshold beyond which the damping filter IS NOT applied. For example, if the value of 50% has been selected: IF the flow rate varies by 50% more than previous value, THEN the indicated flow rate will have the real value. OTHERWISE the damping filter will be applied, in other words, the indicated flow rate will reach slowly the real value.</p>
Peak cut-off	<p>In this sub-menu you will find a value expressed as a percentage of full scale. If the measurement of the flow rate shows amplitude peaks > of the set value, these will not be taken into account in the measurement. For example: setting the value to 10%, a peak > 10% of full scale will be ignored by the device.</p>
Average measure	<p>Indicates the number of mediated samples which are used to manage the increase of the totalizers and pulse outputs. To increase the stability, increase the value in this sub-menu.</p>
Line frequency	<p>It allows the setting of the local power supply frequency (50 Hz or 60 Hz) in order to minimize interference. To read and change the filter values from the FLC-608 software program, access the screen "FILTERS" (Fig. 46) and change the filter values within indicated range.</p> <div style="text-align: center;">  </div>

Fig. 46: Screen "FILTERS"

ZERO CALIBRATION

	<p>Used to perform zero calibration of the device. Before performing the zero calibration, ensure that:</p> <ul style="list-style-type: none"> ■ 1. The sensor is full of liquid; ■ 2. The liquid is perfectly stationary; ■ 3. The sensor has correct electrical grounding.
--	---

FLOW RATE ALARMS

MAX flow rate	<p>It allows the setting of the maximum flow rate value in percentage on the full scale value. This value is factory disabled. Selectable range starts from a minimum threshold of +5% up to 100% of the full scale value. To disable the feature, select > 100%</p>
Min flow rate	<p>It allows the setting of the minimum flow rate value in percentage on the full scale value. This value is factory disabled. Selectable range starts from 1% up to the maximum threshold of the full scale value.</p> <p>(i) NOTE When maximum and minimum flow rates are enabled, a symbol will be displayed on the screen in case these values are reached.</p>

5. FLC-608 converter programming

MENU - PARAMETERS

EMPTY PIPE THRESHOLD (available with sensors that have 4 electrodes)

Allows to adjust the sensitivity of the empty pipe detection. Move the selection to "E" if the empty pipe alarm does not appear and to "F" if the alarm does not disappear with the full pipe.o.



NOTE

To test the empty pipe detection, press the "test" button.

EN

5.3.4 Menu I/O

MENU → I / O

PULSE OUTPUT

Pulse quantity

It allows the selection of the pulse volume.



ATTENTION!

For FLC-608B or FLC-608R converters, during the maximum flow rate of the process select a volume large enough so that the time interval between two consecutive pulses is greater than 1 second in order to preserve the battery life.

On FLC-608 mains powered version



NOTE

Avoid pulse saturation, as this may lead to pulse accumulation which should not be provided in real time considering the actual flow rate.

Calculation of the parameters (values must be reconsidered according to the technical units of the converter).

[$V_p = \text{dm}^3$ (litres), $T_p = \text{seconds}$; $Q_{\text{max}} = \text{device maximum flow rate } \text{dm}^3/\text{s}$] Settable values for T_p are in a range from 0.001s to 2 s.

- Once the time T_p has been set, the minimum volume V_p to be set is calculated as following:
 $V_p > Q_{\text{max}} * 2T_p$;
- Once the volume V_p has been set, the maximum duration T_p to be set is calculated T_p :
 $T_p < V_p / (2 * Q_{\text{max}})$.

If the calculated T_p value is lower than 0.001 s (1 ms), a higher value of V_p must be chosen so that the result is always $T_p \geq 0.001 \text{ s}$.

On FLC-608B or FLC-608R battery powered version



NOTE

High pulse frequency will affect the battery life.

Calculation of the parameters (values must be reconsidered according to the technical units of the converter). Settable values for T_p are in the range from 0.001 s to 0.1 s.

- Once the time T_p has been set, the minimum volume V_p to be set is calculated as:
 $V_p > Q_{\text{max}} * 20T_p$;
- Once the volume V_p has been set, the maximum duration T_p to be set is calculated as:
 $T_p < V_p / (20 * Q_{\text{max}})$.

If the calculated T_p value is lower than 0.001s (1 ms), a higher value of V_p must be chosen so that the result is always $T_p \geq 0.001 \text{ s}$.

Pulse time ON

Select the ON time duration of the pulse on a range between 1 and 1999 ms.



WARNING!

With FLC-608B select the pulse time ON no higher than 0.1 seconds (100 ms).

Reverse flow rate (off/on)

In case of negative flow, this function will enable/disable the pulses from the pulse output.

Active pulse output

Select to disable the frequency output and activate the pulse output (factory condition).

5. FLC-608 converter programming

MENU → I / O

FREQUENCY OUTPUT

Full scale freq.	Set the maximum frequency that corresponds to the full scale flow rate value. Selectable range: 100 Hz ... 10 kHz.
Active output freq.	Select to disable the pulse output (which becomes PWM, pulse width modulation) and frequency enable output.

EN

PROGRAMMABLE OUTPUT

It is possible to choose among the following options for the programmable output:

- Enabled/disabled
- Reverse Flow
- Max flow threshold
- Min flow threshold
- MAX/MIN flow threshold
- Dosing
- Excitation failure
- Empty Pipe
- All alarms

PROGRAMMABLE INPUT

It is possible to choose among the following options for the programmable input:

- Enabled/disabled
- Resetting p+
- Resetting p-
- Resetting p+/p
- P resetting and block

NOTE

If the programmable output is set to “dosing,” the programmable input will be the same and automatically used in the option dosing and it cannot be changed.

DOSING

Set the volume to be dosed. Available only with FLC-608A.

NOTE

In order to guarantee adequate precision, the dosing duration must be greater than 60 s with full speed flow.

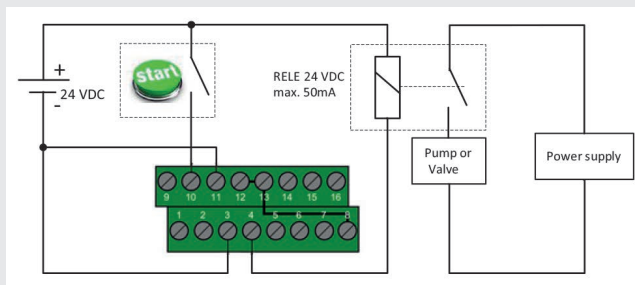


Fig. 47: Example of connection for the Programmable Output

PROGRAMMABLE OUTPUT LOGIC

It is possible to change the logic of the programmable output by choosing between NO/NC – normally open, normally closed.

5. FLC-608 converter programming

5.3.5 Menu Other

MENU → OTHER	
SYSTEM INFORMATION	
	Displays the information on the system. End user cannot change these values.
TIME / DATE	
	Displays time, date, motherboard temperature, power supply voltage.
RESERVED	
	Menu for the exclusive use of the manufacturer.
DIAGRAM	
	Displays the diagram of the measured flow rate.
SIMULATION	
	<p>FLC-608 converter has an integrated flow simulator which checks and sets the pulse output to any connected device system.</p> <p>(i) NOTE When the flow simulator is being used, the counter values are not increased.</p>
COMMUNICATION	
Baud rate RS485	Allows for the adjustment of the RS485 baud rate in a range between 2400 and 115.700 bps.
MODBUS address	Allows for the adjustment of the address of the MODBUS communication in a range between 1 and 255.
Data connection (RS485/IrCOM)	Allows for the selection of the RS485 port or infra-red port for connection to pc. Before starting the infra-red communication, make sure that the function IrCOM of the converter has been enabled: Menu → Other → Communication → Data connection → IrCOM.

5.3.6 Menu Memory

MENU → MEMORY	
UPLOAD USER'S COPY	
	Allows to upload personalized settings.
SAVE USER'S COPY	
LOADING FACTORY SETTINGS	
	Allows to load factory settings.
DATALOGGER	
Displays latest line	Displays the latest information logged: date, time, counter, instantaneous flow rate, temperature, battery status. Other stored information (i.e. temperature, process pressure) can be seen only if the data are downloaded.
Complete deletion	Deletion of the converter memory.
LOG interval	<p>Select the log interval. Minimum 1 minute / Maximum 120 minutes.</p> <p>In battery powered FLC-608B and FLC-608R versions, priority is determined by measurement interval: (LOGGING>=MEASUREMENT). To read and change information stored in the memory in the program of the FLC-608 converter, go to the screen "DATA LOG" (Fig. 48).</p> <p>Select the line START (see 1, Fig. 48) and END (see 2, Fig. 48) to read the button "restore latest log" (see 3, Fig. 48) which shows the latest available log.</p> <p>Press the READ button (see 4, Fig. 48) of the log to download the data.</p> <p>Press "SAVE CSV" (see 5, Fig. 48) to save the data on the PC in CSV format.</p> <p>Press the "Reset datalogger" button (see 6, Fig. 48) to fully reset the converter memory.</p> <p>[Continues]</p>

5. FLC-608 converter programming

MENU → MEMORY

DATALOGGER

LOG interval

EN



ATTENTION!

Before proceeding to memory reset, make sure that all the data have been saved.



NOTE

Data registration interval can be changed in the main screen, in a range between 1 minute and 120 minutes.

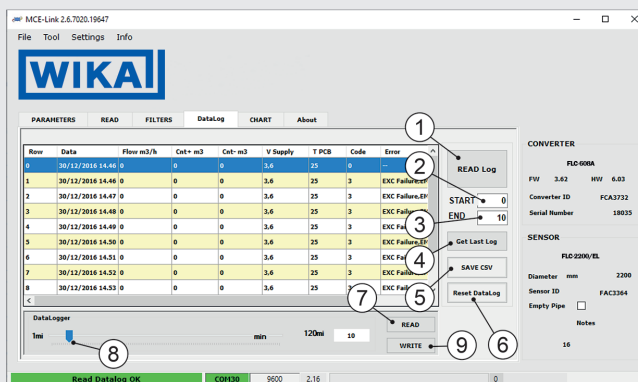


Fig. 48: LOG interval

To view the last line generated by the converter, select “Last log Settings.” The number of the last stored line will then be displayed. Then select “download log” to see the history of the available data.

To save the data in a readable format in Excel, click on “save CSV.”

To change the data logger storage time, click on read (see 7, Fig. 48), and then use the horizontal scroll key between 1 and 120 minutes (see 8, Fig. 48) to change the storage time interval. Click on “Write” (see 9, Fig. 48) to apply the new data and make the change effective. After reading the data, selecting the DIAGRAM screen will show a flow rate chart (Fig. 49).

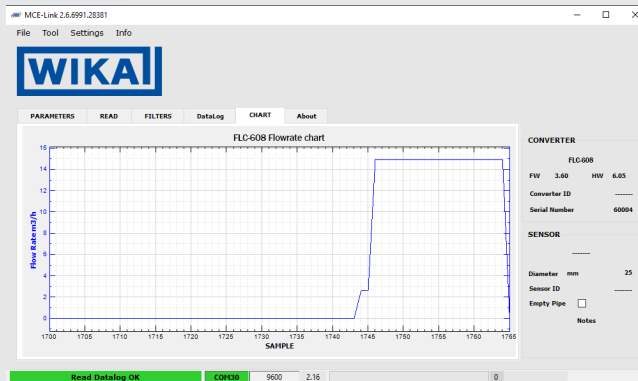


Fig. 49: Flow rate chart

KEY WORD SETTING

Allows you to change the three password levels.

To access the selection of the three passwords that you want to change (L1,L2,L3), the Level 3 password is required.

NEW BATTERY

After replacing the battery pack, select “new battery” to confirm the replacement.

6. Maintenance

6. Maintenance



NOTE

The converter is not equipped with moving parts and/or mechanical parts subject to wear and therefore does not require any ordinary maintenance except for the periodic check of the correct closure of the cable glands, the condition of the sealing gaskets of the covers (in all versions) and the replacement of the discharged battery (in the FLC-608B version).



NOTE

The device (front panel and converter casing) can easily be cleaned with soft cloths and neutral detergents.

6.1 Cable gland closing and gasket condition check

Since the environmental characteristics where the converter is installed are not known in advance, it is not possible to provide univocal indications on how often periodic checks on cable glands and gaskets should be performed.



NOTE

The operating experience of the user and the knowledge of the environmental characteristics of the converter installation location will allow the operator to decide how regular controls must be.



WARNING!

Converters that are positioned outdoors and/or in places/supports subject to vibrations can loosen the cable glands over time, so they must be checked/controlled more frequently than converters that are installed in closed environments and/or protected from external stresses.

Checks:


- Perform periodical checks of the tightness of the cable glands and their condition.
- On this occasion, check the condition of the seal in the cover and, if provided, in the electrical junction box.
- Finally, check that all the electrical cables are correctly affixed to the relative terminals, that they are physically intact and that they do not show signs of deterioration.

6.2 Battery installation/replacement on FLC-608B/R

The battery pack is usually supplied separately from the converter, therefore, before the FLC-608B (and FLC-608R) is put into operation, the battery pack must be inserted in its housing and connected to the instrument according to the instructions provided below.



NOTE

The operations described below are also valid for the replacement of the battery, which is necessary to perform when the status icon “” indicates a low charge level on the FLC-608B display.

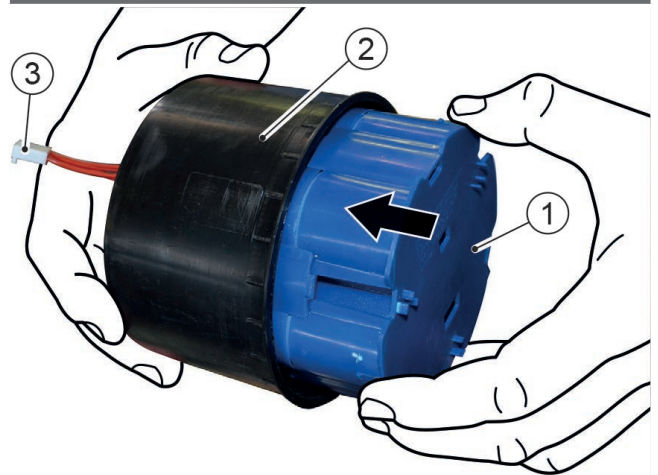


NOTE

Under normal operating conditions, the battery life can last up to 10 years. Any changes to the settings and programming of the converter (see paragraph 5.3) can affect the battery life.

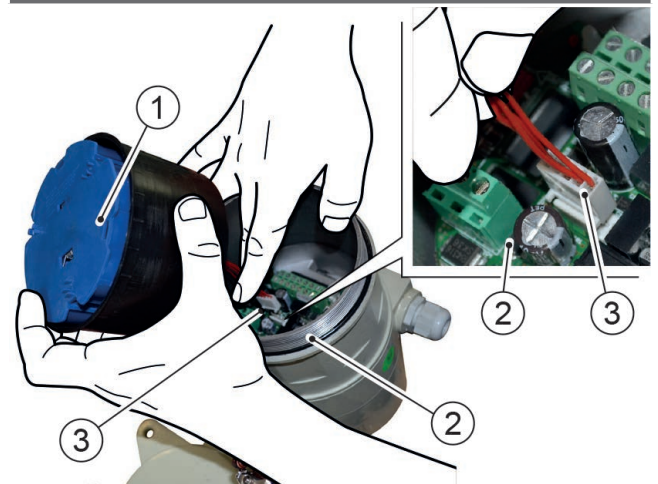
6.2.1 Battery installation/replacement

Step 1 - Fig. 50



Insert the battery pack (see 1, Fig. 50) into the battery holder (see 2, Fig. 50) so that the power cable (see 3, Fig. 50) comes out of the bottom of the holder. When inserting the battery pack, **be careful to match the grooves on the battery to the anti-rotation stops provided on the holder.**

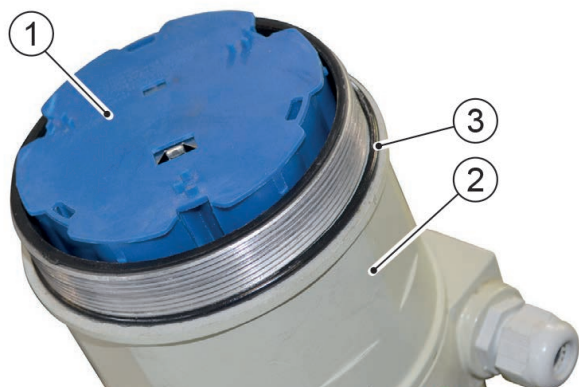
Step 2 - Fig. 51



Connect the battery pack (see 1, Fig. 51) to the electronic board of the converter (see 2, Fig. 51) by inserting the 5-ways connector (see 3, Fig. 51) to the relative counterpart.

6. Maintenance

Step 3 - Fig. 52



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Insert completely the battery pack (see 1, Fig. 52) inside the appropriate housing of the converter (see 2, Fig. 52). Make sure that the O-ring seal positioned on the cover thread (see 3, Fig. 52) is in its place and in good condition (if necessary, replace it).

Step 4 - Fig. 53



Put on the cover (see 1, Fig. 53), close the battery pack and screw it to the end of the stroke by pressing lightly the O-ring seal to guarantee the insulation.

Step 5

Only in case of battery replacement, confirm the replacement by clicking the item "new battery" accessible from the menu "MEMORY."

7. Troubleshooting

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7. Troubleshooting

7.1 Malfunctioning and possible solutions

The following table summarizes the possible malfunctions that may occur during the use of the FLC-608 converter, for which the possible causes and solutions to be adopted in order to restore correct operation of the flowmeter are listed.

Malfunctioning	Possible cause	Solution
The converter shows a flow rate even when there is no flow.	Grounding missing or incorrect.	Check that the sensor and the liquid are correctly grounded, making sure that the relative earth ground connections are correctly connected.
	Lack of liquid in the sensor downstream of the converter.	Check that the sensor is full with liquid.
	Electric conductivity of the liquid is too low or it is not compatible with the material used for the sensor electrodes.	Check which electrode type is used on the sensor. If necessary, replace electrodes and/or sensor.
	Calibration missing or incorrect.	Perform manual zero calibration if necessary (Menu - Parameters, submenu - zero calibration).

Malfunctioning	Possible cause	Solution
External pulse totalizer shows results different than expected.	Pulse output configuration error.	Check the conditions in the paragraph 5.3.4 - menu – Pulse output. Test the output with the external flow simulator and the converter-pulse counter system, simulating a flow rate through System > Simulation.







Malfunctioning	Possible cause	Solution
The screen is turned off and it doesn't turn on.	There is no voltage supply or it is incorrect.	Check the current supply voltage on the converter plate.
		For the FLC-608B version, check the battery life and replace the battery pack.

Malfunctioning	Possible cause	Solution
The flow reading is very unstable.	Caused by HYDRAULIC failure: Air bubbles or unstable flow (vortex motion). The minimum required linear distances upstream and downstream of the device were not complied with.	Check for the minimum required linear distances upstream and downstream of the device. Check for the presence and correct installation of vents on the pipe to avoid the presence of air in the pipe.
	Caused by ELECTRIC failure: Grounding missing or performed improperly, oxidized nodes, very noisy ground point, usually in common with the grounding systems of pumps or inverters.	Change the grounding point or preferably create a new one for the exclusive use of the meter.
	NOTE: If with full pipe and stable liquid an unstable reading can be observed (which varies rapidly) then most likely it is a problem of electrical noise. Only if necessary, set the filters in the following way: <ul style="list-style-type: none"> ■ Set the damping to 150; ■ Reduce the peak cut off filter; ■ Increase the bypass filter. 	

7. Troubleshooting / 8. Return goods

7.2 Alarm messages solution

In this paragraph you will find the alarm messages that can be shown on the display when the relative status icon appears. Each alarm message is accompanied by possible causes that generated it and the possible solutions to be applied in order to restore the correct functioning of the flow meter.

Alarm icon	Causes and possible solutions
 <p>Interrupted excitation</p>	<ul style="list-style-type: none"> ■ Incorrect or damaged electrical connection to the sensor/converter. ■ Sensor damaged. Possible seepage inside the sensor. ■ Converter damaged. <p>In case of remote configuration check for the electrical connections of separation cables.</p>
 <p>Measure error</p>	<ul style="list-style-type: none"> ■ Empty pipe. ■ Air bubbles in the liquid. ■ Incorrect grounding. ■ Incorrect or damaged electrical connection to the sensor/converter. <p>Check if the sensor has been installed correctly and if there is an air inside the pipe. Make sure that the sensor and converter are properly grounded. In case of remote configuration check for the electrical connections of separation cables.</p>
 <p>Empty pipe</p>	<ul style="list-style-type: none"> ■ Empty pipe detection. <p>This message is displayed with sensors that have 4 electrodes. Indicates the alarm of empty pipe, or even only partially empty. In case of persistent message with full pipe (more than a few minutes), check for the electrical connections of separation cables (Remote version). Work on the empty pipe threshold (see EMPTY PIPE THRESHOLD on page 31).</p>
 <p>Pulses accumulation</p>	<ul style="list-style-type: none"> ■ Incorrect pulses frequency. <p>We recommend to change the settings of the pulse volume and duration (see "PULSES OUTPUT" on page 31).</p>
 <p>Power supply voltage</p>	<ul style="list-style-type: none"> ■ Supply voltage out of operating range. <p>Check the power supply network. Move the antenna to a more favorable position.</p>
 <p>Low GSM signal</p>	<ul style="list-style-type: none"> ■ Low or missing GSM signal. <p>Check the antenna connection.</p>

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8. Dismounting, return and disposal

8. Dismounting, return and disposal



WARNING!

Residual media in the dismantled instrument can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

8.1 Dismounting



WARNING!

Do not disconnect while under voltage.

If you decide to put the converter out of service because it is definitely no longer in use, disconnect it from the electrical power source (FLC-608A) and from the connection cables to the sensor before proceeding to its removal and its disposal.

8.2 Return



WARNING!

Strictly observe the following when shipping the instrument: All instruments delivered to WIKA must be free from any kind of hazardous substances (acids, bases, solutions etc.).

When returning the instrument, use the original packaging or a suitable transport packaging.

To avoid damage:

1. Wrap the instrument in an antistatic plastic film.
2. Place the instrument, along with the shock-absorbent material, in the packaging. Place shock-absorbent material evenly on all sides of the transport packaging.
3. If possible, place a bag, containing a desiccant, inside the packaging.
4. Label the shipment as transport of a highly sensitive measuring instrument.



NOTE

Information on returns can be found under the heading "Service" on our local website.

8.3 Disposal

Incorrect disposal can put the environment at risk. Dispose of instrument components and packaging materials in an environmentally compatible way and in accordance with the country-specific waste disposal regulations.

The manufacturer declares that the design, development and construction of the CONVERTER have been carried out in compliance with the directive on the reduction of the use of dangerous substances with particular attention to waste electrical and electronic equipment (WEEE) supporting, from an environmental point of view and the protection of the health of the worker, the intervention of the subjects

who participate in the installation, use and disposal of their products (manufacturer, distributors, consumers, operators involved in WEEE treatment).



Do not dispose of with household waste. Ensure a proper disposal in accordance with national regulations.

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