Instructions manual

# Series FLOMAT
## Sensor FLOMAT-XL + Converter XL1

The art of measuring

R-MI-FAXL1 Rev.: 0 english version

## PREFACE

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

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

## WARNINGS

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- Keep this manual in a place where you can find it when you need it.
- In case of loss, ask for a new manual or download it directly from our website www.tecfluid.com Downloads section.
- Any deviation from the procedures described in this instruction manual, may cause user safety risks, damage of the unit or cause errors in the equipment performance.
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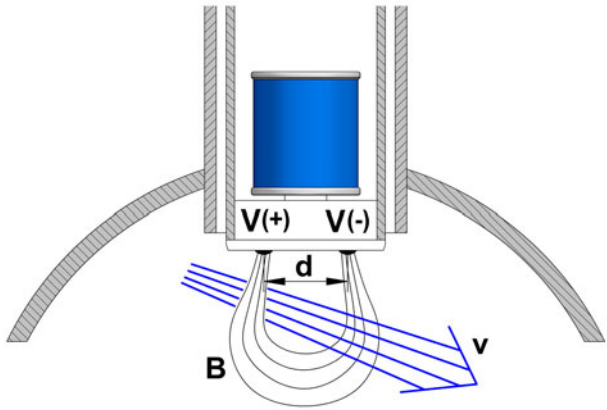
SERIES FLOMAT

# 1 INTRODUCTION

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

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

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




$$V = B \cdot v \cdot d$$

Where:

V = Measured voltage in the electrodes
B = Magnetic field
v = Liquid velocity
d = Distance between electrodes

The electronic converter is based on the most advanced technology in digital signal processing, in order to obtain accurate and reliable measurements.

The device provides the following features:

- Coil excitation by means of pulsed signal to obtain a negligible zero offset.
- Pulse and current output proportional to the flow rate and user programmable.

# 2 RECEPTION

The FLOMAT electromagnetic flowmeters with XL1 converter are supplied conveniently packaged for transportation together with their instruction manual for installation and operation.

All the flowmeters have been verified in our calibration rigs to obtain the gain factor for each sensor.

## 2.1 Unpacking

Unpack the instrument carefully, removing any remains of the packing.

## 2.2 Storage temperatures

-20ºC ..... +60ºC

# 3 HANDLING

It should always be done with care and without knocks.

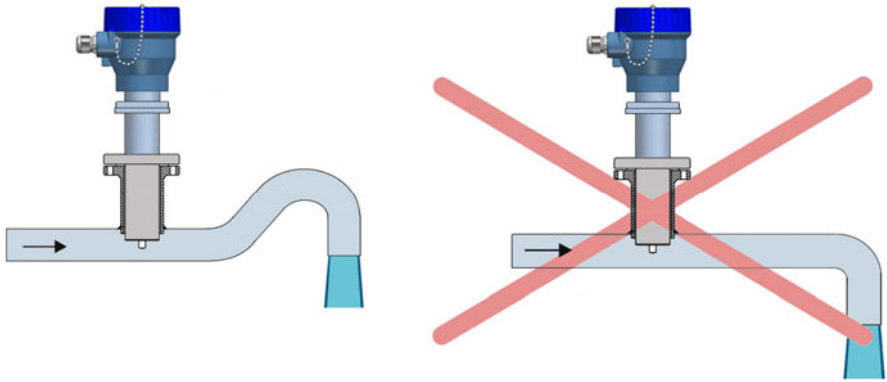
# 4 INSTALLATION

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

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

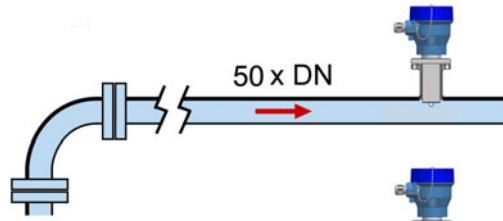
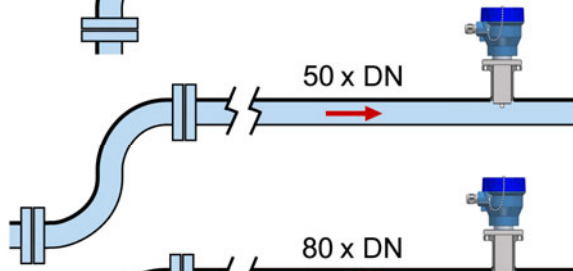
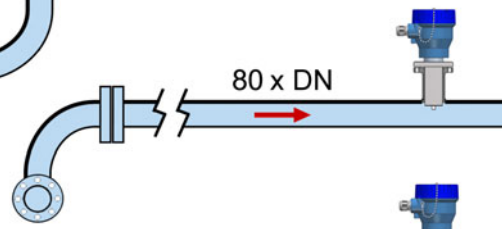
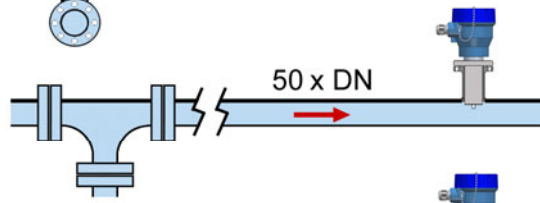
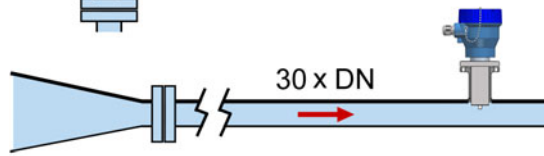
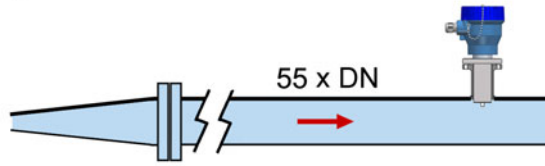
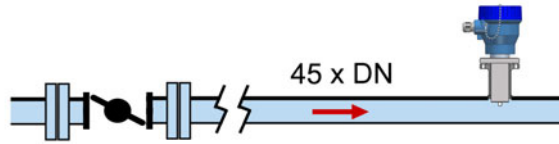
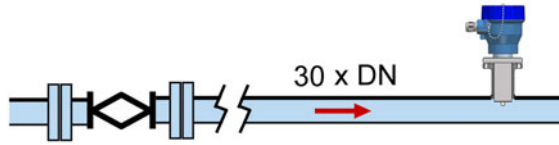
Partially full pipes can involve important reading errors.

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



## 4.1 Straight pipe sections

The point where the FLOMAT sensor will be installed must be a straight pipe section, separated from elements that can disturb the flow profile, such as elbows, diameter changes, etc. Depending on the element the minimum necessary distances upstream from the sensor are shown on the next page (**BS 1042-2.2:1983 standard**):

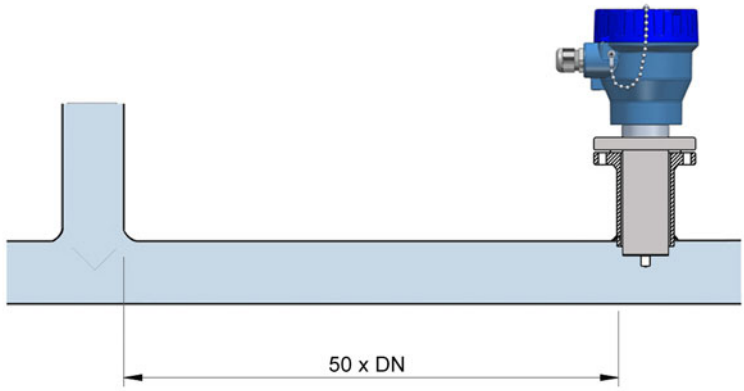
| Disturbing element upstream the sensor | Minimum distance between the sensor and the element |
|---|---|
| 90° elbow |   |
| Several 90° coplanar bends |   |
| Several 90° non-coplanar bends |   |
| T accessory |   |
| Total angle convergent 18 to 36° |   |
| Total angle divergent 14 to 28° |   |
| Fully opened butterfly valve |   |
| Fully opened plug valve |   |

Downstream, the minimum recommended distance to a disturbing element is 5 x DN.

### 4.1.1 Mixtures

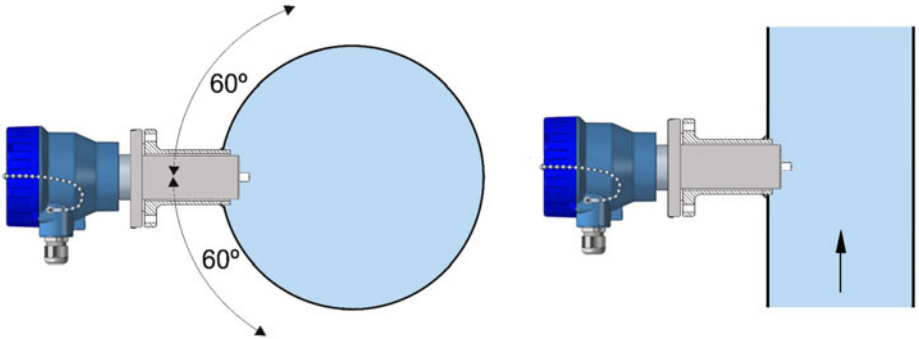
If liquids of different conductivities are mixed it is necessary to install the sensor a minimum of 50 x DN from the point of mixture in order to obtain a uniform conductivity of the liquid and stabilize the readings.

If this distance is shorter, readings may be unstable.



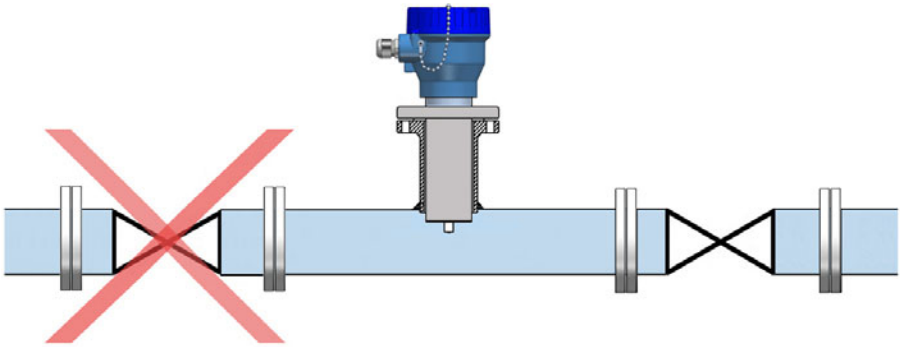

## 4.2 Sensor position

The optimum position to install the sensor is with the electrodes in the side of the pipe. This way, air pockets at the top of the pipe are avoided.



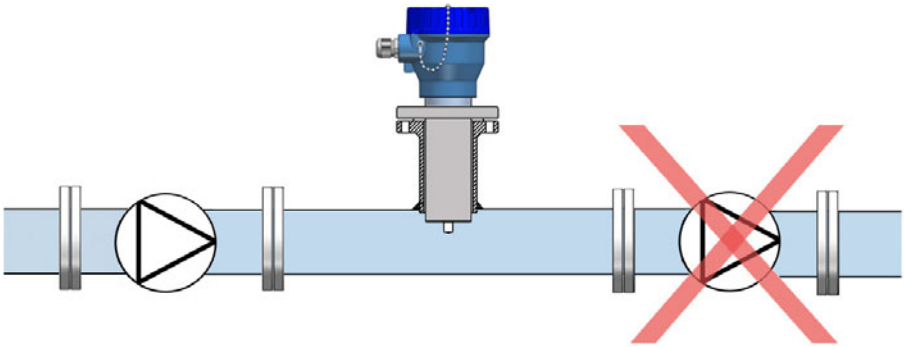

## 4.3 Valves

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



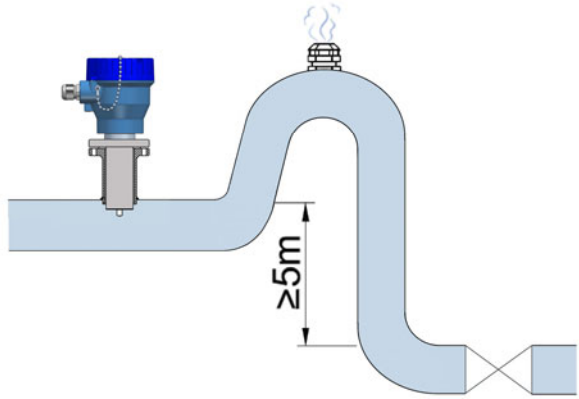
## 4.4 Pumps

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



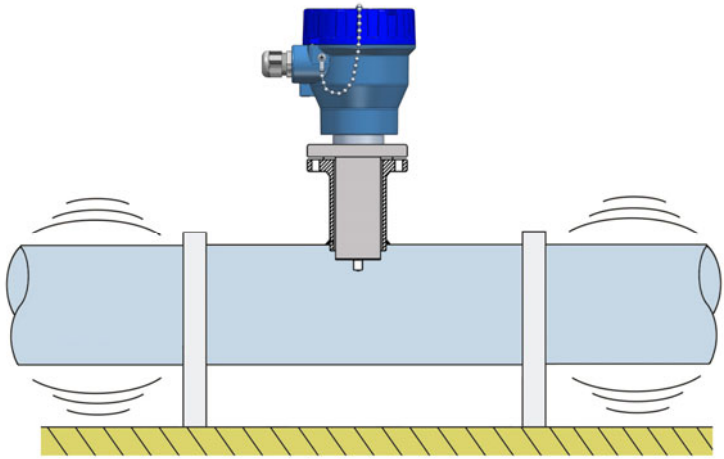
## 4.5 Aeration

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



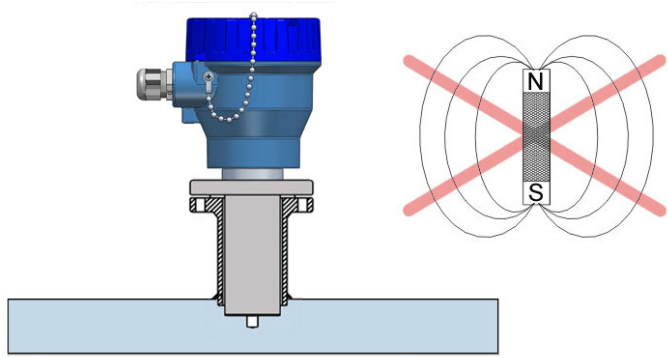
## 4.6 Vibrations

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



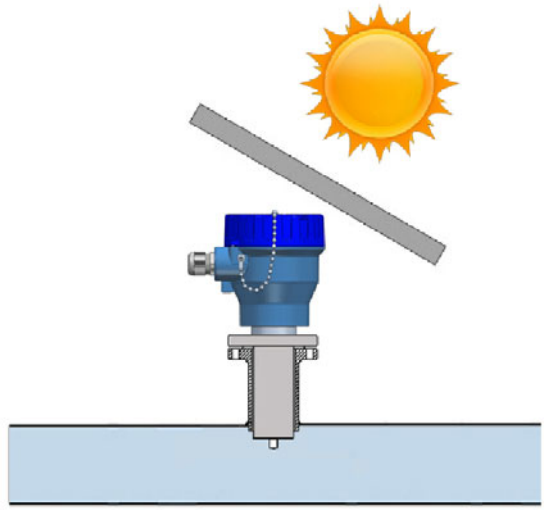
## 4.7 Magnetic fields

Strong magnetic fields close to the sensor should be avoided.




## 4.8 Temperature

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



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

The maximum liquid temperatures are shown on page 32.

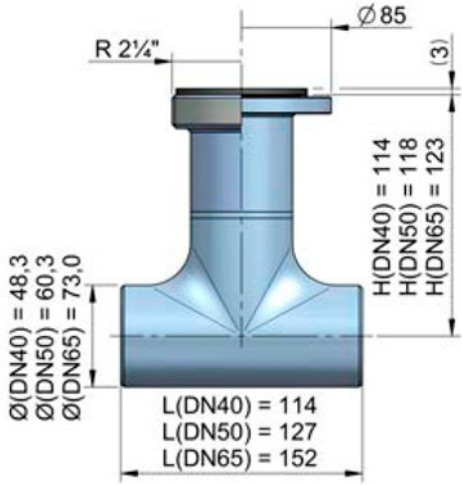
# 5 MOUNTING

## 5.1 Pipe adaptor mounting

The sensor is normally supplied mounted in its pipe adaptor. Before welding the adaptor to the pipe, the sensor must be removed to avoid irreparable damage due to excessive temperatures.

There are two basic types of pipe adaptors: with threaded or with flanged connection.

For the smallest pipe diameters (DN40, 50 & 65) the pipe adaptor is supplied welded to a short length of pipe with a “T” form. For this type just couple it to the pipe by welding or gluing in the case of PVC, PP, PE or other plastics.



For DN80 and bigger, there are three lengths for each of the two types of fittings.

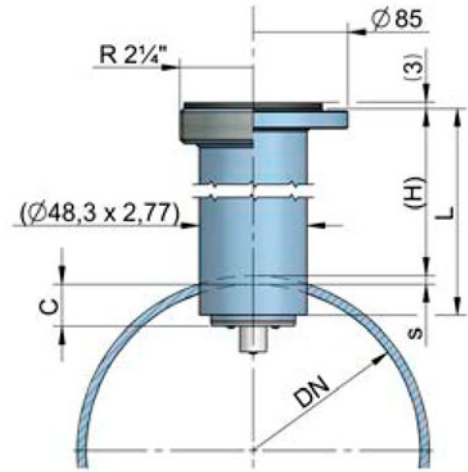
The process of putting the pipe adaptor in should be done accurately. The distance (H) (see drawings on next page) which is what the pipe adaptor should protrude above the surface of the pipe is important.

As shown in the table on the next page, to know the distance, the thickness of the pipe ***s*** must be known.

In order to make the positioning of the pipe adaptor in the pipe easier, there is a label on one of its sides with markings indicating the position of the internal pipe diameter for each DN. Cut this label above the line corresponding to the DN of the pipe, at a distance equal to the pipe thickness. Peel off the bottom part of the label. Once the pipe adaptor is placed into its final position, where the label was cut must coincide with the outer diameter of the pipe.

This ensures that the measuring electrodes penetrate far enough in the area of flow profile that will allow an accurate measurement.

| DN | C (mm) | Insert pipe adaptor | |
|---|---|---|---|
| | | L (mm) | H (mm) |
| 80 | 10 | 93 | 88-s |
| 100 | 12,5 | | 85,5-s |
| 125 | 15,5 | | 82,5-s |
| 150 | 19 | | 79-s |
| 200 | 25 | | 73-s |
| 250 | 31 | | 67-s |
| 300 | 37,5 | | 60,5-s |
| 350 | 44 | | 54-s |
| 400 | 50 | | 48-s |
| 500 | 62,5 | 145 | 140,5-s |
| 600 | 75 | | 128-s |
| 700 | 87,5 | | 115,5-s |
| 800 | 100 | | 103-s |
| 900 | 112,5 | | 90,5-s |
| 1000 | 125 | | 78-s |
| 1200 | 150 | 205 | 203-s |
| 1400 | 175 | | 178-s |
| 1600 | 200 | | 153-s |
| 1800 | 225 | | 128-s |
| 2000 | 250 | | 103-s |



Example:

Suppose a pipe of 300 mm inner diameter (DN300) and 5.5 mm thick. In the chart we can see that the distance that the pipe adaptor must extend above the external wall is H = 60.5 - s = 60.5 - 5.5 = 55 mm.

The values in the chart are calculated considering the gasket supplied with the instrument, which is 3 mm thick. If the thickness of the gasket is changed, the value of H will change.

The equation to calculate H' for a gasket of thickness d is the following:

$$H' = H + 3 - d$$

In the previous example, if the gasket was 5 mm thick, the distance that the adaptor should extend above the external wall would be H' = 55 + 3 - 5 = 53 mm.

Drill a 48.5 mm diameter hole in the pipe to insert the pipe adaptor and weld the fitting to the pipe.

If the pipe is made of concrete or other material to which the pipe adaptor cannot be welded, a clamp-on accessory or saddle should be used. In this case, please contact us to inform about the suitable sensor length.

The axis of the pipe adaptor should be perfectly perpendicular to the pipe axis.

## 5.2 Sensor mounting

Once the pipe adaptor is mounted, place the flat seal in its position and install the sensor with the arrow pointing in the flow direction. The electrodes must be perfectly perpendicular to the pipe axis.

In order to align the sensor, the two bolts or pins situated in each side of the cylinder in the top of the FLOMAT sensor must be aligned with the axis of the pipe and the arrow pointing in the flow direction.

## 5.3 Tightening torque

The tightening torque for the flange screws should not exceed 7.1 Nm.

The tightening torque for the threaded fitting should not exceed 21 Nm.

## 5.4 Electronic converter connection

See point 6.1 on page 14.

## 5.5 Electronic converter programming

FLOMAT sensor is insertion type, so it can be installed in pipes with different diameters.

NOTE: It is essential to program the internal diameter of the pipe, in order that the converter can indicate the correct flow rate.

Programming of the pipe diameter is done by means of the software Winsmeter XL1 as indicated in point 7.4.1 on page 24.

# 6 ELECTRICAL CONNECTION

For the electrical connection, the FLOMAT flowmeter with XL1 converter is provided of terminal strips. To help in the wiring of the equipment, the description of the terminals is marked next to each terminal strip.

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

Before starting the installation, check that the cable glands are the right size for the cables to be used. This will guarantee the instrument will stay watertight. The cable glands used are for cables with outside diameters between 5 mm and 12 mm.

It is better to maintain the cables with mains voltage (power supply) separated from the cables with low level signals (4-20 mA or pulses).

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

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

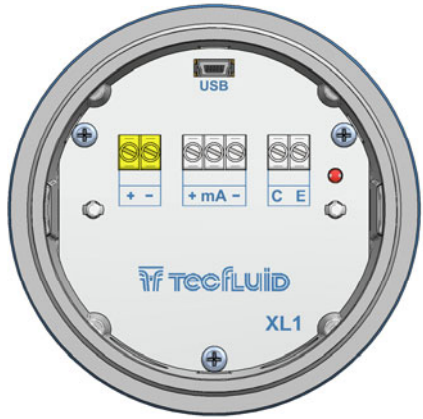
Incorrect installation of the cable gland or inadequate cable placement can cause irreparable damage to the converter.

IMPORTANT NOTE: To ensure smooth operation of the equipment, it is recommended to make the electrical connection according to the following points:

- For output signals, use shielded cable when possible.
- Keep wires away from strong sources of noise.

## 6.1 Power supply wiring

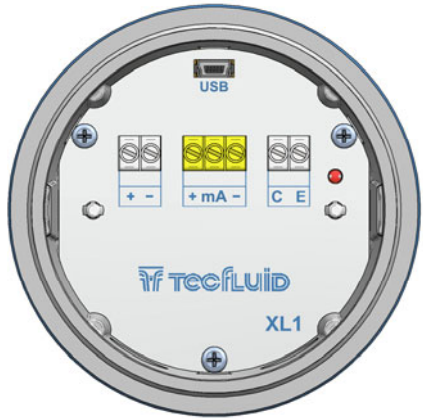
Before starting the installation of the equipment, check that the supply voltage available is the same as marked on the label of the flowmeter.




| Terminal | |
|---|---|
| + | Power supply positive |
| - | Power supply negative |

When the device is powered, the led will be on.

## 6.2 Analog output wiring



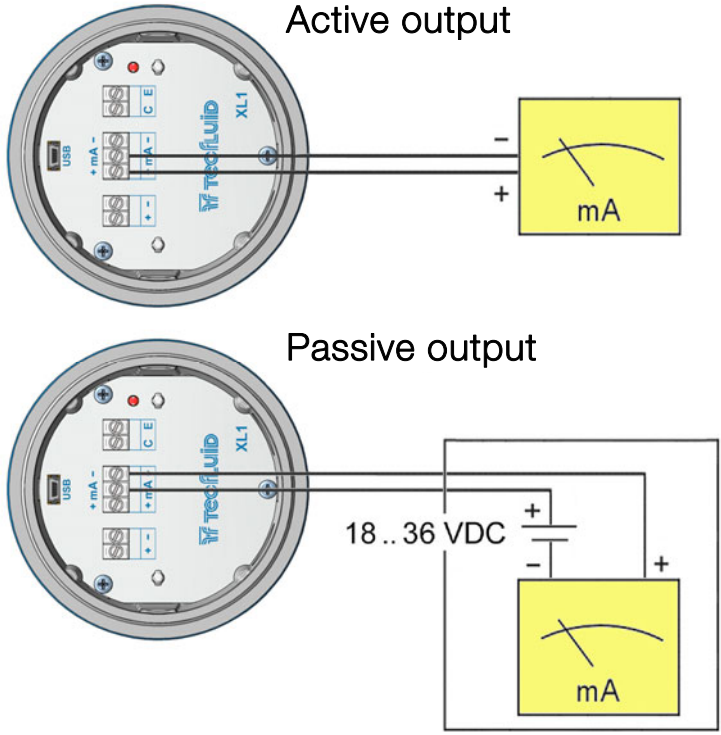

| Terminal | |
|---|---|
| + | mA (positive, active output) |
| mA | mA |
| - | mA (negative, passive output) |

The analog output is a current loop working linearly between 4 and 20 mA and proportional to flow rate. When the converter detects empty pipe, the current loop gives a value of 3.6 mA, and when the flow rate is negative and the current output is configured as unidirectional (see point 7.5.1), the loop will give 21 mA.

The analog output is galvanically isolated. It can be either active (which means that the receiving device must be passive) or passive (which means that the receiver must supply the power for the current loop). It is recommended to use a receptor with an input resistance of less than 700 Ω to guarantee correct operation.

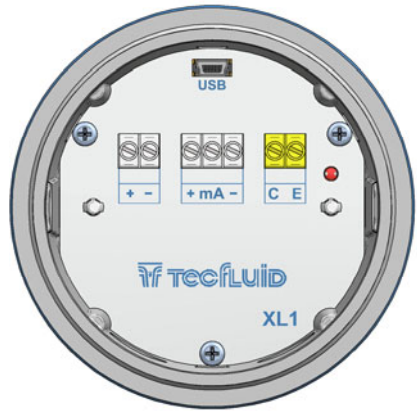
The configuration of the analog output mode (active or passive) is done by means of the connection to the terminal strip. For active mode, terminals “+” and “mA” are connected. For passive mode, terminals “mA” and “-” are connected.

NOTE: The analog output has protection against reversed polarity. Due to another protection against over voltages, if a loop supply voltage of more than 32 V is connected the converter may be damaged.




NOTE: Never connect the load between entre terminals “+” and “–”. The analog output could be damaged.

## 6.3 Digital output wiring



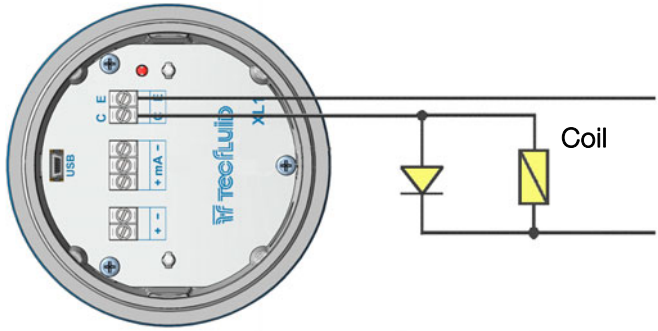

| Terminal | |
|---|---|
| C | Collector |
| E | Emitter |

The digital output is opto-isolated. The terminals are the collector and emitter of a NPN bipolar transistor.

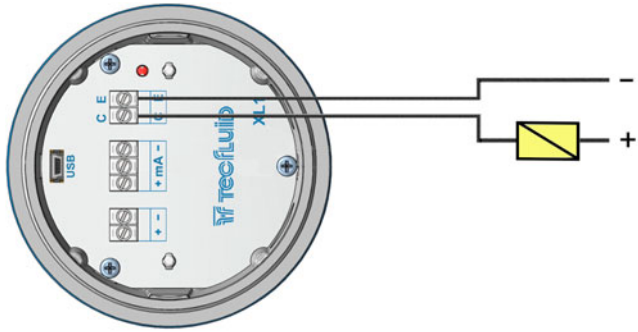
If the equipment is configured as pulse mode (see page 26), the led will alternate between green and red if there is a flow, and will remain green if there is no flow.

If it is configured as alarm mode (see page 26), the led will light red when the alarm is activated and green when it is not.

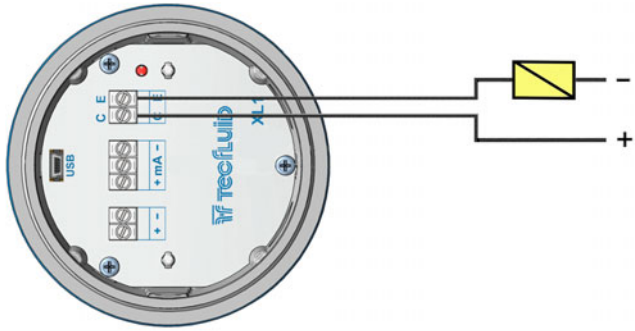
In the case of using inductive loads, in order to protect the output transistor, the use of free wheeling diodes is required.




Example. Connection with the load at the collector




Example. Connection with the load at the emitter



# 7 ASSOCIATED SOFTWARE WINSMETER XL1

By means of this associated software, calibration and adjustment of the instrument can be done in a comfortable and intuitive way.

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

## 7.1 USB cable connection and software installation

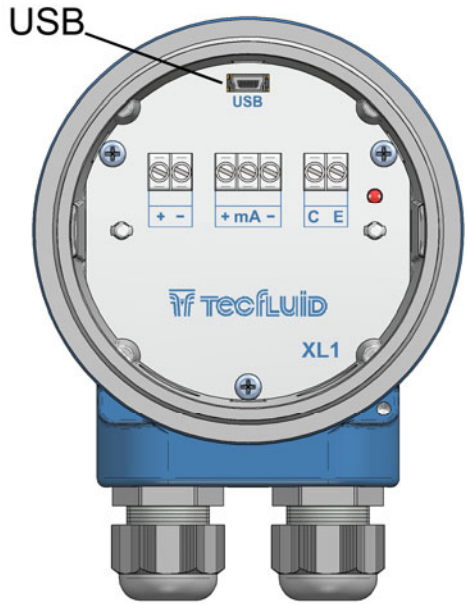
Extract the files from the Winsmeter XL1.zip to a new system folder.

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

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

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

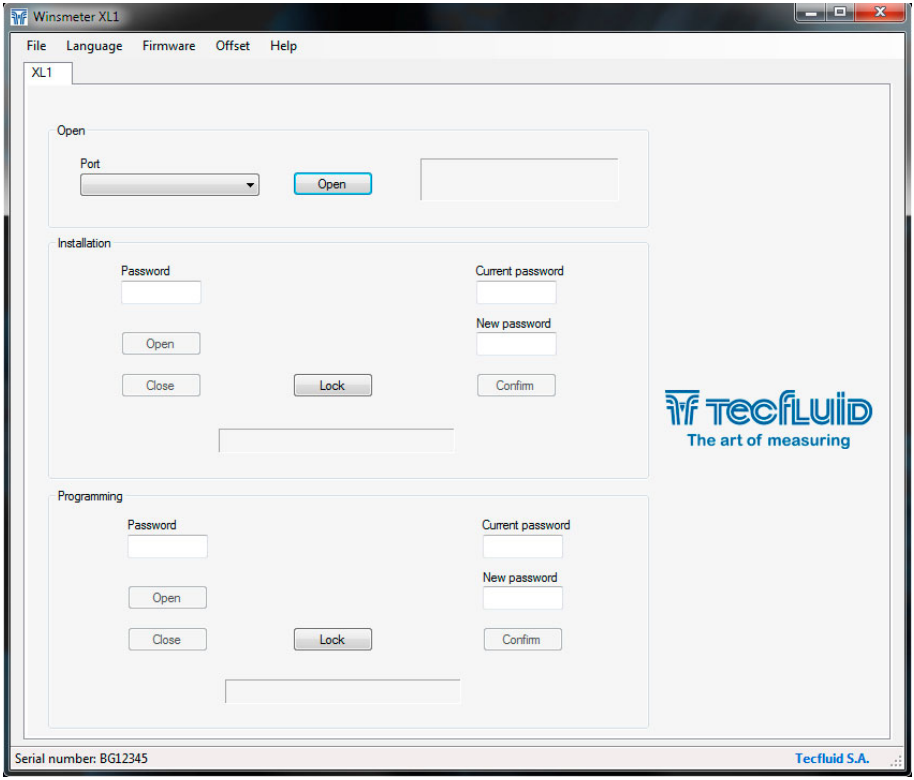
The USB connector is located at the opposite side of the cable glands.



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

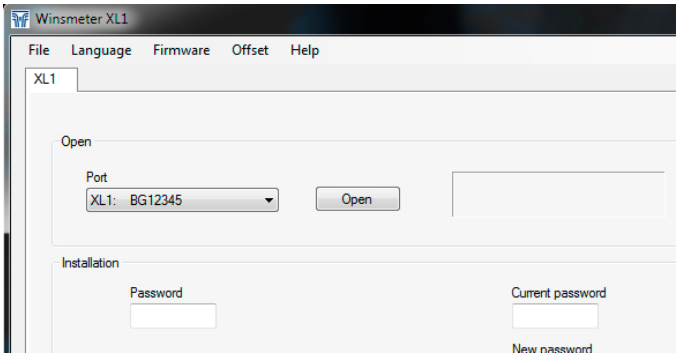
Power on the electronic converter.

Execute the program WinsmeterXL1 following the sequence Start – Programs – Tecfluid S.A. - WinsmeterXL1.

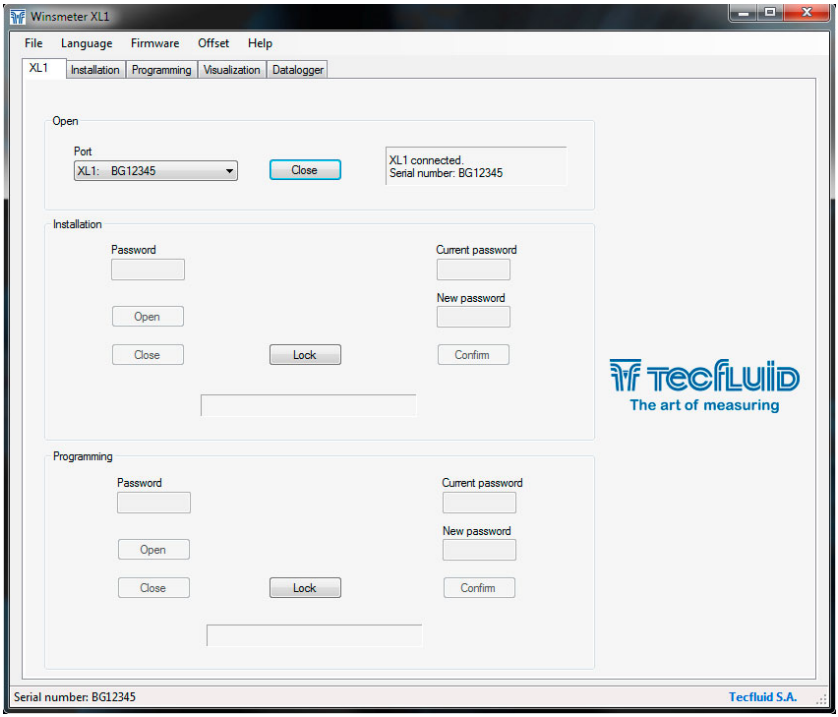



## 7.2 Port connection

In the "Port" section, choose the appropriate port for the converter. This will appear with the name of the port followed by XL1 and its serial number. Then click "Open".



Once the port is open, the button "Lock" is activated.




## 7.3 Password

The XL1 converter can be locked so that programming data can be modified only with previous password access.

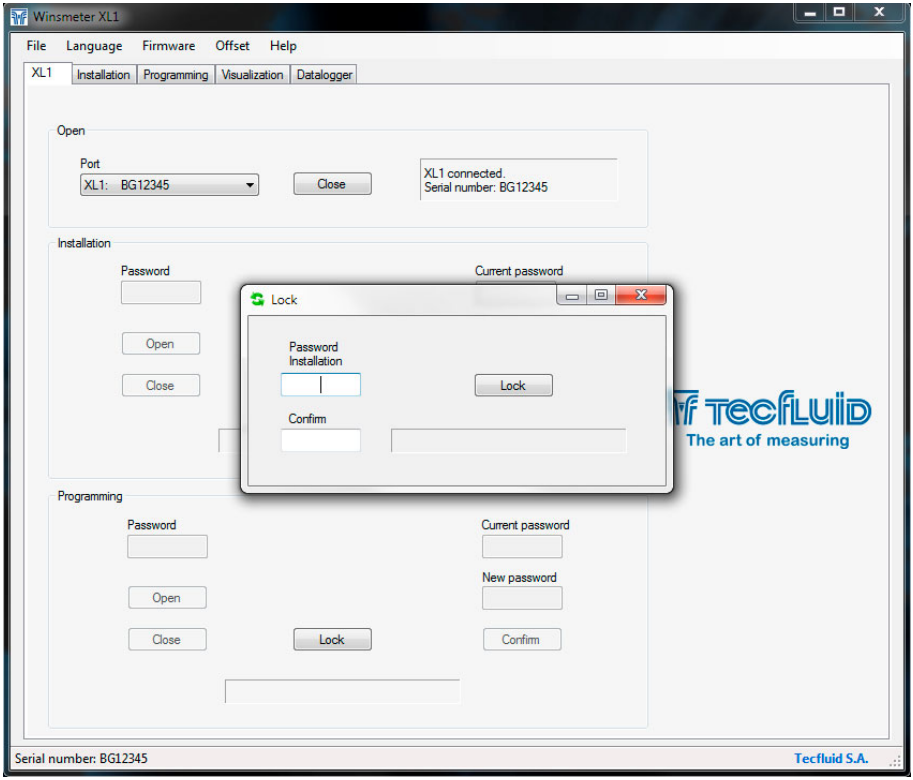
When the converter is locked, data can be read but not modified.

By default the device is unlocked. All data can be modified by means of the program Winsmeter XL1.

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

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

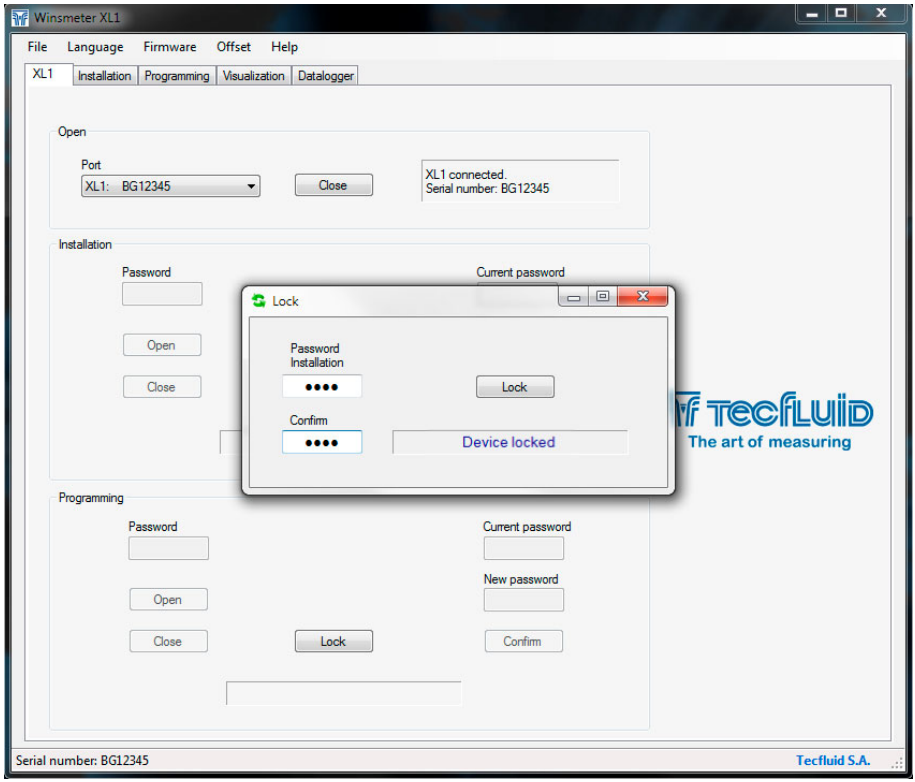
Once done, the following window will appear:



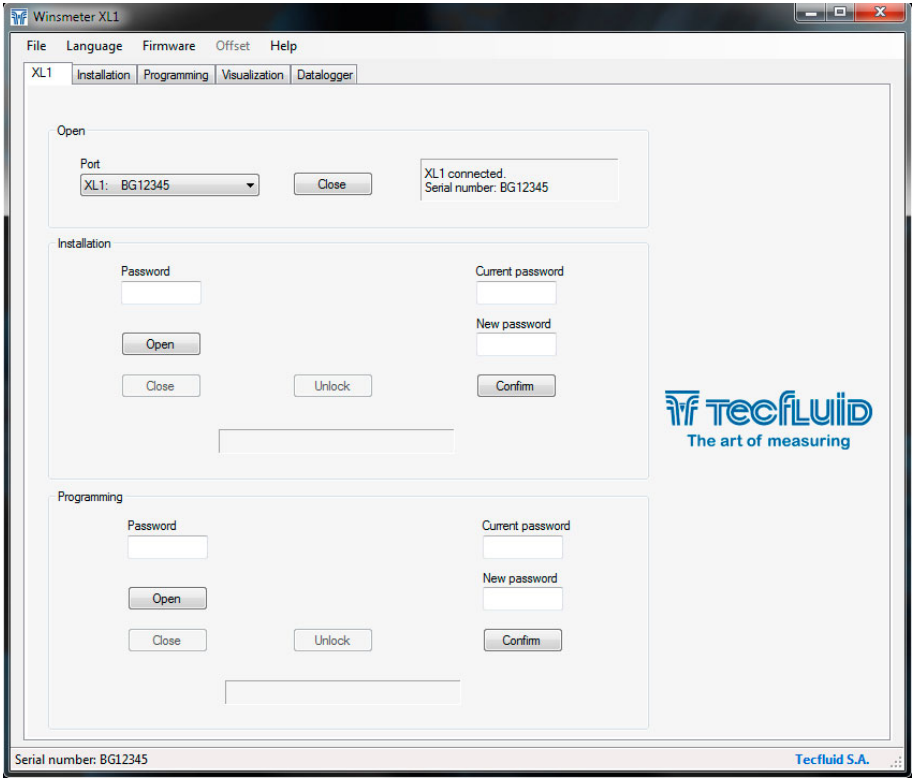

In the “Password” textbox a 4 numeric digit code should be entered, and in the “Confirm” textbox, the code is confirmed to avoid unintentional errors.

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

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



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

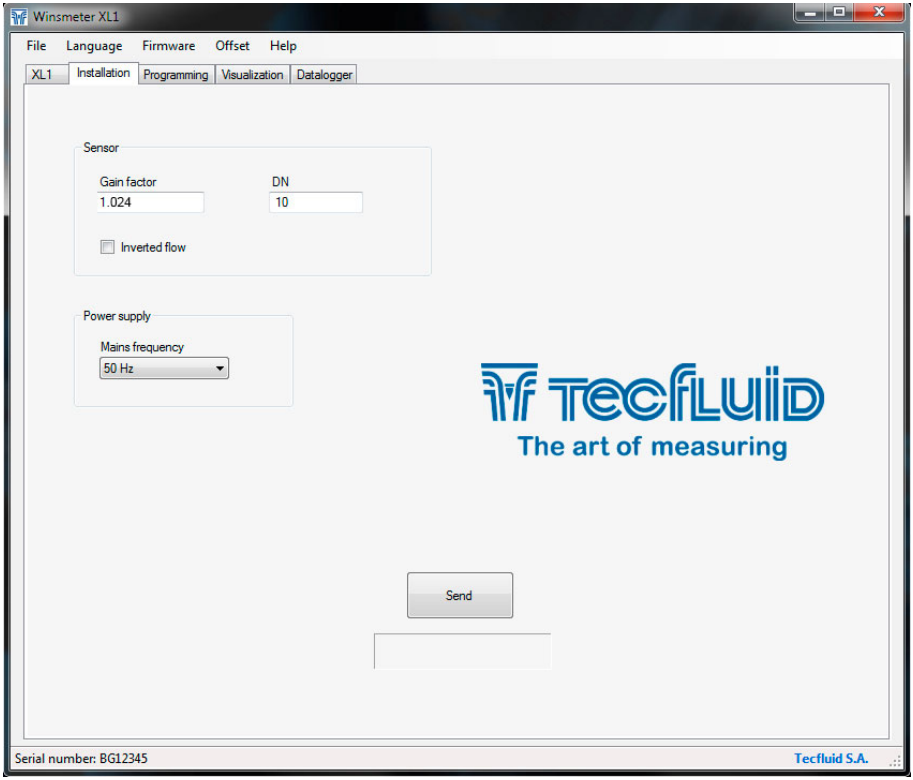



To unlock the section it is necessary to write the correct password and press “Enter” or the “Open” button. The text “Installation enabled” or “Programming enabled” will appear at the bottom of the section

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

## 7.4 Access to “Installation”

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




Changing the parameters of this window, the functions of the equipment that affect the measurement can be programmed. Once the changes have been made, press the "Send" button to save all data into the device memory.

### 7.4.1 Sensor

In the Sensor section, the Gain factor, the nominal diameter (DN) and the flow direction can be configured.

The **Gain factor** is composed of an integer and three decimals.

It must match the Fg parameter on the device label.

**DN** is the inner diameter of the sensor. It is also printed on the device label.

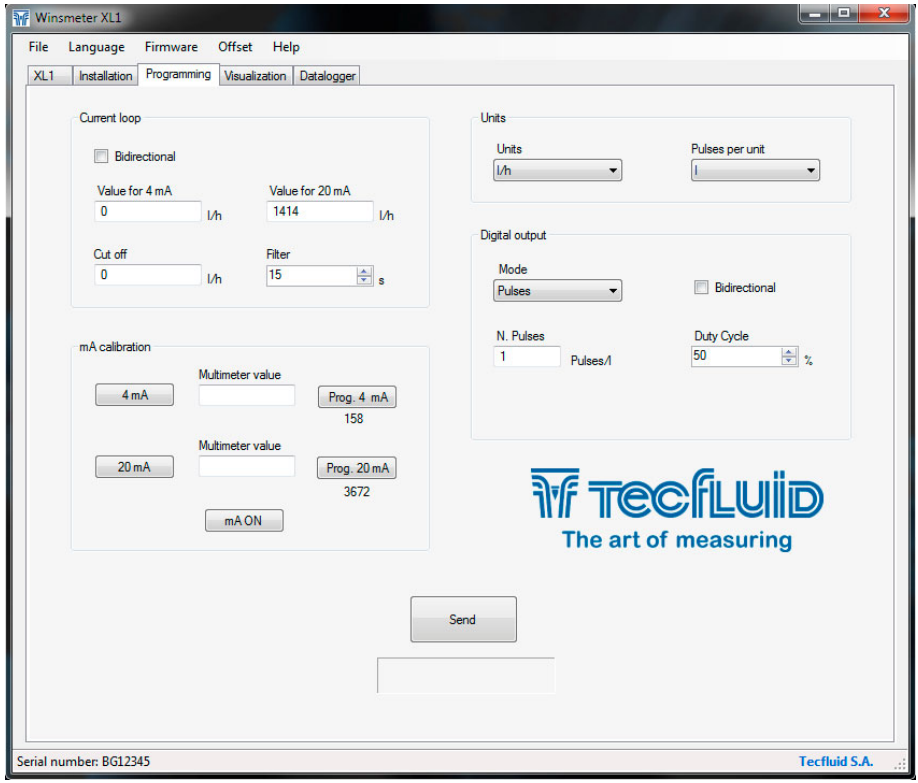
The flow rate has a positive sign when going from left to right, looking at the front flowmeter, and negative in the opposite direction. To change that sign, activate the **Inverted flow** checkbox .

### 7.4.2 Power supply

In this section the mains frequency of the country where the instrument is installed should be selected.

## 7.5 Access to “Programming”

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




Changing the parameters in this screen, the different functions of the equipment can be programmed. Once the changes are made, press the “Send” button to save all data into the device memory.

### 7.5.1 Current loop

In this section parameters related to the current loop can be configured.

If the **Bidirectional** checkbox is selected, the analog output will have a value proportional to flow rate, whether it is positive or negative.

If the checkbox is not selected, the analog output will give a value between 4 mA and 20 mA proportional to flow rate when it is positive, and it will give a value of 21 mA when the flow rate is negative.

**Values for 4 mA and 20 mA** are those that correspond to the current range limits. Therefore, the current loop will give a linear signal between 4 mA and 20 mA when the input signal has a value between the programmed values in these textboxes.

By default, the flowmeter is delivered programmed with flow rate values corresponding to liquid velocities of 0 m/s (4 mA) and 5 m/s (20 mA).

The textbox **Cut off** is useful to program the value below which the XL1 converter will consider that the flow rate is zero, and therefore the analog output will give 4 mA and the digital output will be deactivate if it is programmed as Pulses.

By default, the flowmeter is delivered programmed with a cut off value corresponding to a liquid velocity of 0,5 m/s.

In the box **Damping** the value in seconds of the filter can be programmed. This filter allows to obtain stable current readings despite of fluctuations of the flow rate.

The integration time is selected in seconds, with a minimum value of 1 and a maximum value of 25 seconds.

When there is a sudden variation of the frequency then the filter should react as fast as possible to give a correct reading of the new value. Therefore, the filter controls for each reading the deviation of the instantaneous frequency with respect to a reference. If this deviation exceeds 25%, the filter will stop acting, indicating the instant value, and will start again the filtering process.

### 7.5.2 Units

In order to program the device more intuitively, the **Flow rate** units can be changed so that the desired working units are selected. Programming parameters that have flow rate units will update their value when the units are changed.

In the same way, the volume units related to the pulse output can be selected, which are given in **Pulses / Unit of volume**.

### 7.5.3 Digital output

In the textbox **Digital output** this output can be configured as pulse output or as several types of alarm.

As in the analog output, if the **Bidirectional** checkbox is selected, the pulse output will be operative whether the flow rate is positive or negative.

If it is not selected, the pulse output will be operative only when the flow rate is positive.

In the textbox **Number of pulses** per volume unit, a number of pulses can be programmed. This number will give information of each generated pulse, since this will correspond to a determined volume. If the programmed value involves exceeding the maximum frequency that the device can supply (5000 Hz), a warning message will appear.

In the textbox **Duty cycle**, the width of the output pulse can be programmed as a percentage. The value indicates the percentage of time that the pulse is active with respect to a complete period. The minimum and maximum values of Duty cycle are 10 and 90%.

**Note:** Regardless of the Duty cycle value, the pulse width can not exceed 180 ms.

When the digital output does not operate as a pulse output, it can be programmed as an empty pipe indication, as an inverted flow indication or as a flow alarm.

In this latter case, the values corresponding to the activation and deactivation of the alarm can be programmed.

### 7.5.4 Current loop calibration

The XL1 converter is delivered with the current output already calibrated. If you want to correct a derive of the 4 or 20 mA current values because they do not coincide with the ammeter used, it can be done in the following way:

To calibrate the 4 mA point, press the button “4 mA”. The transmitter will fix the output to this value. Then enter the current value indicated in the multimeter and press the button “Prog. 4 mA”. The transmitter will adjust its output and the multimeter will show 4 mA.

Follow the same steps for the 20 mA point.

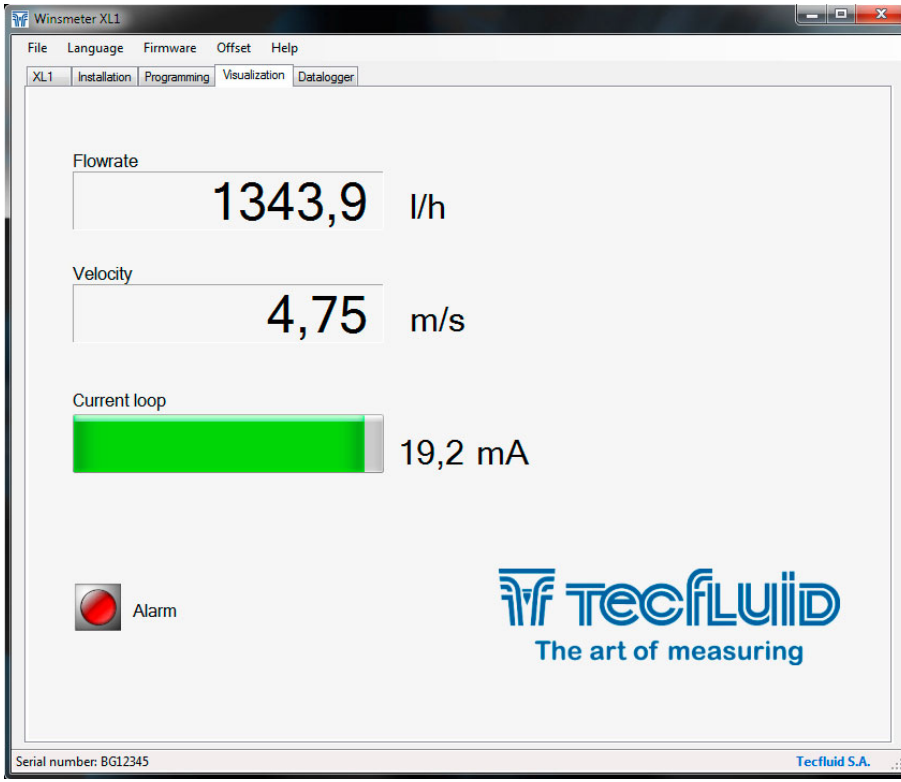
Finally, press the “mA ON” button. The current loop will be calibrated.

Before making a current calibration, be sure that the ammeter used for that is showing the real measure.

## 7.6 Visualization

When the communication with the computer port is established (see section 7.2), the tab "Visualization" opens. This tab lets you view real-time flow rate as well as the liquid velocity.

The current value of the analog output and the status of the digital output if configured as alarm can also be shown.




It also has messages or warnings regarding the status of the flow meter, such as empty pipe, coil errors or excessive fluid velocity.

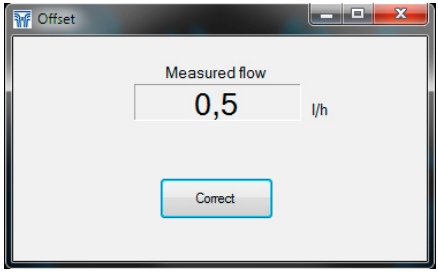
It is an intuitive tool to verify that the instrument has been installed and programmed correctly.

## 7.7 Zero flow drift adjustment

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

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

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



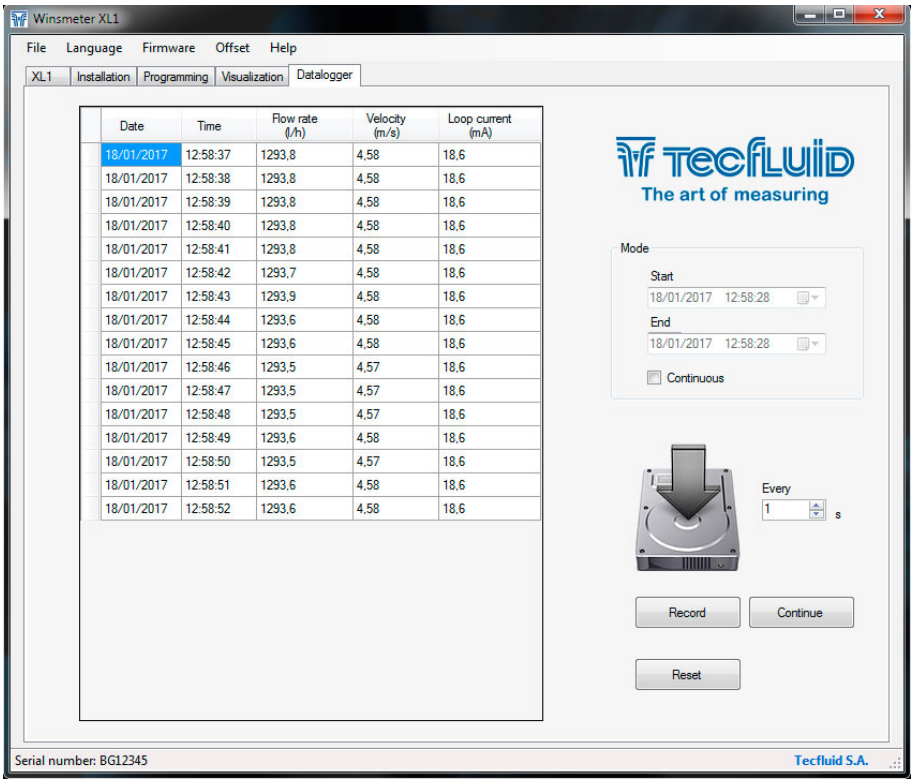

To correct the offset, the flow rate in the installation should be zero, that is, the liquid inside the pipe where the flowmeter is installed must be completely stopped. In addition, it must be ensured that the pipe is completely full of liquid so that this adjustment become effective.

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

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

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

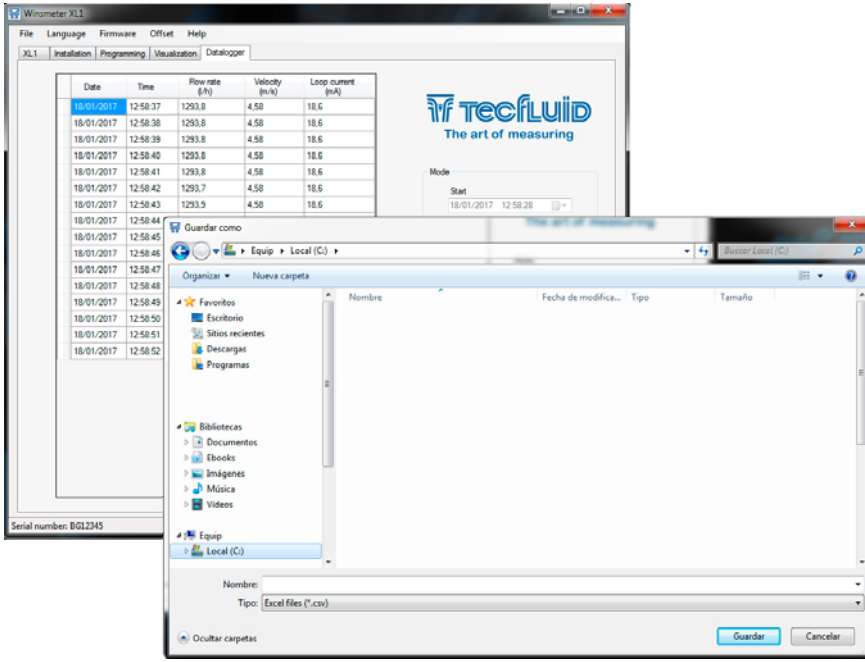
## 7.8 Datalogger



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

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

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




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

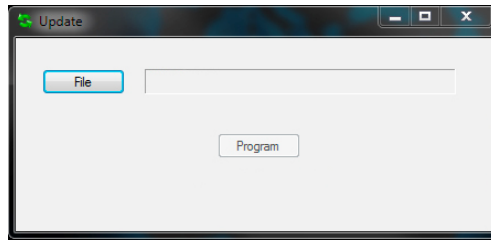
## 7.9 Firmware updates

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

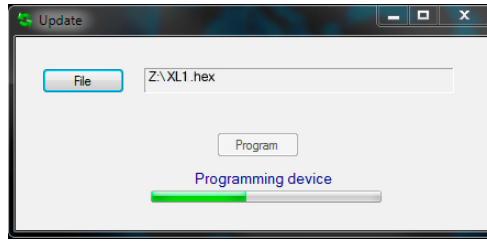
The updates can be downloaded from the following link of Tecfluid S.A. website:

www.tecfluid.com\downloads

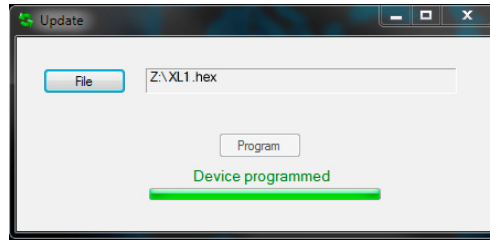
To update the device, go to menu “Firmware” - “Update”, and a screen with the button “File” will appear. Pressing this button the file explorer can be accessed. The downloaded file has to be searched there.



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



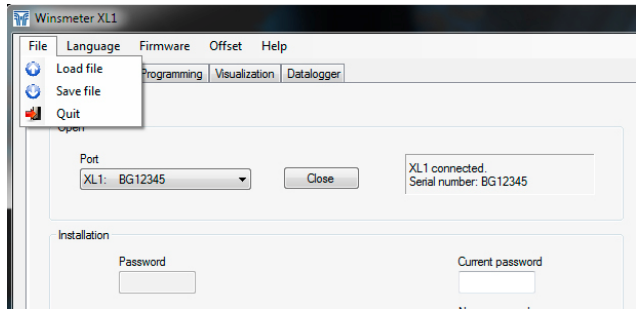

Progress bar will indicate the process, after which the message “Device programmed” will appear.




From this moment, the XL1 converter already has the new version of Firmware.

## 7.10 Configuration file

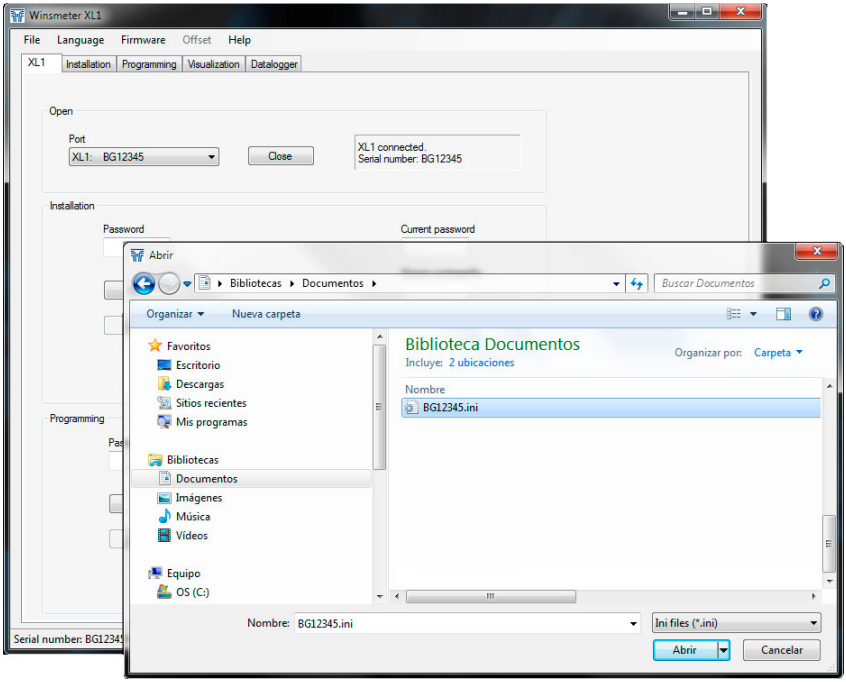
A device configuration backup can be made by saving data into a file. To do this, go to menu “File” - “Save file”.




The file is saved in the same folder where the Winsmeter XL1 software is located.

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

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




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

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

# 8 MAINTENANCE

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

# 9 TECHNICAL CHARACTERISTICS

### Accuracy

±3.5% reading value for v ≥ 0.5 m/s

$\frac{\pm 1.75}{v\ (m/s)}$ % reading value for ≤ 0.5 m/s

### Repeatability

± 0.15 % Reading value ± 0.75 mm/s

### Velocity range

0.15 ...10 m/s

### Temperature

Process temperature: -20ºC … +120ºC
Ambient temperature: -20ºC ... +70ºC

### Minimum conductivity

20 µS/cm

### Power supply

20 ... 30 VDC 4-wire system Power consumption: ≤ 5 W

### Analog output

4-20 mA. Active or passive. Galvanically isolated from the power supply.

### Pulse output

Opto-isolated. NPN bipolar transistor. Vmax: 30 VDC. Imax: 30 mA.
Maximum frequency : 5000 Hz
Minimum frequency : 0.01 Hz

### General characteristics

Sensor materials:

| Neck | Body | Header | Electrodes |
|---|---|---|---|
| EN 1.4301 (AISI 304) | EN 1.4404 (AISI 316L) | PVDF | Hastelloy C AISI 316L Titanium Zirconium Tantalum |
| | PVDF | PVDF | |

XL1 housing material: Coated aluminium

Ingress protection:

FLOMAT-XL: IP67

Converter XL1: IP66/P67

# 10 SAFETY INSTRUCTIONS

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

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

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

## 10.1 Pressure equipment directive

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

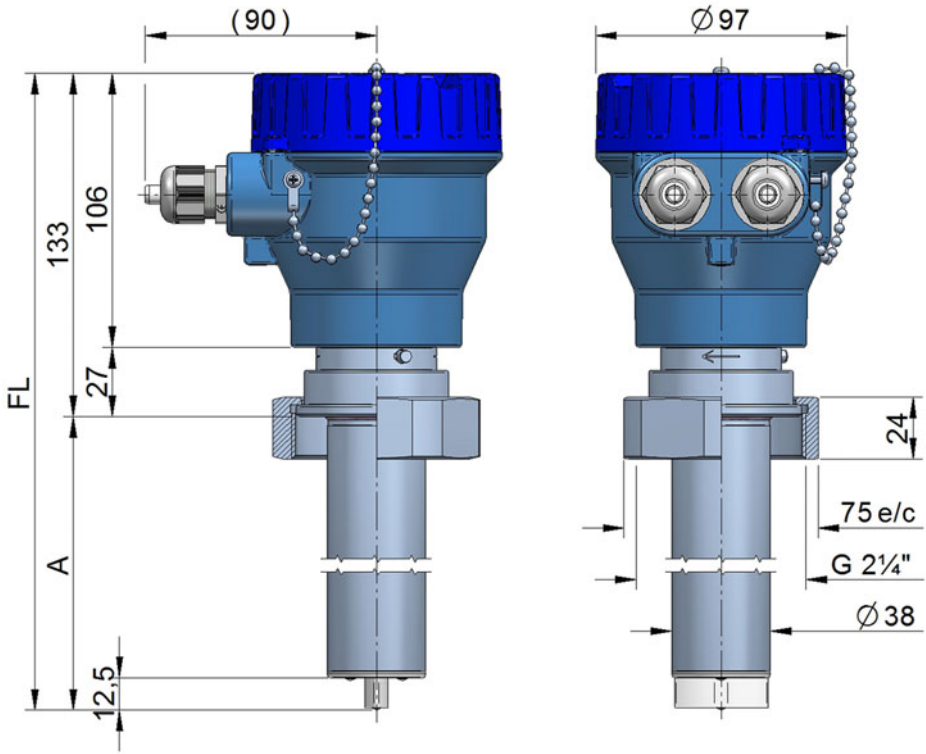
This equipment is considered as being a pressure accessory and **NOT** a safety accessory as defined in the 2014/68/EU directive, Article 2, paragraph 4.

## 10.2 Certificate of conformity TR CU (EAC marking)

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

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

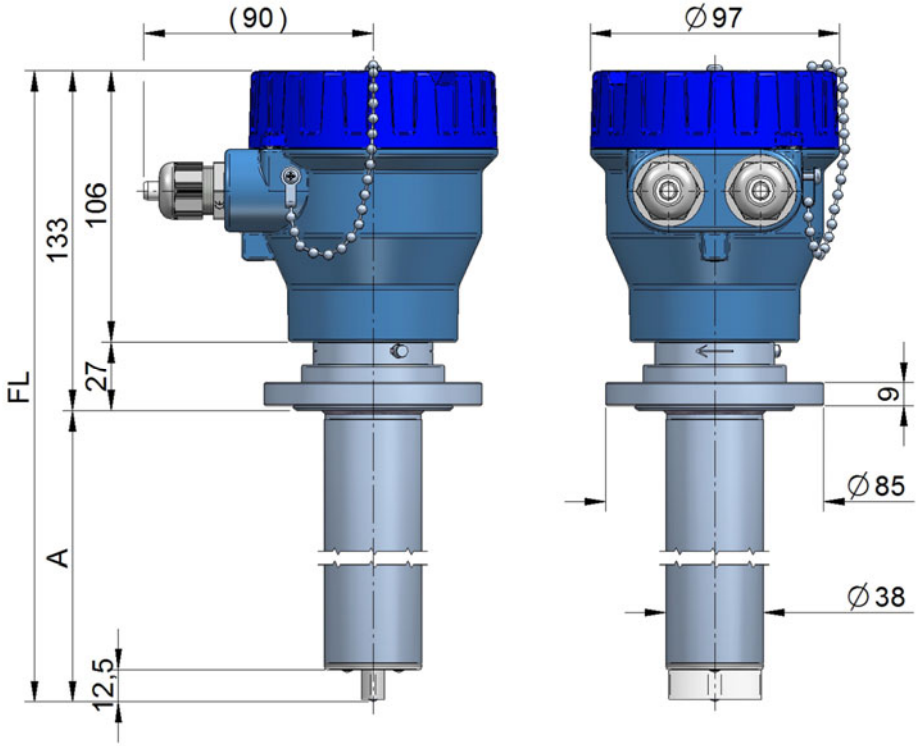
# 11 DIMENSIONS




FLOMAT-XL (R 2 ¼)

| DN | A | FL |
|---|---|---|
| 4 … 400 | 113,5 | 246,5 |
| 500 … 1000 | 218,5 | 351,5 |
| 11200 … 2000 | 368,5 | 501,5 |

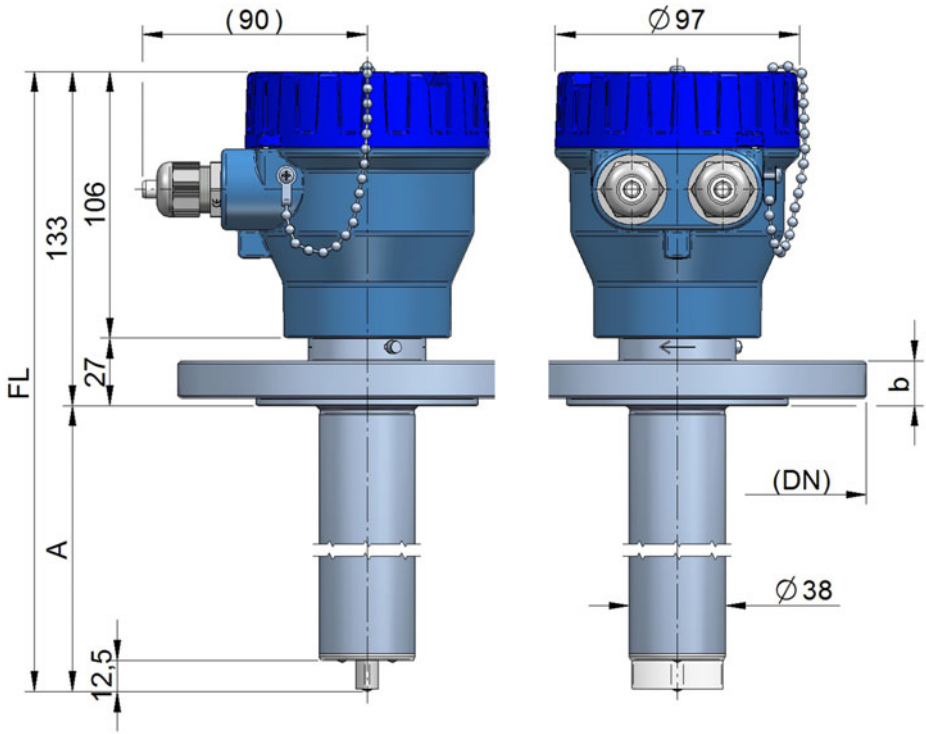
All dimensions in mm




FLOMAT-XL (TF flange)

| DN | A | FL |
|---|---|---|
| 4 … 400 | 113,5 | 246,5 |
| 500 … 1000 | 218,5 | 351,5 |
| 11200 … 2000 | 368,5 | 501,5 |

All dimensions in mm




FLOMAT-XL (EN 1092-1 flange)

| DN | A | FL |
|---|---|---|
| 4 … 400 | 113,5 | 246,5 |
| 500 … 1000 | 218,5 | 351,5 |
| 11200 … 2000 | 368,5 | 501,5 |

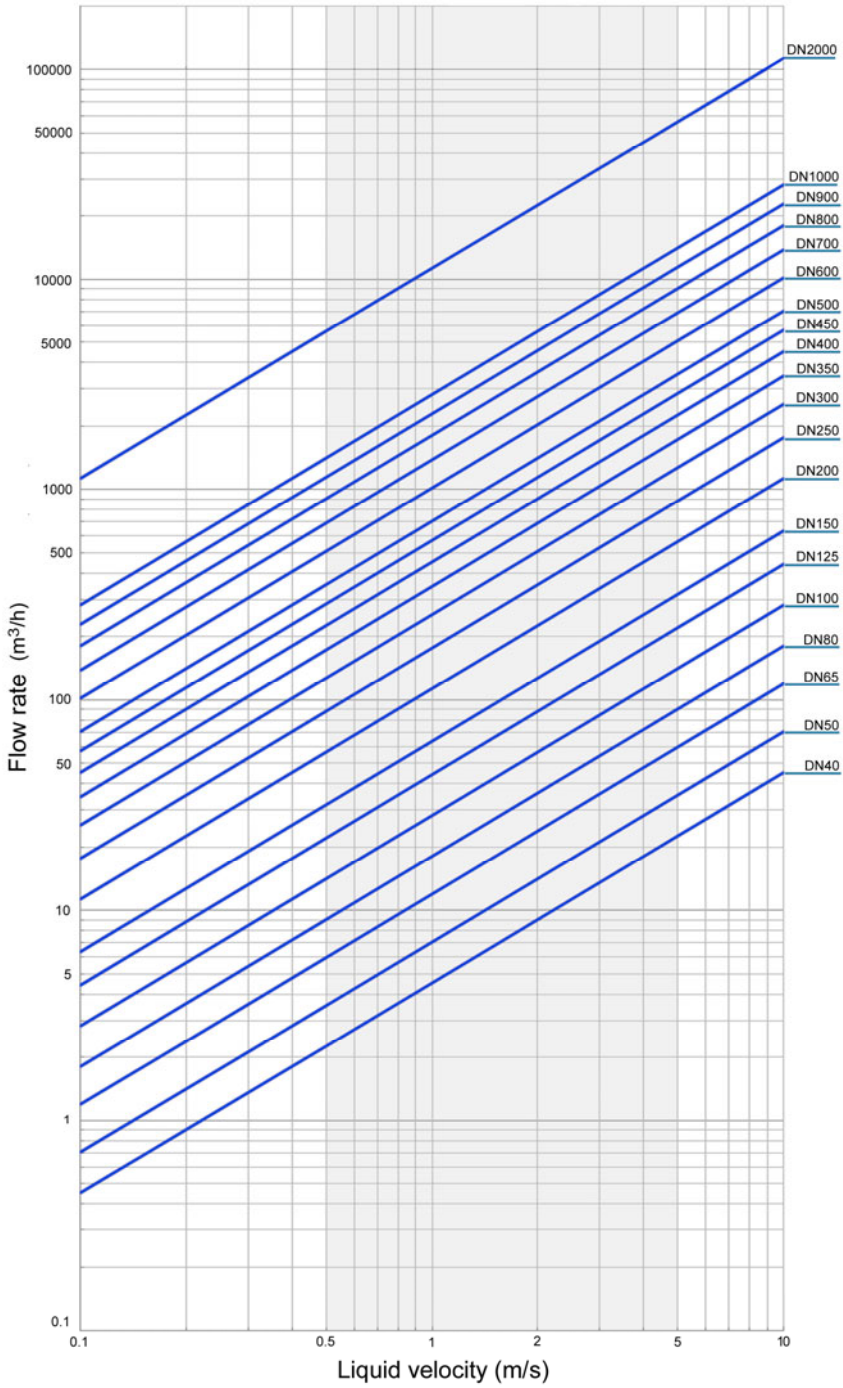
All dimensions in mm

# 12 TROUBLESHOOTING

| Problem | Probable cause | Solution |
|---|---|---|
| Empty pipe alarm (current loop at 3.6 mA or Winsmeter) | Pipe is empty | Make sure that the pipe is completely full, for example, installing the flowmeter in a vertical pipe with upwards flow |
| | Isolation of the electrodes | Clean the sensor electrodes. |
| | Electrode cable disconnected | Connect the cable between the sensor and the electronic converter |
| | Liquid with very low conductivity | The flowmeter is not adequate for the application |
| The flow rate is unstable | Dirt on the electrodes | Clean the sensor electrodes |
| | The product contains air or non-conductive particles in suspension | Verify that the flowmeter is adequate for this application |
| The indicated flow rate is 0 (current loop at 4 mA or Winsmeter) | Coil cable disconnected | Connect the cable between the sensor and the electronic converter |
| | The flow rate is smaller than programmed as CUT OFF | Decrease the value of the cut off (see page 26) |
| The instrument indicates a value when there is not flow | The sensor is damaged due to electrodes corrosion<br>Electrode material not adequate for the liquid | Change the sensor |
| | Sensor flooded by vacuum operation | Change the sensor and check the installation |
| The displayed flow rate is higher than expected | The electrodes are immersed but the pipe is not completely full | Make sure that the pipe is completely full, for example, installing the flowmeter in a vertical pipe with upwards flow |
| The LED is off | Not enough current from the power supply | Change the power supply |
| The analog output gives always 4 mA or 20 mA | Current output range not properly programmed | Program the range properly (see page 25) |
| The analog output gives always 0 mA | Cable disconnected | Check the cable connection |
| No se enciende el LED | Corriente insuficiente de la fuente de alimentación | Cambiar la fuente de alimentación |
| La salida analógica siempre indica 4 mA o 20 mA | Programación inadecuada del rango de corriente | Programar el rango correctamente (ver pág. 25) |
| La salida analógica siempre indica 0 mA | Cables desconectados | Revisar la conexión de los cables |

ANNEX

## Flow rate diagram



## WARRANTY

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

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

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

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

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

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

## TRANSPORTATION

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

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

Tecfluid
The art of measuring

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Quality Management System ISO 9001 certified by

Pressure Equipment Directive certified by

ATEX European Directive certified by

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