Instructions manual

Series SC250
Variable area flowmeter

The art of measuring

R-MI-SC250 Rev.: 10 (2022-12) 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.
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1 INTRODUCTION

The series SC250 are flowmeters for liquids, gases and steam.

They are very robust instruments prepared to work in extreme conditions.

They have local flow rate indication by means of magnetic coupling, with scales calibrated in l/h, m^3/h, kg/h, t/h, %, etc.

They can incorporate switches and/or electronic transmitters that allow to detect a specific flow rate and provide a flow rate signal to a remote device.

2 WORKING PRINCIPLE

Based on variable area principle.

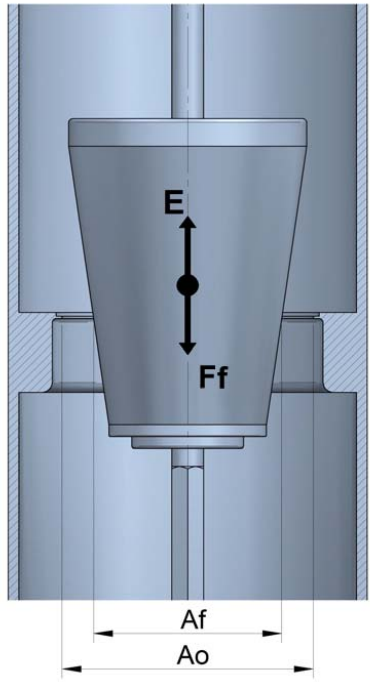
The flowmeter consists of a measuring tube and a float inside it. The flow pushes the float to an equilibrium point. The area obtained between the float and the tube is proportional to the flow rate.

The point of equilibrium depends on:

- E = Force of the fluid flow
- Pf = Weight of the float
- Al = Free area of flow

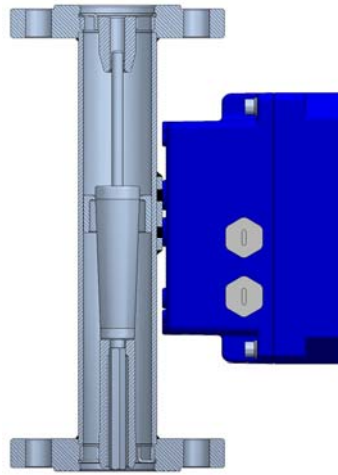
where:

(Al = Ao, calibrated orifice area, - Af, float area)



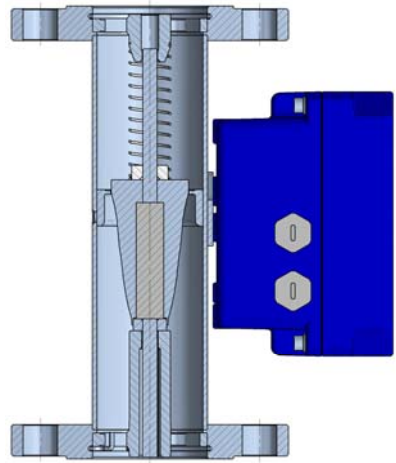
The SC250 model always works always in a vertical position with the flow direction from bottom to top.

The equilibrium point is determined by considering the fluid force and the float weight.

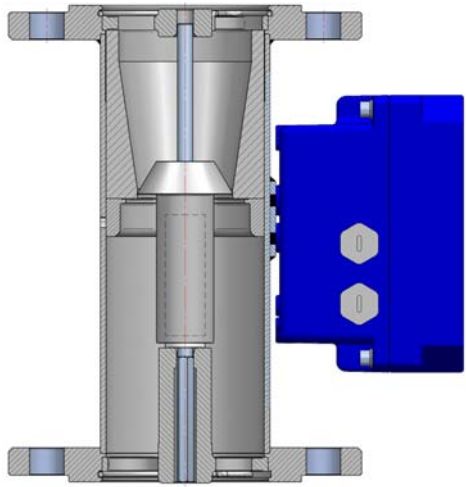


For flowmeters SC250H and SC250V, the force of the fluid moves the float and compresses a spring. This allows that the float can return to its initial position regardless of its position inside the tube when there is no flow.

These flowmeters can be installed in a horizontal pipe with flow from left to right or vice versa or vertical pipe with upwards or downwards flow.



The model SM250 is a version of the flowmeter SC250 designed for liquids with high viscosity, whose flows can not be measured with the standard SC250. This is achieved thanks to its internal design and the use of special floats.



3 RECEPTION

The series SC250 flowmeters are supplied conveniently packaged for their protection during transportation and storage, together with their instructions manual for installation and operation.

The instruments are supplied tested in our calibration rigs, ready for installation and service.

Before installing the flowmeter, remove all the blocking elements.

With the instrument in its working position, move the float and check that the indicating needle moves all over the scale and returns to zero.

4 INSTALLATION

Flowmeters models SC250 and SM250 must be installed in a completely vertical position and with the flow direction upwards.

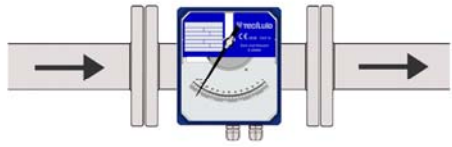
The flowmeter SC250V must be installed vertically (flow direction upwards or downwards).

The flowmeter SC250H must be installed in horizontal position (flow direction from left to right or from right to left).

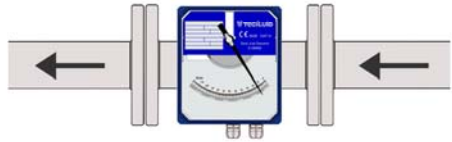
The instrument must be installed so that the flow direction indicated on the dataplate of the instrument matches the flow direction of the fluid.

The “0” of the scale indicates flowmeter inlet, and the full scale indicates the flowmeter outlet.

SC250V DAB



SC250H ED



SC250H DES

SC250
SM250
SC250V BD

It is important that the position is completely horizontal or vertical (depending on the model of the instrument), given that deviations of about 5º can produce errors of about 8-10% of the readings.

4.1 Valves

If the fluid to be measured is a liquid, it is recommended to install a regulating valve before the flowmeter (see point 5.3).

In gas flow measurement, the valve position will depend on the calibrating pressure (see point 5.1).

Valves should always be opened slowly to avoid water hammers.

4.2 Filters

The installation of a filter before the instrument is important, this will avoid possible obstructions and breakdowns in the measuring system.

The mesh of the filter should be maximum 2 mm.

In case of having abundant magnetic particles in suspension, it is necessary to mount a magnetic filter on the inlet of the instrument to avoid the accumulation of particles around the float, which would make it to jam.

4.3 Straight pipe sections

In order to have stable readings, it is essential to avoid turbulences. To do this, it is necessary to install the instrument in a straight pipe section. This section should have the same inner diameter as the flowmeter. The required minimum distances upstream and downstream of the sensor are the following:

Upstream	5 DN
Downstream	3 DN

These distances must be free of elements that can disturb the flow profile, such as elbows, diameter changes, valves, etc.

5 OPERATION

Once the meter is installed, the regulating valve should be opened slowly. The fluid flow will move the float which, by means of magnetic coupling, moves the indicating needle.

Any variations of working conditions with respect to those when calibrated can induce reading errors. The calibration working conditions are indicated on the instrument's dataplate.

5.1 Gas flow measurement

The working pressure and temperature are of maximum importance for correct gas measurement as they directly affect the scale readings.

For example, if a meter is calibrated at 2 bar gauge and the working pressure is 1 bar gauge there will be an error of about 22%.

In the same way, if working temperature does not match calibrating temperature, errors will be induced in the flow rate readings.

In applications of gas flow measurement where the calibrating pressure of the instrument corresponds to the inlet pressure, being higher than the atmospheric pressure, the regulating valve must be installed downstream of the flowmeter. Thus, it is ensured that the instrument works at calibrating pressure and a back pressure that keeps the float in equilibrium is obtained.

NOTE: Scheme valid for gas flow measurement applications with a pressure higher than atmospheric. For gases at atmospheric pressure, turn valves upside down.

The flow should be adjusted by means of the regulating valve, while keeping the shut off valve fully open.

If the regulation is done using the shut off valve, in open circuits or at low gas flow in the meter, the gas will expand which will sharply diminish its density, providing very serious reading errors.

If the flow is regulated by the shut off valve, the float usually experiences an oscillating movement which produces a shut off action until sufficient pressure is gained to overcome its weight. The sudden fall of pressure, when the gas escapes, will make it fall. This cycle is repeated generating an oscillating measurement (resonance).

In applications where the gas outlet is at atmospheric pressure, install the regulating valve upstream of the flowmeter if the flowmeter was calibrated at atmospheric pressure. The shut off valve is then installed downstream of the flowmeter and it should be fully open.

The valve opening procedure should be as following:

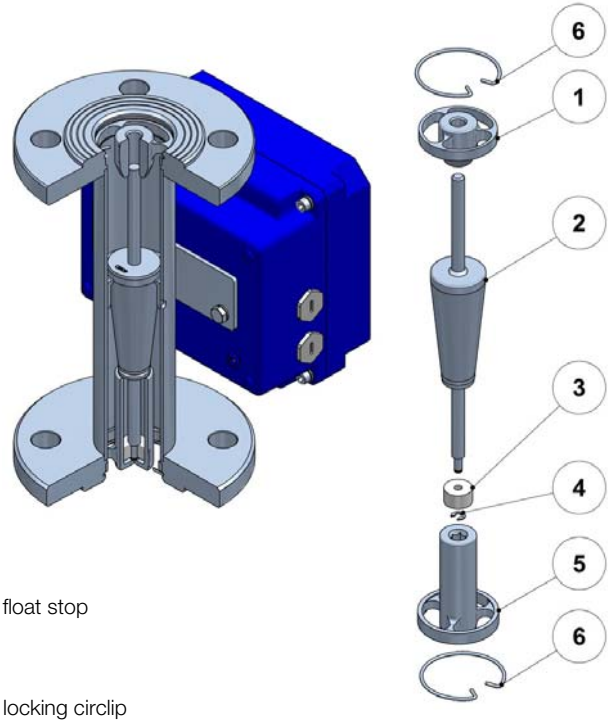
- With the regulating valve closed, fully open the shut off valve.
- Gradually open the regulating valve until the desired flow rate.

And for closing:

- Close the regulating valve gradually until zero flow rate.
- Fully close the shut off valve to isolate the flowmeter.

Operating in a different way may involve water hammers that can damage the meter reading or generate instabilities.

5.2 Gas damping mechanism



1. Upper float stop
2. Float
3. Piston
4. Piston locking circlip
5. Guide cylinder
6. Circlips for locking upper float stop & guide cylinder

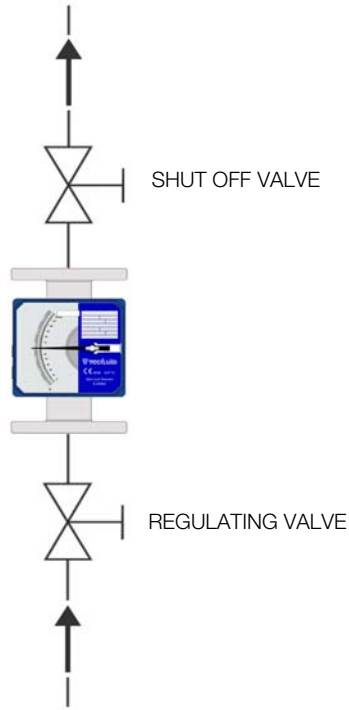
When measuring low pressure gas flow with AISI 316L floats, oscillation of the float often occurs, which makes it very difficult to read the flow rates. In these cases it is recommended to install a damper in the instrument.

The damper consists of a piston mounted inside a cylinder, closed at its lower end. The compression forces of the gas absorb the floats oscillations, maintaining it stable in the reading point.

Close the valves during work stops at the end of the working day in order to avoid sudden surges when started up. If the float hits the stops sharply this could cause damage to the meter.

5.3 Liquid flow measurement

When measuring liquids the regulating valve should be installed as shown in the following figure.



Being the shut off valve partially open, open the regulating valve slowly until the needle of the indicator housing shows a low flow rate. Then also open the shut off valve slowly in order to get rid of the air and then progressively fully opened.

The required flow rate is then regulated by using the regulating valve.

Close the valves during work stops at the end of the working day in order to avoid sudden surges when started up. If the float hits the stops sharply this could cause damage to the meter.

LIMIT SWITCH AMD

6 INTRODUCTION

The AMD limit switch can be used to generate an alarm or an operation when the flow rate that the instrument is measuring reaches a preset value on the scale plate.

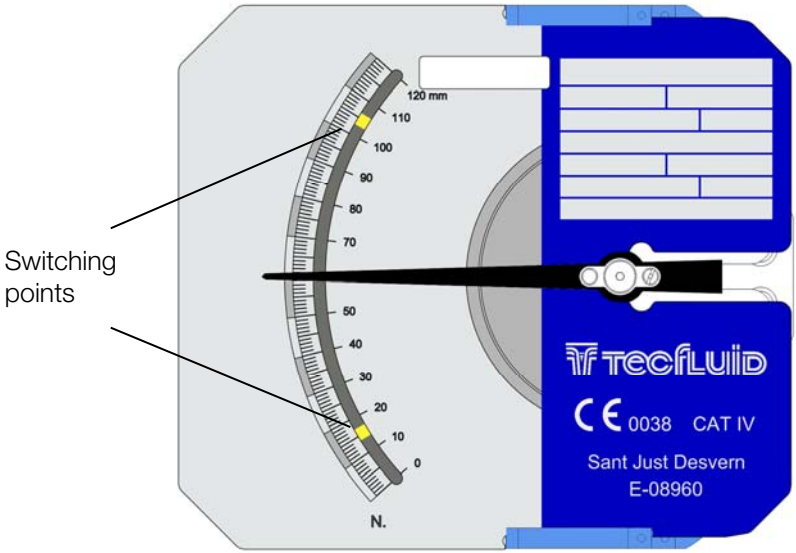
The AMD limit switch consists of a NAMUR slot type inductive sensor, that is actuated by a vane. Given that there is no physical contact in the operation, the limit switch has no influence on the indicator needle movement.

An instrument can be equipped with one or two sensors, depending on the number of points to be detected. A NAMUR amplifier with a relay output can be supplied as an option.

7 OPERATION

The indicator needle moves together with the vane mounted on its shaft. When the vane enters into the slot of the sensor, the limit switch changes its state.

The sensor is mounted on a support which includes a switching point indicator that indicates the switching position. The indicator, that is below the scale plate, can be seen through the scale slot.



8 MOUNTING THE LIMIT SWITCH IN AN EXISTING EQUIPMENT

When the AMD limit switch is to be fitted to an existing device, please follow these steps.

8.1 Kit contents

The kit contains the following elements:

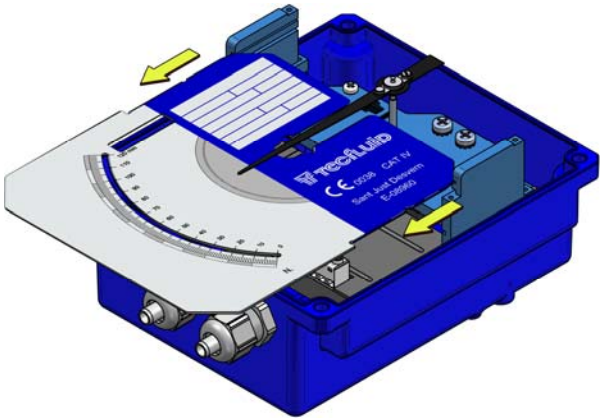
	AMD kit	
Quantity	Material	Position
1	AMD limit switch circuit	1
2	Self tapping screw DIN7982 B-2,2 x 9,5 Nº2 A2	2
1	Screw DIN7985 M3 x 6 A2	3
1	External tooth lock M3 A4	4
2	O-ring Ø 16 x 18,5 x 1,25 mm NBR-70	5
2	Cable gland IP68	6
2	Cable gland blanking plug	7

In the kits, the O-rings (5) and the blanking plugs (7) are not provided as loose parts. They are incorporated in the cable glands (6).

8.2 Preparing the kit

Remove the cover, unscrewing the four screws "Allen" M5 and plastic washers, in the back side of the indicator housing, using a 4 mm Allen key.

Slide the scale plate in the direction indicated in the figure, until it is released from the slot.

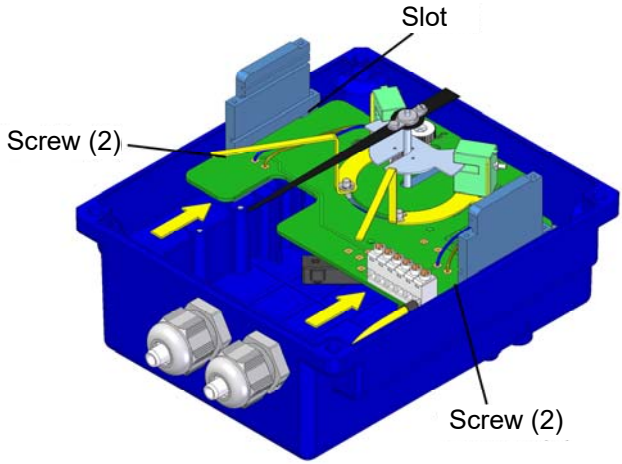


Ensure that the O-rings (5) are placed in the thread of the gland (6). If not, they should be placed. Remove the plugs from the indicator box with a flat screwdriver and replace them by the two cable glands.

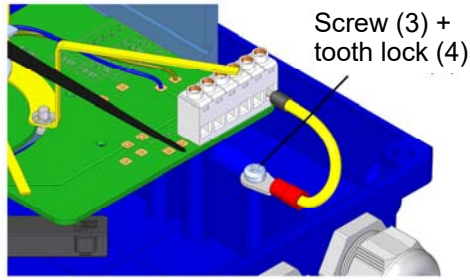
The cable glands that are not expected to be used should be left with the blanking plug (7) placed to preserve watertight.

8.3 Assembling the AMD kit

Slide the circuit into the slot until it stops, and then screw it as shown in the figure.

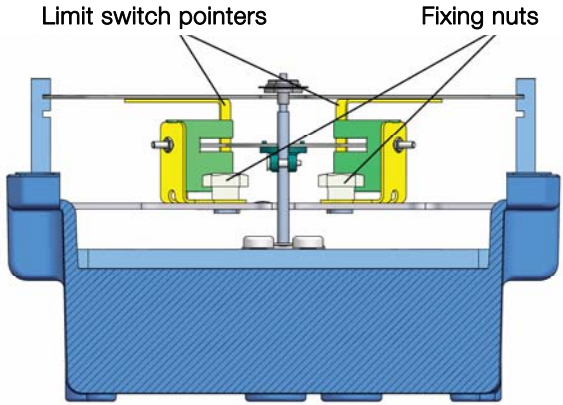


Screw the earth cable terminal with the screw (3) and tooth lock (4).



8.4 Switching point adjustment

The circular fixing nuts of the switching point are in the rear part of the indicator needle.



To move the limit switch needle, the circular fixing nuts have to be slightly loosen by turning them to the left, without removing the scale plate (see the figure on the next page). After that, place the switching point indicator in the required scale value, and fix it again with the screw.

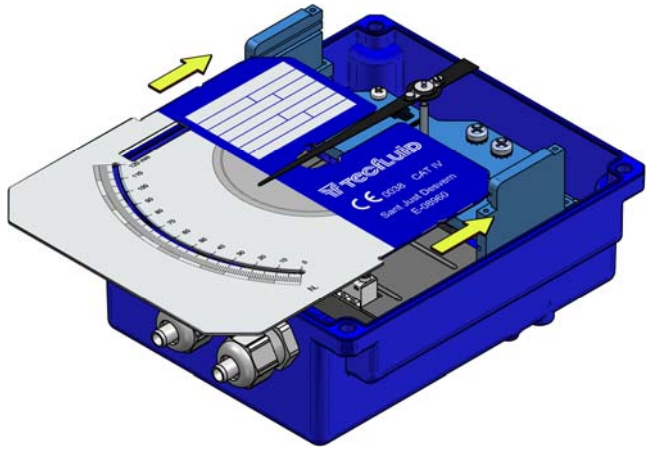
As standard, when the instrument has one AMD, it comes configured as a minimum limit switch.

8.5 Electrical connection

Do it according to section 9.

8.6 Mounting

Slide the scale plate into the slot until it stops as shown in the figure. Mount the cover with the four screws "Allen" M5 and the plastic washers.



9 ELECTRICAL CONNECTION

To gain access to the electrical terminal block, the scale plate must be removed. To do this, slide it to the left by the guide and free it.

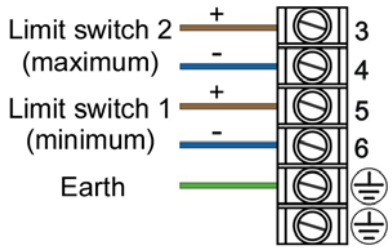
In order to make the electrical connection of the instrument, the limit switch has a screw terminal strip.

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 supplied M16 cable glands are for cables with outside diameters between 6 mm and 10 mm.

Peel the outside insulation to free the inner cables. It is recommended to tin the ends of the wires to avoid loose ends. Next, feed the cables through the cable glands, and connect to the corresponding screw terminals. Last, tighten up the cable glands so that they maintain their ingress protection.

The numbering of the terminals is given on the printed circuit board.



	AMM	AMD
1	NC(2)	
2	NO(2)	
3	C(2)	+(2)
4	NC(1)	−(2)
5	NO(1)	+(1)
6	C(1)	−(1)

LIMIT SWITCH AMM

10 INTRODUCTION

The AMM limit switch can be used to generate an alarm or an operation when the flow rate or the instrument is measuring reaches a preset value on the scale plate.

It consists of a micro-switch driven by a cam mounted on the indicating needle.

An instrument can be equipped with one or two micro-switches, depending on the number of points to be detected.

11 MOUNTING THE LIMIT SWITCH IN AN EXISTING EQUIPMENT

In order to add an AMM limit switch to an existing device, follow the steps shown below.

11.1 Kit contents

The kit contains the following elements:

	AMM kit	
Quantity	Material	Position
1	AMM limit switch circuit	1
2	Self tapping screw DIN7982 B-2,2 x 9,5 Nº2 A2	2
1	Screw DIN7985 M3 x 6 A2	3
1	External tooth lock M3 A4	4
2	O-ring Ø 16 x 18,5 x 1,25 mm NBR-70	5
2	Cable gland IP68	6
2	Cable gland blanking plug	7

In the kits, the O-rings (5) and the blanking plugs (7) are not provided as loose parts. They are incorporated in the cable glands (6).

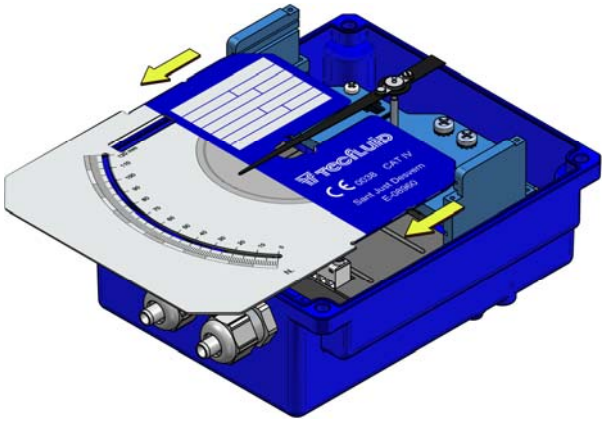
11.2 Preparing the kit

Remove the cover, unscrewing the four screws "Allen" M5 and plastic washers, in the back side of the indicator housing, using a 4 mm Allen key.

Slide the scale plate in the direction indicated in the figure, until it is released from the slot.

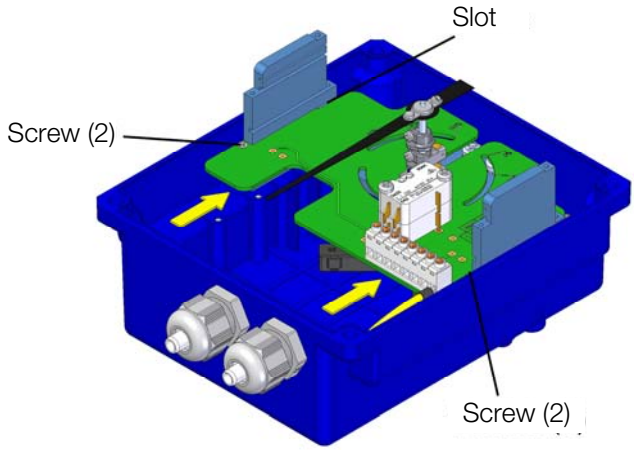
Ensure that the O-rings (5) are placed in the thread of the gland (6). If not, they should be placed. Remove the plugs from the indicator box with a flat screwdriver and replace them by the two cable glands.

The cable glands that are not expected to be used should be left with the blanking plug (7) placed to preserve watertight.

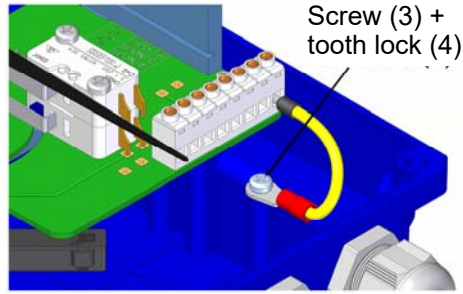


11.3 Assembling the AMM kit

Slide the circuit into the slot until it stops, and then screw it as shown in the figure.

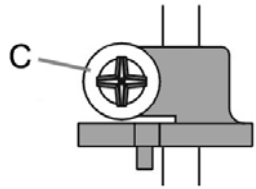


Screw the earth cable terminal with the screw (3) and tooth lock (4).



11.4 Switching point adjustment

To adjust the switching point, loosen slightly the cam's grub screw (C) and turn the cam on the shaft until the required switching point is achieved.

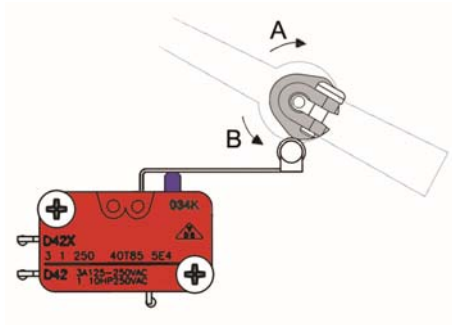


To turn the cam on the shaft, do not hold the shaft by the indicating needle, as this may move the needle on the shaft. The shaft should be held directly.

For the models SC250, SC250V/BD, SC250H/DES and SM250, if the cam is turned in the "A" direction, the acting point will move away from the zero point of the scale. If the cam is turned in the "B" direction, the acting point will move towards the zero point of the scale.

For the models SC250V/DAB, SC250H/ED, if the cam is turned in the "A" direction, the acting point will move towards to the zero point of the scale. If the cam is turned in the "B" direction, the acting point will move away from the zero point of the scale.

Once the cam is in its position, making sure that it rests on the follower of the micro-switch lever, and the grub screw (C) has been tightened, the correct working of the limit switch should be verified by turning the indicating needle shaft and checking the switching at the required point.



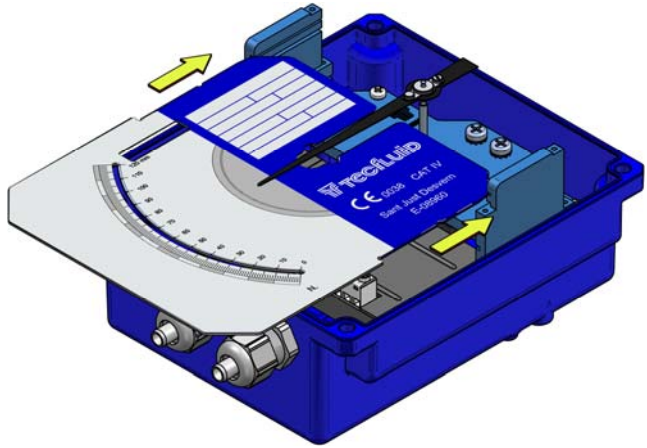
Cam shown acting on the micro-switch lever

11.5 Electrical connection

Do it according to section 12.

11.6 Mounting

Slide the scale plate into the slot until it stops as shown in the figure. Mount the cover with the four screws "Allen" M5 and the plastic washers.



12 ELECTRICAL CONNECTION

In order to make the electrical connection of the instrument, the limit switch has a screw terminal strip.

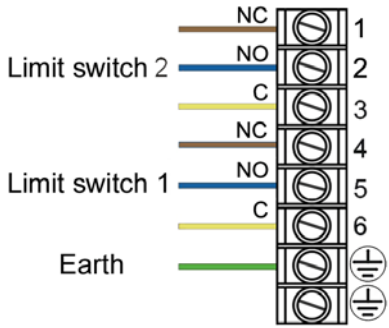
For the electrical installation it is recommended to use multiple conductor cables with individual cable sections in the order of 0.25 to 0.5 mm² in order to make it easier to connect. Loose cables should not be used given that they can affect the seal of the cable glands. It is better to maintain the mains cables separated from the cables with low level signals.

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 M16 cable glands used are for cables with outside diameters between 6 mm and 10 mm.

Peel the outside insulation to free the inner cables. It is recommended to tin the ends of the wires to avoid loose ends. Next, feed the cables through the cable glands, and connect to the corresponding screw terminals. Last, tighten up the cable glands so that they maintain their ingress protection.

The numbering of the terminals is given on the printed circuit board.

Note: The contacts are defined with the cam WHEN NO acting on the micro-switch lever.



	AMM	AMD
1	NC(2)	
2	NO(2)	
3	C(2)	+(2)
4	NC(1)	−(2)
5	NO(1)	+(1)
6	C(1)	−(1)

TH7 TRANSMITTERS

13 INTRODUCTION

TH7 transmitters are microprocessed electronic position transducers. The instrument uses the Hall effect to capture the field of a magnet. The resulting signal, after the micro-controller processing, is converted into a current signal of 4-20 mA in a 2-wire loop. This signal is proportional to the flow rate.

14 MODELS

14.1 TH7

It is a 4 to 20 mA transmitter proportional to flow rate that incorporates a digital output configurable as synchronized pulse output or alarm output. 4 mA corresponds to beginning of the scale. 20 mA corresponds to full scale.

The cut off value can be programmed (see section 20.3 in page 32). By default, the cut off corresponds to the first point on the scale after the zero point.

14.2 TH7H

It is a TH7 transmitter that incorporates HART protocol compatibility. With this protocol the user can change the measuring range of the 4-20 mA loop, and data like flow rate and accumulated volume.

14.3 TH7T and TH7TH

They are the equivalent models to those of the sections 14.1 and 14.2, but in addition they include a 8-digit totalizer (7 entire numbers and 1 decimal).

15 MOUNTING THE TRANSMITTER IN AN EXISTING EQUIPMENT

When the transmitter is to be fitted to an existing device, please follow these steps.

15.1 Kit contents

The kit contains the following elements:

	TH7 or TH7H kit	
Quantity	Material	Position
1	Transmitter	1
4	Screw DIN7985 M 3 x 4 A2	2
2	O-ring Ø 16 x 18,5 x 1,25 mm NBR-70	3
2	Cable gland IP68	4
2	Cable gland blanking plug	5

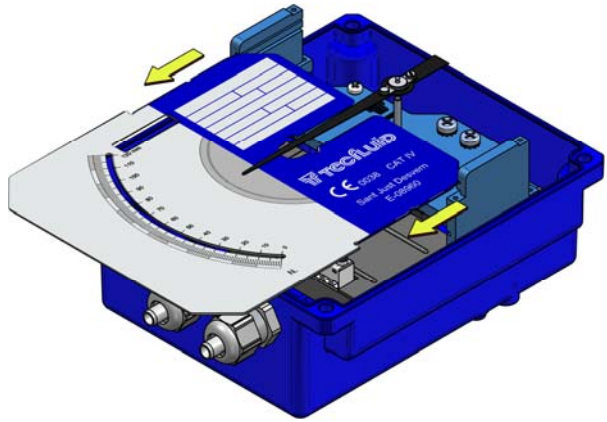
	TH7T or TH7TH kit	
Quantity	Material	Position
1	Totalizer	1
2	Screw DIN7982 B-2,2 x 9 Nº2 A2	2

In the kits, the O-rings (3) and the blanking plugs (5) are not provided as loose parts. They are incorporated in the cable glands (4).

15.2 Preparing the kit

Remove the cover, unscrewing the four screws "Allen" M5 and plastic washers, in the back side of the indicator housing, using a 4 mm Allen key.

Slide the scale plate in the direction indicated in the figure, until it is released from the slot.

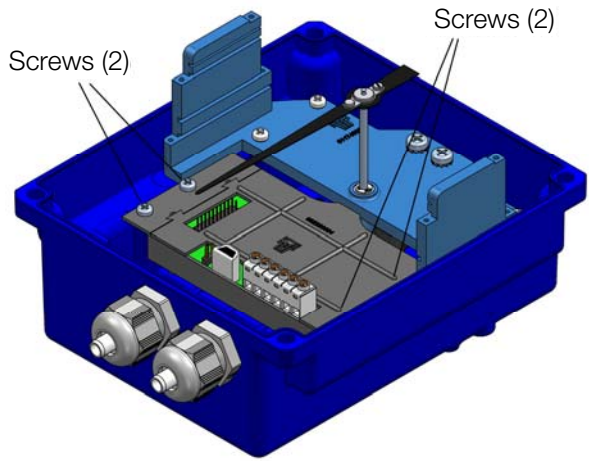


Ensure that the O-rings (3) are placed in the thread of the gland (4). If not, they should be placed. Remove the plugs from the indicator box with a flat screwdriver and replace them by the two cable glands.

The cable glands that are not expected to be used should be left with the blanking plug (5) placed to preserve watertight.

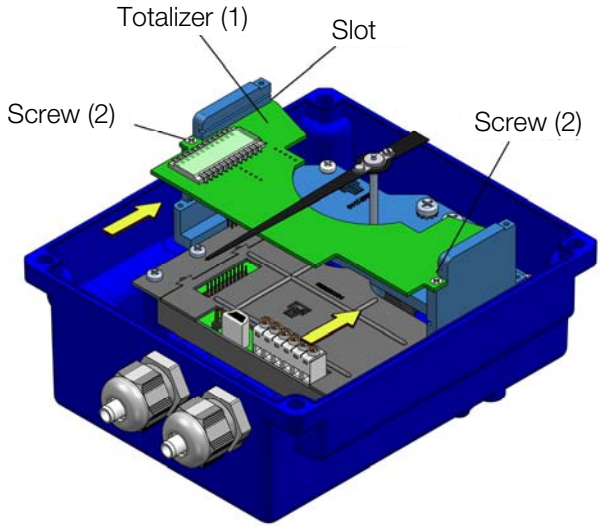
15.3 Assembling the TH7 or TH7H klit

Screw the transmitter as shown in the figure.

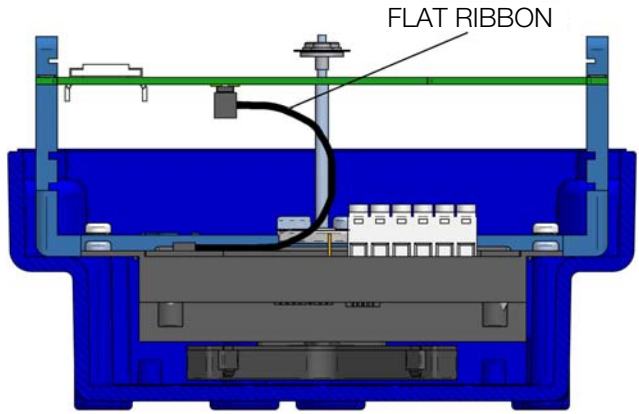


15.4 Assembling the TH7T or TH7TH kit

Slide the circuit through the slot until it stops, and then screw it as shown in the figure.



The flat ribbon connecting the transmitter to the totalizer should be connected as in the figure below.

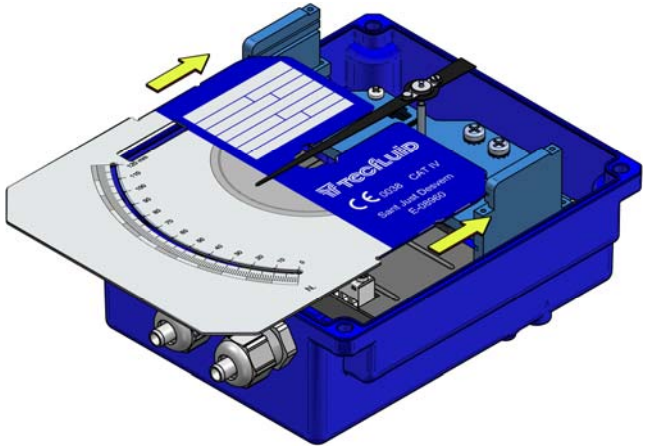


15.5 Electrical connection

Do it according to section 16.

15.6 Mounting

Slide the scale plate into the slot until it stops as shown in the figure. Mount the cover with the four screws "Allen" M5 and the plastic washers.



16 ELECTRICAL CONNECTION

For the electrical connection, the transmitter has a screw 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 mm² in order to make it easier to connect.

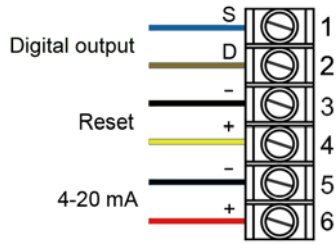
A twisted pair wiring should be used to avoid electrical interferences in the 4-20 mA loop. In some instances, shielded cable may be necessary.

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 M16 cable glands used are for cables with outside diameters between 6 mm and 10 mm.

Peel the outside insulation to free the inner cables. It is recommended to tin the ends of the wires to avoid loose ends. Pass the cables through the cable glands and screw down in the corresponding positions of the terminal strip. Once the wiring is finished make sure that the cables are well gripped by the cable glands to maintain the ingress protection.

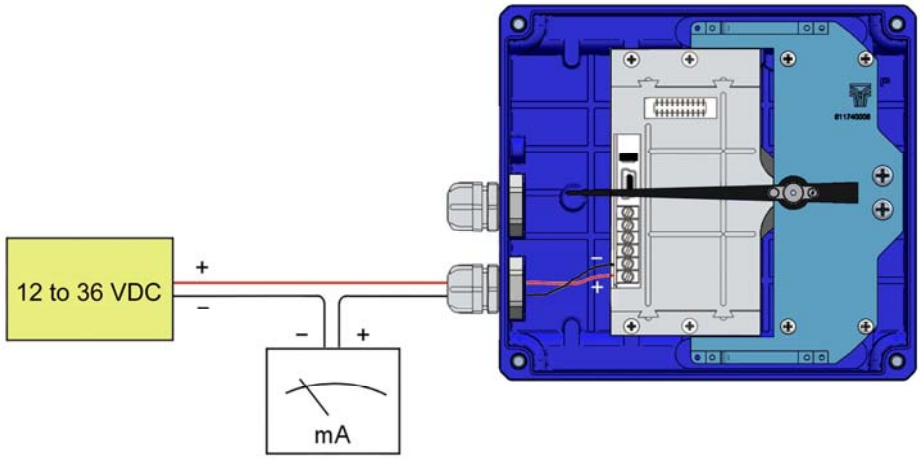
The cable glands must be always closed. Entry of dust or some types of vapours can damage the internal system of bearings and therefore the equipment.

To help in the wiring of the equipment, the description of the terminals is marked on the printed circuit next to the terminal strip.



Before connecting the power supply, you must be sure that the supply voltage is the correct one for the installation. The power supply voltage is indicated on the label of the transmitter.

16.1 Power supply and analog output

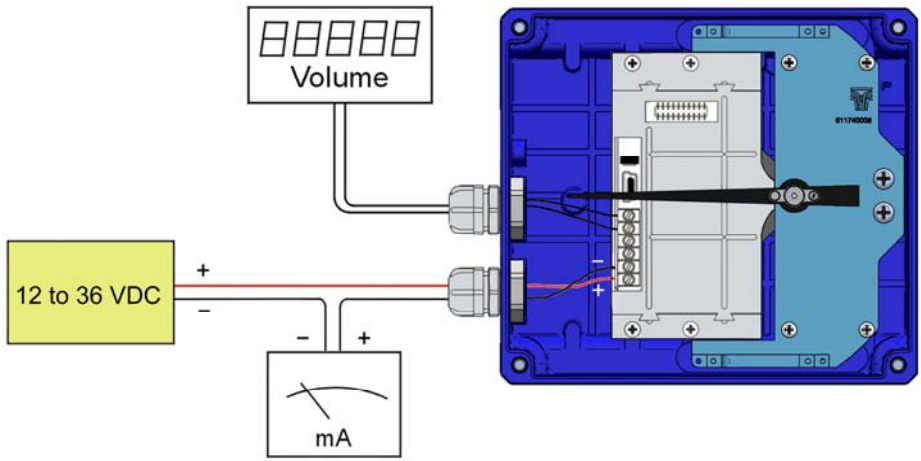


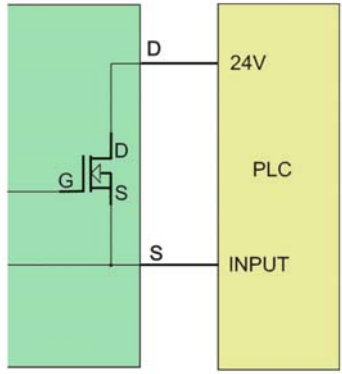
The connection is made in the terminal block. The positive terminal of the power supply is connected to the position + and the positive terminal of the load in the position -. The negative terminals of the power supply and the load are connected together. The instrument works in a 2-wire system, that is, the supply and signal line is the same. It is recommended to use a twisted pair wiring or shielded cable to avoid interferences in the current loop.

16.2 Digital output

The digital output is connected in the positions D and S of the terminal block. The output is an N channel MOSFET transistor isolated from the rest of the circuit and potential free. The S terminal is the source and the D terminal is the drain.

By means of the Winsmeter TH7 software, the digital output can be programmed as pulse output or alarm output (see section 20.3 in page 31).



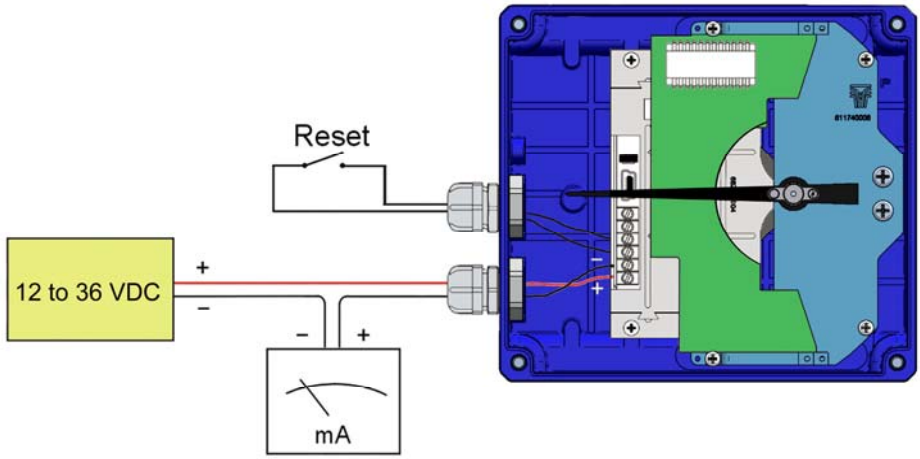


Example of the connection of the pulse output to a PLC

16.3 Reset input

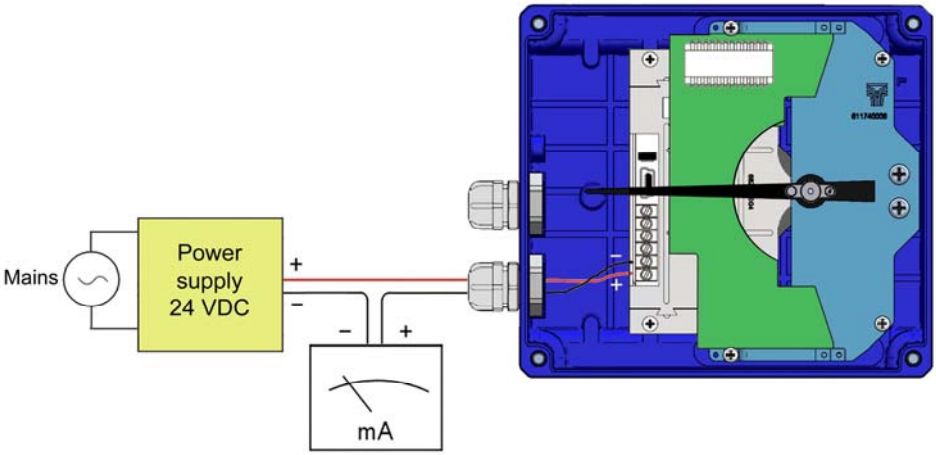
The terminals marked as RESET are a reset input for the totalizer. It can be connected to a normally open potential free contact. It is important that the contact works well with low level voltages, to avoid noise effects.

Note: The reset terminals are not isolated from the rest of the circuit. They must not be connected to other equipment.



17 4-WIRE CONNECTION

If direct current power supply for the transmitter is not available in the installation, it will be necessary to incorporate an additional power supply as in the following figure.



18 HART TRANSMITTERS

The TH7H and TH7TH transmitters have a modem for HART communication.

TH7H transmitters are fully compatible with the **HART Server** software from HART Communication Foundation.

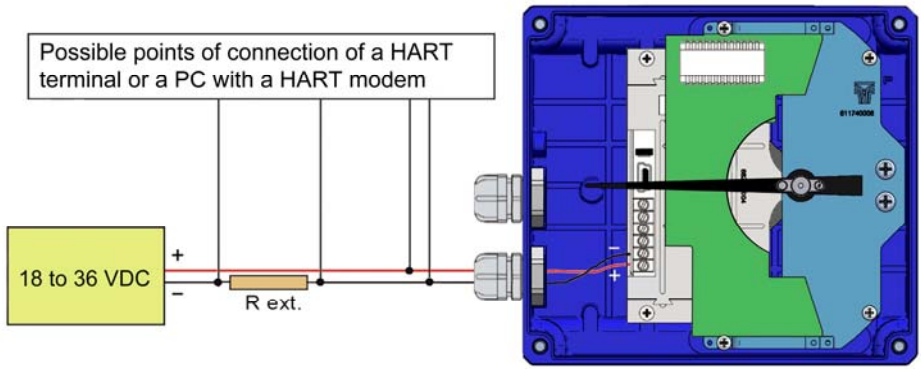
Tecfluid S.A. do not guarantee that the TH7H transmitter is compatible with the different servers on the market.

When connecting the transmitter, an external resistor (R ext.) should be included. Its minimum value needs to be 200 Ω, and the maximum value depends on the power supply as follows:

$$R(Ohm) = \frac{V - 14}{20 \cdot 10^{-3}}$$

In this case the power supply voltage needs to be 18 VDC minimum.

In order to establish HART communication, it is necessary to connect a terminal or PC with a HART modem, in one of the points indicated in the following figure.



18.1 Additional functions with HART communication

By means of the implemented commands, the user can obtain the following information:

- Flow rate value in the scale units
- Totalizer value (even if the equipment does not have a display).
- Reset or writing of a totalizer value.
- Change of beginning and end of scale of the current loop.
- Possibility of writing tags and messages into the instrument.

18.2 HART communication characteristics

The detail of the characteristics with respect to the HART communication are available in the corresponding “Field Device Specification” document.

Summary of the main communication characteristics:

Manufacturer, Model and Revision	Tecfluid S.A., TH7H, Rev. 0
Device type	Transmitter
HART revision	6.0
Device Description available	No
Number and type of sensors	1
Number and type of actuators	0
Number and type of host side signals	1, 4 – 20 mA analog
Number of Device Variables	2
Number of Dynamic Variables	1
Mappable Dynamic Variables	No
Number of Common Practice Commands	5
Number of Device Specific Commands	0
Bits of Additional Device Status	12
Alternative working modes?	No
Burst mode?	No
Write Protection?	Yes

Electrical characteristics referred to the analog loop and communications:
Reception impedance:

Rx	>	3,3 MΩ
Cx	<	1000 pF

19 “WRITE PROTECT”

The instrument has a jumper that can be used to avoid changes in the configuration. When the jumper is connected the instrument can be configured via HART. When the jumper is removed, “Write Protect” is activated for HART, thus avoiding any changes in the configuration.

20 ASSOCIATED SOFTWARE WINSMETER TH7

By means of this associated software the transmitter can perform the following functions, working in a comfortable and intuitive way.

- Complete re-calibration of the transmitter according to the scale of the instrument.
- Programming of 4 and 20 mA values
- Filter and cut off programming
- Totalizer reset or adjustment of a desired value
- Configuration of the digital output as pulse output or alarm

Such software can be downloaded from section “Downloads” of the Tecfluid S.A. website.

NOTE: Programming via USB can only be done in non-classified area.

20.1 USB cable connection and drivers installation

Extract the files from the winsmeterTH7.zip to a new system folder.

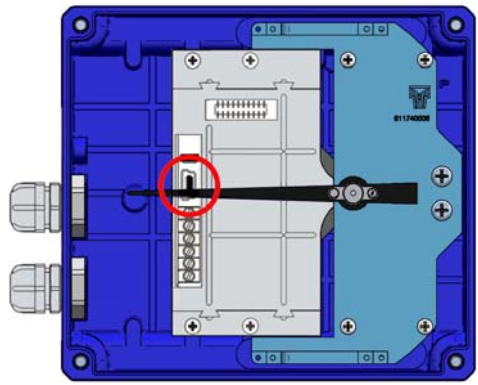
Execute the Setup.exe file and follow the steps for the installation.

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 (cable not supplied).

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

The first step to make the connection is to open the cover of the indicator housing by removing the four screws "Allen" M5 and plastic washers on the back of the housing.

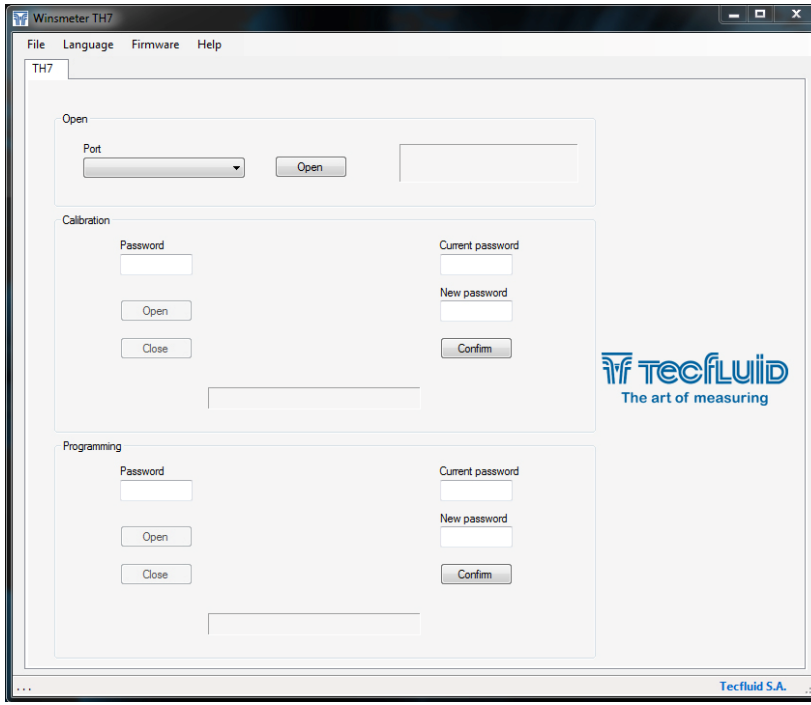
After removing the graduated scale plate sliding it through the slots, the USB connector is visible at the bottom of the housing.



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

Power on the electronic converter.

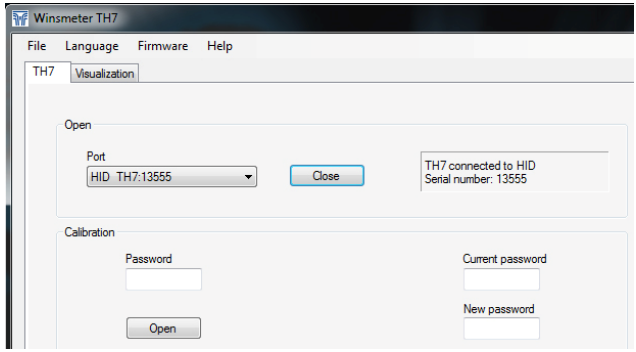
Execute the program WinsmeterTH7 following the sequence Start – Programs – Tecfluid S.A. - WinsmeterTH7.



20.2 Port connection

In the "Port" section, choose the appropriate port for the converter. This will appear with the name of the port followed by TH7 and its serial number. Then click "Open".

Once the port is open, the button "Open" in the "Calibration" and “Programming” sections activates.

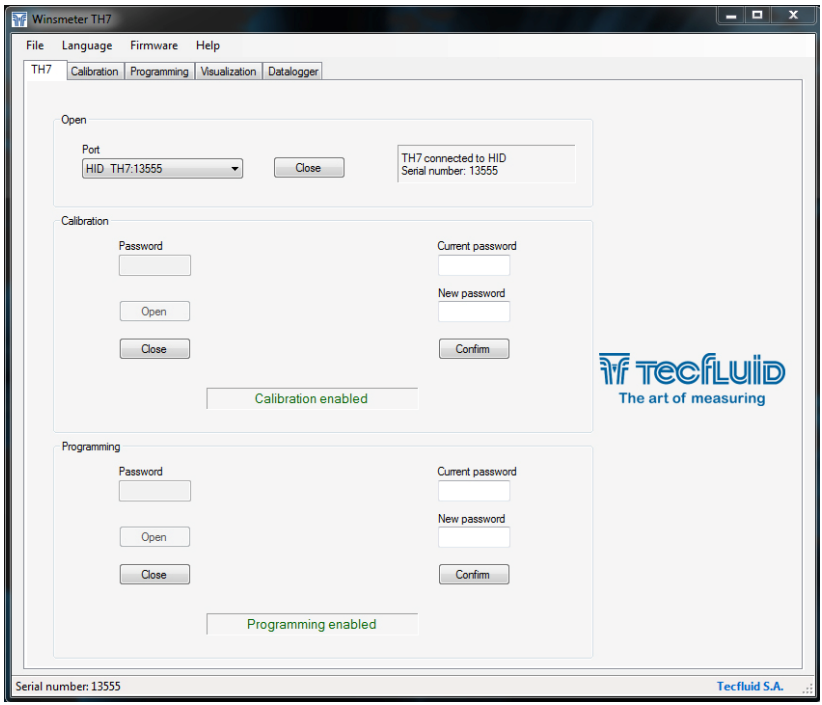


20.3 Access to Calibration and Programming

In order to change data in the tab "Calibration", you must enter a password.

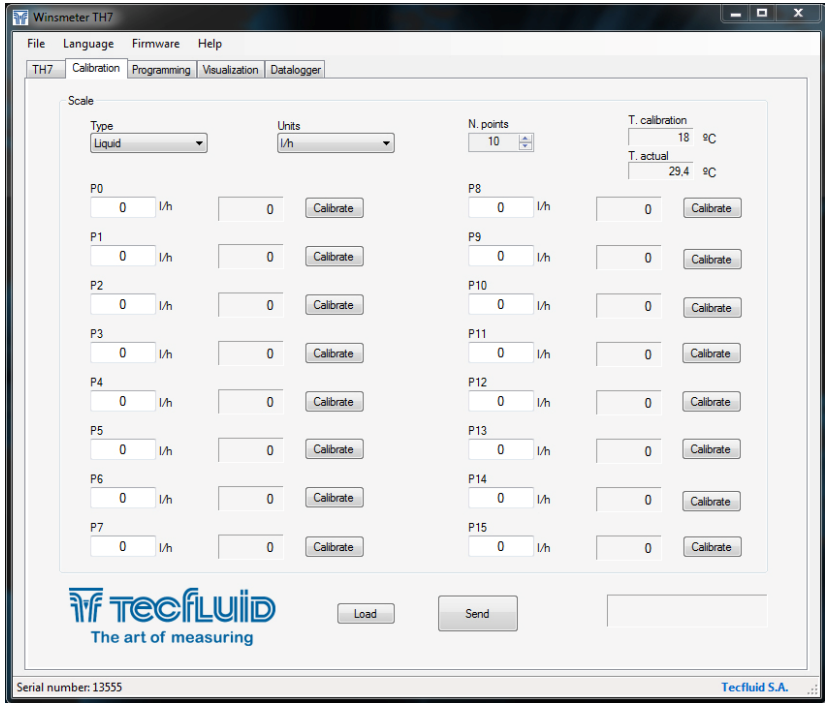
The default password is **calib**, and it can be changed using the boxes on the right of the "Calibration" section.

Likewise, to change data in the tab "Programming" it is necessary to enter the password which by default is **program**. This can be changed using the boxes on the right of the "Programming" section.



Once the password is written, press "Enter" or "Open", and the Calibration or Programming tab will open. At the bottom of each section the text "Calibration tab open" or "Programming tab open" will be displayed

To enter the Installation window, just click the corresponding tab.



In the calibration window a complete re-calibration of the transmitter according to the scale plate can be done.

The first step is to choose the scale units, then the specific units.

In the combo **N. points** the number of points with which the calibration will be performed is selected. The minimum is 10 and the maximum 16.

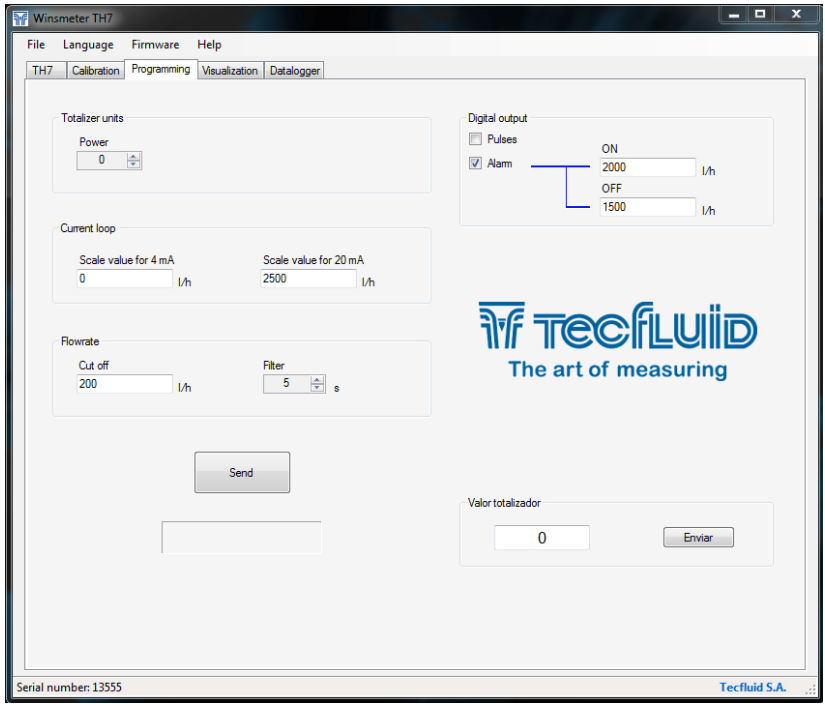
With these data, the boxes P0 ... P10 to P16 are filled with the values of the scale in which the adjustment will be made.

To perform the calibration, the instrument must be in its operating position.

Depending on the instrument in question, move the float or the disc until the needle points each calibration point, and press the "Calibrate" button of the corresponding point.

Once calibrated every point, to send all the data to the transmitter TH7, click the "Send" button. The data is then stored in the transmitter memory.

Likewise, to enter into the programming window, just click the corresponding tab.



Changing the parameters of this screen, (see previous page) you can program the different functions of the equipment.

In the box **Totalizer units** power can be selected. The power allows to multiply or divide by a factor multiple of 10 the totalizer speed as well as the pulse output.

By default, with the power = 0, the totalizer and the pulse output indicate the scale units, ie, if the scale of the instrument is in litres / hour, the totalizer indicates liters and the digital output gives one pulse for each litre.

If, for example, the power is programmed to 1, the totalizer and pulse output will run 10 times faster. If a power = -2 is programmed, they will run 100 times slower.

In the box **Digital output** this output can be configured as pulse output or as alarm. In the latter case, the activation and deactivation values for the alarm can be programmed.

In the box **Current loop** the values of flow rate equivalent to 4 and 20 mA can be programmed. These values do not have to be the beginning of scale and end of scale values.

In the box **Flow rate** the values of cut off and filter can be changed.

The cut off is the value below which the TH7 transmitter will consider zero flow rate, and therefore the analog output will give 4 mA and the digital output will be deactivated if it is programmed in pulse mode.

The filter offers stable current loop readings despite fluctuations in the flow reading. It is programmed in seconds, between 1 and 8.

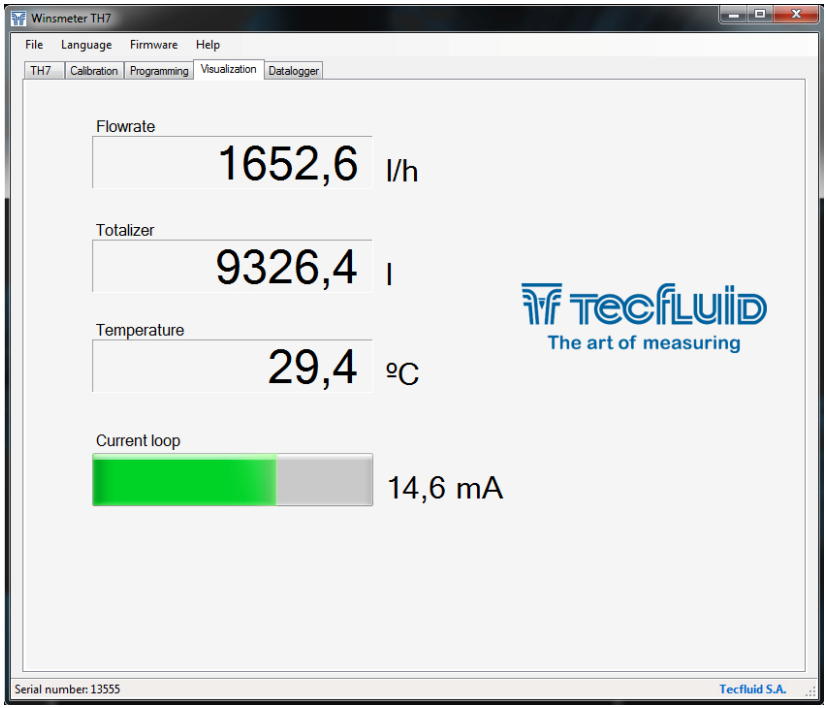
To program this data to the transmitter, press the “Send” button. The programming data will be stored in the memory of the transmitter.

Regardless of the programming process, in the box **Totalizer value** the value of the totalizer can be changed.

20.4 Visualization

When the communication with the computer port is established (see section 20.2), the tab "Visualization" opens. This tab lets you view real-time flow rate, totalizer and velocity values, as well as the current value of the analog output and the status of the digital output if configured as alarm.

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

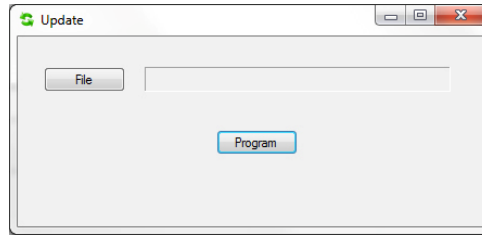


20.5 Firmware updates

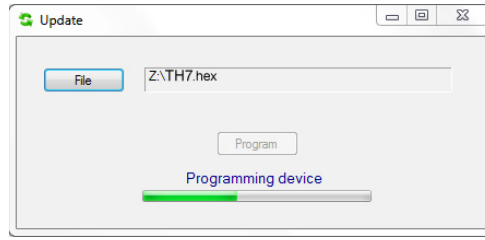
New firmware updates can be published in the website. These updates contain improvements or bug fixes that make the equipment operates at best conditions.

The updates can be downloaded from the section “Downloads” of Tecfluid S.A. website.

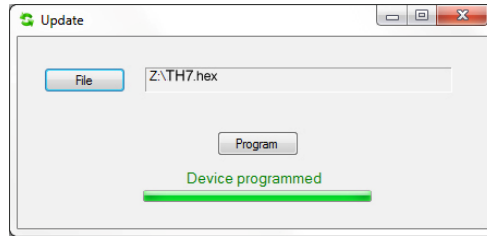
To update the equipment, go to menu “Firmware” - “Update”, and a screen with the button “File” will appear. Pressing this button system can be accessed. The downloaded file has to be searched there.



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



The process takes about 90 seconds, after which the message “Device programmed” will appear.



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

21 MAINTENANCE

21.1 Series SC250

To perform the maintenance of the meter, it is necessary to remove some parts of the flowmeter. Check below drawings for reference.

In flowmeters up to DN80 remove the circlip (6) which locks the top float stop (7). Then remove the float stop (7). The float (2) can now be extracted. Check it is in perfect condition.

For flowmeters DN100 or larger sizes, remove the screw (9) which holds the float end (8). Then remove the float end (8). The float (2) can be extracted from the top of the flowmeter. Clean the magnetic cylinder (10).

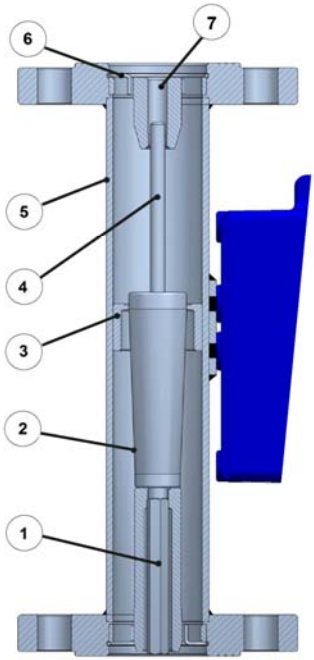
In both cases also check the status of the calibrated orifice (3).

They should have no impact or scratches. Also check that there has been no chemical attack.

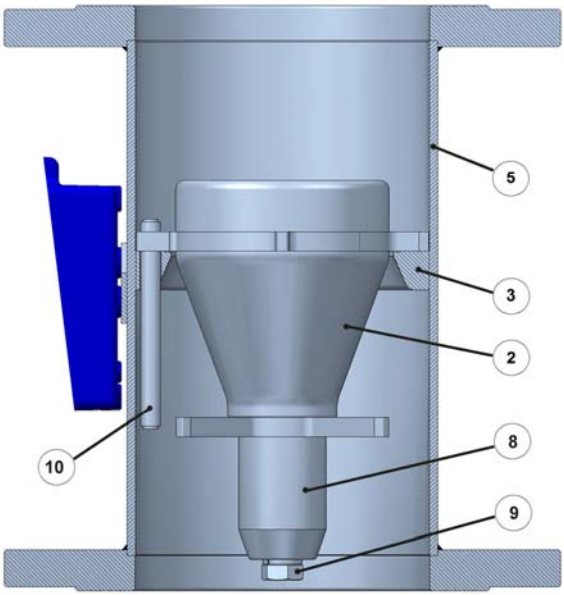
If the float (2) is in poor condition it must be replaced. If the calibrated orifice (3) is also in poor condition, the meter body (5) and float (2) should be replaced. In both cases we recommend to re-calibrate the instrument in Tecfluid S.A. facilities.

To remove adhered chemical dirt to the float (2), metering tube (5) or calibrated orifice (3), clean the parts with suitable products or solvents and soft brushes, never use metallic tools.

Follow the above steps in reverse to reassemble the equipment.



SC250 DN15 … DN80



SC250 DN100 … DN150

21.2 Float for SC250 with hygienic design

Two special tools are necessary to disassemble the float (2) from the flowmeter. They can be supplied on demand by Tecfluid S.A.

These tools fit into the side guides of the float (2) and of the float end (8).

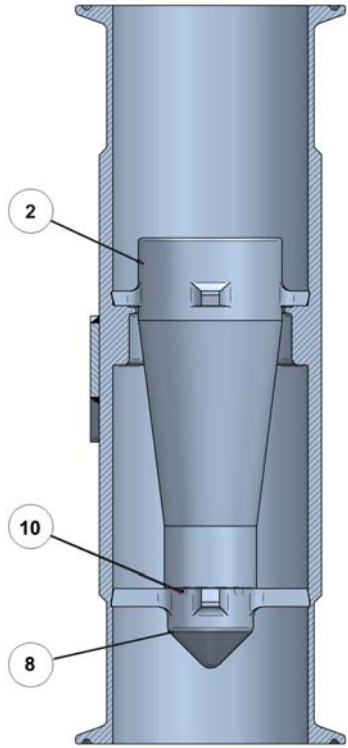
Once the tools have been fitted into their respective guides, turn the float end (8) as if it was a nut. That way the float (2) will be separated from the float end (8), and the float can be taken out from the top of the meter and the float end from the bottom.

Clean the inside of the metering tube and the float (2).

To remove adhered chemical dirt, clean the parts with suitable products or solvents and soft brushes, never use metallic tools.

Follow the above steps in reverse to reassemble the equipment, making sure that the O-ring (10) is correctly placed between the float (2) and the float end (8). Tighten the float end (8) moderately onto the float (2).

If you are interested in acquiring the special tools in Tecfluid S.A., please indicate for which nominal diameter they are required.



21.3 Potential problems with the metering tube

21.3.1 Jammed float

In flowmeters up to DN80 a possible cause is that the float upper guide (4) or the lower one (1) are bent due to a water hammer. To solve this, remove the circlip (6) which locks the top float stop (7). Then remove the float stop (7). The float (2) can now be extracted. Align the guide rods and manually check that the movement is good without rubbing.

For flowmeters DN100 or larger, the cause can be that the magnetic cylinder (10) is bent or dirty. To solve this, extract the float (2) from the flowmeter by removing the screw (9) which holds the float end (7). Then remove the float end. Extract the float (2) from the top of the flowmeter and straighten or clean the magnetic cylinder (10).

Follow the above steps in reverse to reassemble the equipment.

The float may also become clogged by accumulation of metallic particles around it due to the float magnetic field. In this case disassemble the float (2) following the above instructions, clean it, and install a magnetic filter on the inlet of the meter, or just a normal filter depending on the size and nature of the particles.

21.3.2 Bent top float stop

If the top float stop (7) is bent due to a water hammer, disassemble it following the instructions of the section 21.1. If it is possible, straighten it and check its alignment. Otherwise change it for a new one.

21.3.3 Lack of magnetic field

Disassemble the float (2) as indicated in section point 21.1. Check if the float has suffered chemical aggression and if so the permanent magnet has been affected. If this is the case, the float must be replaced and the flowmeter will have to be re-calibrated in Tecfluid S.A. facilities.

21.3.4 Damaged calibrated orifice and / or float

Check that they do not show any impacts or scratches. Also check for any chemical attack. If the float (2) is in bad condition it must be replaced. If the calibrated orifice (3) is damaged, the metering tube and the float must be replaced. In both cases the flowmeter has to be re-calibrated in Tecfluid S.A. facilities.

21.4 Potential problems with the indicator housing

21.4.1 The indicator pointer rubs on the reading scale

To remove the cover, remove the four screws "Allen" M5 and plastic washers, in the back side of the indicator housing, using a 4 mm Allen key.

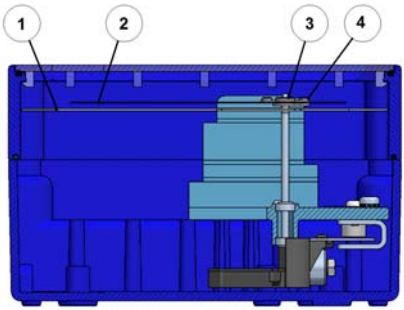
Rubbing normally happens if the meter has been hit or dropped. Simply straighten the pointer (2) by bending it slightly until it is separated between 2-3 mm from the reading scale surface (1)

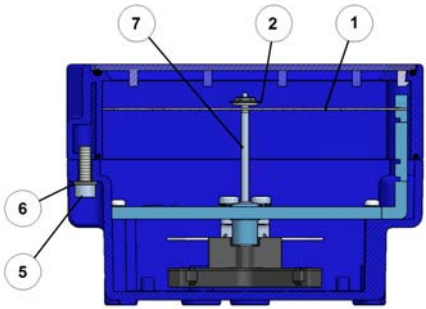
21.4.2 Deviation of the zero on the scale

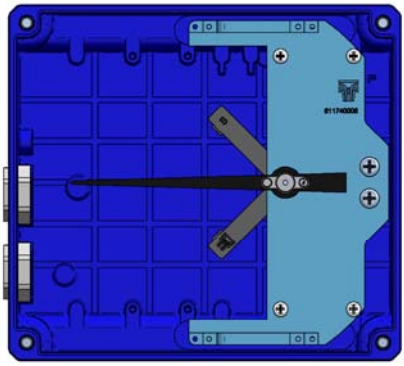
When the indicator pointer (2) does not point zero in its rest position, place the flowmeter in its real working position on top of a non-magnetic table. If when the float is moved the pointer moves but does not return to 0, check that the pointer hub (3) is firmly attached to the pointer shaft (7). If it isn't, secure the pointer hub (3) onto the conical tip (7) of the shaft by tapping it lightly and carefully.

If the pointer hub is fixed, make the indicator pointer coincide with the 0 on the scale using the frontal adjusting screw (4) on the indicator pointer. Make sure that the shaft (7) is held fast so as not to be bent or damaged

Check that there is no rubbing between the pointer movement system and the cables connected to a limit switch or transmitter.







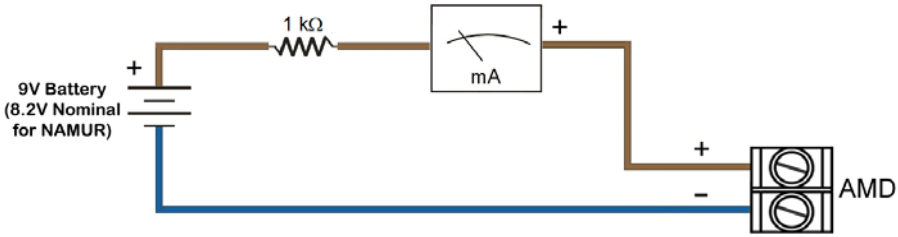
21.5 AMD limit switch maintenance

21.5.1 Electrical verification

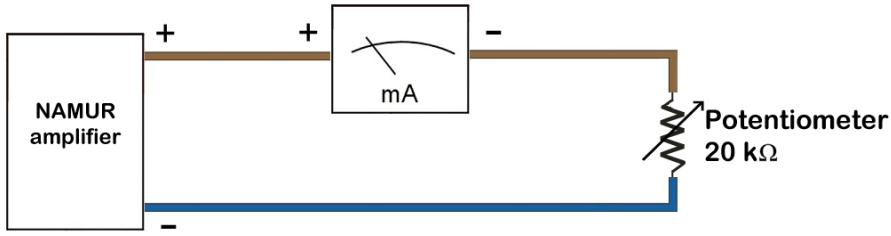
Check that the voltage at the terminals + and - is over 7.5 V when the vane is in the slot. Connect a multimeter with the scale in DC mA, in series with the terminal +.

Verify that the current is less than 1 mA when the vane is in the slot, and more than 3 mA when the vane is out of the slot.

If you do not have the NAMUR amplifier, the current can be checked using the following circuit diagram:



If you do not have the AMD sensor, the operation of the amplifier can be checked using the following circuit diagram:



With the potentiometer the current of the NAMUR amplifier can be modified. The switching point must be between 1.2 mA and 2.1 mA. That is, with the current below 1,2 mA the output relay must have a state and above 2,1 mA the output relay must have the other state.

21.6 AMM limit switch maintenance

No special maintenance is required.

21.7 TH7 transmitter maintenance

No special maintenance is required.

22 TECHNICAL CHARACTERISTICS

22.1 Series SC250

Accuracy SC250, SC250H, SC250V	According to VDI/VDE 3513 sheet 2 (qG=50%): 2.5% / 1.6% on request		
SM250	According to VDI/VDE 3513 sheet 2 (qG=50%): 1.6%		
Scales	Direct in engineering units or in %		
Mounting length	250 mm, except DN150/6" 300 mm		
Scale range	10:1		
Fluid density	No restrictions		
Fluid viscosity	Up to 10 mPa·s approx., depending on flow rate (SC250 models)		
Working temperature Standard	AISI316L: PVC: PTFE: PP:	-50ºC ... +300ºC 0ºC ... +50ºC -20ºC ... +150ºC -20ºC ... +90ºC	
With thermal separator	EN 1.4404:	-200ºC ... +400ºC	
Ambient temperature	EN 1.4404: PVC: PTFE: PP:	-20ºC ... +80ºC 0ºC ... +45ºC -20ºC ... +80ºC -5ºC ... +80ºC	
Working pressure	EN 1.4404	PN40 PN16	DN15 ... DN50 DN65 ... DN150
	PVC / PP / PTFE	PN40 PN16	DN15 ... DN40 DN50 ... DN150
	Fully PVC / Fully PP	PN16	
Connections	DN15 … DN150 EN 1092-1 flange or ASME B16.5 equivalent Other flange standards on request (JIS,...) Threaded connections BSP or NPT Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®		
Housing	IP65 - coated aluminium IP65 - PP, on request IP67 - EN 1.4404 with glass window, on request		

22.2 AMD limit switch

Nominal voltage	8 V
Working voltage	5 ... 25 V
Power supply internal resistance	1 kΩ
Current with the vane into the slot	< 1 mA
Current with the vane out of the slot	≥ 3 mA
Standard:	DIN EN 60947-5-6 (NAMUR)
Ambient temperature	-25ºC ... +100ºC

22.3 AMM limit switch

Maximum switching voltage	250 VAC
Maximum switching current	3 A
Potential free SPDT contacts	
Ambient temperature	-25ºC ... +100ºC

22.4 TH7 transmitter

22.4.1 Power supply

2 wire

Minimum voltage (TH7 and TH7T):	0.02 Z + 12 (Volt) (Z is the load in the current loop in Ohm) The minimum value is 12 VDC for Z=0 Ohm
Minimum voltage (TH7H and TH7TH):	0.02 (Z+Rext) + 14 (Volt) (Z is the load in the current loop in Ohm) The minimum value is 18 VDC for Z=0 Ohm and Rext=200 Ohm
Maximum voltage:	36 VDC
Consumption:	maximum 20 mA

22.4.2 Outputs

Analog output:	4 - 20 mA, factory calibrated
Maximum load in the 4-20 loop:	1.1 kW (at 36 VDC supply voltage)
Pulse output:	MOSFET transistor N channel potential free I_{max}: 200 mA
Maximum frequency:	6 Hz.
Pulse duration:	Approx. 62.5 ms Pulse / units of volume or mass depending on the scale; factory adjustable or by means of Winsmeter software
Totalizer:	8 digits. (7 + one decimal. Reset by means of potential free contact)

22.4.3 General characteristics

Accuracy (analog output respect the magnetic field):	< 0.6 %
Ambient temperature:	-20ºC … +70ºC
Cable gland:	M16 x 1.5

23 SAFETY INSTRUCTIONS

The series SC250 flowmeters are in conformity with all essential requirements of all EC directives applicable to them:

2014/68/EU Pressure equipment directive (PED)

Limit switches and transmitters:

2014/30/EU Electromagnetic compatibility directive (EMC)

2012/19/EU Waste electric and electronic equipment (WEEE).

Limit switch AMM:

2014/35/EU Low voltage directive (LV)

Equipment for hazardous areas:

2014/34/EU Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX).

In the last sections of this manual the EC type certificate and the declarations of conformity according to the ATEX directive are attached.

Other declarations of conformity EC can be downloaded from the section “Download” of the Tecfluid S.A. website.

23.1 Pressure equipment directive

Tecfluid S.A. have subjected the series SC250 of flowmeters to a conformity assessment method for the pressure equipment directive, specifically according to module H (full quality assurance).

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

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

G Gases and vapours

1 Group of liquids 1

CATII Category II

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

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

23.2 IECEx certification

This equipment has been certified IECEx. The respective documentation can be downloaded from the IECEx website www.iecex.com.

23.3 Certificate of conformity TR CU (EAC marking)

Tecfluid S.A. have subjected the series SC250 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.

24 ADDITIONAL INSTRUCTIONS FOR THE Ex VERSION

This chapter only applies to equipment intended for use in explosive atmospheres.

These equipment conform with the directive 2014/34/EU (Equipment and protective systems intended for use in potentially explosive atmospheres) as indicated in the EC-type examination certificate and in its marking. They are also compliant with the IECEx scheme.

Given that this instrument is group II, it is intended for use in places likely to become endangered by explosive atmospheres, but not in mines.

For the category 1G, the equipment is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists are present continuously, for long periods or frequently.

For the category 1D, the equipment is intended for use in areas in which explosive atmospheres caused by inflammable dusts are present continuously, for long periods or frequently.

24.1 Surface temperature

Equipment is certificated as Exia IIC T4 or Exia IIC T6.

The maximum possible Surface temperature are the following:

Temperature class	Maximum surface temperature	Ignition temperature of the specific gas involved
T4	135ºC	135ºC
T6	85ºC	85ºC

24.2 Non metallic parts

WARNING: POTENTIAL RISK OF ELECTROSTATIC CHARGE

The front of the housing consists of a transparent plastic window in order to let the user see the position of the pointer on the scale.

Since the danger of ignition by electrostatic discharge when rubbing this window can not be avoided, **the instrument must always be cleaned with a damp cloth**.

WARNING: RISK OF IMPACT

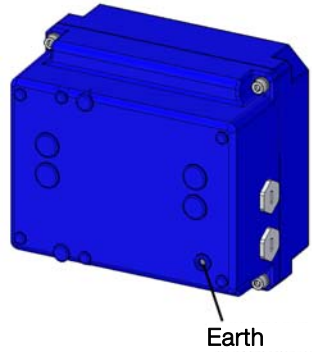
Because the housing base is made of aluminium, **the equipment must be installed and operated always in locations at low risk of impact.**

WARNING: WIRING

The wiring of the variants containing transmitter and inductive sensor must be kept separated.

24.3 Connecting conductive parts to earth

When the instrument is not grounded securely through the connection process, it should be grounded through the housing screw, as shown in the figure.



24.4 AMD limit switch

When the equipment includes an AMD limit switch, it is certified as intrinsic safety with the following parameters:

Marking	Ex ia IIC T4	Ex ia IIC T6
Specific parameters	Ui : 16 V	Ui : 16 V
	Ii : 25 mA	Ii : 76 mA
	Pi : 64 mW	Pi : 242 mW
	Ci : 50 nF	Ci : 50 nF
	Li : 250 uH	Li : 250 uH

24.5 AMM limit switch

When the equipment includes an AMM limit switch, can be certified as intrinsic safety. No specific electric parameters are required for gas. In case of dust, the parameters are the following:

Marking	Ex ia T6 Ga	Ex ia IIIC T135 ºC Da
Specific Parameters	Without parameters	Ii: 250 mA
		Pi: According to certificate
		Ci: 0 nF
		Li: 0 uH

24.6 TH7 transmitters

Transmitters TH7 can be supplied with certification to be installed in potentially explosive atmospheres. They are intrinsic safety devices.

Differing from TH7 transmitters for safe zone, they do not have pulse output.

The electrical connection and the information respect the HART protocol is the same as in the TH7 transmitter (see sections 13 to 19).

The technical characteristics that differ from TH7 transmitters are the following:

Maximum voltage:	30 VDC
Maximum load in the 4-20 loop:	900 Ω (at 30 VDC supply voltage)
Pulse output:	Not available in this version.

The rest of characteristics are the same as TH7 transmitter (see section 22.4).

The specific intrinsic safety parameters are the following:

Marking	Ex ia IIC T4 Ga	Ex ia IIC T6 Ga
Specific parameters	Ui : 30 V	Ui : 30 V
	Ii : 100 mA	Ii : 100 mA
	Pi : According to certificate	Pi : According to certificate
	Ci : 57.3 nF	Ci : 57.3 nF
	Li : 0 uH	Li : 0 uH

Marking	Ex ia IIIC T_{200} 85ºC Da	Ex ia IIIC T_{200} 90ºC Da
Specific parameters	Ui : 30 V	Ui : 30 V
	Ii : 100 mA	Ii : 100 mA
	Pi : According to certificate	Pi : According to certificate
	Ci : 57,3 nF	Ci : 57,3 nF

NOTE: Programming via USB can only be done in non-classified area.

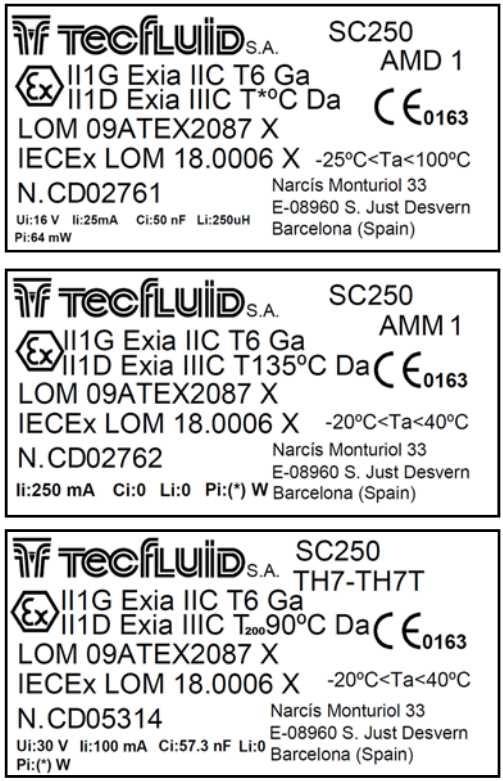
24.7 Maintenance

It is the same as in non-Ex equipment.

Ex-intrinsically safe equipment **can not be repaired**. In case of any incident that requires intervention in the equipment, a new equipment will be supplied.

24.8 Marking

Some examples of marking are shown as follows.



The marking of the equipment shows the following characteristics:

- Manufacturer
- Serial number
- ATEX and IECEx marking
- Address of the manufacturer
- Model
- CE marking
- Certification number

The marking label is located at one side of the housing, always visible

25 FLOW RANGES

25.1 SC250

Size DN (NPS)	Float N.	Flow scales EN 1.4404 (AISI 316L) float (7.95 g/cm³)		
		l/h water	Nm³/h air 1.013 bar abs 20ºC	ΔP (mbar)
15 (½")	15025	2.5-25	0.06-0.7	40
	15040	4-40	0.11-1.2	40
	15060	6-60	0.2-1.8	40
	15100	10-100	0.3-3	40
	15160	16-160	0.5-5	50
	15250	25-250	0.6-7.6	50
15 (¾")	15400	40-400	1.2-12	50
	15600	60-600	2-18	50
	15800 *	80-800 *	2.5-24 *	60 *
25 (1")	25100	100-1000	3-30	60
	25160	160-1600	5-50	70
	25250	250-2500	6-76	90
	25400	400-4000	12-120	110
40 (1 ½")	40400	400-4000	15-120	45
	40600	500-6300	20-180	55
	40800	800-8000	25-240	90
	40100 *	1000-10000 *	30-300 *	120 *
50 (2")	50800	800-8000	25-240	70
	50100	1000-10000	30-300	90
	50150	1500-16000	50-480	100
	50200 *	2000-20000 *	60-600 *	130 *
65 (2 ½")	65150	1500-15000	45-450	70
	65200	2000-20000	60-600	100
	65300 *	3000-30000 *	90-900 *	140 *
80 (3")	80020	2000-20000	60-600	80
	80025	2500-25000	80-760	100
	80030	3000-30000	100-900	120
	80040 *	4000-40000 *	120-1200 *	160 *
	80050 *	5000-50000 *	150-1500 *	190 *
	80060 *	6000-60000 *	180-1800 *	220 *
100 (4")	81040	4000-40000	150-1200	100
	81050	5000-50000	150-1500	120
	81060	6000-60000	200-1800	150
	81085 *	8500-85000 *	260-2600 *	190 *
	81095 *	10000-95000 *	300-2900 *	220 *
125 (5")	82080	8000-80000	250-2400	120
	82100	10000-100000	300-3000	150
	82120	12000-120000	350-3600	180
150 (6")	83150	15000-150000	500-4600	220
	83180	18000-180000	500-5500	220

* Special flow ranges.

Size DN (NPS)	Float N.	Flow scales PVC float			
		l/h water	ΔP mbar	Nm³/h air 1.013 bar abs 20°C	ΔP mbar
15 (½")	15025	2.5-25	20	0.1-1	30
	15040	6-60	15	0.2-2	25
	15060	10-100	15	0.4-4	25
	15100	16-160	15	0.6-6	25
	15160	25-250	15	1-10	25
	15250	40-400	15	1.6-16	25
15 (¾")	15400	60-600	15	2-20	25
25 (1")	25100	16-160	10	0.6-6	20
	25160	25-250	10	1-10	20
	25250	40-400	10	1.6-16	20
	25400	60-600	10	2.5-25	20
	25101	100-1000	10	4-40	20
	25161	160-1600	10	6-60	20
	25251	240-2400	10	9-96	20
40 (1 ½")	40400	150-1500	20	5-50	25
	40600	250-2500	20	8-80	25
	40800	400-4000	20	14-140	25
50 (2")	50800	250-2500	15	9-90	25
	50100	400-4000	15	15-150	25
	50150	600-6000	15	20-200	25
	50101	1000-10000	15	35-350	25
65 (2 ½")	65150	800-8000	15	25-250	25
	65200	1000-10000	15	40-400	25
80 (3")	80020	1000-10000	15	40-400	25
	80025	1600-16000	15	60-600	25
100 (4")	81040	1600-16000	20	60-600	25
	81050	2000-20000	20	100-1000	25
125 (5")	82080	3000-30000	20	150-1500	30
	82100	4000-40000	20	200-2000	30
	82120	6000-60000	20	220-2200	30
150 (6")	83150	8000-80000	25	250-2500	35
	83180	10000-100000	25	300-3200	35

25.2 SC250H, SC250V

Size DN (NPS)	Flow scales l/h water			Δp mbar
	Spring N.1	Spring N.2	Spring N.3	
15 (½")	10-100			390
	16-160	25-250		290
	25-250			290
	40-400	60-600		200 / 350
15 (¾")	100-1000			350
	150-1500	250-2500		350 / 600
25 (1")	60-600 (1)			90
	100-1000 (1)			90
	160-1600	250-2500		290
	400-4000			290
	600-6000			290
	800-8000 (1)			120
	1000-10000			300
40 (1 ½")	400-4000 (1)			90
	650-6500	800-8000		130 / 160
	1000-10000			150
	1600-16000	2000-20000		180 / 270
50 (2")	600-6000			120
	1100-11000			120
	1800-18000			150
	2300-23000*	3000-30000*	4000-40000	170* / 280
65 (2 ½")	1800-18000			110
	2400-24000*	3000-30000*	4000-40000	150* / 220
80 (3")	2500-25000 (1)	3000-30000 (1)		50 / 60
	4000-40000	5000-50000		140
	6000-60000			220

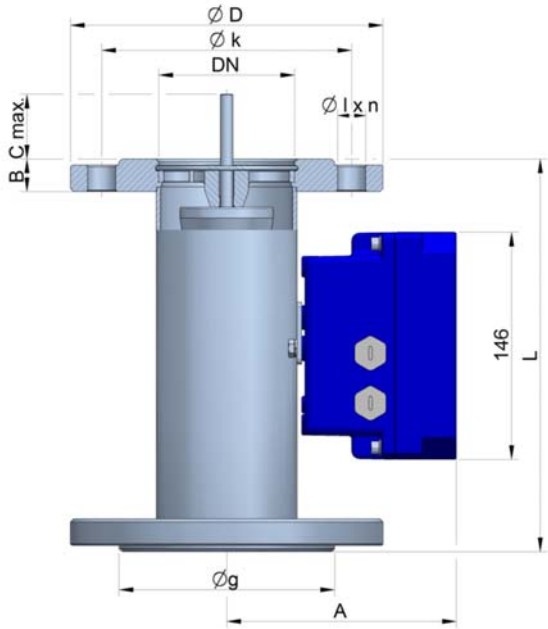
(1) Flow ranges available only with plastic float (PP / PVC / PTFE)

25.3 SM250/INOX (EN 1.4404 – AISI 316L)

Size DN (NPS)	Flow scales Flotador EN 1.4404 (7,95 g/cm³) l/h water		Δp mbar	
	Type T	Type V	Type T	Type V
15 (½")	6-60		55	
	12-120		55	
	16-160		55	
	25-250	30-300	55	55
15 (¾")	25-250	30-300	55	55
	40-400	50-500	55	55
	60-630	80-800	55	55
	80-800	100-1000	60	60
25 (1")	25-250	30-300	60	70
	40-400	50-500	60	70
	60-630	80-800	60	70
	80-800	100-1000	60	70
	100-1000	130-1300	60	70
	120-1200	160-1600	70	80
	160-1600	200-2000	70	100
	200-2000	250-2500	90	120
	250-2500	300-3000	110	160
40 (1 ½")	160-1600	200-2000	45	60
	200-2000	250-2500	45	60
	250-2500	300-3000	45	60
	300-3000	400-4000	45	60
	400-4000	500-5300	55	80
50 (2")	300-3000	400-4000	50	60
	400-4000	500-5300	50	60
	500-5000	650-6500	50	60
	600-6000	800-8000	55	80
	750-7500	1000-10000	70	100
65 (2 ½")	600-6000	800-8000	60	80
	750-7500	1000-10000	60	80
	1000-10000	1300-13000	60	80
	1200-12000	1500-15000	70	90
80 (3")	1000-10000	1300-13000	60	80
	1200-12000	1500-15000	60	80
	1600-16000	2000-20000	60	80
	2000-20000	2500-25000	80	100

26 DIMENSIONS

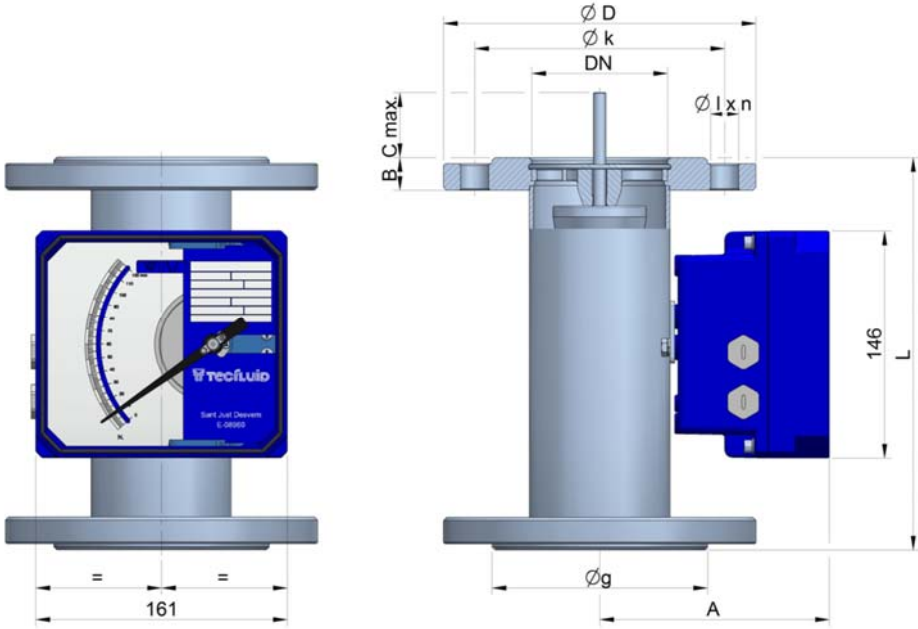
EN 1092-1 flanges



DN	PN	Ø D	Ø k	Ø g	Ø l x n	B	A		C max		L
							SC250	SM250	SC250	SM250	
15	40	95	65	45	14 x 4	16	133	136	45	45	250
25	40	115	85	68	14 x 4	18	146	154	45	45	250
40	40	150	110	88	18 x 4	18	154	167	45	45	250
50	40	165	125	102	18 x 4	20	167	176	45	45	250
65	16	185	145	122	18 x 8	18	176	192	45	45	250
80	16	200	160	138	18 x 8	20	192	211	45	45	250
100	16	220	180	162	18 x 8	20	211	-	45	-	250
125	16	250	210	188	18 x 8	22	236	-	45	-	250
150	16	285	240	218	22 x 8	22	262	-	45	-	300

(dimensions in mm)

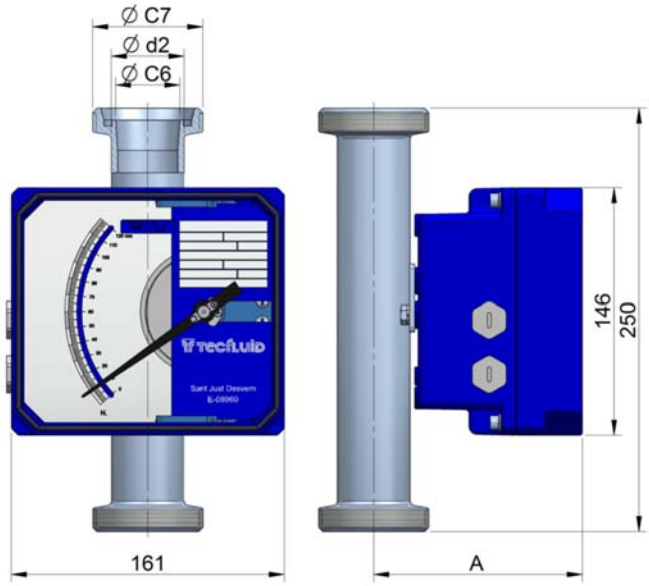
ASME B16.5 flanges



NPS	Class	Ø D	Ø k	Ø g	Ø l x n	B	A		C max		L
							SC250	SM250	SC250	SM250	
½"		88.9	60.3	34.9	15.90 x 4	11.1	122	122	45	45	250
¾"		98.4	69.8	42.9	15.90 x 4	12.7	133	146	45	45	250
1"		107.9	79.4	50.8	15.90 x 4	14.3	146	154	45	45	250
1 ¼"		117.5	88.9	63.5	15.90 x4	15.9	146	154	45	45	250
1 ½"		127.0	98.4	73.0	15.90 x 4	17.5	154	167	45	45	250
2"	150#	152.4	120.6	92.1	19.05 x 4	19.1	167	176	45	45	250
2 ½"		177.8	139.7	104.8	19.05 x 4	22.2	176	192	45	45	250
3"		190.5	152.4	127.0	19.05 x 4	23.8	192	211	45	45	250
4"		228.6	190.5	157.2	19.05 x 8	23.8	211	-	45	-	250
5"		254.0	215.9	185.7	22.20 x 8	23.8	236	-	45	-	250
6"		279.4	241.3	215.9	22.20 x 8	25.4	262	-	45	-	300

(dimensions in mm)

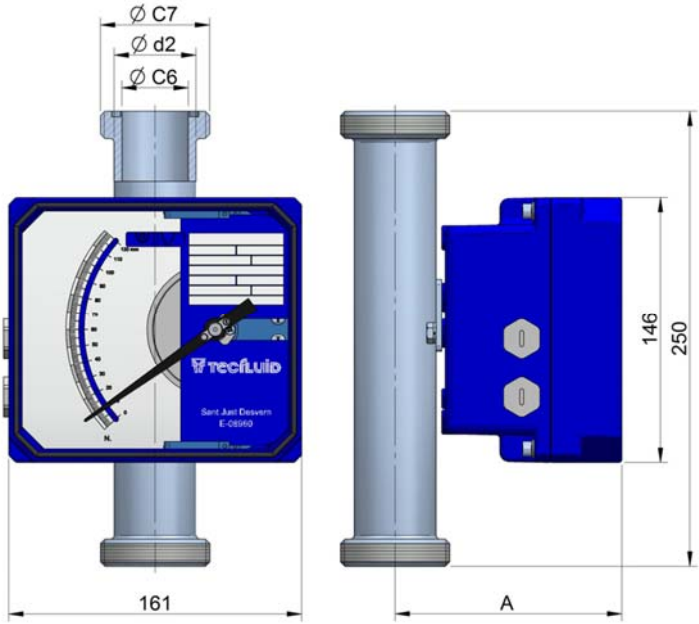
Sanitary connection DIN 11851 (EN 1.4404)



NW - DN	15	25	40	50	65	80	100
Ø C_7	Rd 34 x 1/8"	Rd 52 x 1/6"	Rd 65 x 1/6"	Rd 78 x 1/6"	Rd 95 x 1/6"	Rd 110 x 1/4"	Rd 130 x 1/4"
Ø C_6	17	24.8	35.6	45.8	67	82.8	100
Ø d_2	21.3	30	42	51	73	88.9	108
A	114	118	124	129	140	148	157
DIN EQ.	15(PC)*	15	25	40	50-65	80	100

(dimensions in mm)

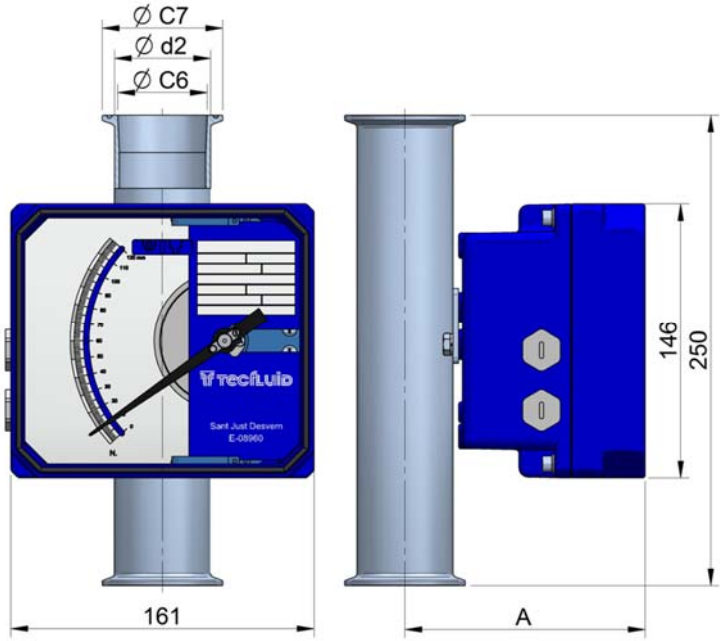
Sanitary connection SMS 1145 (EN 1.4404)



NW - DN	15	25	40	50	65	100
Ø C_7	40	60	70	85	98	125
Ø C_6	22.5	35.5	48.5	60.5	72	100
Ø d_2	25	42	51	63.5	73	108
A	115	124	129	135	140	157
DIN EQ.	15	25	40	50	65	100

(dimensions in mm)

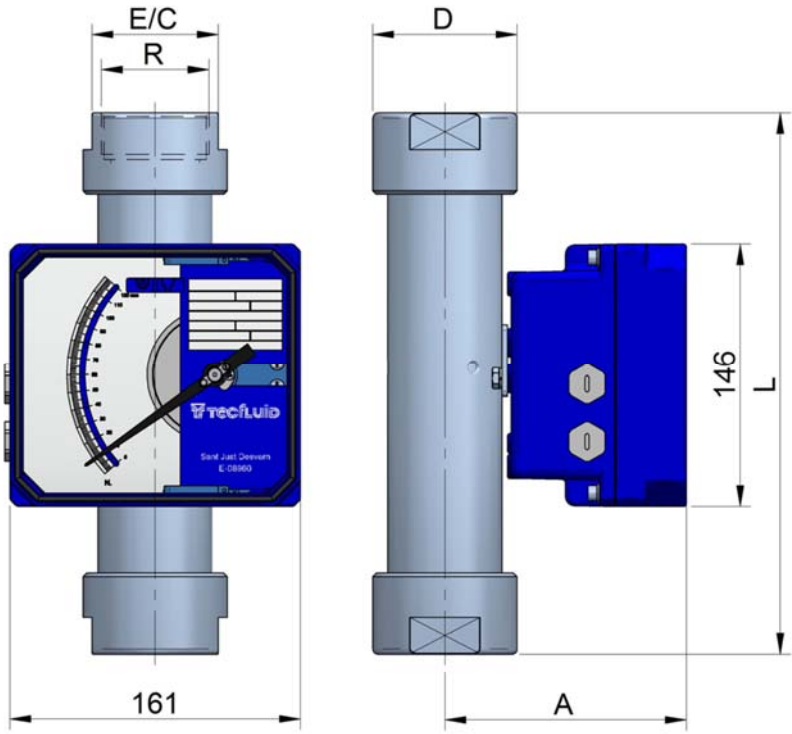
Sanitary connection CLAMP ISO 2852 (EN 1.4404)



Ø C_7	34	50.5	50.5	64	77.5	91	106	130
Ø C_6	17	24.8	35.6	45.8	58.3	67	82.8	100
Ø d_2	21.3	30	42	51	63.5	73	88.9	108
A	114	118	124	129	135	140	148	157
DIN EQ.	15(PC)*	15	25	40	50	65	80	100

(dimensions in mm)

Threaded connection BSP / NPT (EN 1.4404)



R	½”	¾”	1”	1 ½”	2”	2 ½”	3”	4”
L	275	275	285	300	300	310	310	310
D	35	40	50	65	80	90	110	130
A	114	118	124	129	135	140	146	156
E/C	30	35	45	60	70	84	104	124
DIN EQ.	15(PC)*	15	25	40	50	65	80	100

(dimensions in mm)

27 DECLARATIONS OF CONFORMITY ACCORDING TO ATEX

EU Declaration of Conformity

Manufacturer:	TECFLUID S.A. Narcís Monturiol, 33 E 08960 Sant Just Desvern
Equipment:	Series SC, DP flowmeters and LP level meters
Models:	SC250, SC250H, SC250V, SM250, DP65, DP500, LP80
Switches:	AMD1, AMD2, AMM1, AMM2
Transmitters:	TH7, TH7T, TH7H, TH7TH
Certification:	LOM 09ATEX2087 X/2
Group and category:	II 1G Ex ia IIC T4 Ga (transmitter TH7 not encapsulated)
	II 1G Ex ia IIC T6 Ga (transmitter TH7 encapsulated) II 1D Ex ia IIIC T_{200} 85ºC Da II 1D Ex ia IIIC T_{200} 90ºC Da

Standards to which conformity is declared:

Directive ATEX 2014/34/EU

EN60079-0:2018	Equipment. General requirements
EN6009-11:2012	Equipment protection by intrinsic safety "i"

Changes in the current standards regarding the standards mentioned in this declaration of conformity do not affect the EC-type examination certificate LOM 09ATEX2087 X/2 corresponding to this equipment

For production, Tecfluid S.A. complies with the Module D (annex IV) of the directive 2014/34/EU, having the notification for production quality assurance n. LOM 02ATEX9033, of the notified body with identification number 0163 (Laboratorio Oficial J.M. Madariaga)

I, the undersigned, declare that the equipment stated above is in conformity with the essential requirements of the Directives of the European Parliament and the Council on the approximation of the laws of Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

In Sant Just Desvern
Date: October 7, 2022

Alberto Barea (Responsible for Ex Products)

Declaration of Conformity

Manufacturer: TECFLUID S.A.
Narcís Monturiol, 33
E 08960 Sant Just Desvern

Equipment: Flowmeters and level meters

Models: Series SC, DP, LP

Declaration:

Having reviewed the essential health and safety requirements related to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, Tecfluid S.A. consider that this device is outside the scope of the Directive 2014/34/EU, given that it does not content any potential ignition sources. Therefore it does not require certification by a notified body or marking in conformity with the ATEX Directive.

Special emphasis has been done in the compliance of EN 80079-36:2021 standard.

80079-36 5.1

Instructions for use of the equipment include the terms of service.

80079-36 5.2

Ignition hazard assessment.

Potential ignition source		Description of the measure(s) applied
Normal operation	**Expected malfunction**	
Hot surfaces		The equipment itself does not generate any increase of heat, the maximum temperature will depend on the operating conditions (process temperature)
Ingress of dust inside the enclosure		The equipment has an IP65 ingress protection to avoid ingress of dust into the enclosure
Static electricity		A warning label indicating risk of static electricity is placed
Impact of moving parts		Sparks cannot be generated since material is aluminium
Bearings		The bearings cannot generate an ignition
Mechanical resistance		Impact test is performed

80079-36 6.2.3

Maximum surface temperature. The devices themselves do not generate any heat.

80079-36 7.4.2

Classification of non-metallic parts.

There is a non-metallic part in the instrument. It is the front window of the cover. It is made of a transparent plastic (polycarbonate resin, whose trademark is LEXAN® 143R) that allows viewing the needle position on the scale.

80079-36 7.4.3

Thermal endurance.

The temperature index of the equipment is 130 ° C.

80079-36 6.7

When the metal enclosure is made of aluminium, it is coated with an insulating paint whose thickness is always less than 2 mm.

Since the risk of ignition by electrostatic discharge when rubbing the polycarbonate front window cannot be avoided, the instruments include a warning label with the safety measures to be applied in service.

The same case applies to the entire enclosure when it is made of polypropylene.

80079-36 6.4.4 (60079-0 8)

Lightweight materials.

The index of the metal magnesium in the equipment of aluminium enclosure is around 0.2%, well below the established limit of 7.5%.

80079-36 6.7.3

Connection facilities for earthing conducting parts.

The instruments have a safe earth connection for cases where this earth connection by means of the process connection cannot be ensured.

In Sant Just Desvern
Date: October 7, 2022

Alberto Barea (Responsible for Ex Products)

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.

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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