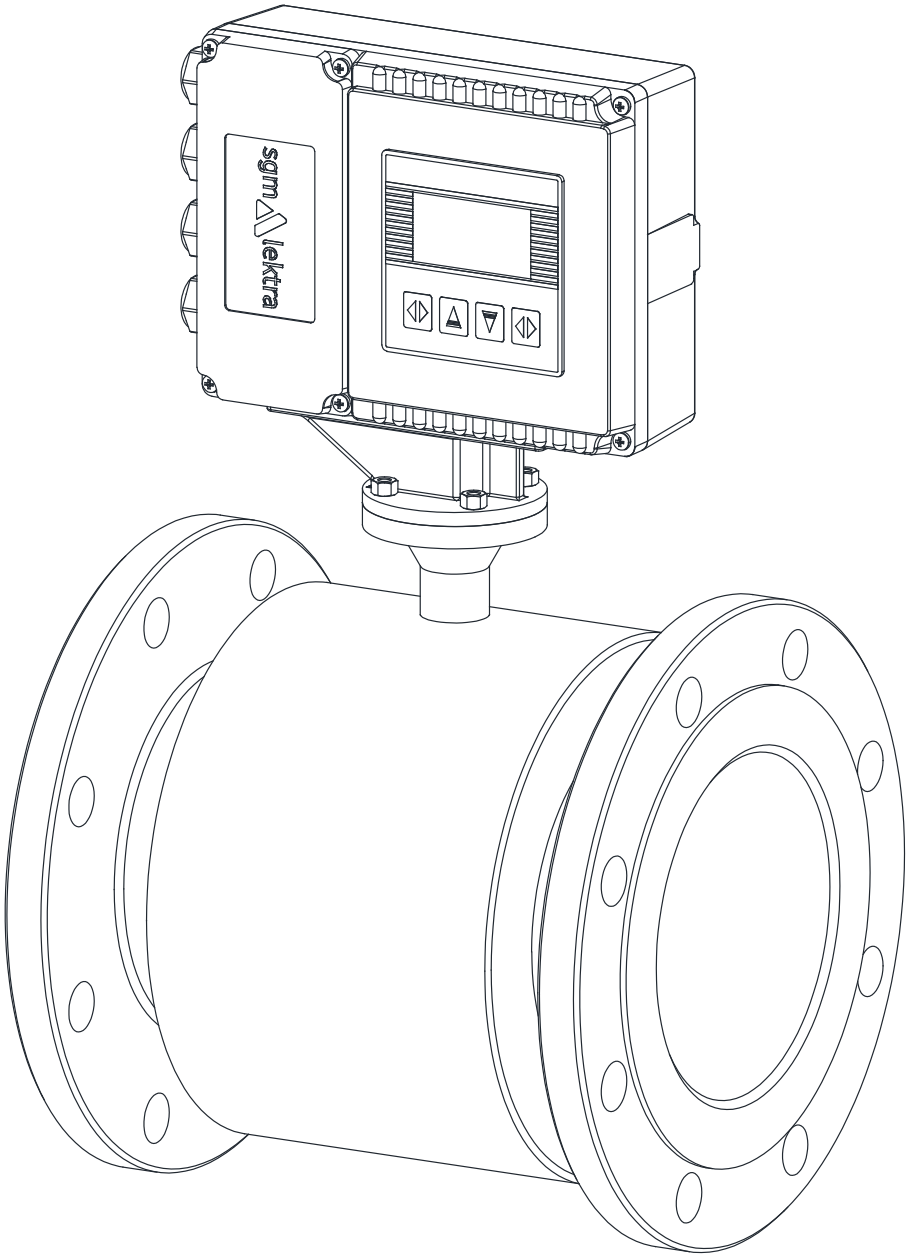
RCmag standard

flow meter for pulp and sewagee



documentazione tecnica IT rev. del 19/09/2024

sgm lektra

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1-WARRANTY

SGM LEKTRA SRL si impegna a porre rimedio a qualsiasi vizio, difetto o mancanza, verificatosi entro 12 mesi dalla data di consegna, purchè sia ad essa imputabile e sia stato notificato nei termini previsti.
SGM LEKTRA SRL potrà scegliere se riparare o sostituire i Prodotti difettosi.
I Prodotti sostituiti in garanzia godranno della ulteriore garanzia di 12 mesi.
I Prodotti riparati in garanzia godranno della garanzia fino al termine originale.
Le parti dei Prodotti riparati fuori garanzia godranno di una garanzia di 3 mesi.
I Prodotti sono garantiti rispondenti a particolari specifiche, caratteristiche tecniche o condizioni di utilizzo solo se ciò è espressamente convenuto nel Contratto di acquisto o nei documenti da esso richiamati.
La garanzia della SGM LEKTRA SRL assorbe e sostituisce le garanzie e le responsabilità, sia contrattuali che extracontrattuali, originate dalla fornitura quali, ad esempio, risarcimento di danni, rimborsi di spese, ecc., sia nei confronti del Cliente, sia nei confronti di terzi.
La garanzia decade nel caso di manomissioni o di utilizzo improprio dei Prodotti.

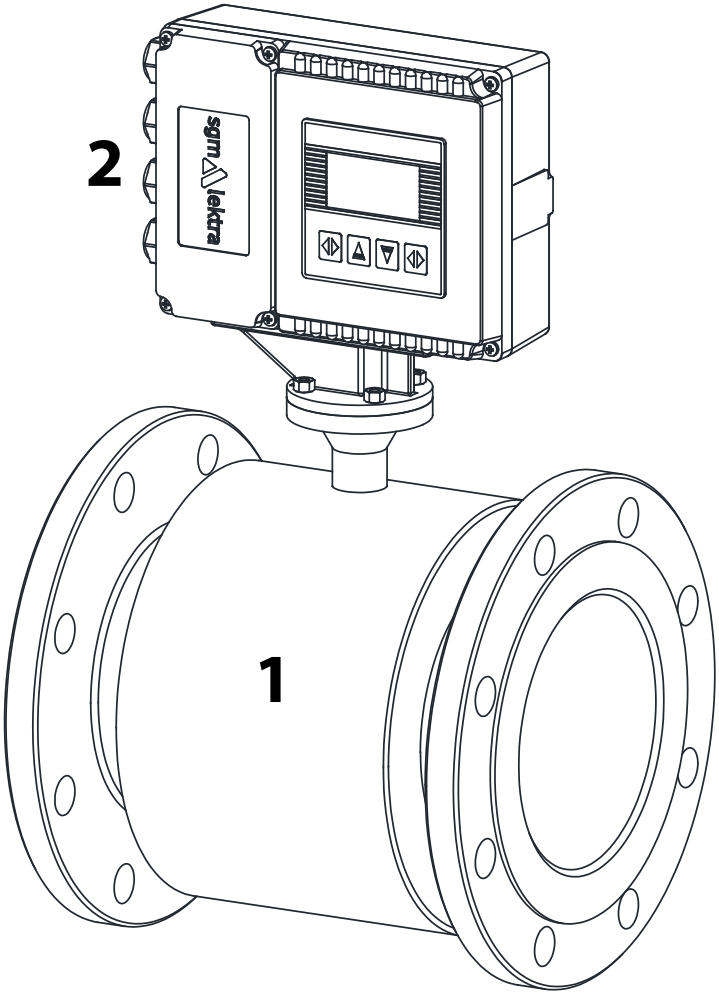
2-CALIBRATION CERTIFICATE

The magnets are all individually tested on 3-point calibration rigs.
SGM LEKTRA issues a document on letterhead that certifies the average error of the 3 calibration points.
The calibration document is supplied together with the unit itself.
SGM LEKTRA keeps a file of the test data of each magnet on the basis of which the relative certificate was issued.
The calibration rig is certified by the NIM (National Institute of Metrology), which is recognized by the international body BIPM (Bureau International des Poids et Metrologie), and complies with the NTC ISO IEC 17025 standards

3- PRODUCT

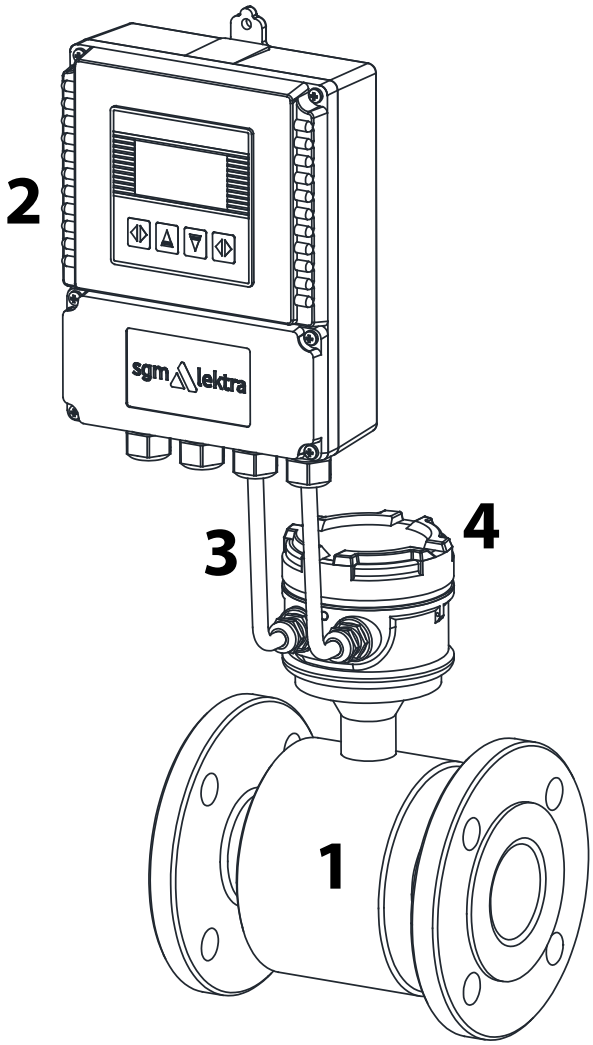
COMPACT VERSION

1- SENSOR PIPE
2- CONVERTER



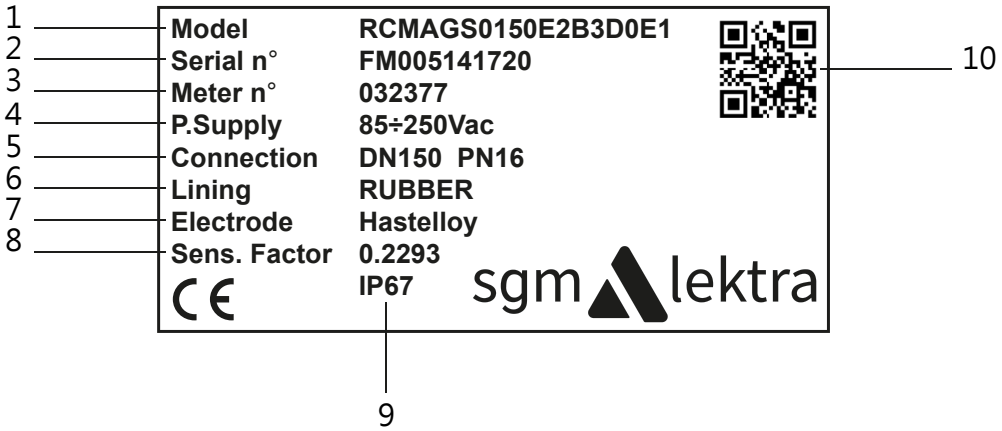
REMOTE VERSION

1- SENSOR PIPE
2- CONVERTER
3- CONNECTION CABLES
4- CONNECTION HOUSING



3.1 - IDENTIFICATION

Every instrument has an adhesive identification plate on which the main information about the meter is outlined.
The following image describes the information and data on the plate.



1. Product Code
2. Serial number
3. Production lot
4. Supply voltage
5. Process connection
6. Coating material
7. Electrodes material
8. Sensor coefficient
9. Protection rating
10. QR code, link to the product web page

4-TECHNICAL SPECIFICATIONS

Flow range
Processing of signals coming from fluids with speeds up to 10m/s in both directions (bidirectional meter).

Lining material / range size
PTFE DN10 ÷ DN500
RUBBER DN65 ÷ DN2000

Sensor material
SS321

Electronic housing material
epoxy painting aluminium

Electrode material
SS316L - Hastelloy C - - Titanium – Tantalum - Platinum

Measurement range
<0,1m3/h ÷ >110000m3/h

Accuracy
±0,5%

Repeatability
±0,1%

Fluid conductivity
The fluid must have a conductivity of at least 20 micro-Siemens

Power supply voltage
85 ÷ 250Vac; 20 ÷ 36 Vac/Vdc; 11 ÷ 13Vdc

Sensor pipe temperature range
Remote version process temperature: rubber -10 ÷ +80°C; PTFE -40 ÷ +150°C
Compact version process temperature: rubber -10 ÷ +80°C; PTFE -40 ÷ +100°C
Storage temperature: -40÷85°C

Converter temperature range
-20 ÷ 60°C

Communication protocol
Modbus (opz.)

Output signals
Pulse: open collector
Analog: 4÷20mA

Reverse flow
Instantaneous measurement and totalisation of the reverse flow.

Start time
0.5s from zero flow.

Flow cutoff
Adjustable. Below the set value, the instantaneous flow is displayed and the outputs are forced to zero.

Relative humidity
≦ 95%

Response time (integration)
Adjustable between 0.1 and 99 seconds

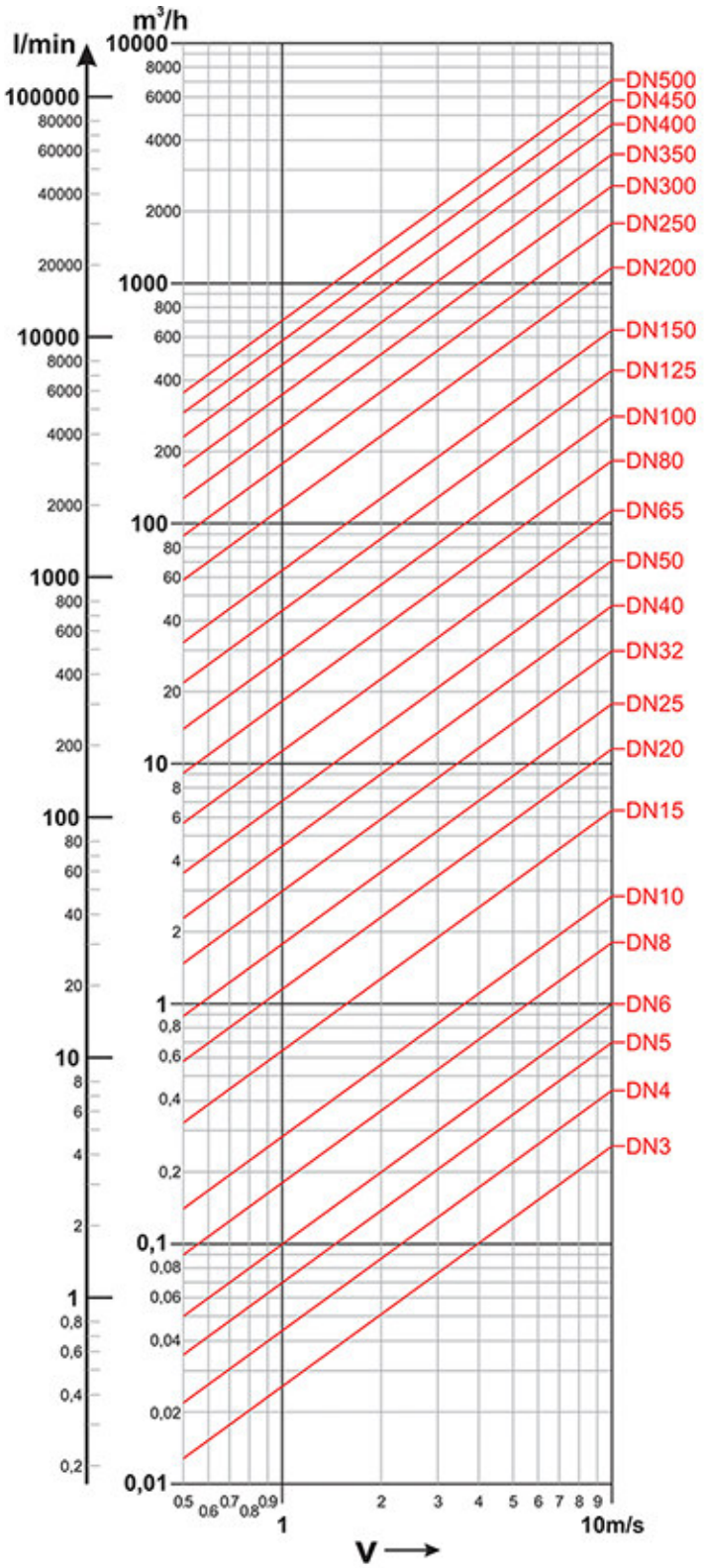
Compact version protection
IP65

Remote version protection
sensor IP67 / IP68 (by request) - converter IP67

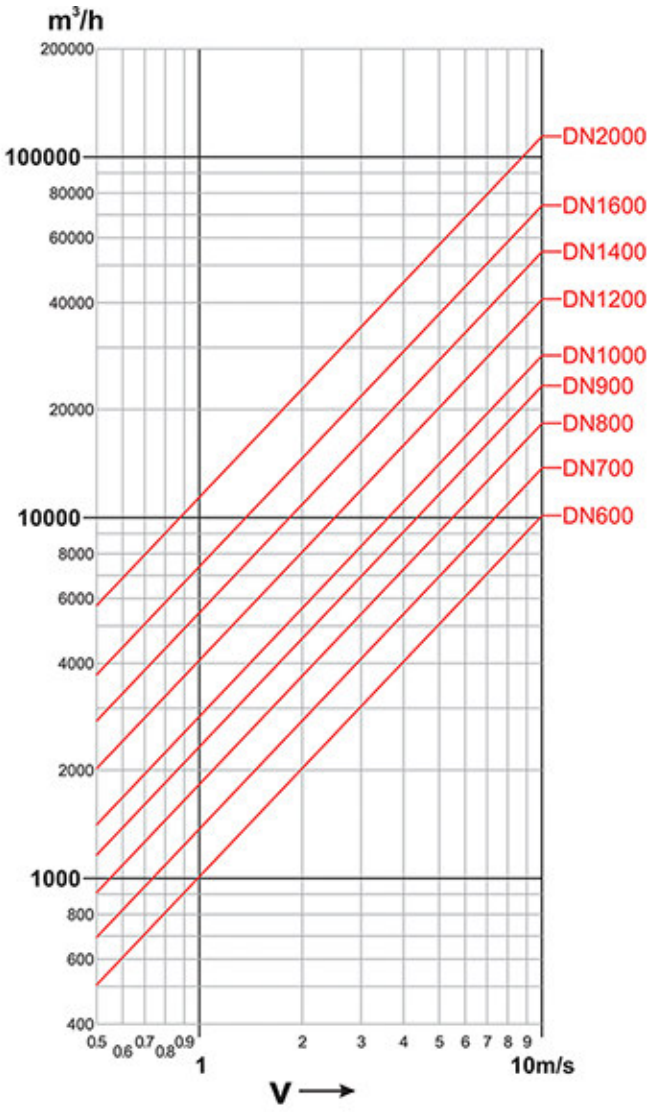
5-FLOW RANGE

5.1 - FLOW RANGE GRAPH

Flows from DN3 to DN500 (standard min.DN10)



Flows from DN600 of DN2000

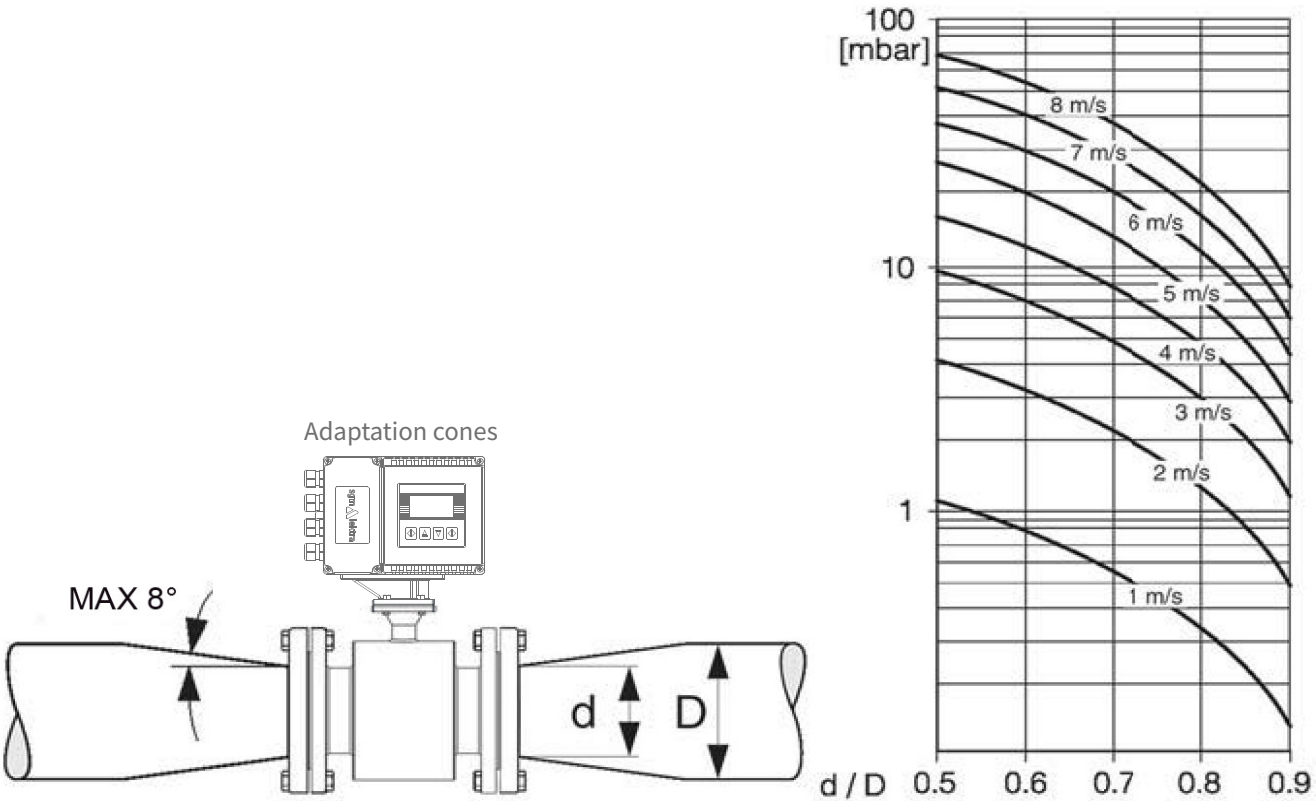


5.2 - FLOW RANGE TABLE

Flow range table DN10 ÷ 1600	
DN (mm)	**Minimum (0,5 m/s) / maximum (10 m/s) ramge**
10	0.14 ÷ 2.9 m3/h
15	0.3 ÷ 6 m3/h
20	0.5 ÷ 12 m3/h
25	0.6 ÷ 18 m3/h
32	1 ÷ 30 m3/h
40	1.8 ÷ 42 m3/h
50	3 ÷ 66 m3/h
65	5.8 ÷ 120 m3/h
80	8.9 ÷ 180 m3/h
100	11 ÷ 282 m3/h
125	20 ÷ 450 m3/h
150	30 ÷ 600 m3/h
200	50 ÷ 1100 m3/h
250	85 ÷ 1700 m3/h
300	110 ÷ 2400 m3/h
350	180 ÷ 3300 m3/h
400	220 ÷ 4200 m3/h
450	270 ÷ 5400 m3/h
500	320 ÷ 6600 m3/h
600	490 ÷ 9600 m3/h
700	680 ÷ 13500 m3/h
800	900 ÷ 18000 m3/h
900	1200 ÷ 22500 m3/h
1000	1450 ÷ 28000 m3/h
1200	2500 ÷ 40000 m3/h
1400	3000 ÷ 55000 m3/h
1600	4000 ÷ 65000 m3/h (9 m/s)

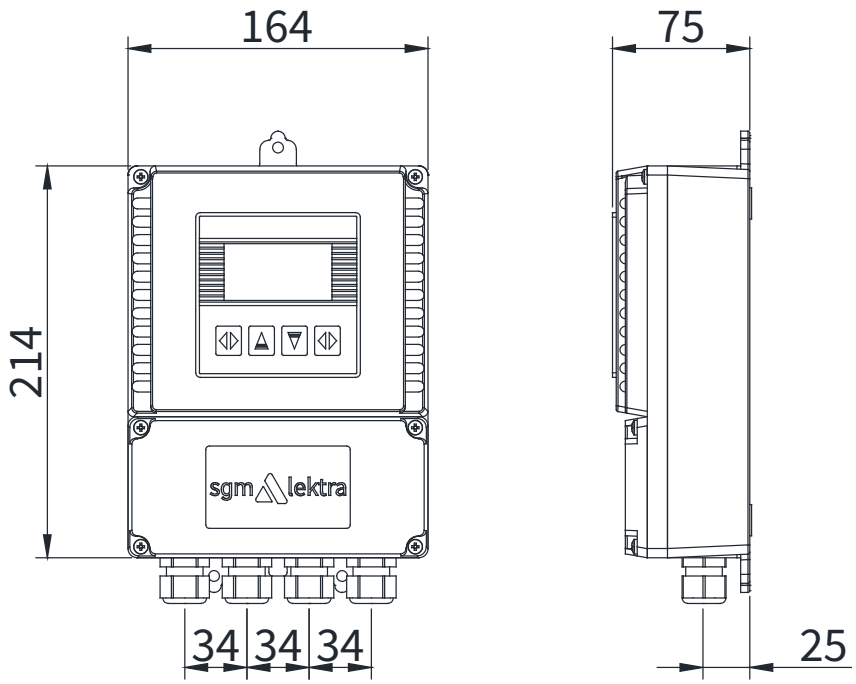
MAX FLOW	
DN (mm)	**Default flow**
10	3
15	6
20	12
25	18
32	30
40	42
50	63
65	120
80	180
100	250
125	450
150	600
200	1000
250	1700
300	2400
350	3300
400	4200
450	5400
500	6600
600	9600
700	13500
800	18000
900	22500
1000	28000
1200	40000
1400	55000
1600	65000

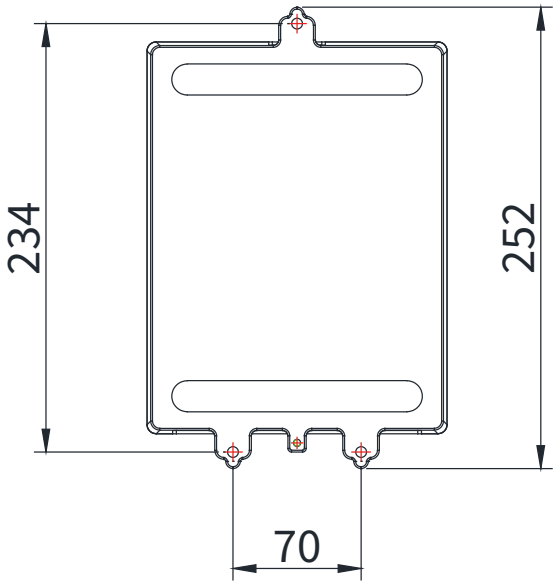
5.3 - HEAD LOSS



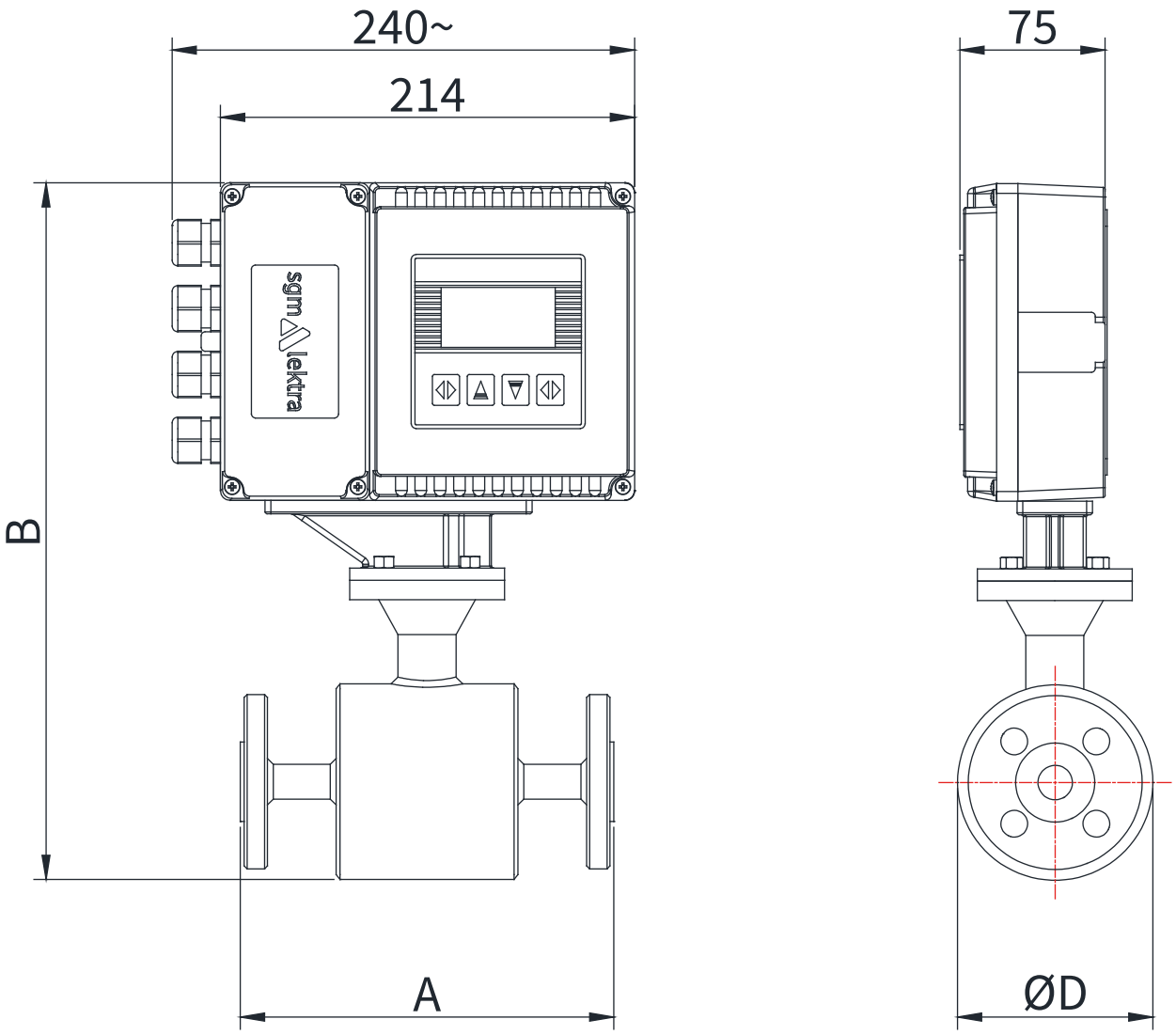
6-DIMENSIONS

6.1 - REMOTE VERSION CONVERTER - WALL MOUNTING



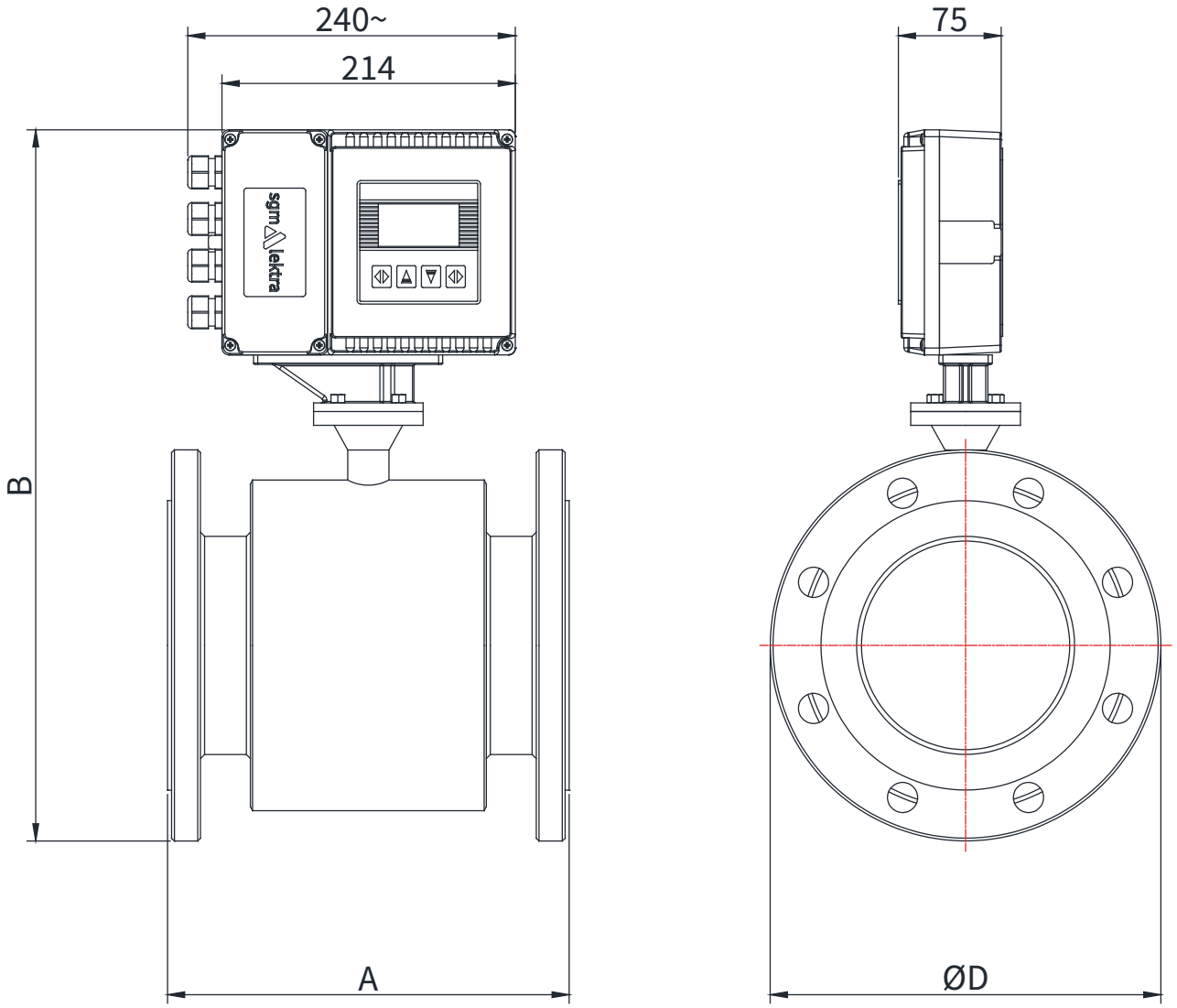


6.2 - COMPACT VERSION DN10 ÷ DN80 PN16 - PN40



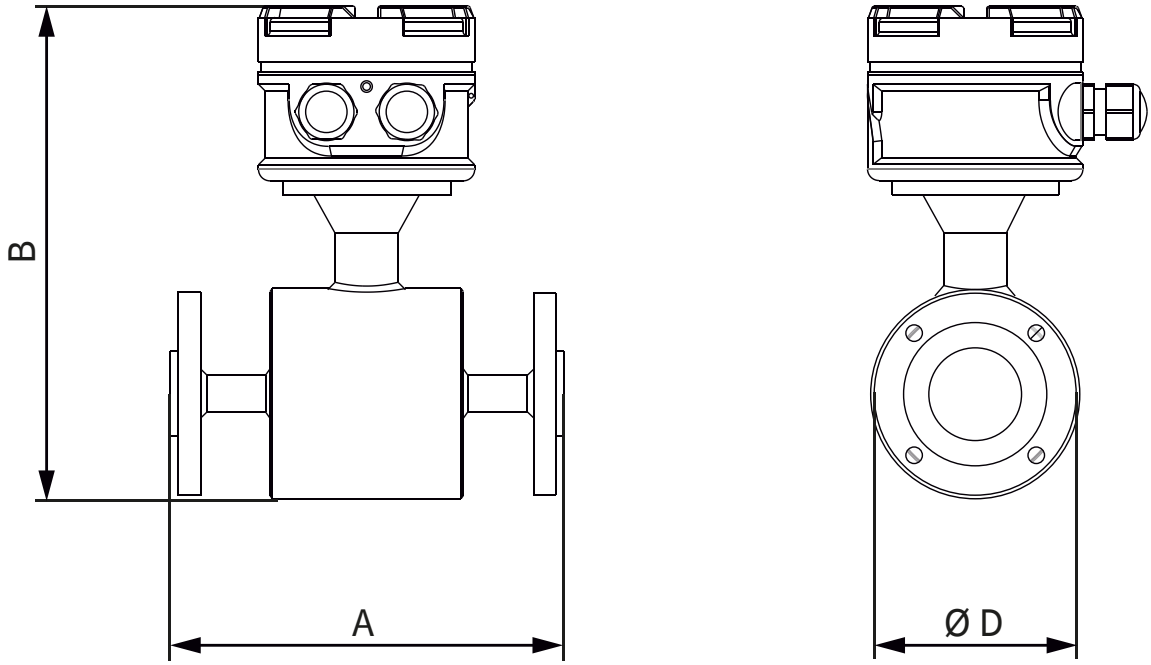
DN (mm)	A (mm)	PN 16 - PN 40	
		B (mm)	ØD (mm)
10	200	60	90
15		60	95
20		65	105
25		65	115
32		180	140
40		200	150
50		205	165
65		225	185
80		240	200

6.3 - COMPACT VERSION DN100 ÷ DN1000 PN10 - PN16 - PN40



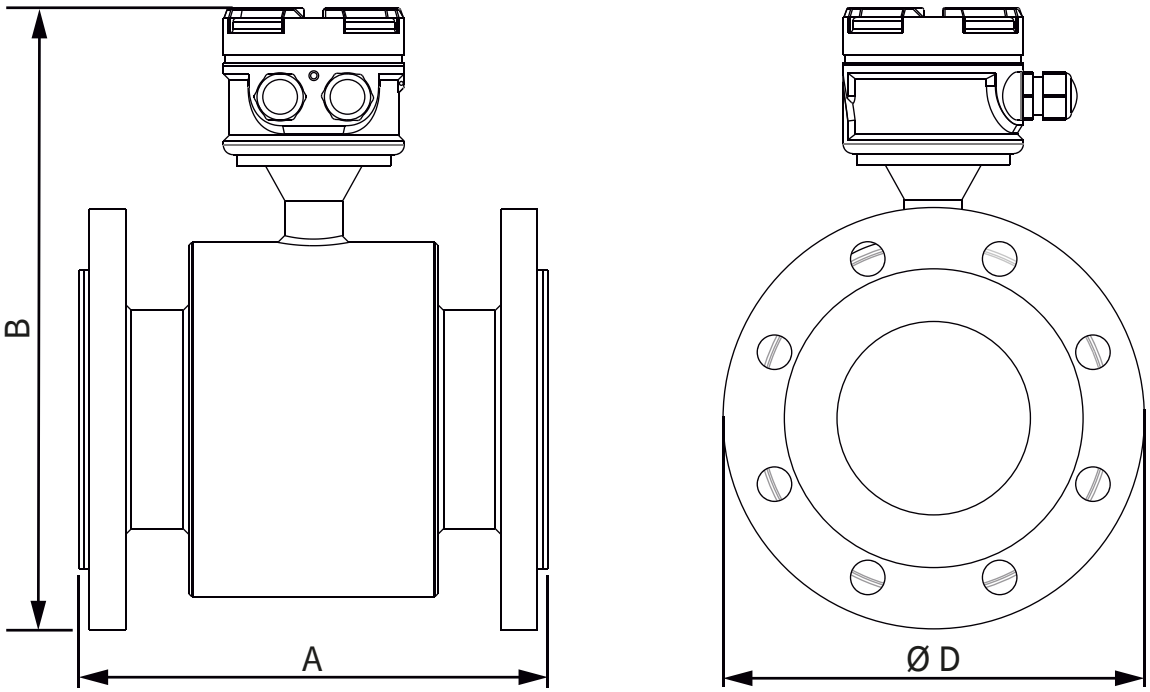
DN (mm)	A (mm)	PN 10		PN 16		PN 40	
		B (mm)	ØD (mm)	B (mm)	ØD (mm)	B (mm)	ØD (mm)
100	250	-	-	465	220	475	235
125	250	-	-	490	250	500	270
150	300	-	-	525	285	530	300
200	350	580	340	580	340	600	375
250	450	635	395	640	405	665	450
300	500	680	445	690	460	715	515
350	550	735	505	745	520	775	580
400	600	795	565	805	580	845	660
450	600	845	615	860	640	880	685
500	600	895	670	915	715	935	755
600	600	1000	780	1030	840	940	890
700	700	1120	895	1125	910	-	-
800	800	1230	1015	1235	1025	-	-
900	900	1335	1115	1340	1125	-	-
1000	100	1425	1230	1440	1255	-	-

6.4 - REMOTE VERSION DN10 ÷ DN25 PN16 - PN40



DN (mm)	**A** (mm)	**PN 16 - PN 40**	
		B (mm)	**ØD** (mm)
10	200	235	90
15		235	95
20		240	105
25		240	115

6.5 - REMOTE VERSION DN32 ÷ DN1000 PN10 - PN16 - PN40



DN (mm)	A (mm)	PN 10		PN 16		PN 40	
		B (mm)	**ØD** (mm)	**B** (mm)	**ØD** (mm)	**B** (mm)	**ØD** (mm)
32	200	-	-	251	140	254	140
40	200	-	-	270	150	270	150
50	200	-	-	280	165	280	165
65	200	-	-	298	185	298	185
80	200	-	-	315	200	315	200
100	250	-	-	333	220	343	235
125	250	-	-	358	250	368	270
150	300	-	-	393	285	400	300
200	350	450	340	450	340	468	375
250	450	505	395	510	405	533	450
300	500	550	445	558	460	586	515
350	550	605	505	613	520	643	580
400	600	665	565	673	580	713	660
450	600	715	615	728	640	751	685
500	600	765	670	785	715	805	755
600	600	870	780	900	840	810	890
700	700	987	895	995	910	-	-
800	800	1100	1015	1105	1025	-	-
900	900	1202	1115	1207	1125	-	-
1000	1000	1293	1230	1306	1255	-	-

7-7- INSTALLATION

This section covers the procedures for installing the Rcmag magnetic flow meter.

7.1 - SAFETY MESSAGES

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel carrying out the operations. Safety information will be highlighted by the warning symbol.

Refer to the following safety guidelines before performing an operation preceded by this symbol ⚠

7.2 - WARNINGS

7.2.1 - Explosions may cause death or serious injury

- Check that the installation and operation area comply with the characteristics of the sensor tube and the transmitter.
- Do not open the transmitter in explosive atmospheres when the power supply is switched on.

7.2.2 - Failure to follow safe installation and maintenance guidelines can result in death or serious injury

- The installation must be carried out only and exclusively by skilled personnel.
- Do not perform any operations other than those described in this manual.

7.3 - PREPARATION FOR INSTALLATION

There are several preparation steps that make the installation process easier.
They include identifying the options and configurations that apply to your application, setting switches if necessary, and considering mechanical, electrical, and environmental requirements.
We remind you that the inner lining of the measuring tube can be damaged if handled incorrectly.
Do not place any objects inside the measuring tube in order to lift or leverage.
Any damage to the inner lining of the measuring tube can make the latter unusable.

7.3.1 - Options and configurations

Standard functions of the Rcmag include checking the measuring tube coils and of one or more of the following configurations or options:

- Analogical output
- Pulse output
- MODBUS RTU output

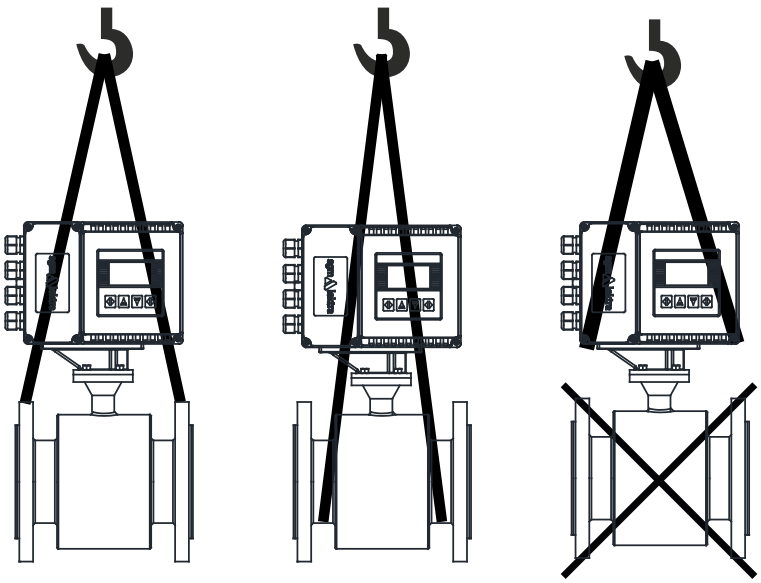
Be sure to correctly identify the options and configurations relevant to your application, and prepare a list to be used during the installation and configuration procedure.

7.3.2 - Mechanical Considerations

The mounting site for the RCmag Integral Mount Transmitter should provide enough room for secure mounting, easy access to the conduit ports, full opening of the transmitter covers, and easy readability of the local operator interface (LOI) screen.

7.3.3 - Lift

The flowmeter can be lift ed using the lift as shown in following pictures.
The safe load and measure for the li” should reach to the relative requirement.
Don’t lift the flowmeter using the rope to tie the connection between the sensor and the transmitter (compact version) or the connecting box (remote version).

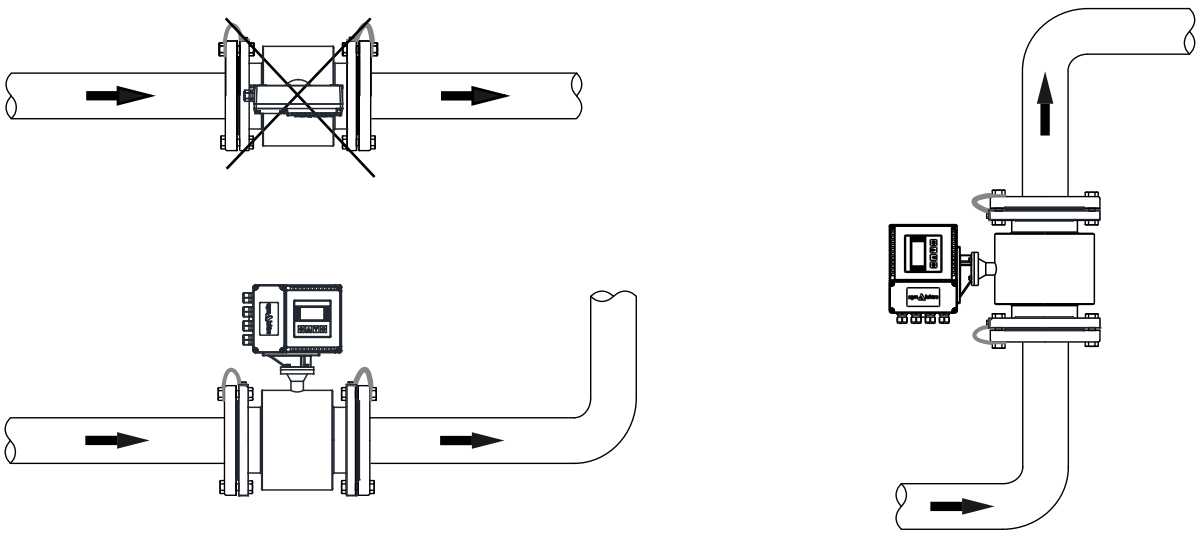


7.4 - INSTALLATION GENERAL CRITERIA

The direction arrow marked on the nameplate is flow direction when calibrated in factory, you should install the flowmeter to make the actual flow direction same as the flow direction arrow marked on the nameplate.
If this is not possible, simply reverse the direct flow direction through the “Indication”.
The upstream straight pipe should be longer than 5XDN and the downstream straight pipe should be more than 3XDN in order to guarantee the accuracy of measurement.

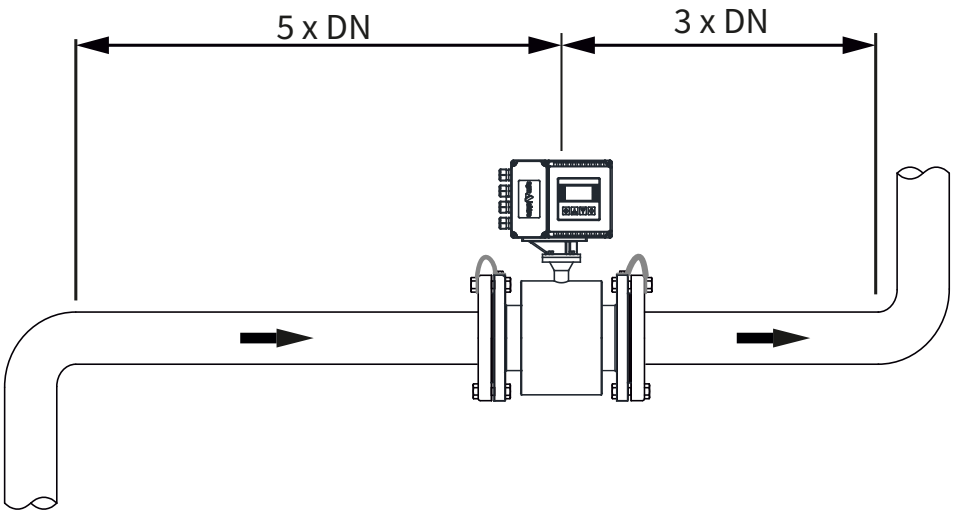
7.5 - INSTALLATION IN PIPELINE

Installation may be horizontal or vertical, but make sure no deposit on the electrodes or air bubbles when horizontal installation.

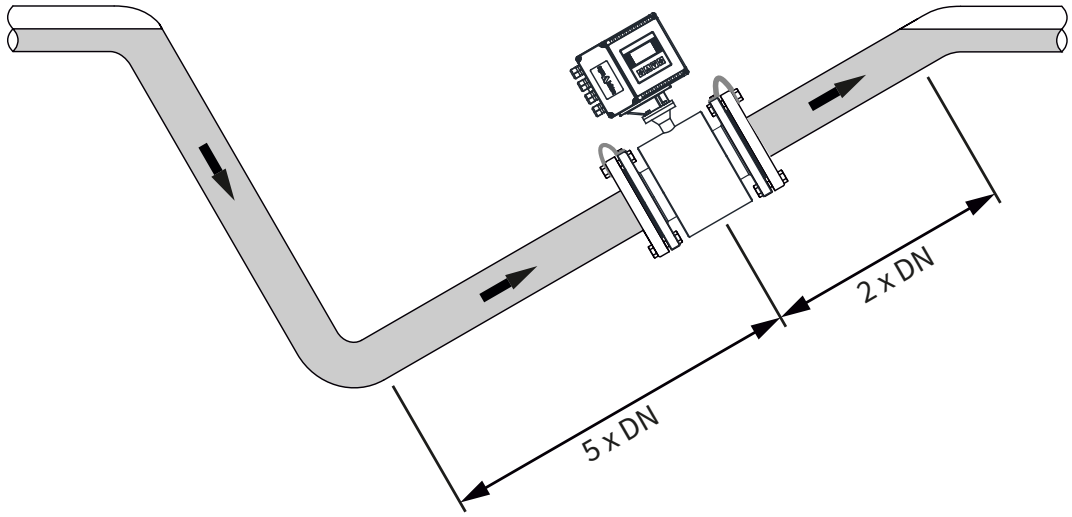


Installation in horizontal or vertical pipeline

To install an rectifier or straight pipe is necessary to normalize the flow profile if there are pipe elbow, flow regulation valve or half-open ball valve in front of the sensor.

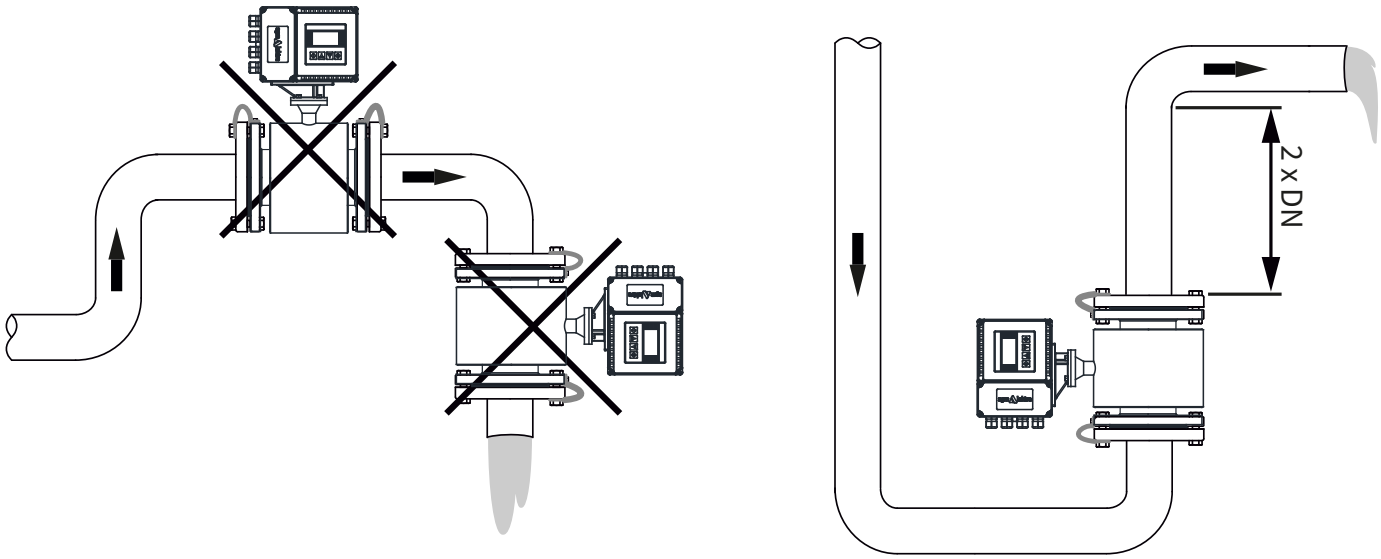


The electromagnetic flowmeter must be installed so that the pipe is always completely filled with fluid.
In partially filled pipe case, the flowmeter must be installed with the siphon phenomenon, for which the pipe stretch where the meter is installed is kept always full.



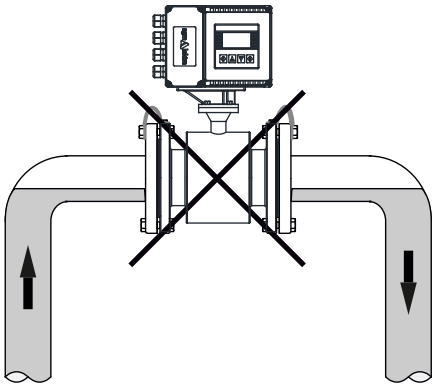
Installation in partially filled pipes

The electromagnetic flowmeter must not be installed in the pipe section with a free pipe outlet that could run empty.
When installating in a downstream pipe, please make sure the pipe is always fully filled with medium.



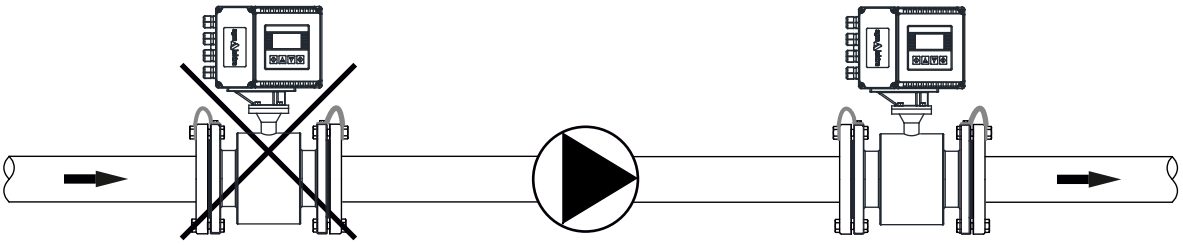
Installation in pipe without emptying

The electromagnetic flowmeter cannot be installed at the pipe highest point, because air or gas accumulations may occur in the measuring pipe.



Installation at highest point

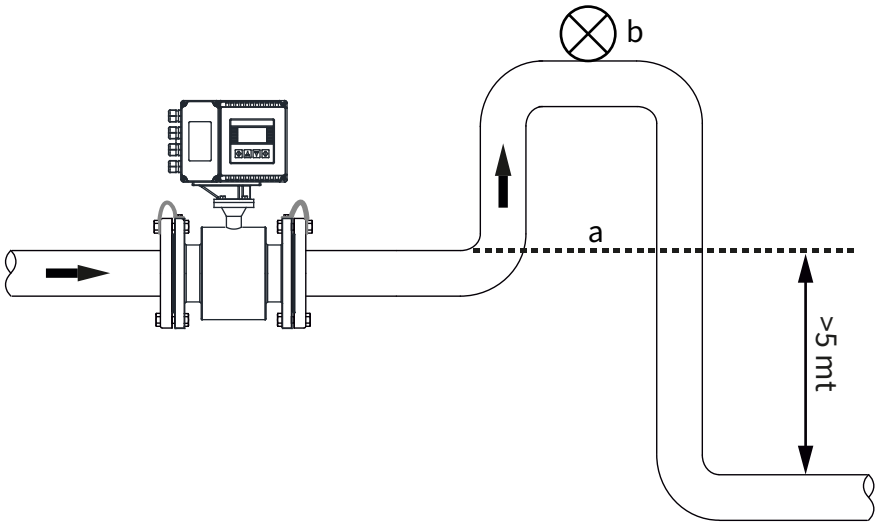
The electromagnetic flowmeter cannot be installed upstream of a pump to prevent cavitation, which can damage the sensor lining.



Pump proximity installation

Install a siphon (a) with a vent valve (b) downstream of the sensor in down pipes longer than 5 meters.
This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube.

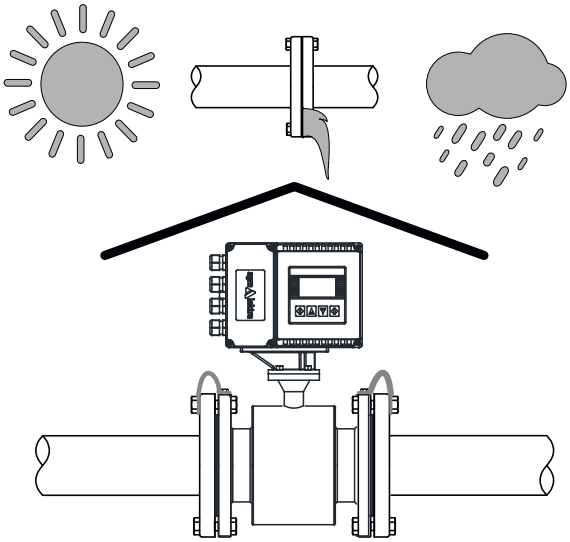
WARNING: all the phenomena that generate a strong depression inside the pipe can irremediably damage the insulating coating of the sensor tube itself.



Installation in proximity of a > 5m down pipe section

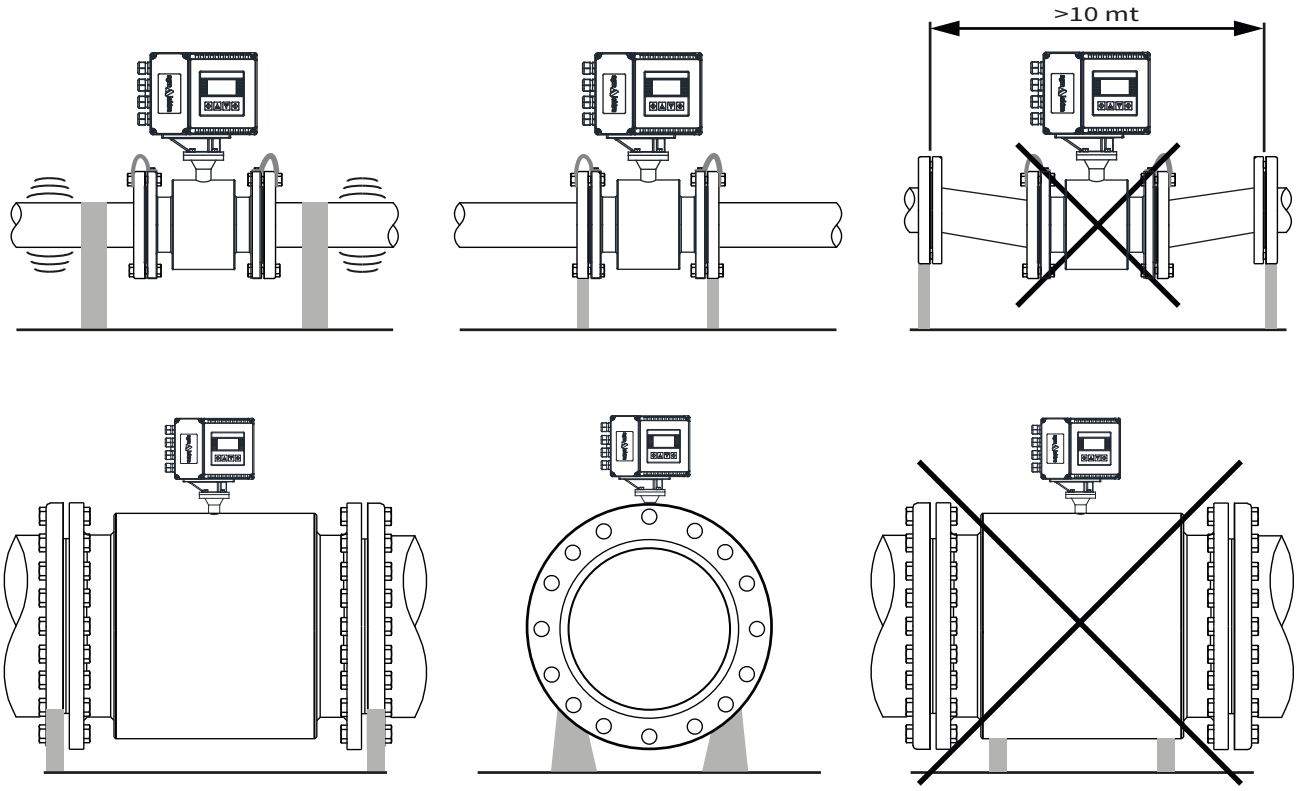
7.6 - INSTALLATION PRECAUTIONS

An all-weather cover should be used to prevent the housing from the direct sunlight or rain when the device in outdoors
The flowmeter should the excessive vibrations, large ambient temperature changing and long-time shower.
It should be prevent from the leakage of the corrosive liquid.



7.7 - PIPE CONNECTION

The sensor should be supported by the connecting pipes, it cannot withstand its own weight.
Mechanical and thermal stress must be avoided.



7.8 - MOUNTING REQUIREMENTS

a) The sensor pipe and the line pipes must have the same axis. For the sensors under DN50, the axial difference between the measuring tube and operating pipe should be less than 1.5mm; for the sensors from DN65 to DN300, it should be less than 2mm; for the sensor over DN350, it should be less than 4mm.

b) The gasket between flanges should have a good corrosive resistance. The gasket must not extend to the pipe inside.

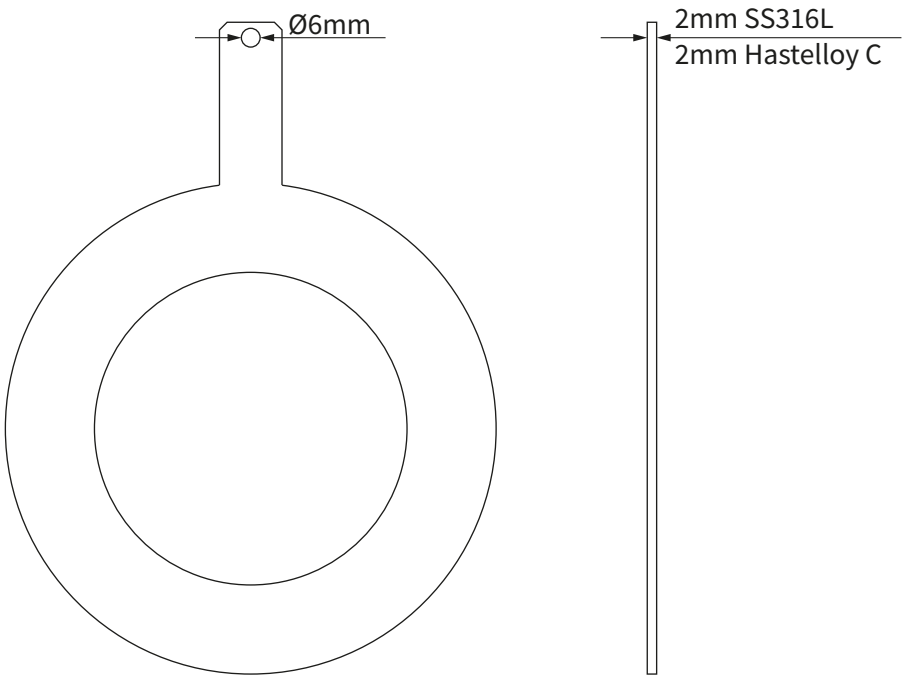
c) The threads of the fasten bolts and nuts should be in good condition.
The bolts should be fastened using torque spanner with certain torque according the size of flange.

d) It should take separate measure to prevent the lining from heat when weld or flame cutting in the pipe closed to sensor. If the sensor is installed in a well or immersed in water, the connecting box for sensor must be filled and sealed with sealing glue after commissioning).

7.9 - ACCESSORIES

7.9.1 - Grounding ring, optional

Material: SS316L or Hastelloy C Thickness: 2mm
For the non-conductive pipe, the grounding rings should be installed between the flanges of sensor and pipe to make the flowmeter and measured medium at same potential.

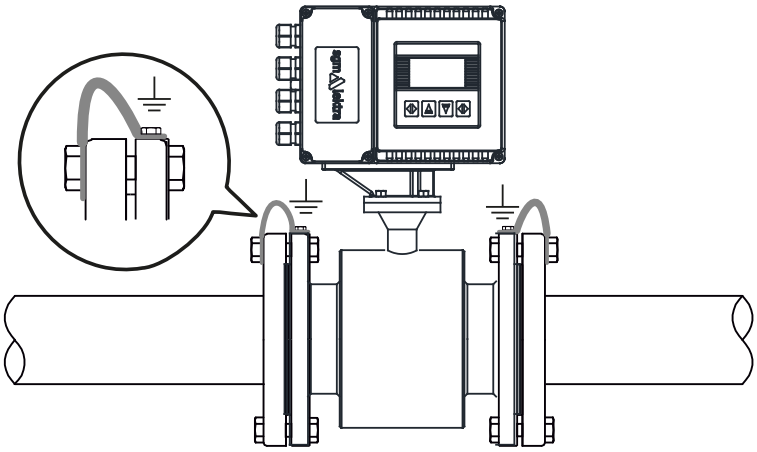


Grounding ring

7.10 - EQUIPOTENTIALITY AND ELECTRICAL INTERFERENCE REDUCTION

The measuring circuit assumes the fluid at ground potential, as it is in most of application with conductive pipes.
The sensor is isolated from the fluid because of the lining, therefore it's necessary to connect the grounding cables to the pipe's flanges, as shown in fig. 18-A. The resistance for grounding connection should be less than 10ohm.
Most of application do not require special precautions for installation, the only requirement is to keep the signal cable separate from the main cable.
In case of sensor with cathodic protection or electrolysis processes, the main current shall not flow through the measured fluid. The following measure should be taken in order to reduce the influence of magnetic field:

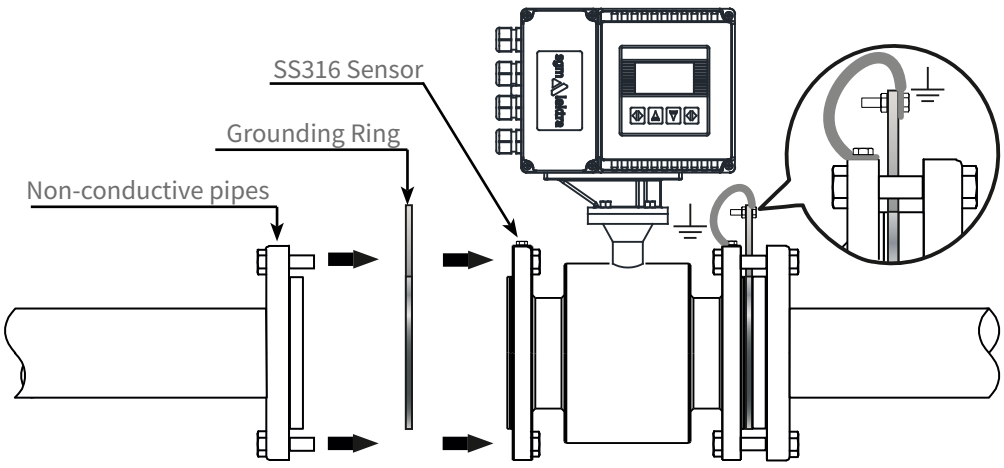
a) With conductive pipes, potential equalization is made by connecting sensor and the adjoining pipes as shown in figure. The bolt connection for flanges cannot be used instead of the electric connection, it must have an additional electric connection as shown in the following drawing.



Sensor equipotentiality

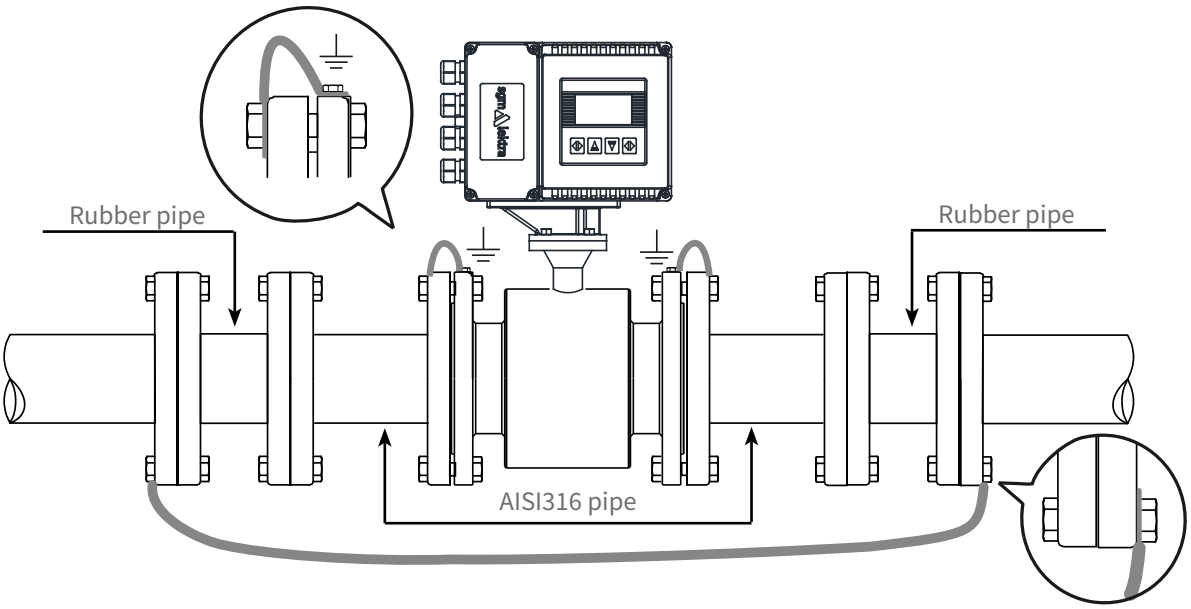
b) For the non-inductive pipe have to use sensor pipe with third electrode or, alternatively, two grounding rings should be installed between the both flanges for sensor and the both flanges for pipe.

N.B.: In application with dark/waste water or similar, the use of grounding rings is recommended.



Grounding with non-conductive pipes

c) Some systems, such as pipes with cathodic protection, may be affected by potential disturbance because not all the line is at ground potential. In order to eliminate this type of interference, it must be isolate the line with two rubber pipes as shown.



Line sectioning

7.11 - PREPARATION FOR OPERATION

Strictly check the instalment and wirings before it gets into operation!

It shall be pointed out that the instrument, including the sensor and converter has been fully adjusted, calibrated with actual flow, and inspected under strict measures. All the units are certified. No further adjustments are required when put it into operation. Observing the contents in this manual, to check and analyze any malfunction.

The following steps are to be followed to get the instrument into operation.

1) Make sure that the sensor is completely filled with fluid.

2) Turn the power supply ON. After approx. one minute, the display will show a value which indicates that the wire connection is correct. If the flow value is negative, it can be adjusted via the “FLOW DIRECTION” parameter”.

3) Zero verification. Shut off the valve tight in downstream first and then the valve in upstream, to let the liquid stops to flow in the pipeline. The displayed value should be 0.
The value displayed can be corrected at the converter if the value is different than 0.

7.12 - MAINTENANCE

Generally, no extraordinary maintenance is needed on magnetic flowmeter.
Only in case the product can adhere to the inner wall of the sensor, and its electrodes, it is necessary to perform periodic cleaning operations.
Be careful not to damage the lining and the electrodes.

8-ELECTRICAL CONNECTIONS

8.1 - CABLE INPUT

The compact version converter enclosure has n. 2 M20x1.5 cable glands.
The remote version has n.2 M16x1.5 cable glands for sensor pipe connection.

8.2 - ELECTRICAL CONNECTION REQUIREMENTS

Before making the electrical connections, consider the following standards and be sure to have the correct power supply, ducts and other accessories.

8.2.1 - Power supply voltage

RPmag transmitter is designed to be powered with 85÷250Vac, 20÷36Vac/Vdc e 11÷13Vdc voltage.

8.2.2 - Power supply voltage interruption

Power supply wires must be connected to the device via a circuit breaker or an external disconnecting switch.
The switch or circuit breaker should be clearly labeled and located close to the transmitter.

8.3 - INFILTRATION AND HUMIDITY PREVENTION

To avoid the humidity infiltration inside the converter and sensor pipe is recommended:
- fully well tighten the cap and the cable glands
- position the cable so that it forms a downward curve at the M20x1.5 and/or M16x1.5 output (see below figure); in this way the condensation and/or rain water will tend to drip from the curve bottom.

8.4 - POWER CONNECTION

To connect the power supply to the meter, complete the following steps:

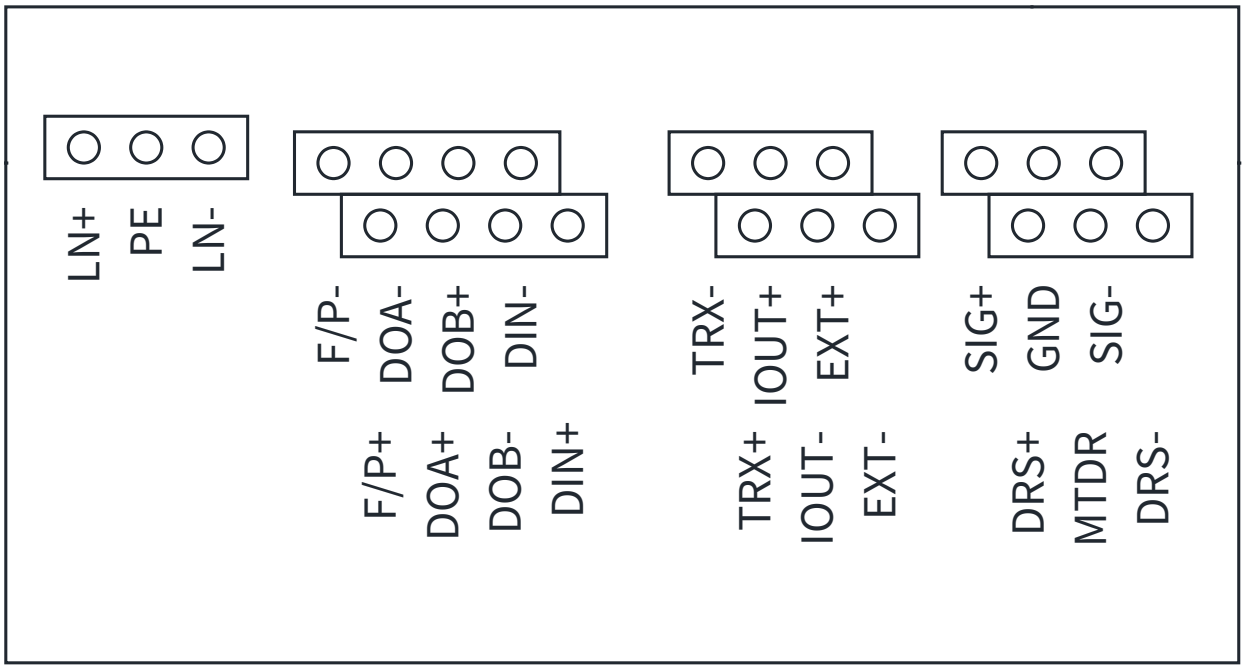
1) Open the box connections cover.
2) Insert the power supply cable through the cable gland.
3) Follow the sequent list to connect the power supply cable: AC

AC units:

- Connect the GND grounding to PE terminal
- Connect the neutral to N terminal.
- Connect the phase to L terminal.

DC units:

- Connect the GND grounding to PE terminal
- Connect the 20÷36Vac/Vdc or 11÷13Vdc to LN+ terminal (+).
- Connect the 0V to LN- terminal



8.5 - OUTPUT

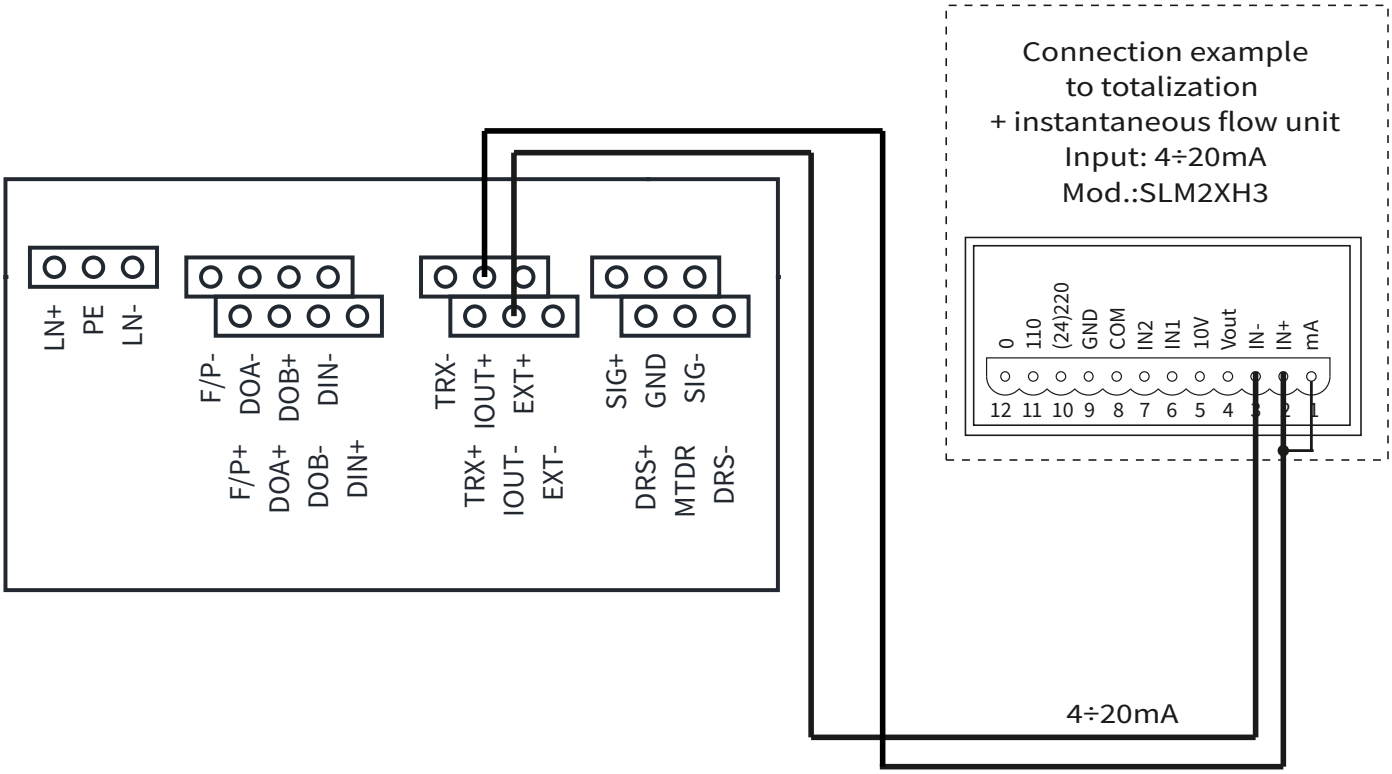
To connect the analog and/or impulsive output follow the instructions of the following points

8.5.1 - Analog output

The current output is powered from the transmitter.
The circuit resistance must be equal to or less than 500ohm.
Follow the below steps to connect the signal cable to the transmitter:

1) Insert the signal cable through the cable gland.
2) Connect the two wires to IOUT and COM terminals

The below drawing shows the connection diagram between the RCMAG flowmeter and SLM2XH3 flow totalizer unit.

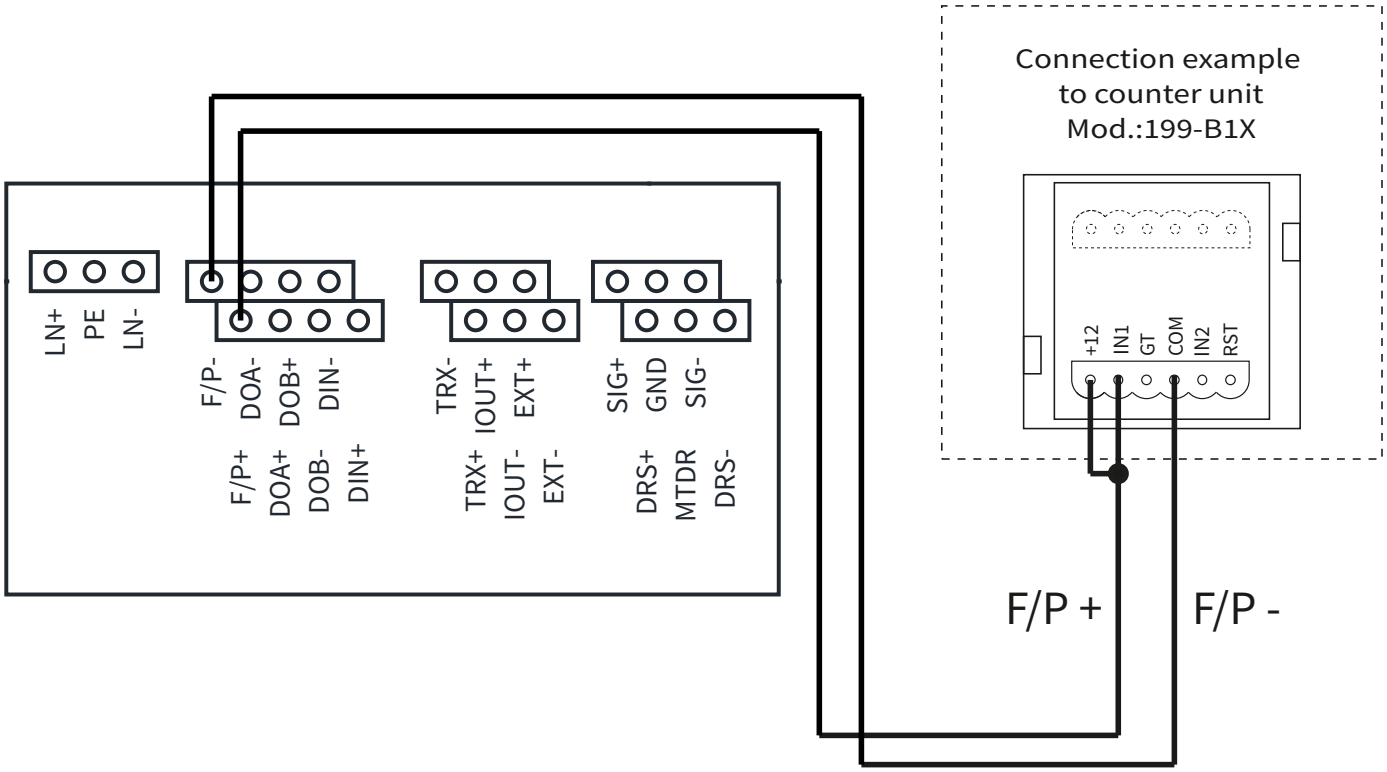


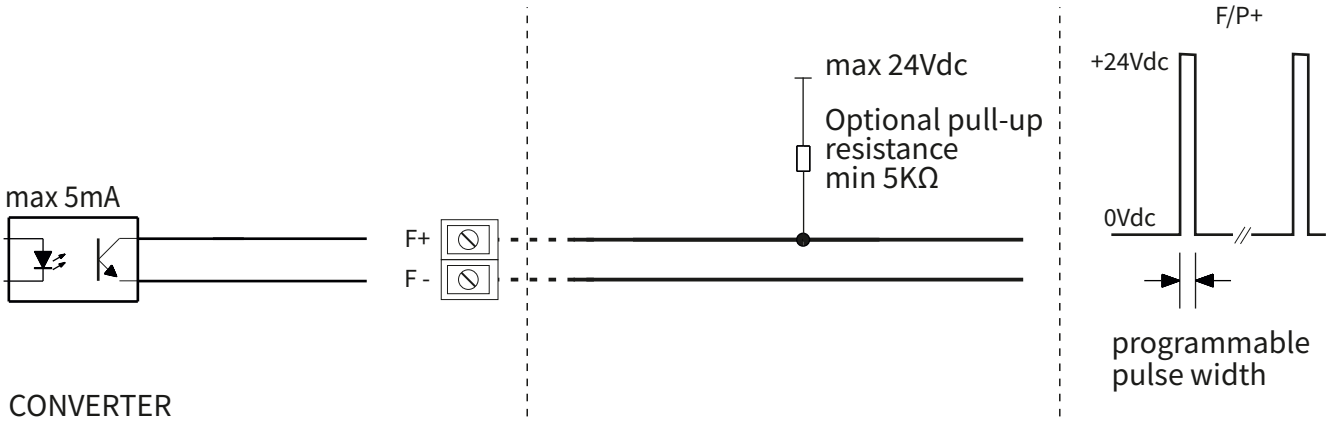
8.5.2 - Digital output

To enable the operation of the digital output, refer to paragraph 10.5.2 OUTPUT PARAMETER of this manual.
When digital output is set in frequency mode, it generates an Hz output signal proportional to the measured flow rate; however if it's set in pulsed mode generates an output signal in relation to the totalized volume increase.
The signal is normally used in combination with an external totalizer, a pulse counter or an acquisition system.
The resistance in the circuit must be equal to or greater than 100Kohms.
Follow the below steps to connect the signal cable to the transmitter:

1) Insert signal cable through the cable gland
2) Connect two wires to F/P+ and F/P- terminals

N.B. - When the RCmag pulse output is connected to an acquisition system that requires a current higher than 11mA, a properly sized pull-up resistor must be connected to ensure the minimum current required by the acquisition system connected (see drawing below); example: if the acquisition system requires a min. current of 15mA, a 1,6 Kohm pull-up resistor must be connected (according to the calculation R = V / I = 24V / 15mA = 1,6Kohm) between an external power supply of 24 Vdc and the acquisition system input terminal.
The below drawing shows the connection diagram between the RCMAG flowmeter and the 199-B1X counter unit.





8.5.3 - Alarm output

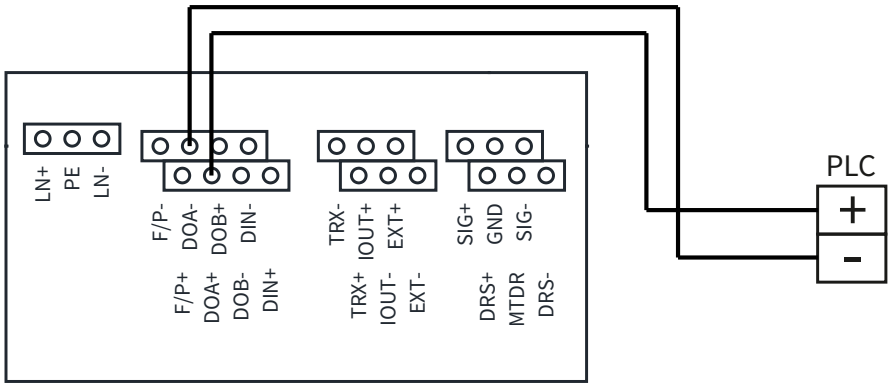
To enable the operation of the digital output, refer to paragraphs 10.5.1.1 HIGH ALARM ENABLE, 10.5.1.2 HIGH ALARM VALUE, 10.5.1.3 LOW ALARM ENABLE, 10.5.1.4 LOW ALARM VALUE and 10.5.1.5 SYSTEM ALARM ENA of this manual. The digital output generates an output signal in relation to the enabled alarm event.

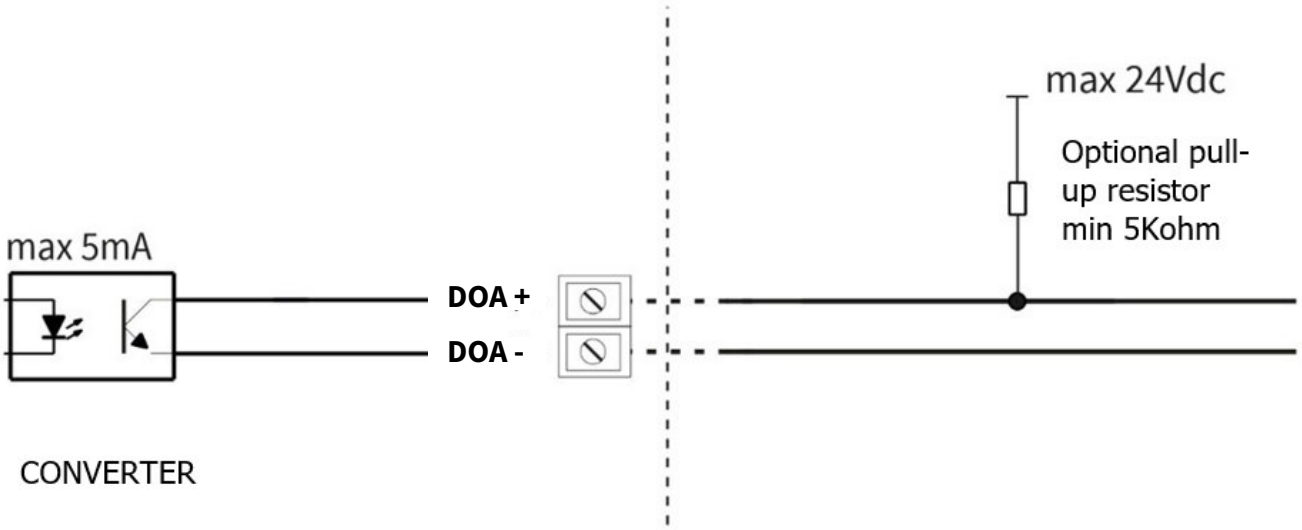
Follow the procedure described below to connect the signal cable to the transmitter:

1) Connect the two wires to the DOUT and COM terminals

N.B. - When the acquisition system, connected to the pulse output of the RCmag, supplies a voltage to the circuit (MAX 24Vdc), it must be kept in mind that the output transistor can switch a maximum of 5mA; therefore it is necessary to appropriately size the collector resistor. For example, if the system supplies a voltage of 24Vdc, the collector resistance (PULL-UP) must be equal to or greater than 5K ohm.

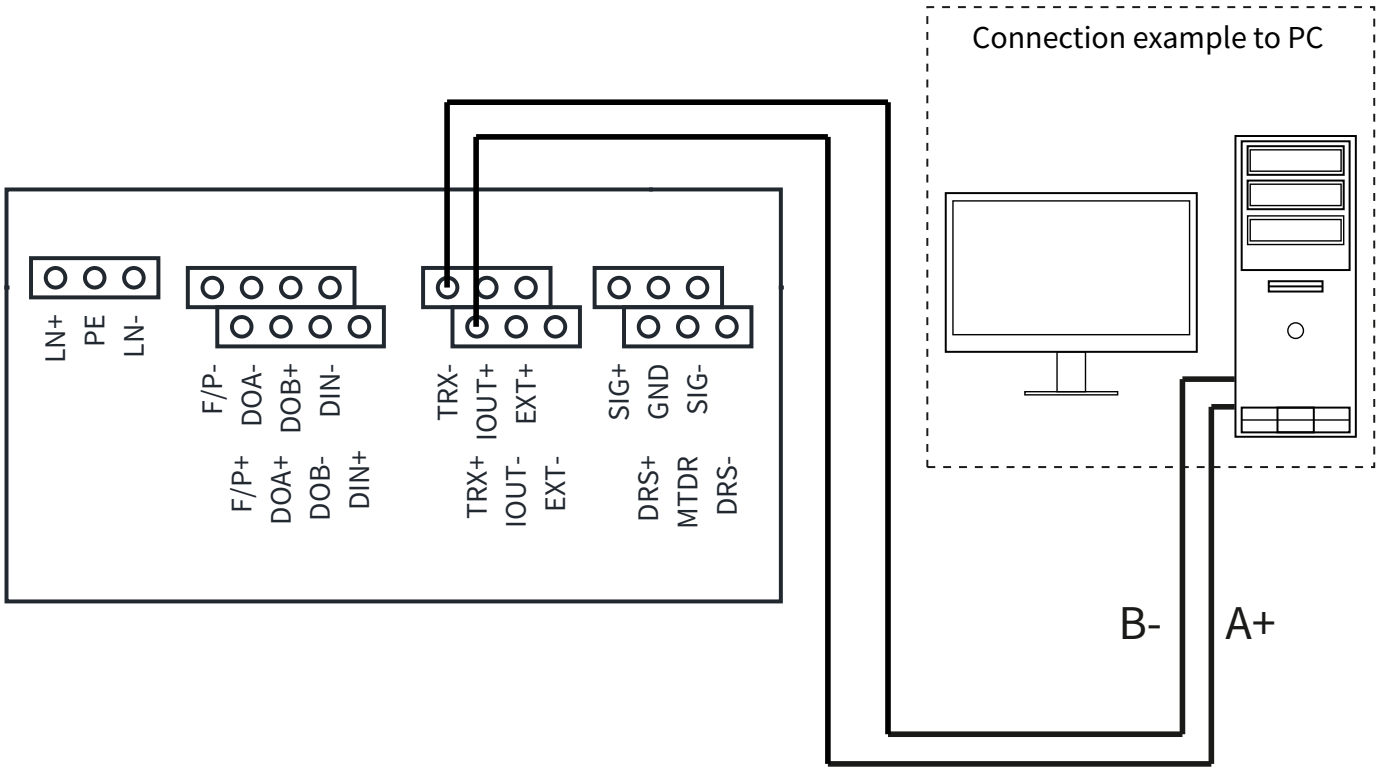
The diagram below shows the connection between the RCMAG flow meter and the digital input of a PLC.





8.5.4 - RS485 serial output

In the models provided it is possible to communicate via MODBUS. Connect the serial cable to terminals A+ and B-
The diagram below shows the connection diagram between the RCMAG flow meter and, for example, a notebook.

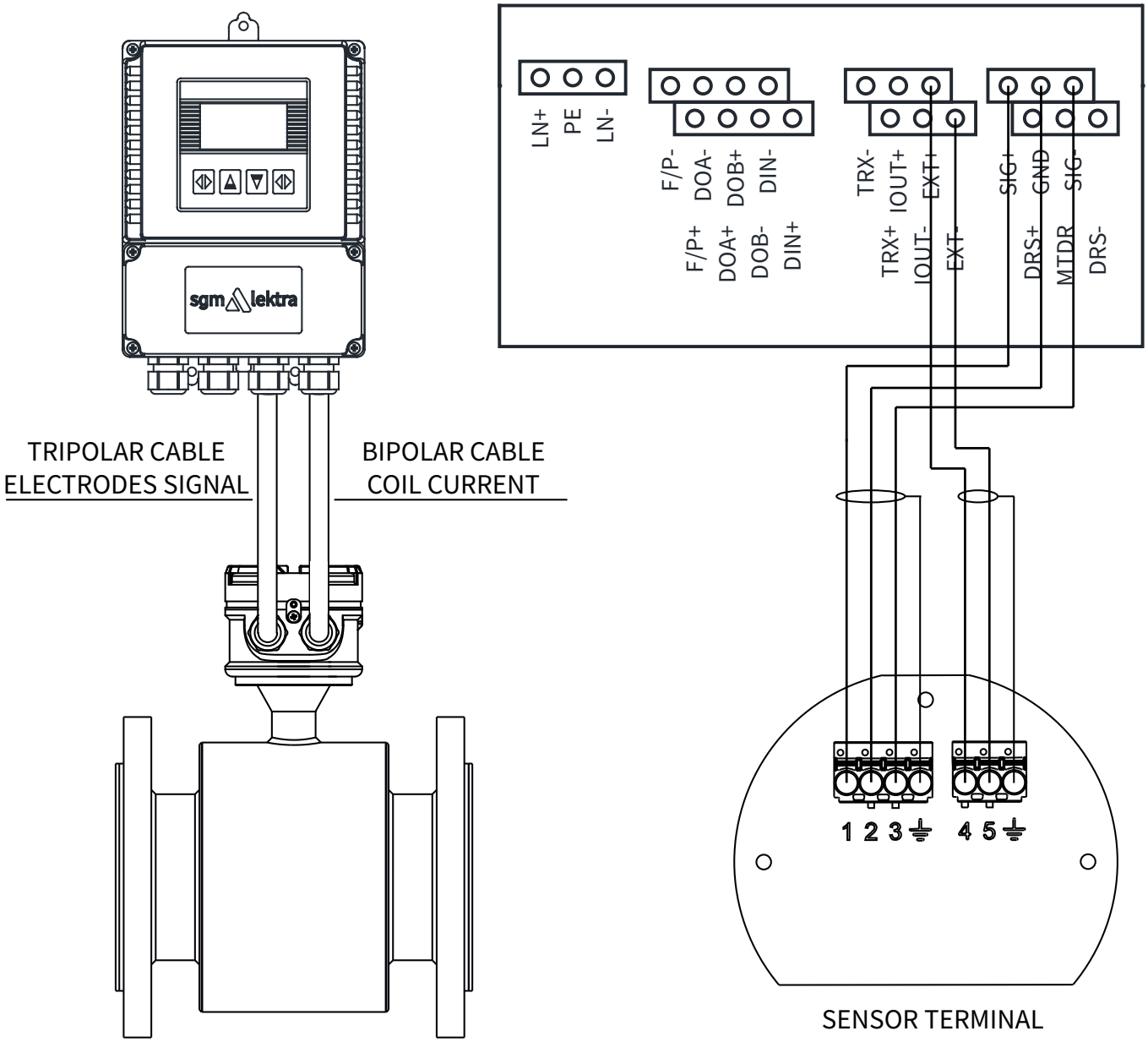


8.6 - REMOTE VERSION

During the remote version installation comply with the following information to ensure correct measurements:

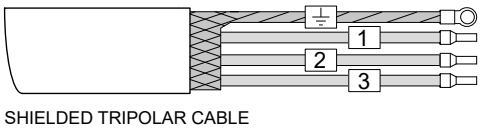
1) The cables must be as short as possible, especially with low conductivity fluids.
2) The cables should be far from electrical machinery and switching devices such as contactors or solenoid valves.
3) The cables must not be in conduit with power cables or cables for the switching devices control.
4) When necessary, ensure the equipotential between sensor and transmitter.
5) The maximum cable length is a fluid conductivity function. Refer to paragraph 8.6.2.

Connect the sensor to the converter respecting the diagram below.

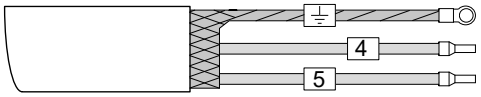


8.6.1 - Remote version wiring

Cable	Wire		Function	Pos. morsetto
	Num.	Color		
Bipolar	4	black	coil	EXT+
	5	brown	coil	EXT-
	braid		shield	GND
Tripolar	1	white	electrode 1	SIG+
	2	yell./green	commonG ND	GND
	3	brown	electrode 2	SIG-
	braid		shield	⏚



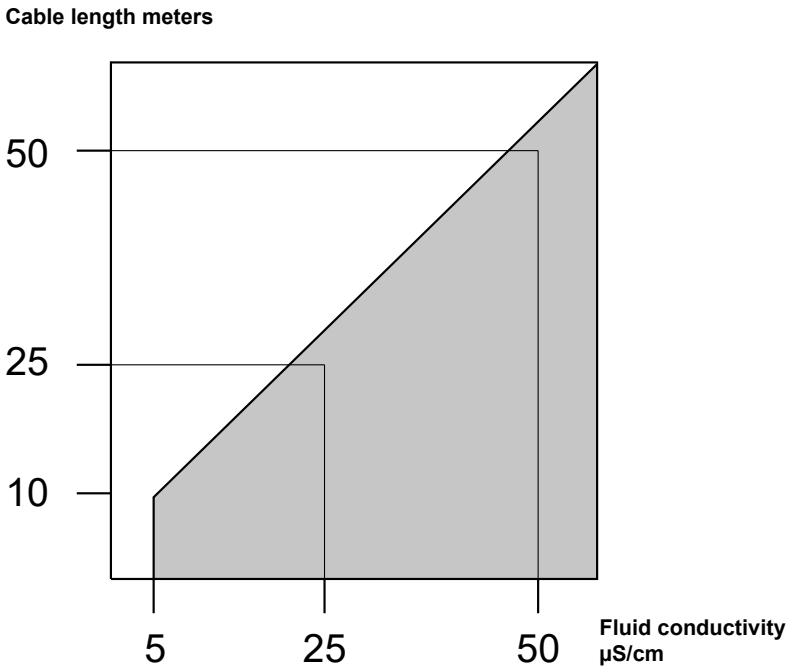
SHIELDED TRIPOLAR CABLE



SHIELDED BIPOLAR CABLE

8.6.2 - Connecting cables length

Maximum length of the connecting cables between the sensor and the convertor is determined by the fluid conductivity value. In the graph below the gray highlighted area indicates the allowed cable length in relation to the fluid conductivity value. With a 150 microS fluid conductivity, for example, the connection cables will have a maximum length of 150 meters.



8.6.3 - Connectiong cables

8.6.3.1 - Coil cable technical specification

Shielded bipolar cable FR20H2R 2x1.5 section	
Conductors	Tinned copper stranded wire, class 5
Insulations	PVC R2 Ø 2,8mm ± 0,1
Conductors Colors	Black - Brown
Cable stranding	Concentric with polyester tape
Shielding	Tinned copper braid
Sheath	PVC RZ resistant to hydrocarbons; Ø 8,2mm ± 0,30; Black
Operating temperature	-25÷+70°C (fixed installation)
Test voltage	3KV V.c.a.
Working voltage	450/750V
Conductors electrical resistance	CEI 20-29
Reference Standards	CEI 20-22 II-IEC 332.3A-ROHS 2011/65/UE(ROHS 2)

8.6.3.2 - Electrodes signal cable technical specification

Shielded tripolar cable FR20H2R 3x1.5 section	
Conductors	Tinned copper stranded wire, class 5
Insulations	PVC R2 Ø 2,8mm ± 0,1
Conductors Colors	White - Brown - Yellow/Green
Cable stranding	Concentric with polyester tape
Shielding	Tinned copper braid
Sheath	PVC RZ resistant to hydrocarbons; Ø 8,2mm ± 0,30; Black
Operating temperature	-25÷+70°C (fixed installation)
Test voltage	3KV V.c.a.
Working voltage	450/750V
Conductors electrical resistance	CEI 20-29
Reference Standards	CEI 20-22 II-IEC 332.3A-ROHS 2011/65/UE(ROHS 2)

9-LOCAL OPERATOR INTERFACE (LOI)

LOI is an operator communications center for the RCmag. Through the LOI, the operator can access any transmitter function for changing configuration parameter settings, checking totalized values, or other functions.

9.1 - SAFETY MESSAGES

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol.
Please refer to the following safety messages before performing an operation preceded by this symbol: ⚠

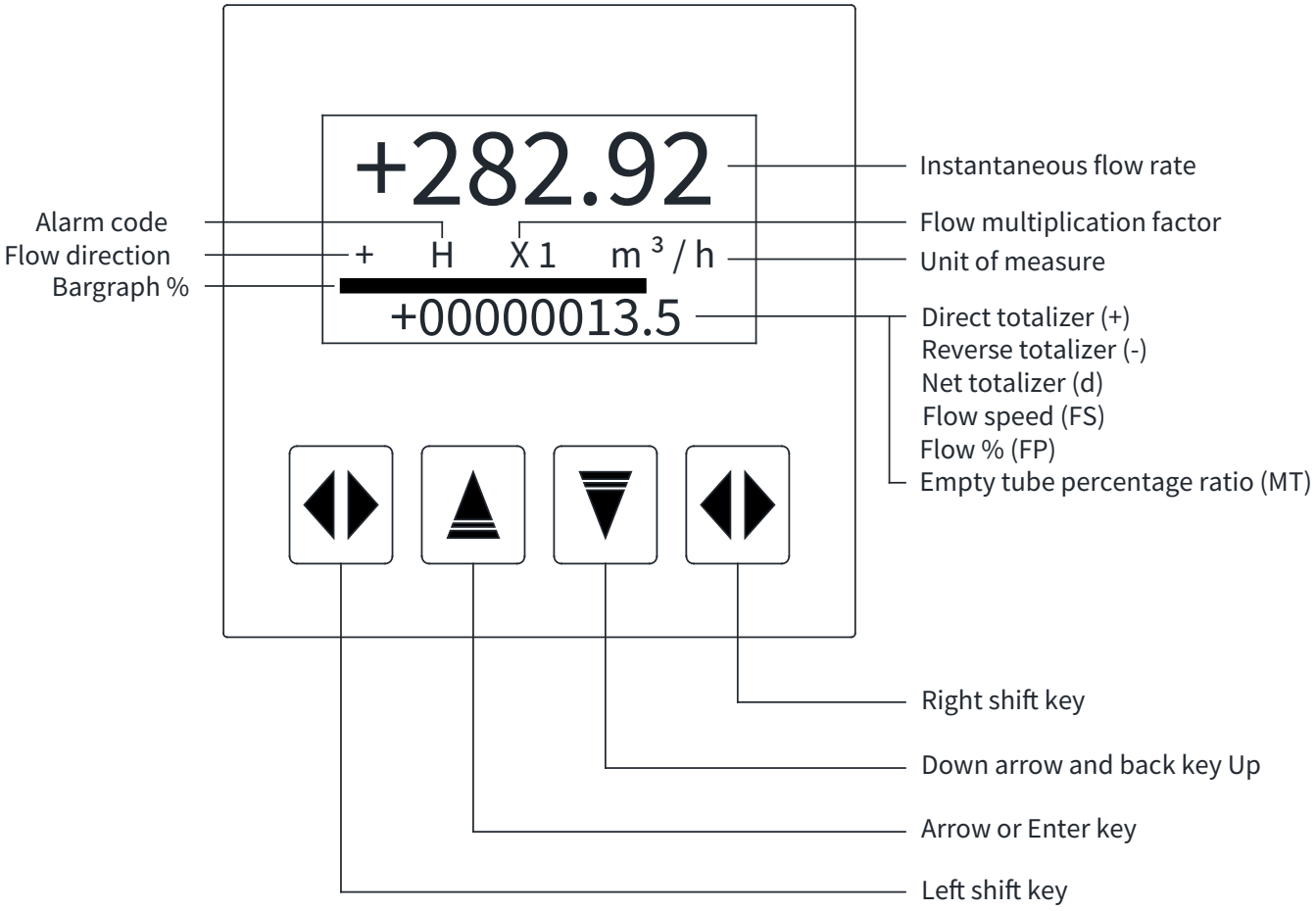
9.2 - WARNINGS

Explosions could result in death or serious injury

- Verify that the area of installation and operation comply with the characteristics of the measuring tube and the transmitter.
- Make sure only qualified personnel perform the installation.
- Do not perform any service other than those contained in this manual unless qualified.

9.3 - LOI Features

The “LOI” has an alphanumeric liquid crystal display (LCD) and 4 buttons for navigation and programming.



10-PROGRAMMING

10.1 - DATA ENTRY

In RUN mode, RCmag displays the flow rate measurement and totalizers.
By pressing the up arrow key it is possible to select the measurement quantity displayed in the lower line of the display, which are:

- Direct totalizer; indicated with the “+” symbol
- Reverse Totalizer; indicated with the symbol “-”
- Net totalizer; indicated with the symbol “d”
- Flow speed; indicated with the symbol “FS”
- % value of the flow rate, in relation to the value of the “Flow Range” parameter; indicated with the symbol “FP”
- Empty tube signal percentage ratio; indicated with the symbol “MT”

To access the programming menu, proceed as follows:

1) Press the right shift key (hereinafter referred to as the right key)
2) Enter the password 19818 by pressing the up/down arrow keys to change the number and the left movement keys (hereinafter referred to as the left key) or right key to move the cursor.
3) Press the right or left button to select the ▲ symbol
4) Press the up arrow key (Enter) to confirm access to the programming menu

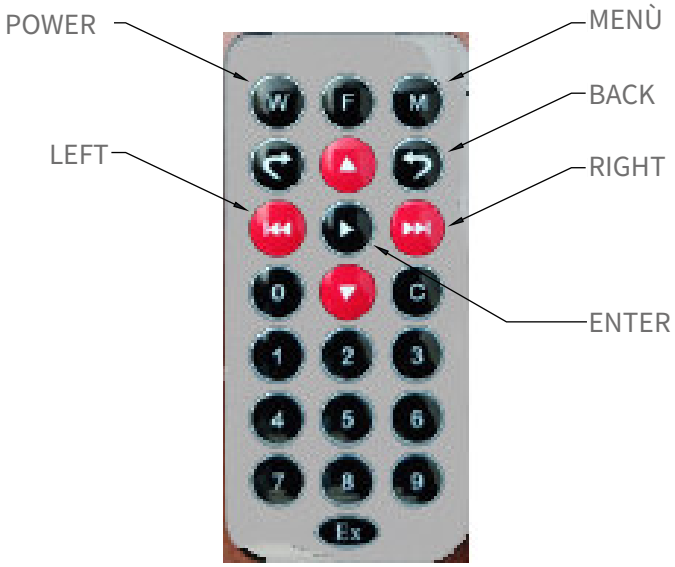
To exit without accessing programming, press the right or left button to select the ▼ symbol and press the down arrow button to return to RUN mode.

10.2 - DATA ENTRY VIA REMOTE CONTROL

The remote control has numerical and control buttons to access the menu and configure RCmag.
To access the programming menu, proceed as follows:

1) Press the MENU button on the remote control.
2) Enter the password 19818 using the remote control.
3) Press the ENTER button on the remote control

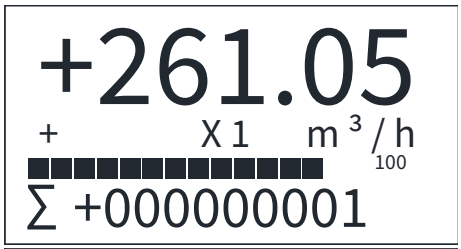
To resume measuring, exit the programming menu and press the POWER button on the remote control.



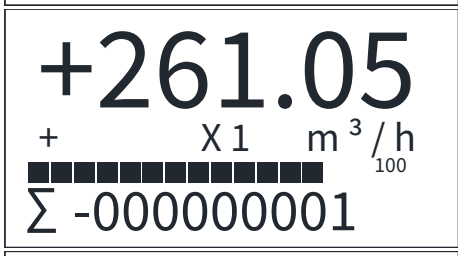
10.3 - DISPLAY PAGES

In RUN mode, RCmag displays the flow measurement and totalizers.
By pressing the up arrow key you can select the measurement to display in the bottom row.

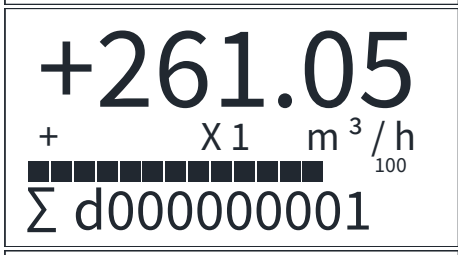
Instantaneous flow rate with direct totalizer.



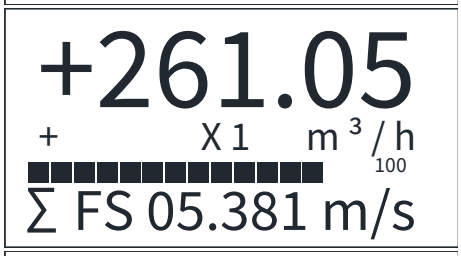
Instant flow rate with reverse totalizer.



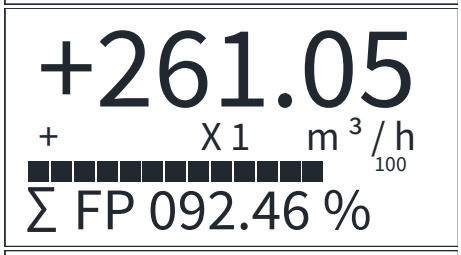
Instantaneous flow rate with net totalizer.



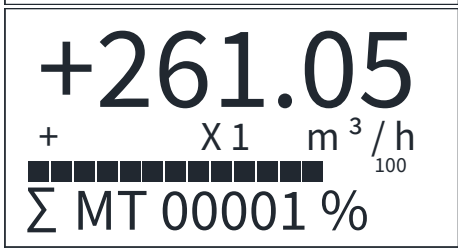
Instantaneous flow rate with flow speed.



Instantaneous flow rate with percentage flow rate.

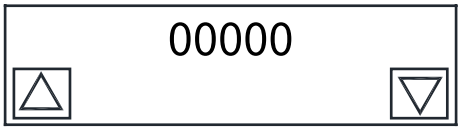


Instantaneous flow rate with empty pipe percentage ratio.



10.4 - PARAMETERS SET MENU

To access the PARAMETERS SET menu, follow the procedure described in the "DATA ENTRY" paragraph by entering the password 19818.



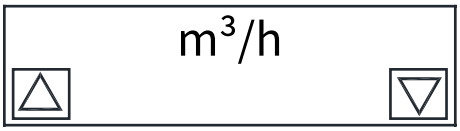
In the PARAMETERS SET menu it is possible to make all the settings and calibrations for the flow measurement.
To access, select the ▲ symbol and press the up arrow key

10.4.1 - FLOW PARAMETER menu

This menu contains the configuration parameters of the RCmag flow measurement.
To access, select the ▲ symbol and press the up arrow key.

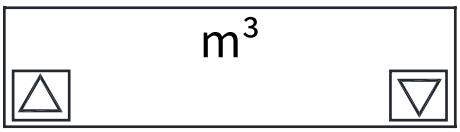
10.4.1.1 - Flow Unit

The selectable instantaneous fl ow measurement units are:
L/s; L/m; L/h; m3/s; m3/m; m3/h; uk/s; uk/m; uk/h; us/s; us/m; us/h;
Kg/s; kg/m; kg/h; t/s; t/m; t;/h
Press up or down arrow to select the unit of measurement.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “m3/h”.



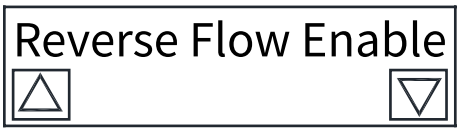
10.4.1.2 - Flow Total Unit

The selectable units of measurement of the totalizers, with their decimal point position, are:
1. m3; 0.1 m3; 0.01 m3; 0.001 m3; 1. ltr; 0.1 ltr; 0.01 ltr; 0.001 ltr; 1. ton; 0.1 ton; 0.01 ton; 0.001 ton; 1. Kg; 0.1 Kg; 0.01 Kg; 0.001 Kg; 1. usg; 0.1 usg; 0.01 usg; 0.001 usg; 1. ukg; 0.1 ukg; 0.01 ukg; 0.001 ukg.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting:1m3



10.4.1.3 - Reverse Flow Enable

The RCmag converter has the function of disabling the reverse flow, whendisabled (“DISABLE”), the negative flow is not displayed or counted. When enabled (“ENABLE”), RCmag also shows and counts the negative flow.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and savet he change.
Default setting: “ENABLE”

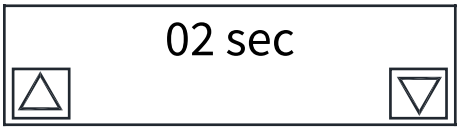


10.4.1.4 - Flow Range

To set the “Flow Range” value (max flow rate), press the up or down arrow to modify the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: max flow rate value of the sensor pipe.

10.4.1.5 - Flow Filter Time

Allows setting of a delay time, in seconds, for reading variations.
It is used to attenuate flow measurement oscillations.
The available options are: 01sec; 02sec; 04sec; 06sec; 08sec; 10sec; 16sec; 30sec; 40sec; 60sec.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit e save the change.
Default setting: “02 SEC”



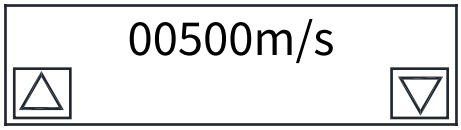
10.4.1.6 - Analog Damp Time

Allows setting of a delay time, in seconds, for variations in the analog output signal. The available options are: 000s; 005s; 010s;020; 050s; 080s; 150s; 250s
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “005s”

10.4.1.7 - Peak Limit Ena

With paper pulp, or other slurries, solid particles in the fluid rub or hit the measurement electrodes, causing a “false peak signal”.
To eliminate this type of false signal, the converter is designed with a peak suppression function.
By setting the “Peak Limit Valu.” and “Peak Limit Time” parameters, the converter will be able to suppress the false signal to minimize measurement oscillation.
Set “ENABLE” to activate the false peak signal filtering function.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “disable”

10.4.1.8 - Peak Limit Valu.



The “Peak Limit Valu.” threshold, expressed in m/s, is the maximum difference allowed between the real value and the measured peak value of the flow velocity.
RCmag has two ways of managing the threshold exceeding event:

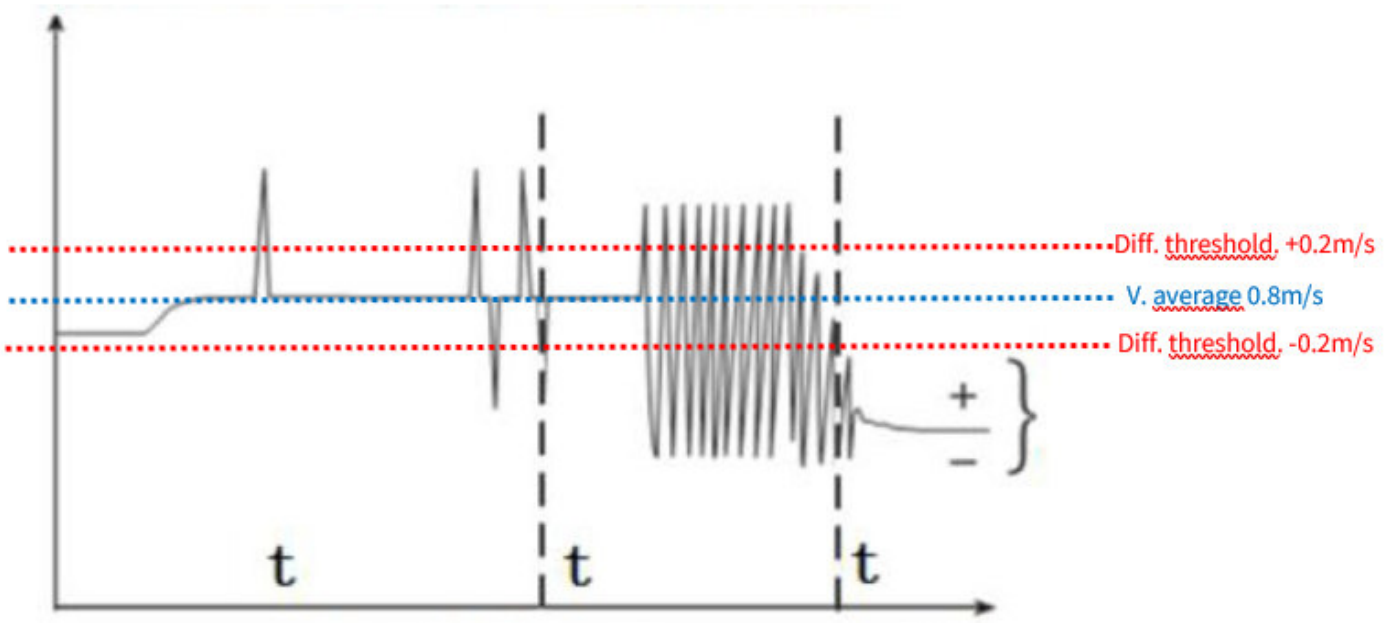
1) When “Peak Limit Ena.” is set to “Enable”; “Peak Limit Value.” is the threshold to suppress the false speed measurement. E.g.:
   “Peak Limit Valu.” = 0.2m/s and average speed of 0.8m/S; if a speed of 1.1m/s is measured, RCmag will consider the value as a false measurement, suppressing it, and the PSM symbol will be shown on the display.
   Instead, if a speed of 0.9m/s is measured, RCmag will consider the value as real.
2) When “Peak Limit Ena.” is set to “Disable”; “Peak Limit Value.” determines the noise sensitivity test. If the “FST” alarm appears frequently on the display, it is recommended to increase the value of “Peak Limit Valu.”

Press the up or down arrow to modify the digit, press the right button to move the cursor.
Range: 00.300÷19.999m/s.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “00.500m/s”

10.4.1.9 - Peak Limit Time

This parameter selects the time interval within which the speed measurement variation, higher than the “Peak Limit Valu.” threshold value, is considered a false measurement. In the event that the flow speed variation persists beyond the set time interval, the speed measurement will be considered real.
The available options are: 0s; 2s; 3s; 4s; 5s; 6s; 8s; 10s; 20s; 30s.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “0s”

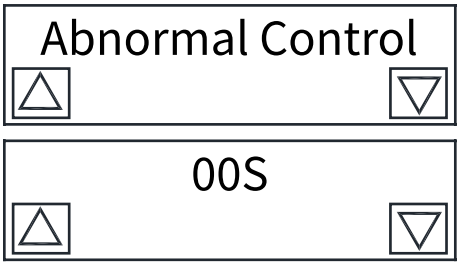
Velocità di flusso misurata non attenuata



t = Suppression time **Time**

Resulting flow rate with Peak Limit Val filter. and Peak cut-off time

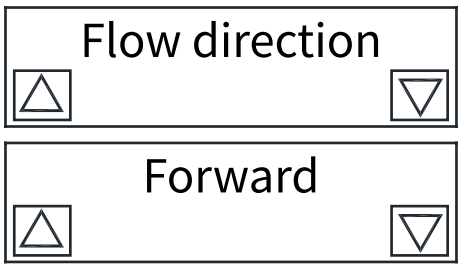
10.4.1.10 - Abnormal Control



Abnormal Control is a hardware and firmware filter that suppresses measurement conditions considered anomalous, such as the presence of air bubbles. When RCmag detects a measurement condition deemed anomalous, the alarm code “ABN” will be shown on the display.
Abnormal Control can be set in seconds, and is the period of time for which the filter remains active from the start of the anomaly event.
By setting it to 0 the filter function is disabled.
The available options are: 0s; 10s; 15s; 20s; 30s; 40s; 50s; 60s; 70s; 99s.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “00”

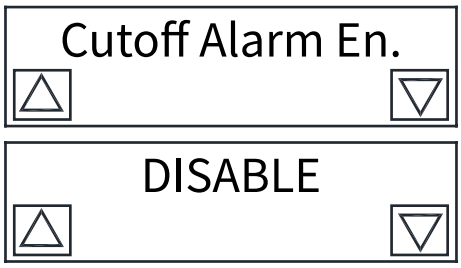
10.4.1.11 - Flow direction

Specifies the instantaneous flow rate value below which the instantaneous flow rate reading (direct or reverse) and the outputs are forced to zero.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “FORWARD”.



10.4.1.12 -Cutoff Alarm En.

It is used to enable the low flow rate cut intervention alarm.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “DISABLE”

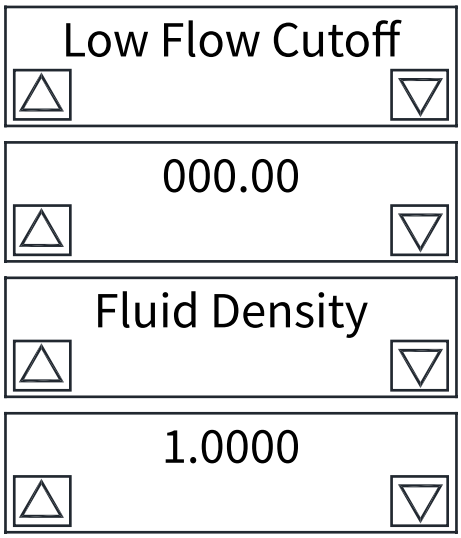


10.4.1.13 - Low Flow Cutoff

Specifies the instantaneous flow rate value below which the instantaneous flow rate reading (direct or reverse) and the outputs are forced to zero.
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “000.00”

10.4.1.14 - Fluid Density

Set the value of the fluid specific weight.
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “1.0000”.



10.4.1.15 - Zero Correction

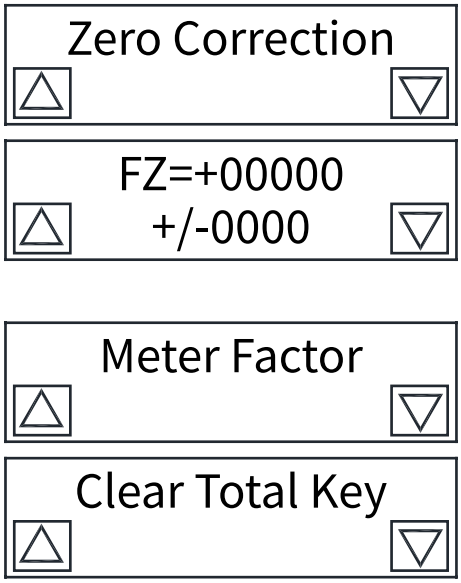
Before proceeding with the zero flow rate correction, make sure that the sensor pipe is full and with the fluid perfectly still.
Modify the value of the bottom row to obtain the value of FZ equal to 0 (zero).
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “0000”.

10.4.1.16 - Meter Factor

Reserved

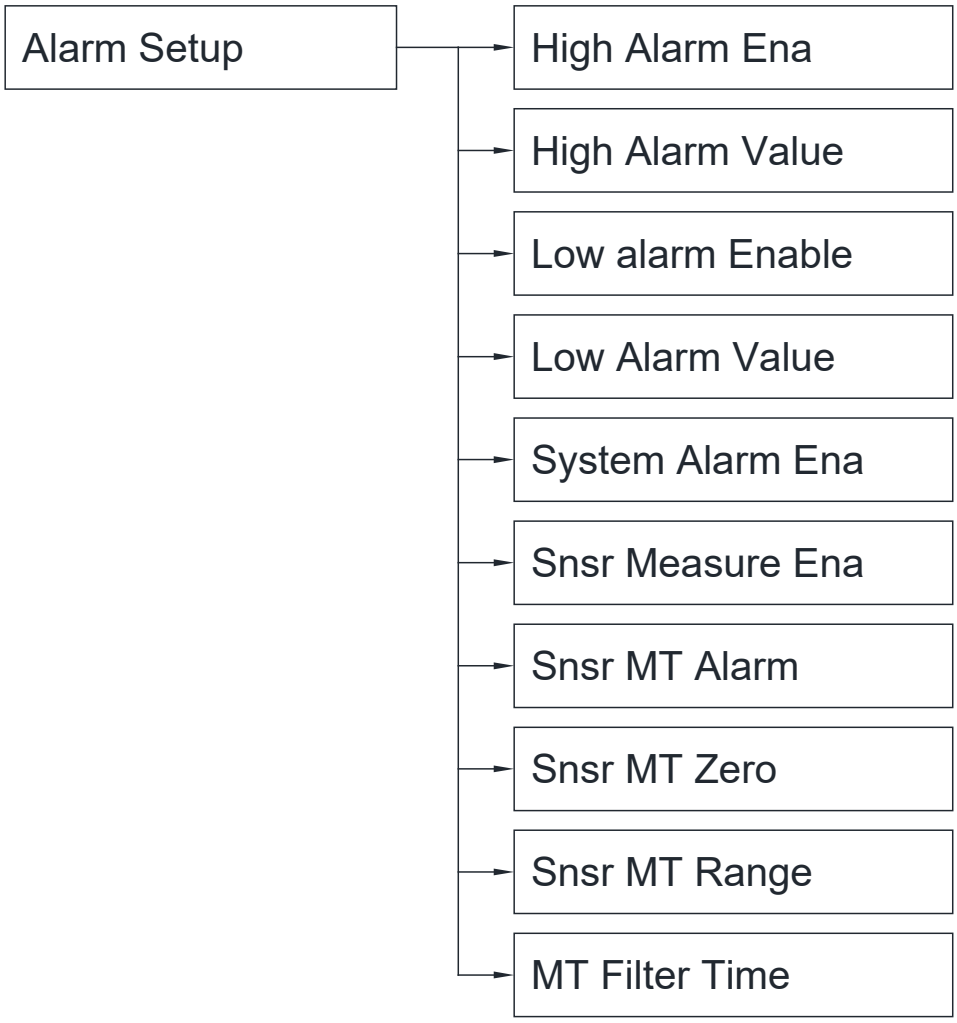
10.4.1.17 -Clear Total Key

Reserved



10.5.1 - Menù ALARM SETUP

The alarm configuration parameters reside in this menu.
To access, select the ▲ symbol and press the up arrow key.

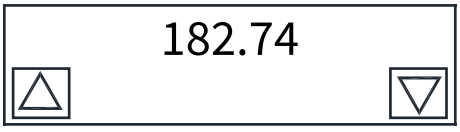


10.5.1.1 - High Alarm Ena

Enable or disable the high flow alarm. When enabled (ENABLE) during the alarm event the “DOA+/-“ output is in a high state.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “DISABLE”

10.5.1.2 - High Alarm Value

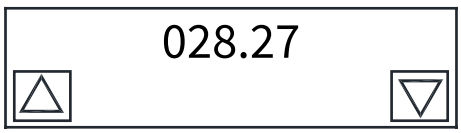
It is the high flow alarm threshold.
When the flow value is greater than the set value, RCmag transmits the alarm signal from the “DOA+/-” terminals.
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “182.74”



10.5.1.3 - Low Alarm Enable

Enable or disable the high flow alarm. When enabled (ENABLE) during the alarm event the “DOA+/-“ output is in a high state.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “DISABLE”

10.5.1.4 - Low Alarm Value



It is the low flow alarm threshold.
When the flow value is greater than the set value, RCmag transmits the alarm signal from the “DOA+/-” terminals.
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “028.27”

10.5.1.5 - System Alarm Ena

The selectable options are:
- DISABLE; disables the system alarm
- ENABLE; enables the system alarm. With this option, in the event of a coil interruption alarm event, the SYS code will be shown on the display and the “DOA+/-“ output will be in a high state.
- ENABLE | OUTPUT; enables the system alarm. With this option, in the event of a coil interruption alarm event, the SYS code will be shown on the display and the “DOA+/-“ output will be in low status.

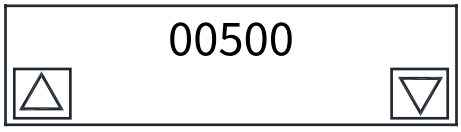
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “ENABLE | OUTPUT”

10.5.1.6 - Snsr Measure Ena

The selectable options are:
- DISABLE; disables the empty pipe alarm
- ENABLE; enables the empty pipe alarm. With this option, in the event of a coil break alarm event, the MTP code will be shown on the display and the “DOA+/-“ output will be in a high state.
- ENABLE | OUTPUT; enables the system alarm. With this option, in the event of a coil break alarm event, the MTP code will be shown on the display and the “DOA+/-“ output will be in low state.

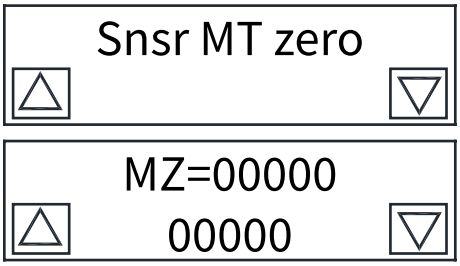
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “ENABLE | OUTPUT”.

10.5.1.7 - Snsr MT Alarm



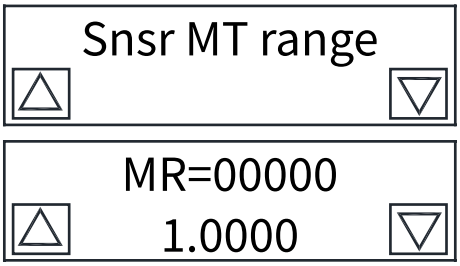
It is the threshold for recognizing the empty pipe condition.
To correctly identify the value to be programmed, you must exit in RUN mode, press the up arrow to display the MT value in the bottom line.
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: 0050

10.5.1.8 - Snsr MT Zero



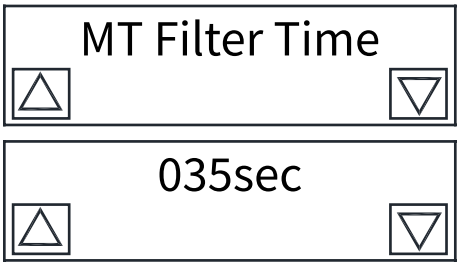
It is used to adjust the recognition of the full pipe when the fluid conditions are such as to increase the MZ value.
The adjustment is made by setting a value in the bottom line that modifies MZ to a value between 5 and 10
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “00080”.

10.5.1.9 - Snsr MT Range



It is used to amplify the delta between the MR value with a full tube and the MZ value with an empty tube.
The adjustment is made by setting a value in the bottom line that increases the MR value; recommended MR value 00500.
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “01.000”.

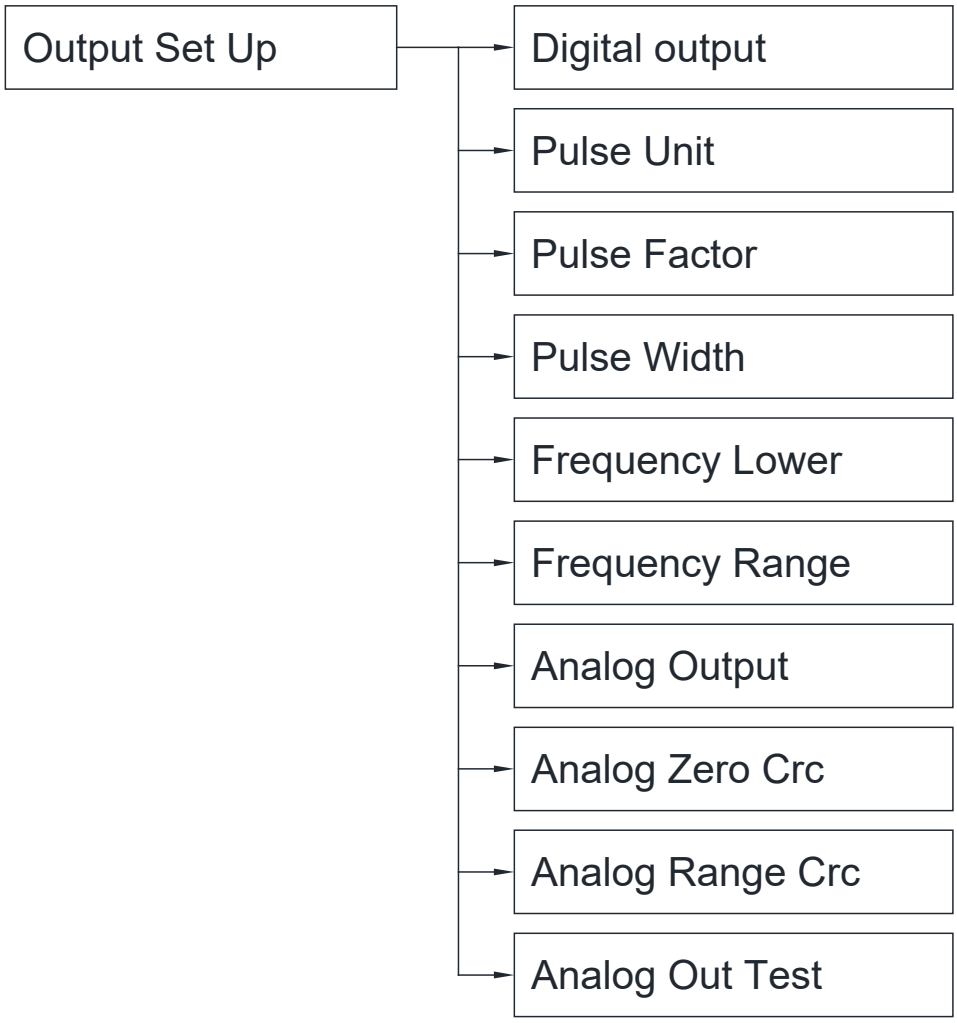
10.5.1.10 - MT Filter Time



MT Filter Time is the delay time of the empty pipe alarm signal.
The selectable options are: 010sec; 015sec; 020sec; 025sec; 030sec; 035sec; 040sec; 045sec; 050sec; 060sec.
Press up or down arrow to select.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “035sec”.

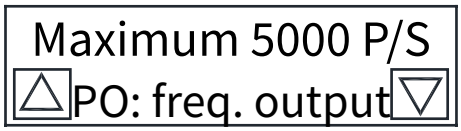
10.5.2 - Menù OUTPUT SET UP

This menu contains the configuration parameters of the output signals.
To access, select the ▲ symbol and press the up arrow key.



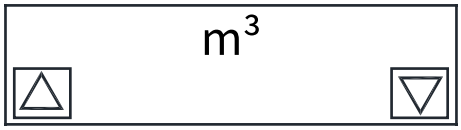
10.5.2.1 -Digital Output

To select whether the open collector digital output has the function of a frequency signal, proportional to the instantaneous flow rate value measured, or has the function of a pulse launcher based on the increase in the totalized value. By setting “Frequ. Output” enables the frequency output function; setting “Pulse Output” enables the pulse output function.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “Freq. Output”



10.5.2.2 - Pulse Unit

The selectable pulse output measurement units are: m3, ltr, ton, kg, usg, ukg.
Press up or down arrow to select the unit of measurement.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “m3”

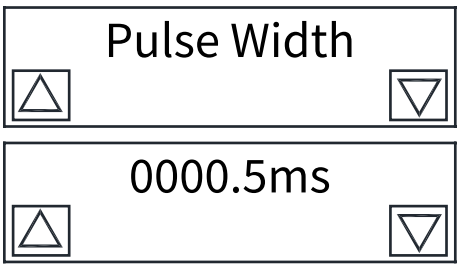


10.5.2.2 - Pulse Factor

It is the weight of the impulse, the range is between 00.001 ÷ 59.999.
The unit of measurement depends on the “Pulse Unit” parameter”.
To set the value, press the up or down arrow to change the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “01.000”

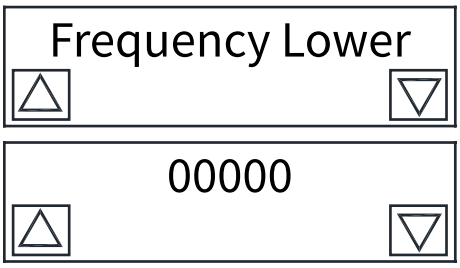
10.5.2.3 - Pulse Width

It is the width of the pulse, the range is between 1000.5 ÷1 999.9 ms.
To set the value, press the up or down arrow to change the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “0000.5”



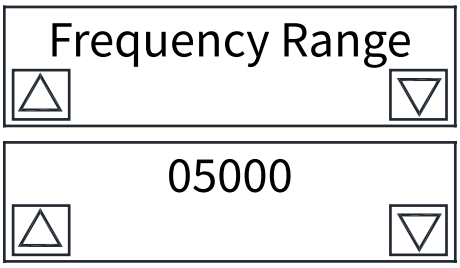
10.5.2.4 - Frequency Lower

It is the frequency that will be transmitted at zero range.
The range is between 0 ÷ 09999 Hz.
To set the value, press the up or down arrow to change the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “00000”



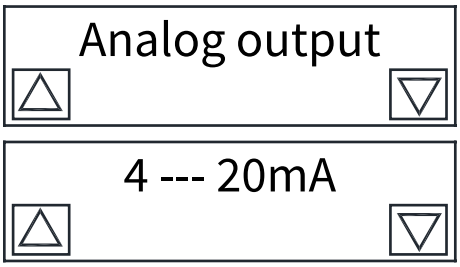
10.5.2.5 - Frequency Range

It is the frequency that will be transmitted at maximum flow rate (see Flow Range parameter). The range is between 0 ÷ 10000 Hz.
To set the value, press the up or down arrow to change the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “05000”



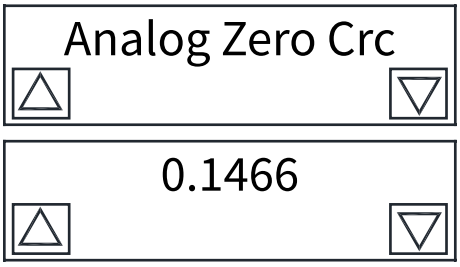
10.5.2.6 - Analog output

This is the operating mode of the analogue output.
The following options are available:
- 4 --- 20mA; 4mA at zero flow and 20mA at full scale positive or negative flow
- 4 --- 12mA,12—20mA; 4mA at negative full scale, 12mA at zero flow and 20mA at positive flow full scale - --- 4mA--- ; 4mA fixed.
Press up/down arrow to change the setting.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “4 --- 20mA”



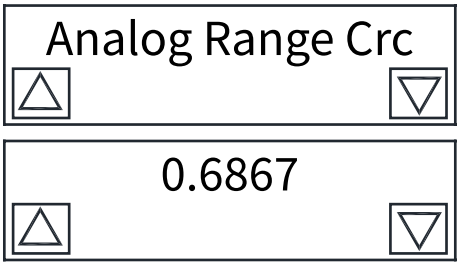
10.5.2.7 - Analog Zero CRC

With Analog Zero CRC it is possible to correct the 4mA calibration.
To set the value, press the up or down arrow to change the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.



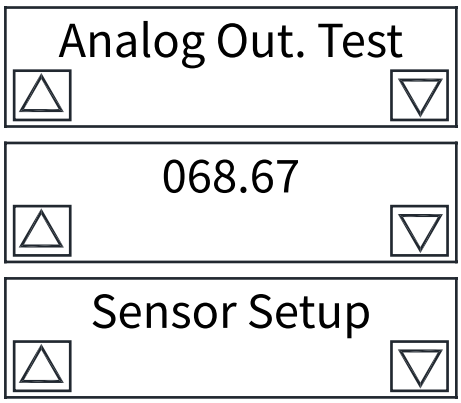
10.5.2.8 - Analog Range CRC

With Analog Range CRC it is possible to correct the 20mA calibration.
To set the value, press the up or down arrow to change the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.



10.5.2.9 - Analog Out. Test

With Analog Out Test you can test the analog output signal.
The test value is expressed in % in the range 0÷99.99%:0%=4mA, 99.99%=20mA
To set the value, press the up or down arrow to change the digit, press the right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit.

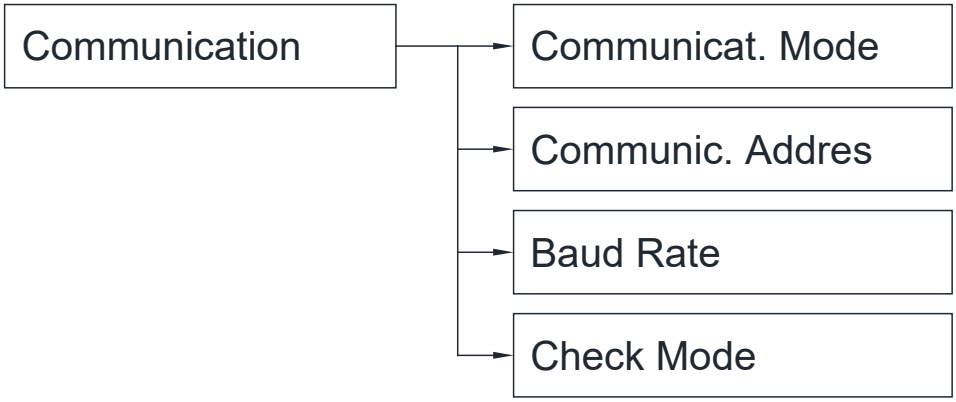


10.5.2.10 - Menù SENSOR SETUP

Reserved.

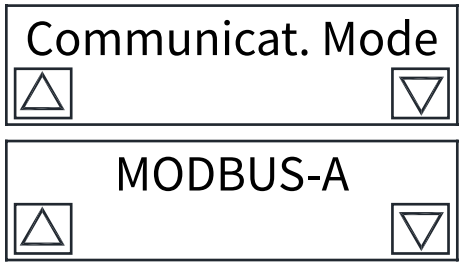
10.5.3 - Menù COMMUNICATION

This menu contains the parameters for configuring digital communication.
To access, select the ▲ symbol and press the up arrow key.



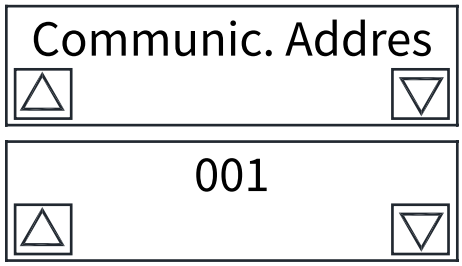
10.5.3.1 - Communicat. Mode

RCmag has 3 digital communication modes:
MODBUS-A (RTU), HART e PROFIBUS. Press up or down arrow to select.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “MODBUS-A”.



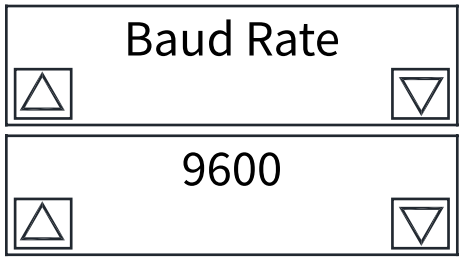
10.5.3.2 - Communic. Addres

Set the UID address in a communication network, set the range: 001÷250.
Press up or down arrow to change the digit, press right button to move the cursor.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “00014S”.



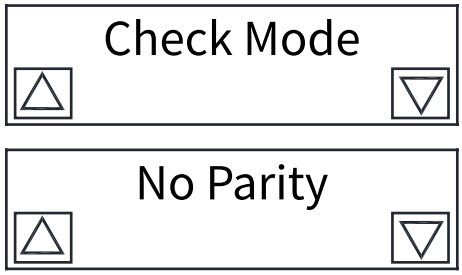
10.5.3.3 - Communicati. Rate

It is the transmission BAUD RATE.
The selectable values are: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.
Press up or down arrow to select.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Default setting: “9600”.



10.5.3.4 - Check Mode

It is transmission parity.
The selectable settings are: No Parity, Odd Parity, Even Parity.
Press up or down arrow to select.
Select the ▼ symbol and press the down arrow key to exit and save the change.
Defaul setting: “No Parity”.



10.5.3.4 - Menù METER PARAMETER

Reserved.

11-TROUBLESHOOTING

I Problems in the magnetic flowmeter system are usually indicated by incorrect output readings from the system, error messages, or failed tests.
Consider all sources when identifying a problem in your system.

Symptom	Potential Cause	Corrective Action
Output at 0 mA.	No power to transmitter.	Check power source and connections to the transmitter.
	Analog output improperly configured.	Check the connections.
	Electronics failure.	Replace the electronics boards.
Output at 4mA.	Min Flow Cutoff set too high.	Configure the Min flow cutoff to a lower value or increase the flowrate above the min flow cut off value.
	Flow is in reverse direction.	Enable Invert Flow Dir function.
	Shorted coil.	Check coil.
	Empty pipe.	Fill pipe.
	Electronics failure.	Replace the electronics boards.
Pulse output at zero, regardless of flow.	No power to transmitter.	Check power source and connection to the transmitter.
	Wrong wiring.	Check pulse output wiring at digital output terminals. Refer to wiring diagram for pulse output.
	Reverse flow.	Enable Invert Flow Dir function.
	Electronics failure.	Replace the electronics boards.
Reading doesn't appear to be within rated accuracy.	Transmitter, control system, or other receiving device not configured properly.	Check all configuration variables for the transmitter,flowpipe, communicator, and/ or control system. Perform a loop test to check the integrity of the circuit.
	Electrode Coating.	Downsize flowtube to increase flowrate above 3 m/s. Periodically clean flowpipe.
	Air in line.	Move the flowpipe to another location in the process line to ensure that it is full under all conditions.
	Flow rate is below 0.3 m/s (specification issue).	See accuracy requirement for specific transmitter and flowpipe.
	The "Zero flow" calibration was not performed when the flowpipe is full, or flowrate is zero.	Perform the "zero flow" function.
	Empty pipe Error.	Perform the full pipe and empty pipe calibration.
	Coil Error.	Check the coil connection.
	Transmitter failure.	Replace the electronics boards.

In some circumstances, process conditions themselves can cause the meter output to be unstable.
The basic procedure for addressing a noisy process situation is outlined below.
Complete them in order. When the output attains the desired stability, no further steps are required:

1. Increase the Damping
2. Check the Ground connection

If the basic steps for troubleshooting are not sufficient contact our technical support.

Symptom	Potential Cause	Corrective Action
Noisy Process.	Chemical additives upstream of magnetic flowmeter.	Move injection point downstream of magnetic flowmeter.
	Sludge flows–Mining/Coal/Sand/ Slurries (other slurries with hard particles).	Decrease flow rate.
	Styrofoam or other insulating particles in process.	Consult factory.
	Electrode coating.	Downsize flowtube to increase flow rate. Periodically clean Sensor pipe.
	Air in line.	Move the Sensor pipe to another location in the process line to ensure that it is full under all conditions.
Meter output is unstable.	Electrode incompatibility.	Check the chemical compatibility of the electrode material.
	Improper grounding.	Check ground wiring. See wiring and grounding procedures.
	High local magnetic or electric fields nearby.	Move magnetic flowmeter far from the electromagnetic noice sources.
	Sticky valve (look for periodic oscillation of meter output).	Correct valve sticking.
	Sensor fault.	Perform sensor tests.

12-FACTORY TEST AND QUALITY CERTIFICATE

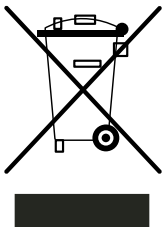
CE

In conformity to the company and check procedures I certify that the equipment:

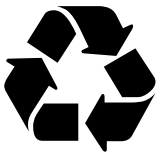
(Electromagnetic induction flow measurement)

is conform to the technical requirements on Technical Data and it is made in conformity to the procedure

Quality Control Manager: ..... Production and check date: .....



This mark on the instrument indicates that the product and its electronic accessories must not be disposed of with other household waste at the end of their useful life.
To avoid possible damage to the environment or human health resulting from uncontrolled waste disposal, please return the equipment directly to a specialized recycling company, in compliance with local regulations.



NI - MH

This instrument is powered by a battery type 2,4V triple-A, 0.6Ah NiMH; at the end of the life of the battery or the instrument, do not disperse it in the environment.
The battery must be disposed of in the appropriate collection centers.

SGM-LEKTRA S.r.l.
Via Papa Giovanni XXIII, 49
20053 Rodano (MI) - ITALY
tel: ++39 02 95328257
fax: ++39 02 95328321
e-mail: info@sgm-lektra.com
web: sgm-lektra.com

sgm lektra