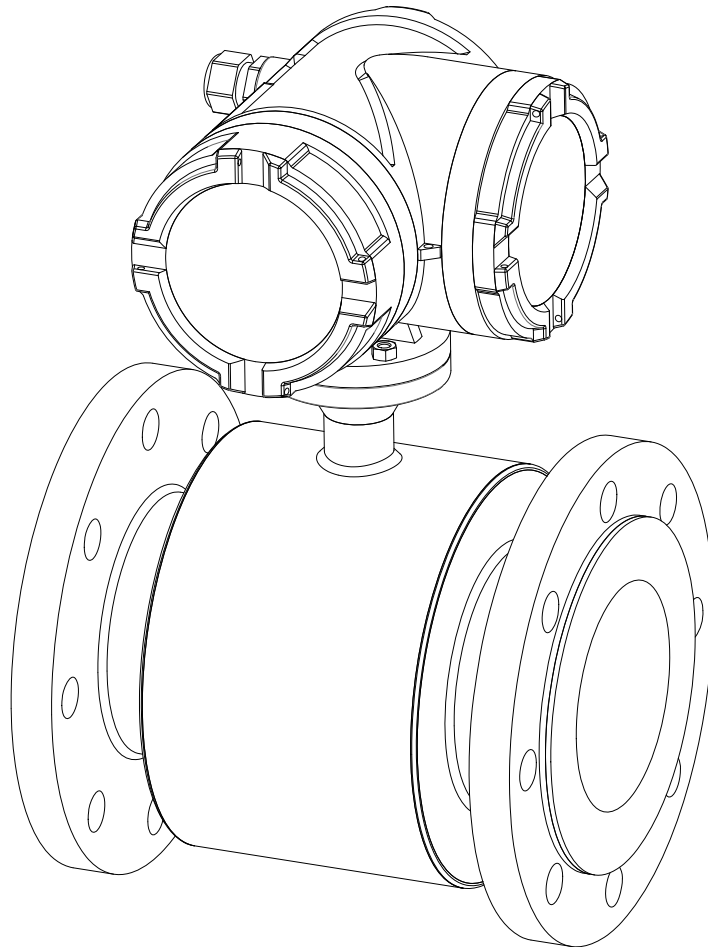


# RBmag

battery powered electromagnetic flow meter



technical documentation EN Rev. A

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## 1-WARRANTY

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Products supplied are guaranteed for a period of 12 (twelve) months from delivery date according to the conditions specified in our sale conditions document.

Producer can choose to repair or replace the Product.

If the Product is repaired it will maintain the original term of guarantee, whereas if the Product is replaced it will have 12 (twelve) months of guarantee.

The warranty will be null if the Client modifies, repair or uses the Products for other purposes than the normal conditions foreseen by instructions or Contract.

In no circumstances shall the producer be liable for direct, indirect or consequential or other loss or damage whether caused by negligence on the part of the company or its employees or otherwise howsoever arising out of defective goods

## 2-CALIBRATION CERTIFICATE

---

All the electromagnetic flowmeter are tested by 3 point rigs calibration.

The producer releases a document on letterhead certifying the average error of the 3-point calibration.

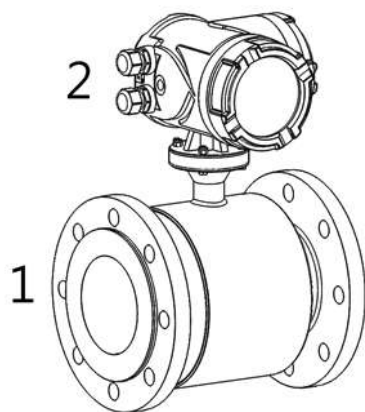
The calibration certificate is supplied with the unit.

The company archives the test data of each electromagnetic flowmeter.

The calibration rig is certificated by N.I.M. (National Institute of Metrology), which is internationally recognized by B.I.P.M. (Bureau International des Poids et Metrologie) and complies with NTC ISO IEC 17025 standard.

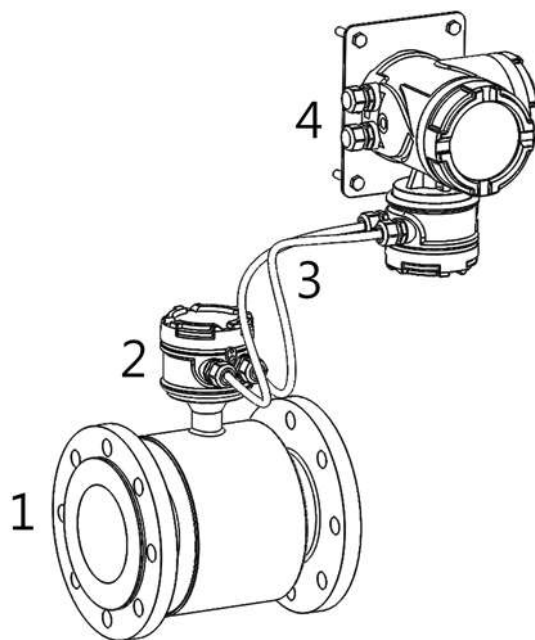
All calibrations are made in accordance to EN 45001 standards and with an accuracy better than 99.97%

### 3- PRODUCT



#### COMPACT VERSION

- 1. Sensor
- 2. Converter

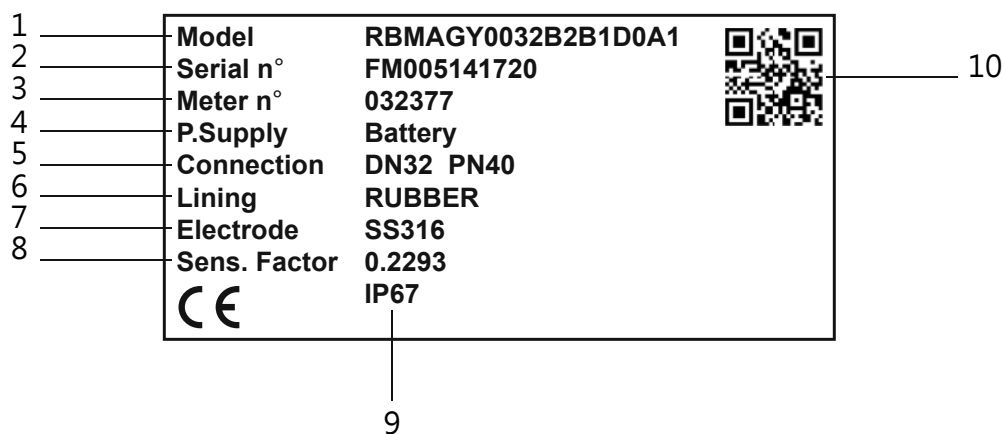


#### REMOTE VERSION

- 1. Sensor
- 2. Connection housing
- 3. Connection cables
- 4. Converter, wall mounting

#### 2.1 IDENTIFICATION

Each meter has an adhesive identification plate on which are the meter main data. The following picture describes the information and data on the identification plate.



- 1. Product code
- 2. Serial number
- 3. Production batch
- 4. Power supply

- 5. Process connection
- 6. Lining material
- 7. Electrodes material
- 8. Sensor factor

- 9. Protection

## 4-FEATURES

---

### Flow rate range

RBmag is able to process signals from fluids with flow rates of up to 10m / s in both directions (bidirectional meter).

### Range dimension / lining material

PTFE DN10 ÷ DN500

RUBBER DN65 ÷ DN2000

### Sensor material

SS321

### Housing material

aluminium

### Electrodes material

SS316L - Hastelloy C - Titanium - Tantalum - Platinum

### Measure range

<0,1m3/h ÷ >110000m3/h

### Accuracy

±0,5% standard; ±0,2% optional

### Repeatability

±0,1%

### Fluid conductivity

>5µS/cm.

### Power supply

Battery powered, 5 years life

### Ambient Temperature Limits

Remote version operating temperature:

RUBBER -10 ÷ +80°C; PTFE -40 ÷ +150°C

Compact version operating temperature:

RUBBER -10 ÷ +80°C; PTFE -40 ÷ +100°C

Storage temperature: -40÷85°C

### Communication protocol

modbus (opt.)

### Output

Frequency output: 0,1÷5000 Hz

Pulse output: open collector

### Reverse Flow

Allow measure reverse flow.

### Output Testing

Frequency Source: Transmitter can be commanded to supply a specified test frequency between 0.1 and 5000 Hz

### Start-up Time

0.5 seconds.

### Low Flow Cutoff

Adjustable between 0.0 and 9.9%Qmax. Below selected value, output is driven to the zero flow rate signal level.

### Humidity Limits

0-100% RH to 150 °F (65 °C), not condensing.

### Damping

Adjustable between 0.1 and 99 seconds.

### Compact version IP rating

IP67

### Remote version IP rating

sensor IP67 / IP68 (by request) - converter IP67

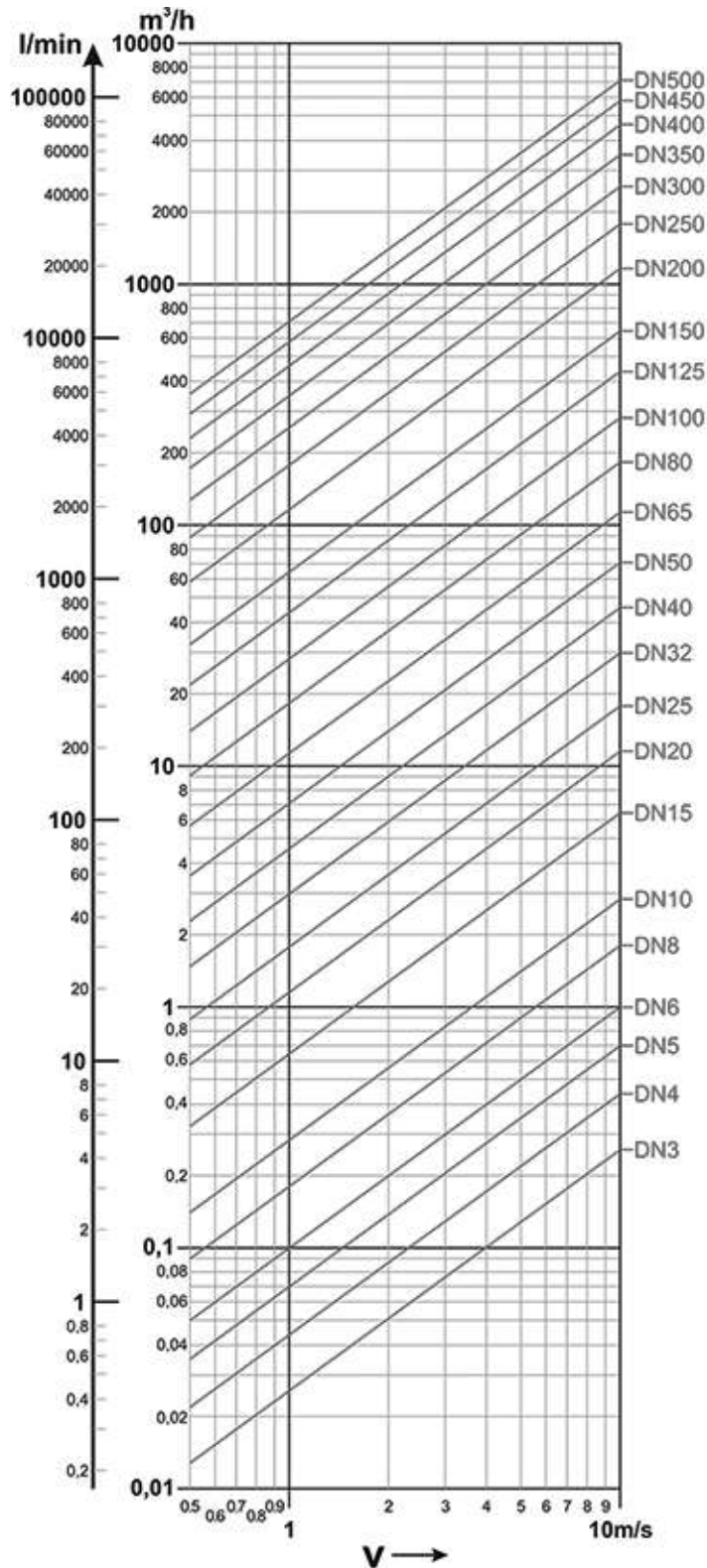
### Anti-condensation filter

Anti-condensation filter installed on converter

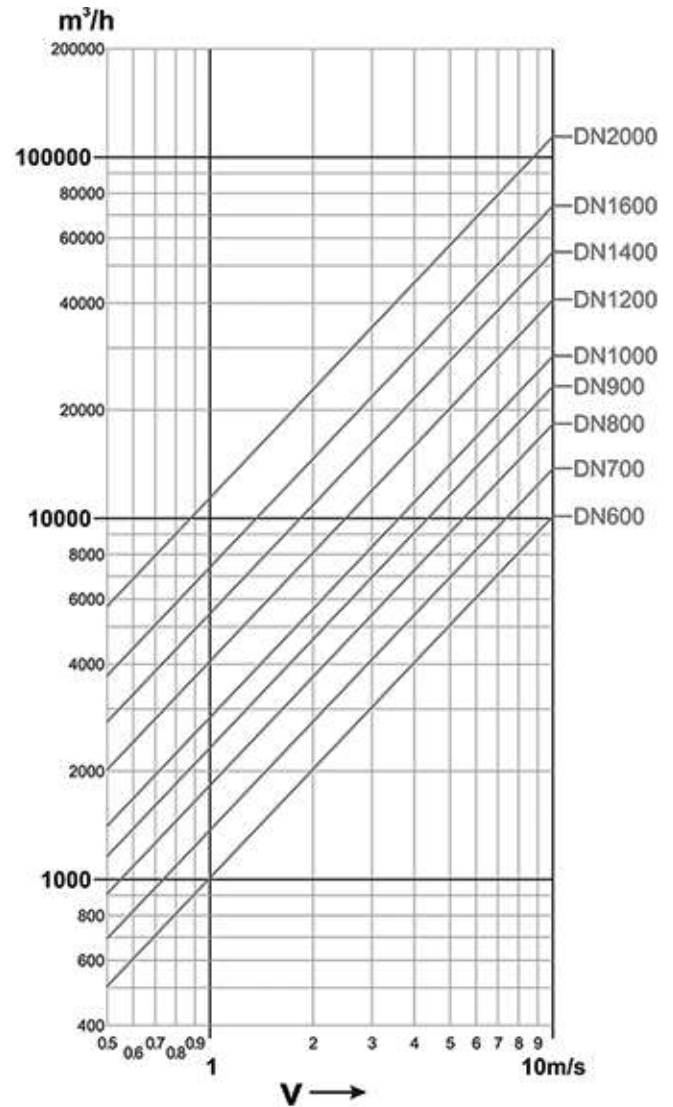
# 5-FLOW RANGE

## 5.1 FLOW RANGE GRAPHIC

Flow range from DN3 to DN500 (starting from DN10)



Flow range from DN600 to DN2000

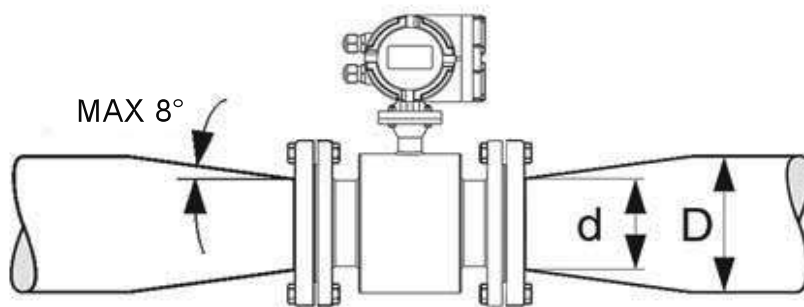


## 5.2 FLOW RANGE TABLES

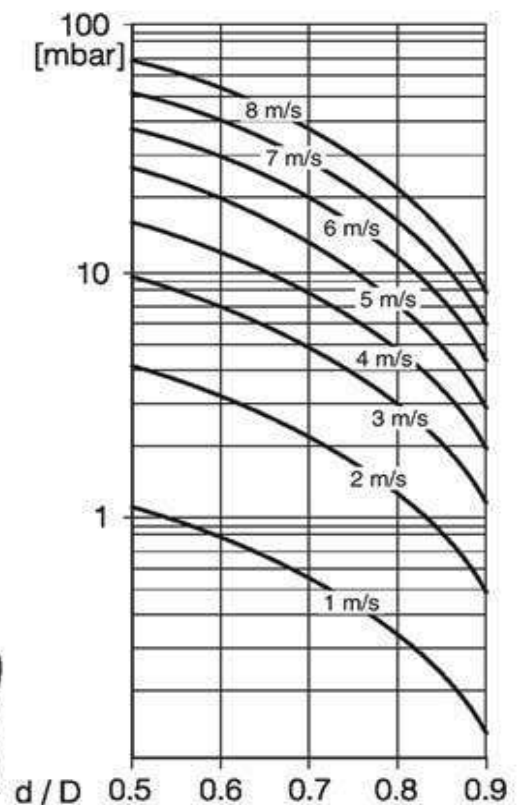
DN10 ÷ 300	
DN (mm)	Range: Minimum (0,5 m/s) / Maximum (10 m/s)
10	0.14 ÷ 2.9 m <sup>3</sup> /h
15	0.3 ÷ 6 m <sup>3</sup> /h
20	0.5 ÷ 12 m <sup>3</sup> /h
25	0.6 ÷ 18 m <sup>3</sup> /h
32	1 ÷ 30 m <sup>3</sup> /h
40	1.8 ÷ 42 m <sup>3</sup> /h
50	3 ÷ 66 m <sup>3</sup> /h
65	5.8 ÷ 120 m <sup>3</sup> /h
80	8.9 ÷ 180 m <sup>3</sup> /h
100	11 ÷ 282 m <sup>3</sup> /h
125	20 ÷ 450 m <sup>3</sup> /h
150	30 ÷ 600 m <sup>3</sup> /h
200	50 ÷ 1100 m <sup>3</sup> /h
250	85 ÷ 1700 m <sup>3</sup> /h
300	110 ÷ 2400 m <sup>3</sup> /h

DN350 ÷ 2000	
DN (mm)	Range: Minimum (0,5 m/s) / Maximum (10 m/s)
350	180 ÷ 3300 m <sup>3</sup> /h
400	220 ÷ 4200 m <sup>3</sup> /h
450	270 ÷ 5400 m <sup>3</sup> /h
500	320 ÷ 6600 m <sup>3</sup> /h
600	490 ÷ 9600 m <sup>3</sup> /h
700	680 ÷ 13500 m <sup>3</sup> /h
800	900 ÷ 18000 m <sup>3</sup> /h
900	1200 ÷ 22500 m <sup>3</sup> /h
1000	1450 ÷ 28000 m <sup>3</sup> /h
1200	2500 ÷ 40000 m <sup>3</sup> /h
1400	3000 ÷ 55000 m <sup>3</sup> /h
1600	4000 ÷ 70000 m <sup>3</sup> /h
1800	5000 ÷ 90000 m <sup>3</sup> /h
2000	6000 ÷ 110000 m <sup>3</sup> /h

## 5.3 LOAD LOSS

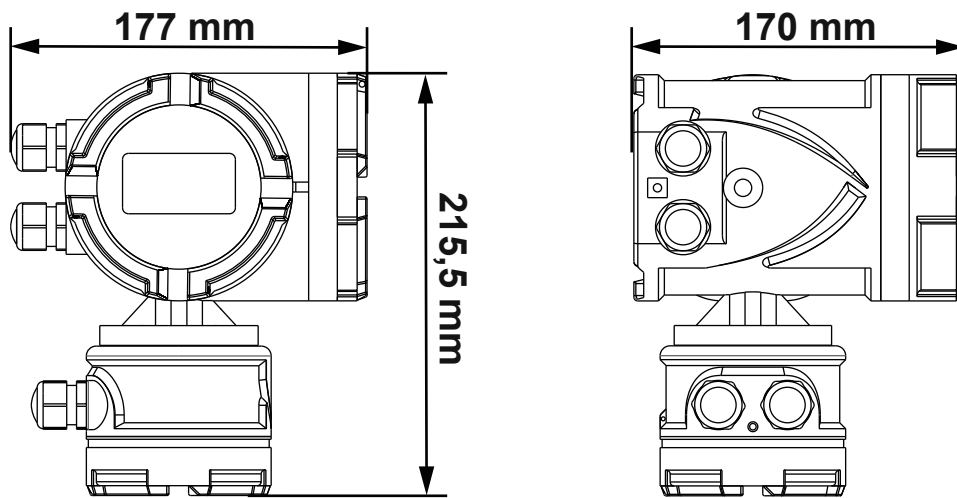


Adaptation cones

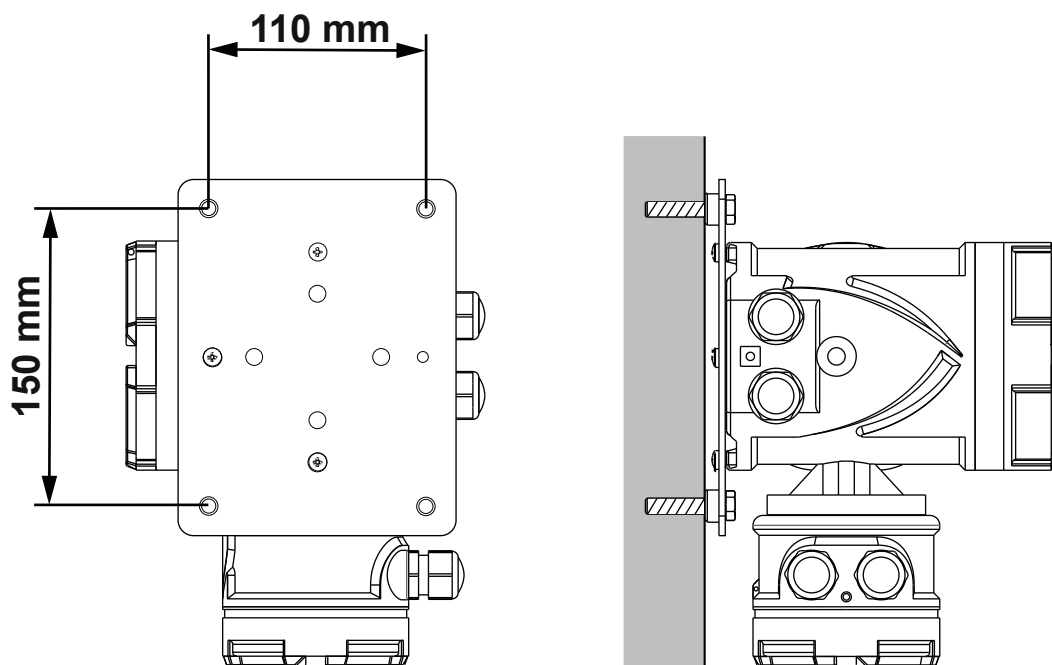


## 6-DIMENSIONS

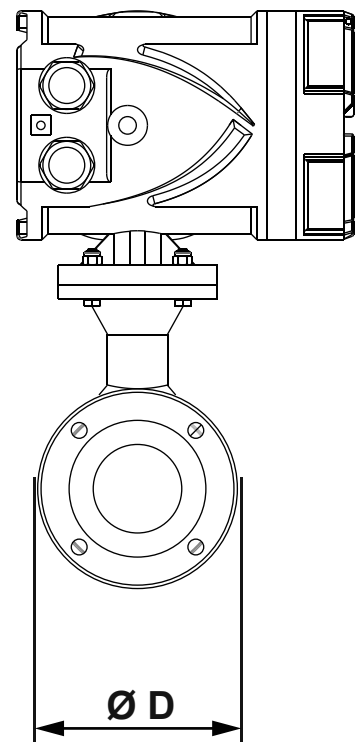
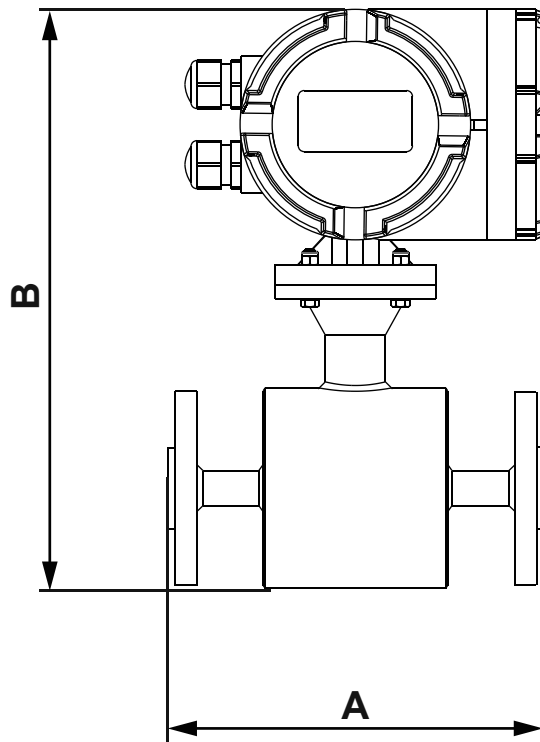
### 6.1 REMOTE VERSION CONVERTER



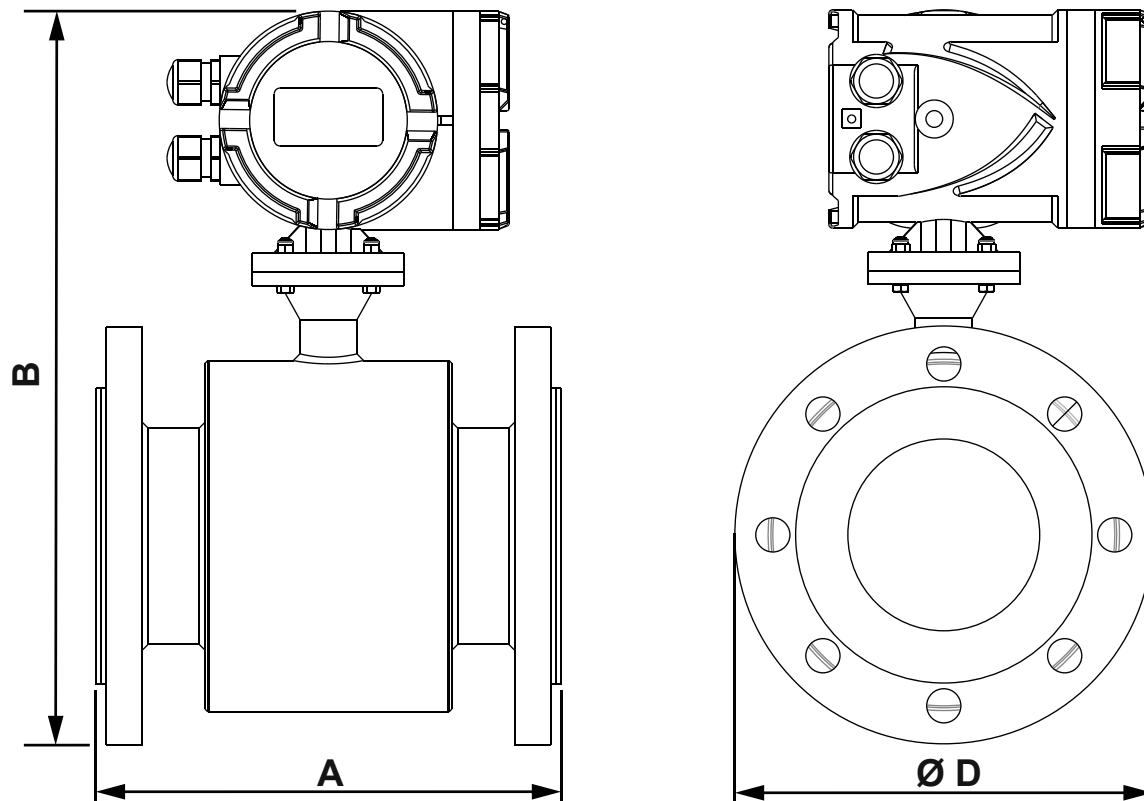
### 6.2 WALL MOUNTING REMOTE VERSION CONVERTER





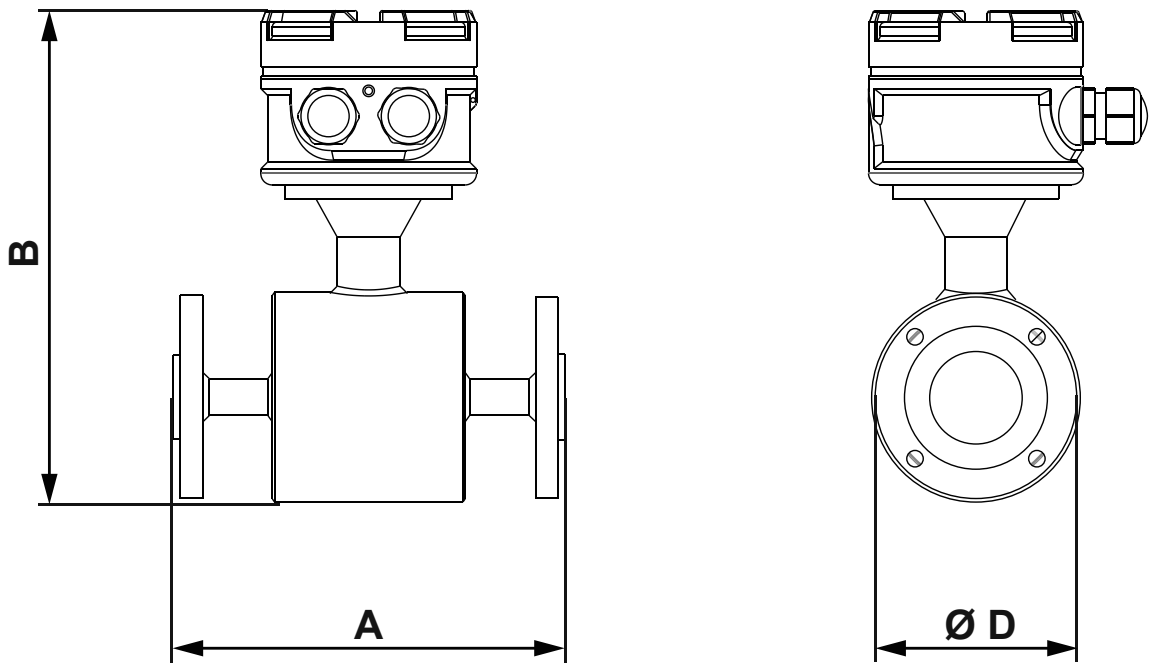
**6.3 COMPACT VERSION DN10 ÷ DN80 PN16 - PN40**

DN (mm)	A (mm)	PN 16 - PN 40	
		B (mm)	ØD (mm)
10	200	295	90
15		295	95
20		300	105
25		300	115
32		315	140
40		335	150
50		344	165
65		360	185
80		375	200

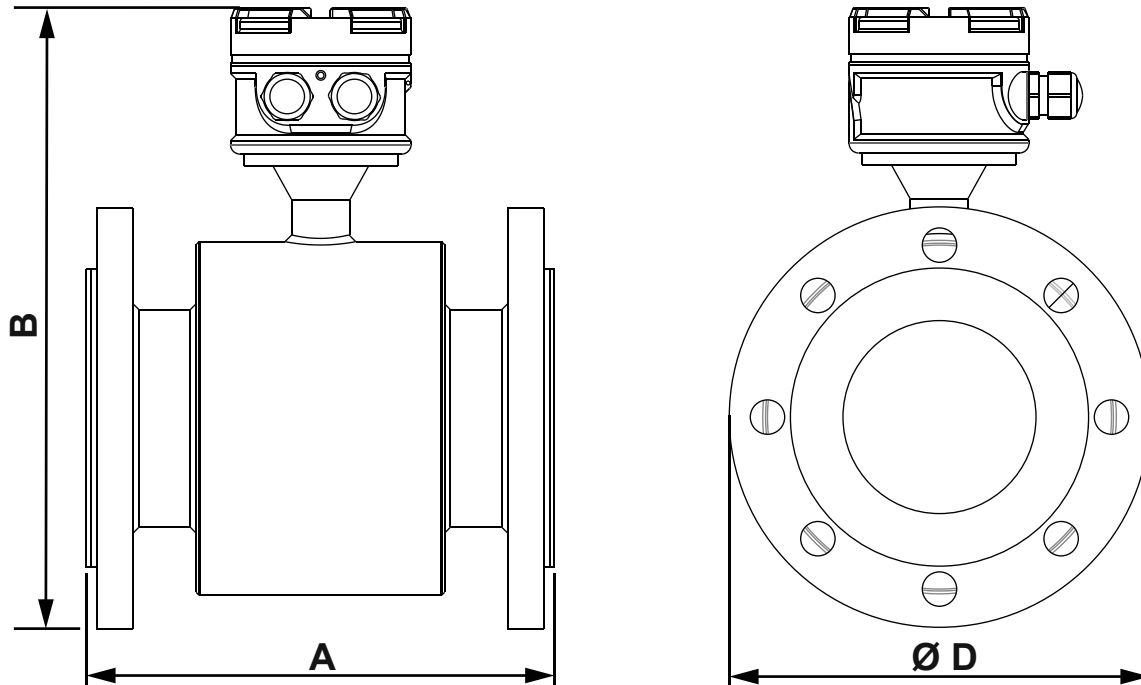
**6.3 COMPACT VERSION DN100 ÷ DN1000 PN10 - PN16 - PN40**

DN (mm)	A (mm)	PN 10		PN 16		PN 40	
		B (mm)	ØD (mm)	B (mm)	ØD (mm)	B (mm)	ØD (mm)
100	250	-	-	400	220	410	235
125	250	-	-	420	250	435	270
150	300	-	-	460	285	468	300
200	350	520	340	520	340	538	375
250	450	570	395	575	405	598	450
300	500	620	445	620	460	648	515
350	550	670	505	678	520	708	580
400	600	730	565	738	580	778	660
450	600	780	615	793	640	816	685
500	600	830	670	850	715	870	755
600	600	930	780	960	840	985	890
700	700	1050	895	1080	910	-	-
800	800	1165	1015	1170	1025	-	-
900	900	1270	1115	1275	1125	-	-
1000	1000	1360	1230	1375	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-INSTALLATION

### 7.1 SAFETY MEASURE

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. ⚠

### 7.2 WARNINGS

#### 7.2.1 Explosions could result in death or serious injury

- Verify that the operating atmosphere of the sensor pipe and transmitter is consistent with the appropriate hazardous locations certifications.
- Do not remove the transmitter cover in explosive atmospheres when the circuit is alive.

#### 7.2.2 Failure to follow safe installation and servicing guidelines could result in death or serious injury

- Make sure only qualified personnel perform the installation.
- Do not perform any service other than those contained in this manual unless qualified.

### 7.3 PRE-INSTALLATION

There are several pre-installation steps that make the installation process easier. They include identifying the options and configurations that apply to your application, setting the hardware switches if necessary, and consideration of mechanical, electrical, and environmental requirements. Please remember that the sensor pipe liner is vulnerable to handling damage. Never place anything through the sensor pipe for the purpose of lifting or gaining leverage. Damaged liner can render the sensor pipe useless.

#### 7.3.1 Identify Options and Configurations

Standard application of the RBmag includes control of the sensor pipe coils and one or more of the following configurations or options:

- Pulse output

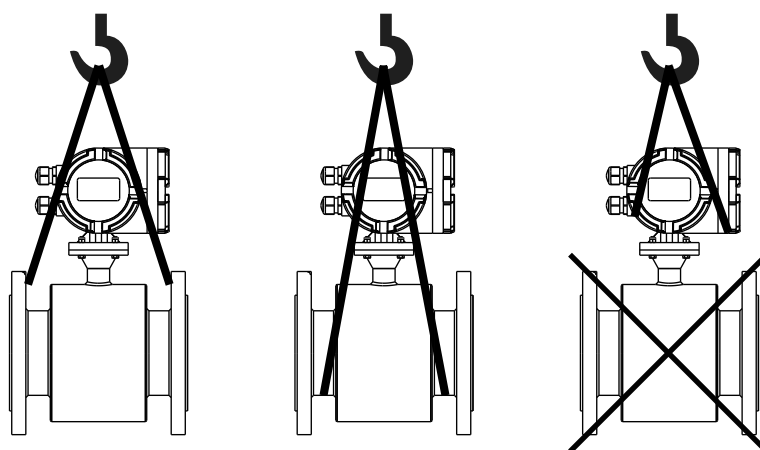
Be sure to identify the options and configurations that apply to your situation, and keep a list of them nearby during the installation and configuration procedures.

#### 7.3.2 Mechanical Considerations

The mounting site for the RBmag 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. The LOI can be rotated in 90° increments.

#### 7.3.3 Lift

The flowmeter can be lifted using the lift as shown in following pictures. The safe load and measure for the lift 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)



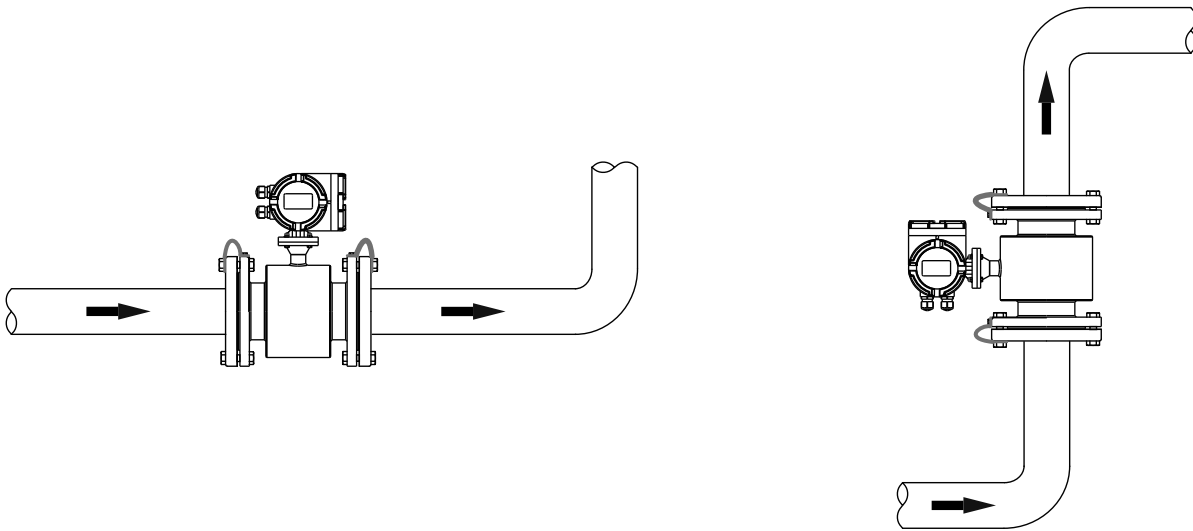
## 7.4 INSTALLATION GENERAL CRITERIA

The flowmeter can test automatically flow direction. Because 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" (see par. 10.4.4.2.4)

The upstream straight pipe should be longer than  $5 \times \text{DN}$  to guarantee the accuracy of measurement. When the distance is more than  $5 \times \text{DN}$  between the device (e.g. cone pipe, orifice plate, valve) and the sensor of flowmeter, their affection is negligible. And the downstream straight pipe should be more than  $3 \times \text{DN}$

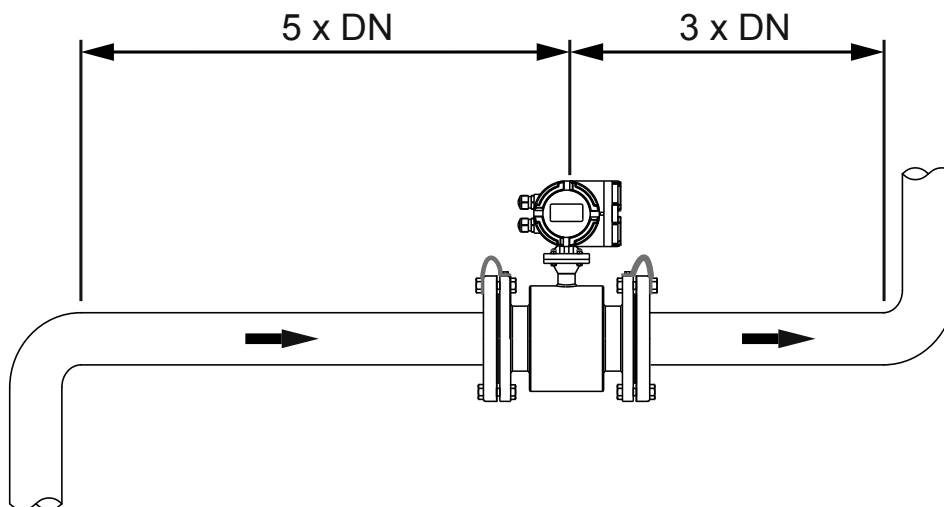
## 7.5 INSTALLATION IN PIPELINE

In principle, the measurement of the electromagnetic flowmeter is independence of the distribution of velocity as long as the distribution of velocity in measuring tube is symmetrical. Installation may be horizontal or vertical, but make sure no deposit on the electrodes when horizontal installation. See **Fig.13-A**.



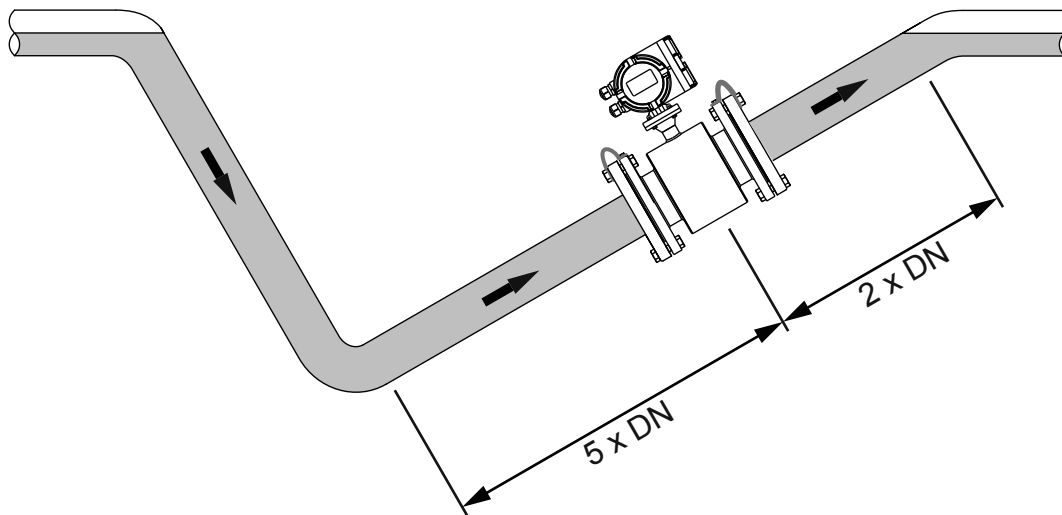
**Fig.13-A.** Installation in horizontal or vertical pipeline

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. See **fig.13-B**.



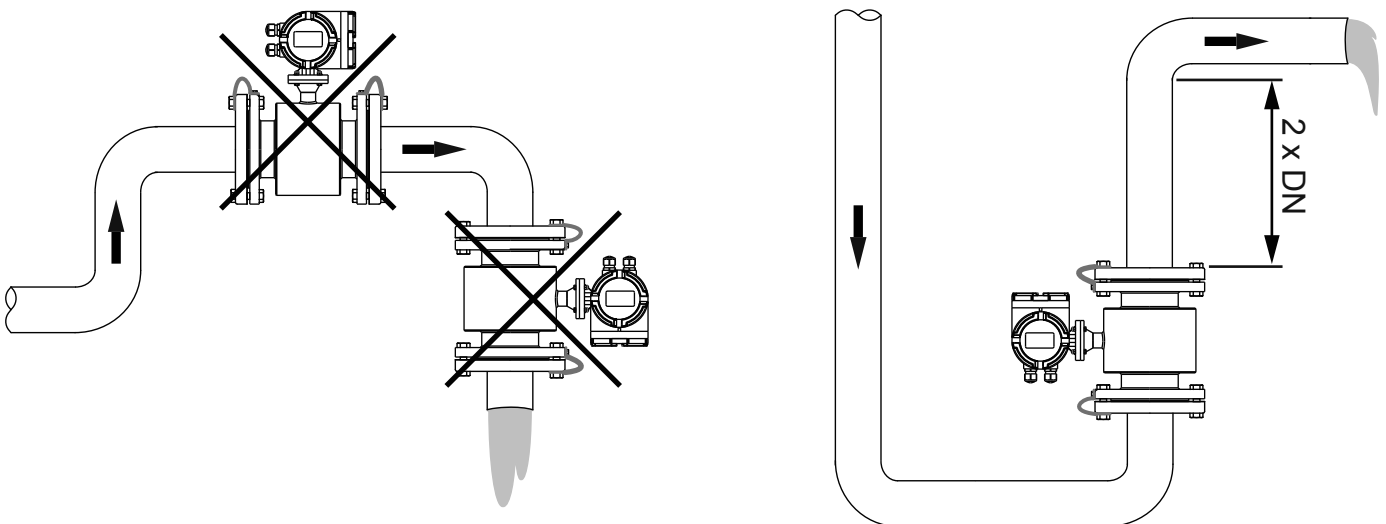
**Fig.13-B.** Requirement to install the flowmeter straight pipes

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. See **Fig.14-A**.



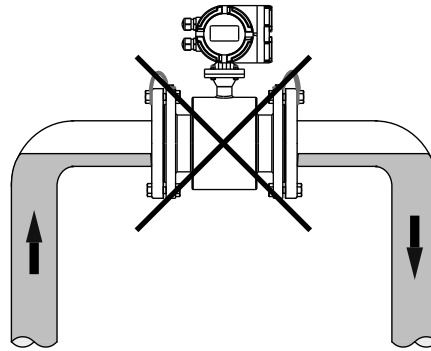
**Fig.14-A** Installation in partially filled pipes

The electromagnetic flowmeter must not be installed in the pipe section with a free pipe outlet that could run empty. When installing in a downstream pipe, please make sure the pipe is always fully filled with medium. See **Fig.14-B**.



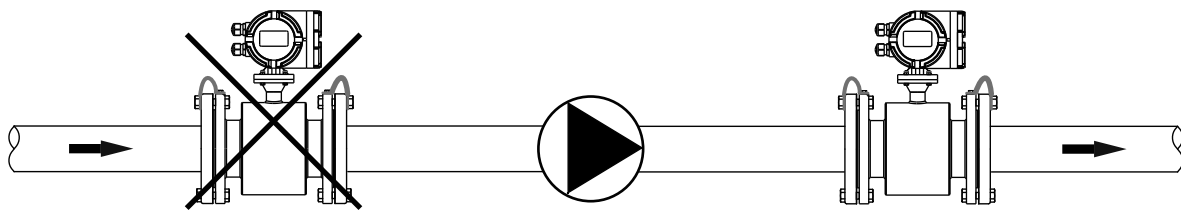
**Fig.14-B** Installation in pipe without emptying

The electromagnetic flowmeter can not be installed at the pipe highest point, because air or gas accumulations may occur in the measuring pipe. See **Fig.15-A**



**Fig.15-A** Installation at highest point

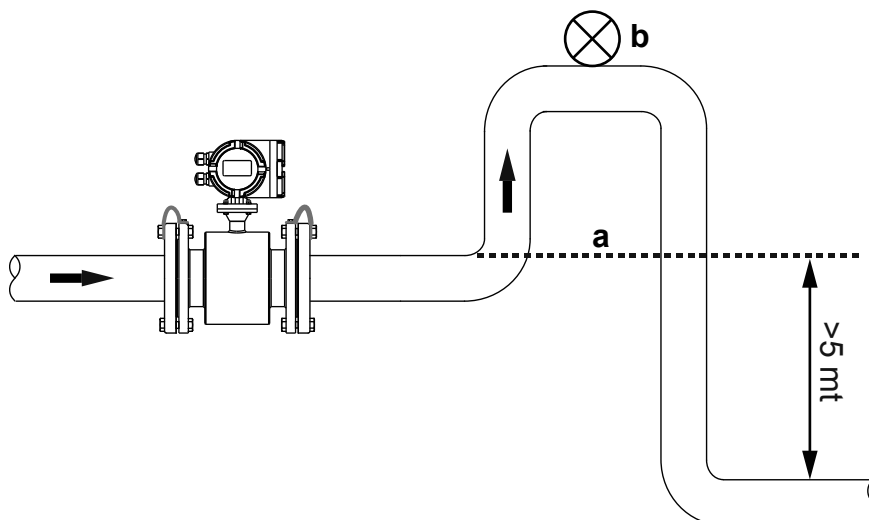
The electromagnetic flowmeter can not be installed upstream of a pump to prevent cavitation, which can damage the sensor lining. See **Fig.15-B**



**Fig.15-B** Near pumps 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. See **Fig.15-C**

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

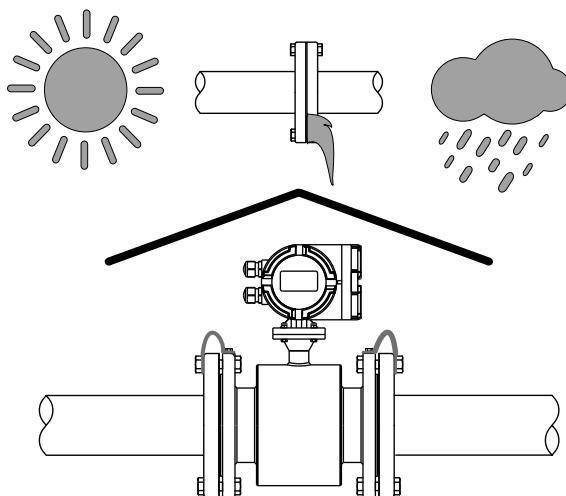


**Fig.15-C** Installation in proximity of a > 5m down pipe section



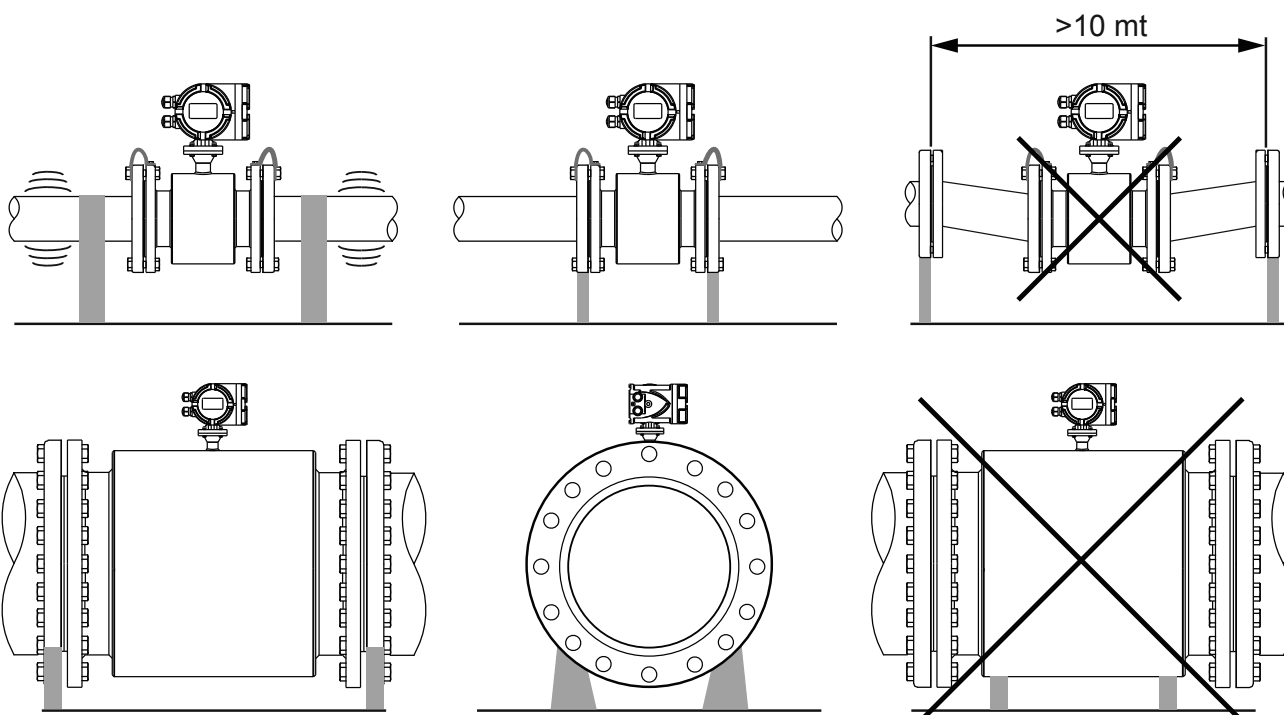
## 7.6 INSTALLATION PRECAUTIONS

An all-weather cover should be used to prevent the housing from the direct sunlight or rain when the device is outdoors. The flowmeter should not be subjected to excessive vibrations, large ambient temperature changing and long-time shower. It should be prevented from the leakage of the corrosive liquid.



## 7.7 PIPE CONNECTION

The sensor itself can not be as its support, it should be supported to the connecting pipes. And the sensor should not withstand too big fastening stress. It should be taken to account to eliminate the affection of the stress caused by thermal expansion.



## 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

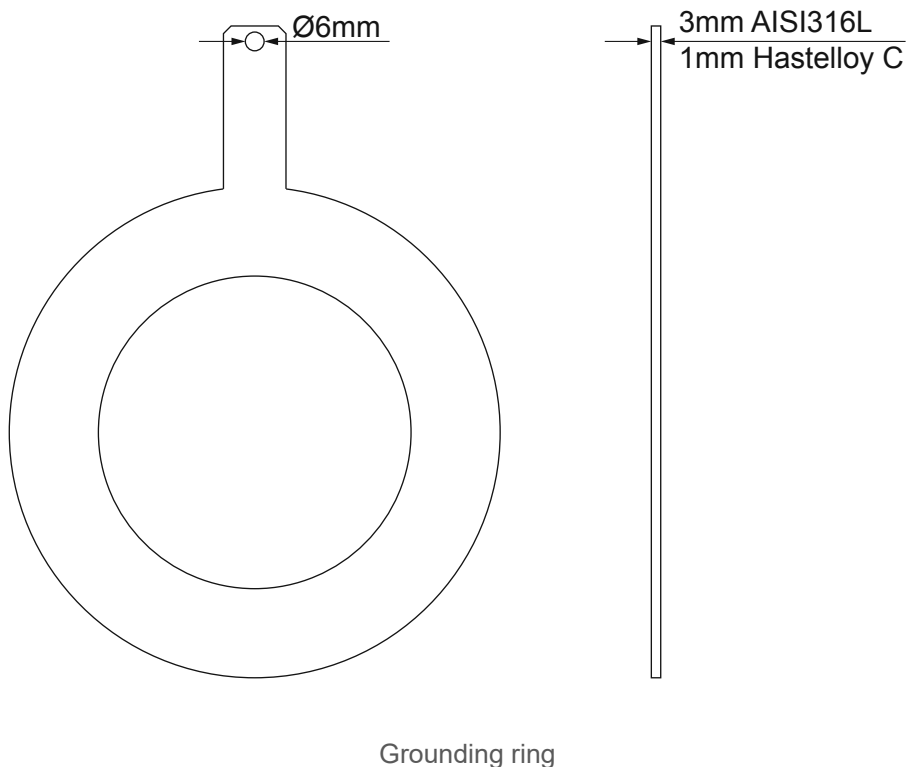
### 5.9.1 Grounding ring

Material: SS 316L or Hastelloy C

Thickness: 3mm for SS 316L or 1mm for Hastelloy C

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 same potential.

To make equipotential the meter with the fluid, the grounding rings must be in direct contact with the fluid to be measured.

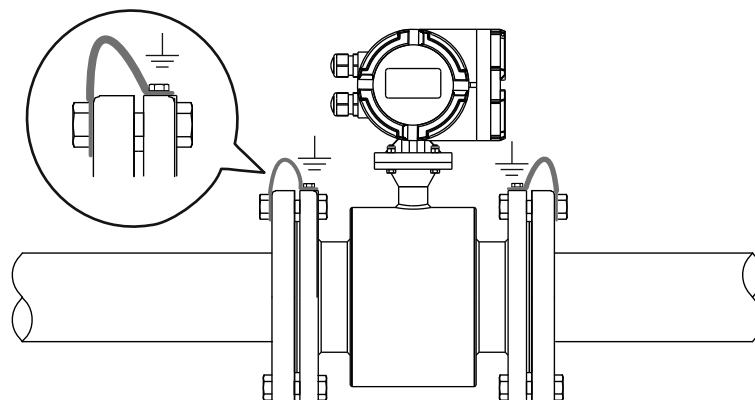


## 7.10 EQUIPOTENTIALITY AND ELECTRICAL INTERFERENCE REDUCTION

The measuring circuit considers the measured fluid as zero potential. The measured fluid is grounding potential in most of application, therefore grounding connection actually means connecting to measured fluid. The grounding cable for sensor is connected to metal pipe welding with flanges. The metal tube isolates from the measuring fluid because of lining, so the flanges of sensor should be connected to the flanges contacting directly measuring fluid using wires. The resistance for grounding connection should be less than 10ohm. In most of application, it is unnecessary to take special measure for installing sensor, only require the signal cable separate from the main cable. If the sensor with cathode protection or the process with electroanalysis the main current must not go through the measuring fluid in the sensor.

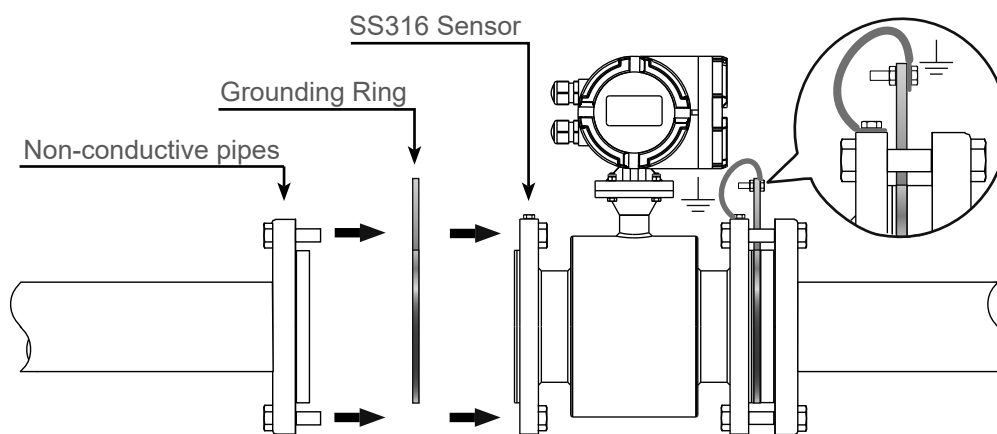
The following measure should be taken in order to reduce the affection of magnetic field:

- a) In metal piping, the device is made potential equalization via the connection between the sensor and the adjoining pipe. The bolt connection for flanges can not be used instead of the electric connection, it must have an additional electric connection as shown in **Fig.18A**.



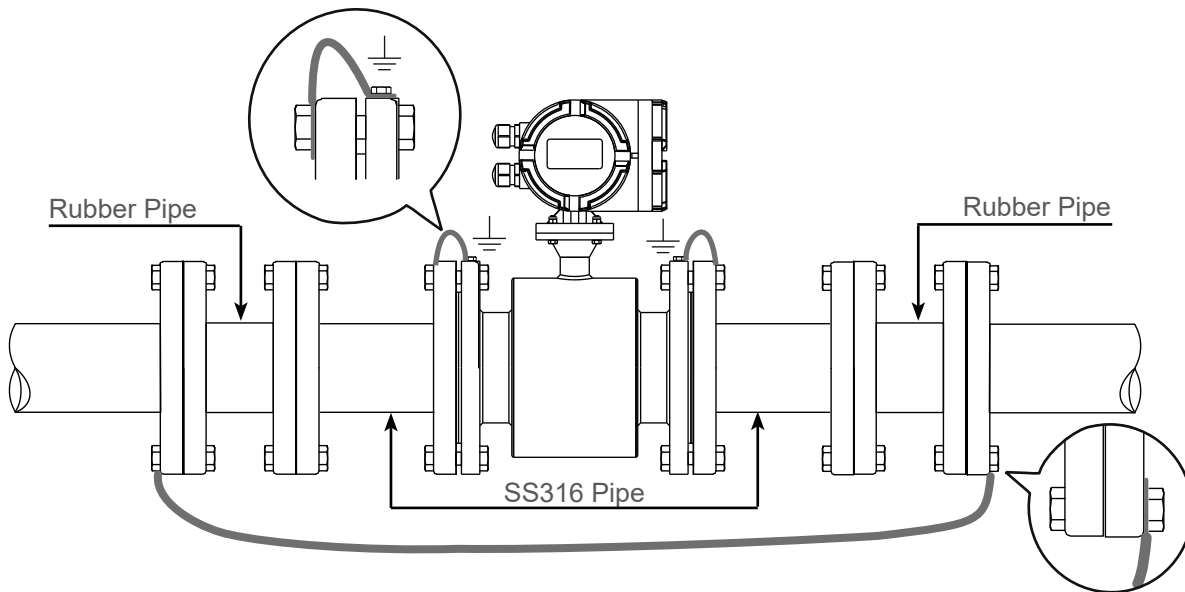
**Fig.18A** Sensor equipotentiality

- b) For the non-inductive pipe, the grounding rings should be installed between the both flanges for sensor and the both flanges for pipe. See **Fig.18B**.



**Fig.18B** 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 in **Fig.19A**.



**Fig.19A** Pipe segmentation

## 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 shipped 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) One minute later, the value displayed in the indicator will reach some amount, which means the connections of wires are correct. If the flow direction is wrong, then change the flow direction on the converter.
- 3) Zero verification. Shut off the valve tight in downstream first and then the valve in upstream, to let the medium in the pipeline stops. The displayed value should be 0. The value displayed can be corrected at the converter if the value is different than 0: ensure that no leaks.

## 7.12 MAINTENANCE

In general, they are not necessary maintenance and supply of the magnetic flowmeter. Only in the case in which 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 ENTRY

The compact version converter enclosure has n. 2 M20x1.5 cable glands.

The converter enclosure remote version has n.2 M20x1.5 cable glands for power supply and outputs signal, and 2 M16x1.5 cable glands for sensor pipe connection

### 8.2 INFILTRATION AND HUMIDITY PREVENTION

To avoid the humidity infiltration inside the converter and sensor pipe is recommended:

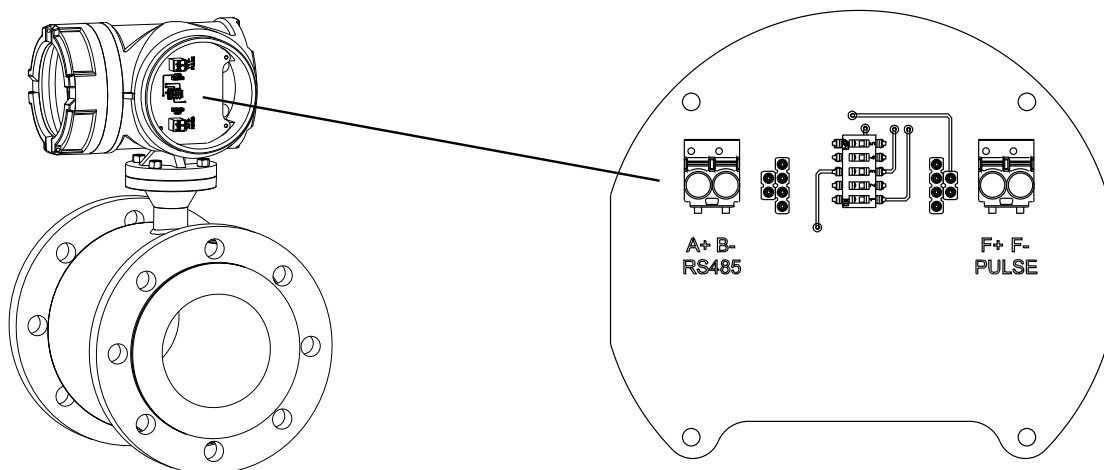
- fully well tighten the cap and the cable glands
- position the cable so that it forms a downward curve at the M20x1.5 and/or M16x1.5 output (see below figure); in this way the condensation and/or rain water will tend to drip from the curve bottom.



### 8.3 ACCESS TO CONNECTIONS

To connect the output or the sensor (remote version), open the converter blind cover is necessary (see image below). When the cover is opened, the circuit board with the terminal connections and the test point switches are visible. The connections details are shown in the following paragraphs.

**N.B.** The dip switches must be always be set to ON.



### 8.4.1 Digital output

In order to enable the digital output , please refers to section 10.4.4.3.5 of this manual.

When digital output is set in frequency mode, it generates an  $0.1 \div 5000\text{Hz}$  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.

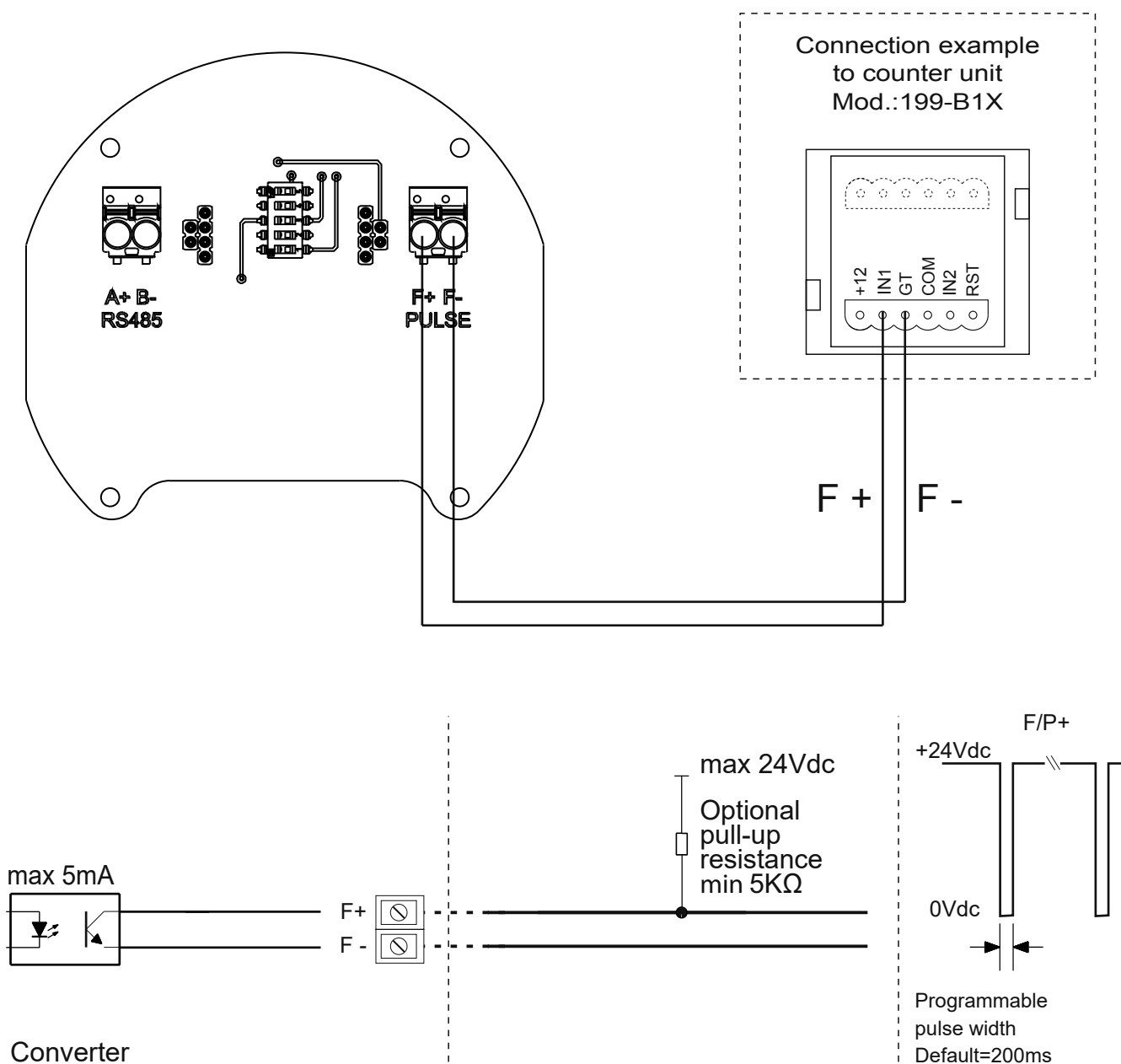
The resistance in the circuit must be equal to or greater than 100Kohms.

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+** and **F-** terminals

**N.B.** - When the RBmag pulse output is connected to an acquisition system that supply a voltage (24Vdc MAX), be carefull of the max current sustainable by transistor (5mA MAX); a proper pull-up resistor should be placed in order tonot exceed this limit. E.G. if the system is supplying 24Vdc, the value of pull-up resistance should be 5K ohm or greater.

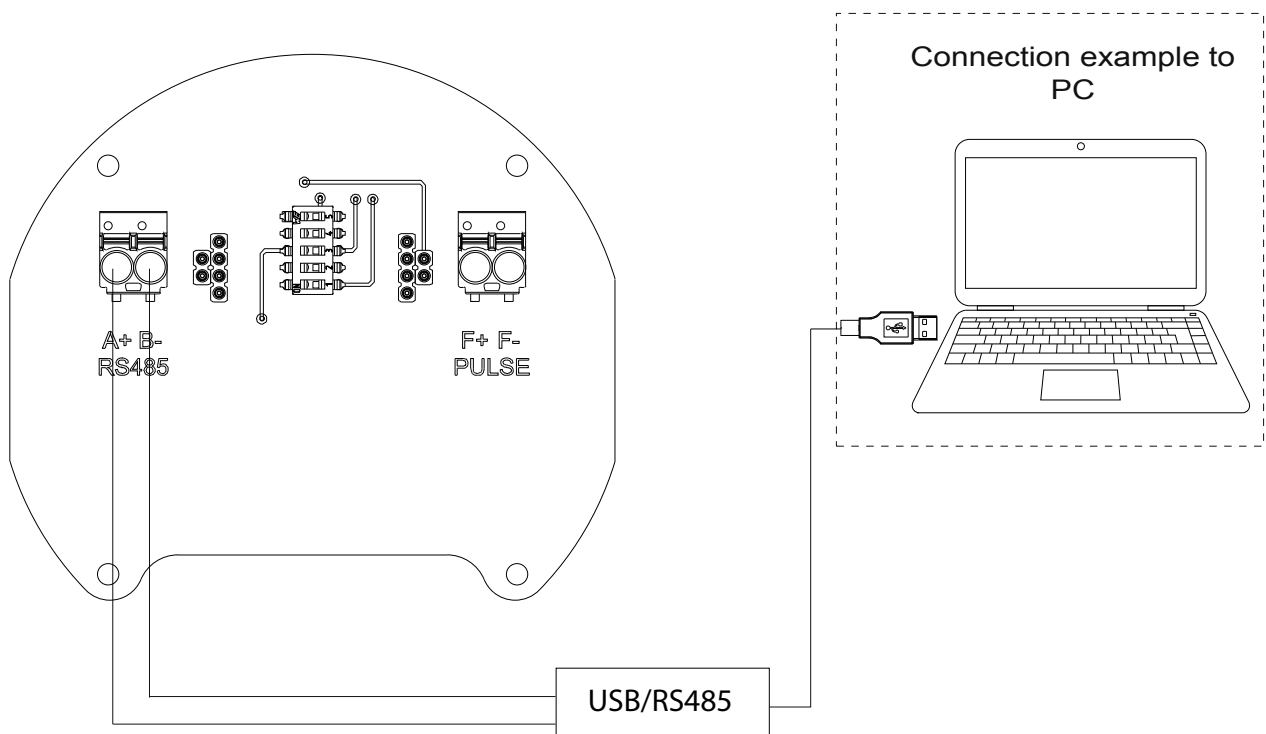
The below drawing shows the connection diagram between the RBMAG flowmeter and the 199-B1X counter unit



#### 8.4.2 RS485 serial output

Communicate via MODBUS is possible in models with RS485 serial port.  
Connect the serial cable to **A+** and **B-** terminals

The below drawing shows connection example diagram between RBMAG flowmeter and a notebook.

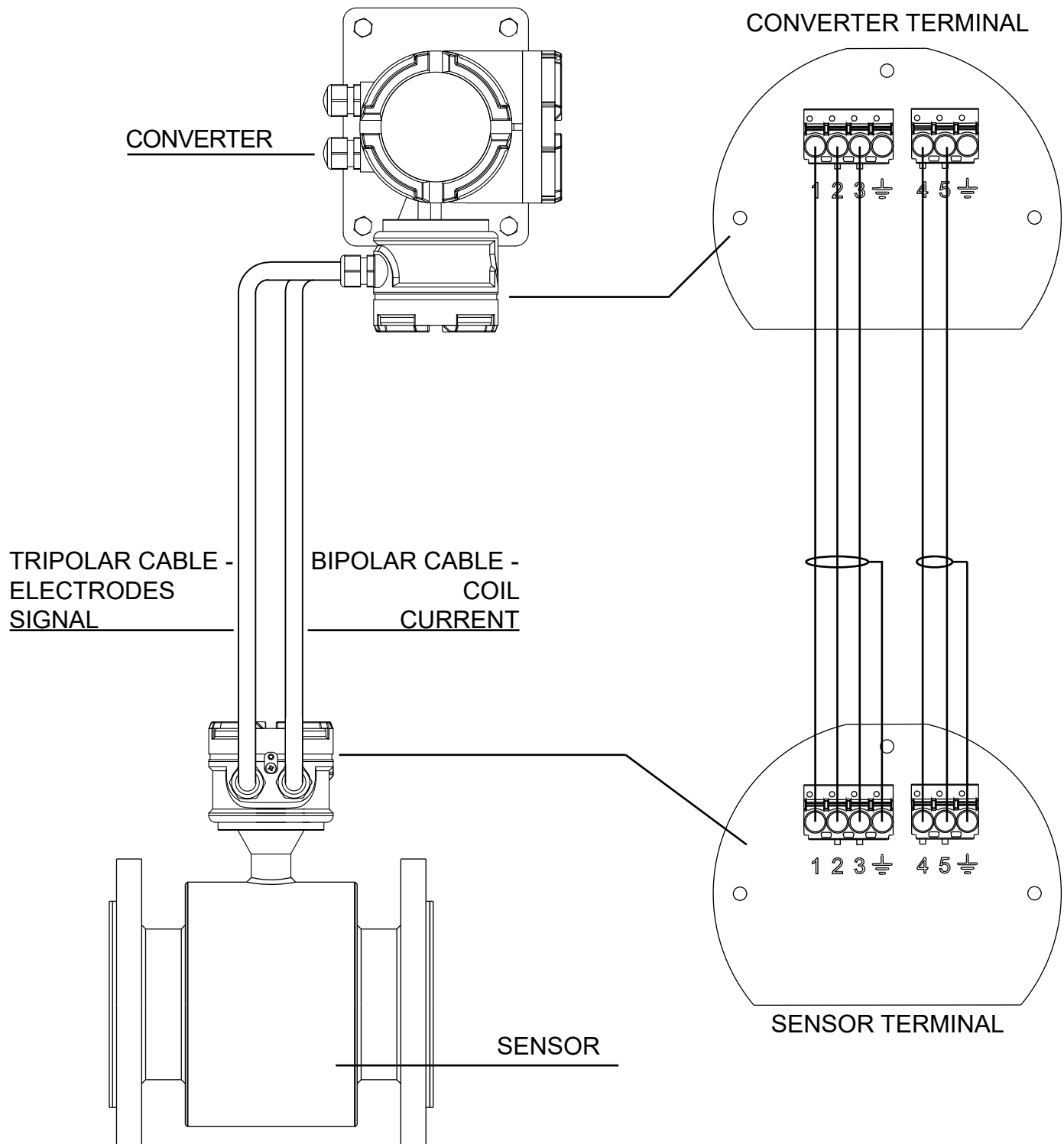


## 8.5 REMOTE VERSION

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

- 1) The cables must be laid in an armored conduit or fixed along their path to avoid errors in measurement, especially with low conductivity fluids
- 2) The cables should be away 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 8.5.2.

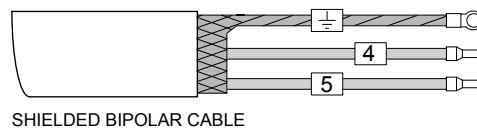
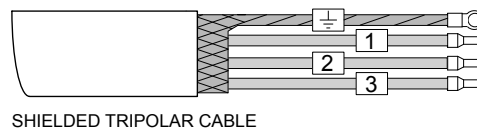
Connect the sensor to the converter according to the below diagram.





### 8.5.1 Remote version wiring

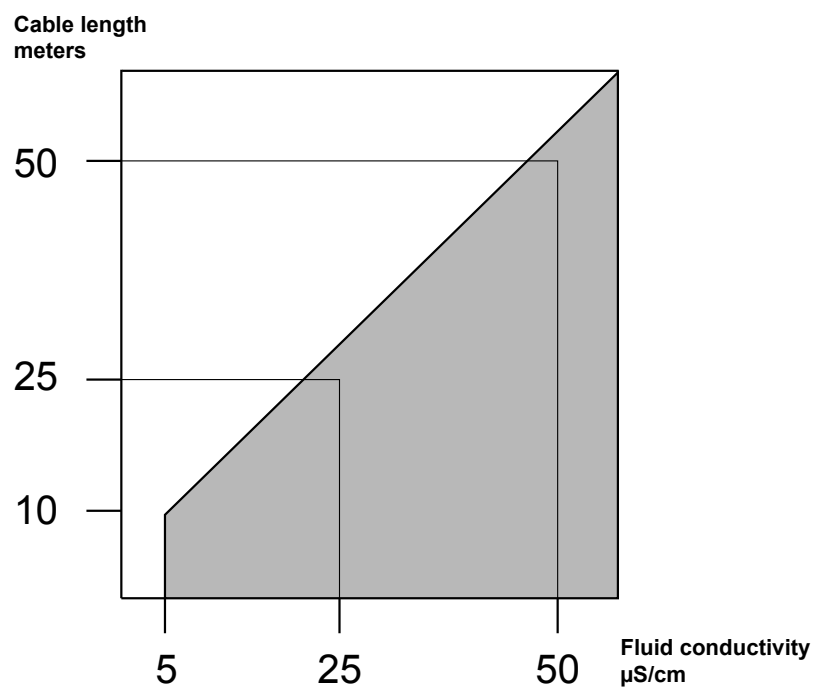
Cable	Wire		Function	Terminal position
	Num.	Color		
Bipolar	4	black	coil	4
	5	brown	coil	5
	braid		shield	$\perp$
Tripolar	1	white	electrode 1	1
	2	yell./green	common GND	2
	3	brown	electrode 2	3
	braid		shield	$\perp$



### 8.5.2 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 an 25 microS fluid conductivity, for example, the connection cables will have a maximum length of 25 meters.



### 8.5.3 Connectiong cables

#### 8.5.3.1 - 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; RAL5015 blue color
Marking	SGM-LEKTRA RODANO MILANO ITALY - 525B005A
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)

#### 8.5.3.2 - 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; RAL5015 blue color
Marking	SGM-LEKTRA RODANO MILANO ITALY - 525B005A
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 RPmag. 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

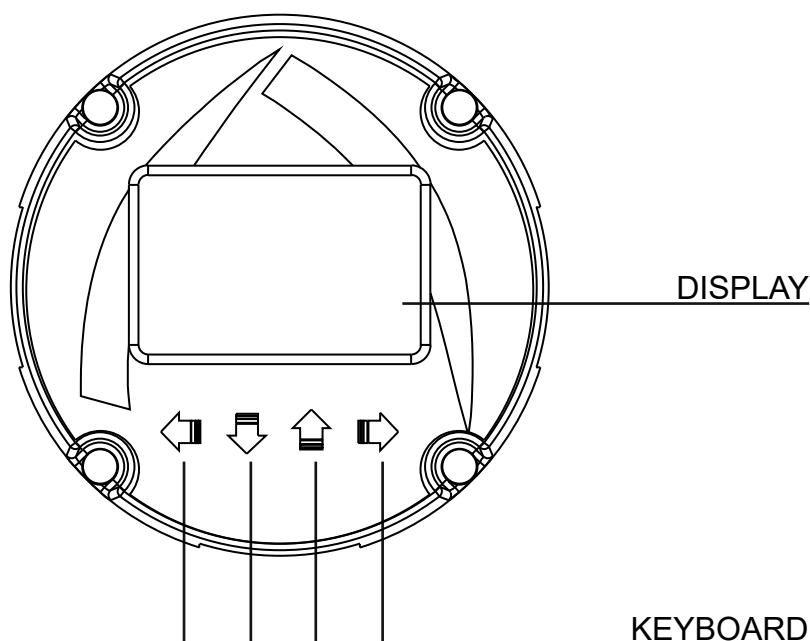
- Verify that the area of installation and operation comply with the characteristics of the measuring tube and the transmitter.
- Make sure only qualified personnel perform the installation.
- Do not perform any service other than those contained in this manual unless qualified.

### 9.3 LOI FEATURES

LOI has an alphanumeric liquid crystal display LCD visible from any angle. There are four touch keys on the pad, and a infrared decoder to receive keys that on the remote encoder.

Following table lists and details the functions of the LOI keys.

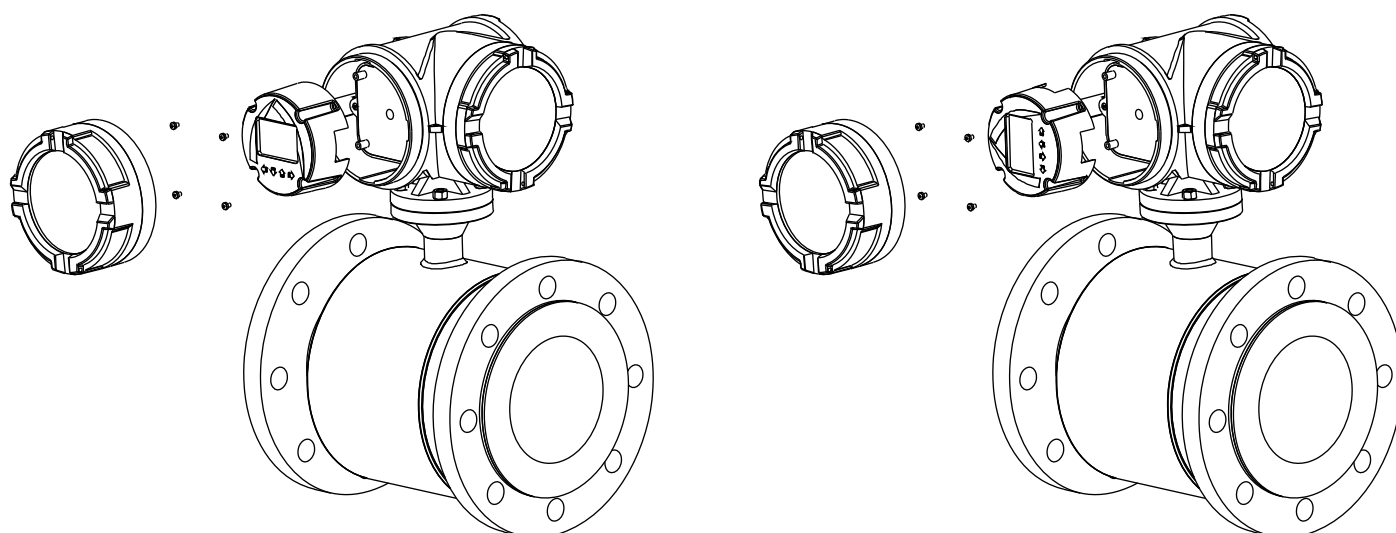
LOI KEY	FUNCTION
	Enter; Moves to the previous display field; Save parameters
	Moves the cursor to the next higher field; Changes user-selected variables in a field to next higher value; Changes parameters on a predefined list; Change display page; Change parameters page when browsing parameters
	Moves the cursor to next lower field; Changes user-selected variables in a field to next lower value; Changes parameters on a predefined list; Change display page; Change parameters page when browsing parameters
	Toggle keypad lock (keep pushed for 3 seconds)
	Enter menu; Moves cursor to next user-selected variable; Changes parameters on a predefined list; Aborts a chosen operation; Aborts browse parameters
 	Zero Trim (from RUN mode)



## 9.4 DISPLAY ROTATION

Each magnetic flowmeter installation is different from application to application; therefore, the display can be rotated to accommodate various setup using the following procedure:

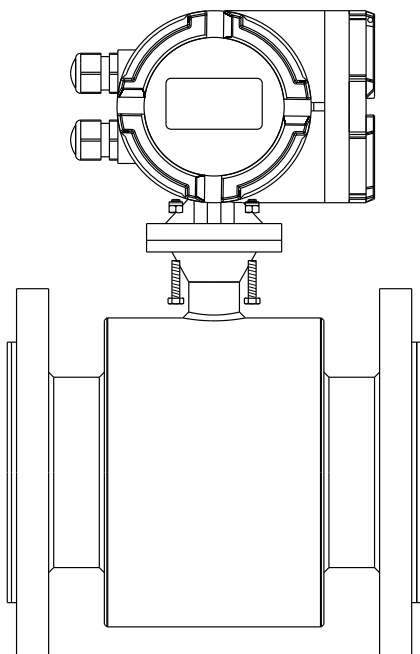
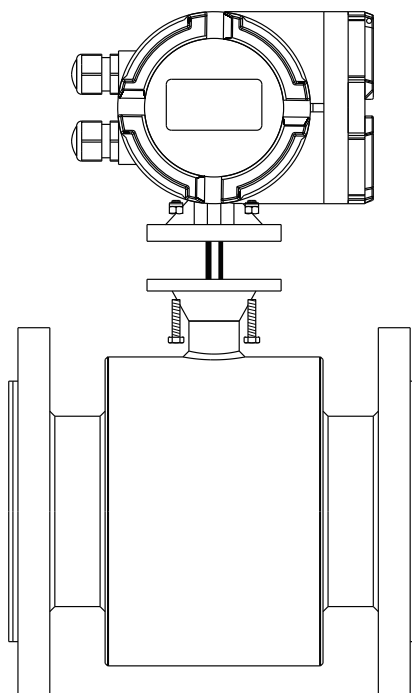
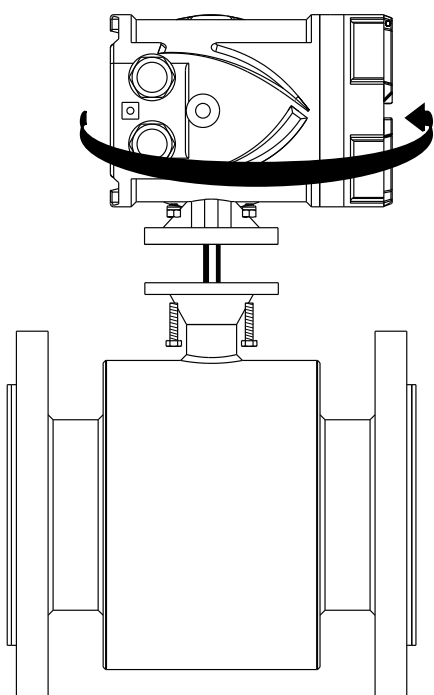
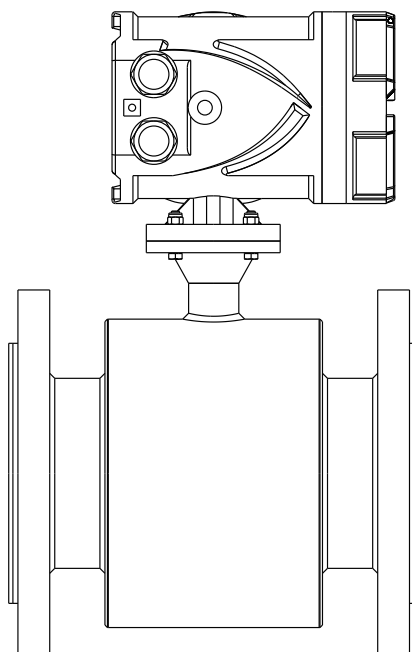
1. Unscrew the transparent cover.
2. Remove the four screws that secure the “display/electronics” bracket to the container, paying attention to the wiring between the electronics and the terminal.
3. Rotate the display / electronics bracket to set the position (minimum 90° rotation).
4. Tighten the four screws that secure the “display/electronics” bracket to the container.
5. Tighten the transparent cover.



## 9.5 CONVERTER ROTATION

To a greater functionality and adaptation to the application the entire converter, in addition to the display, can be rotated. Follow the following steps to make the change.










1. Remove the four screws that secure the converter to the sensor pipe.
2. Slightly lift the converter paying attention to the electrical connections between the sensor pipe and the terminal.
3. Turn the converter (minimum 90° rotation) bringing it to the desired position.
4. Fix the converter to the sensor with the 4 fixing screws.

**1****2****3****4**




# 10-PROGRAMMING

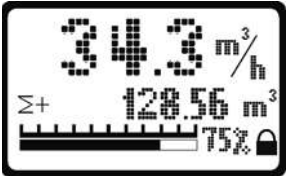
## 10DATA ENTRY

The LOI keypad has no numerical keys. Enter numerical data using the following procedure:




- 1. Access the appropriate function.
- 2. Use  to highlight the digit you want to enter or change.
- 3. Use  or  to change the highlighted value.  
For numerical data,  or  toggles through the digits 0÷9,decimal point; For alphabetical data, they toggle through the letters of the alphabet A-Z, digits 0÷9, and the symbols &, +, -, \*, /, \$, @, %, and the blank space ( or  are also used to toggle through pre-determined choices that do not require data entry.).
- 4. Use  to highlight and change other digits you want to change.
- 5. Push  to confirm data entry.

### 10.1 KEYBOARD LOCK

Pushing  from RUN mode, for 5 seconds, keyboard will be locked.  
Display will show  simbol as shown in adjacent picture.  
Pushing  from RUN mode, for 5 seconds, keyboard will be un-locked.



### 10.2 LCD CONTRAST

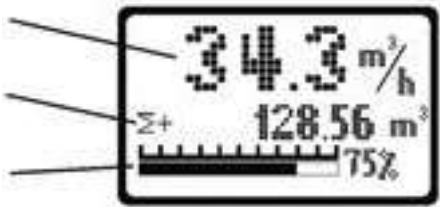
By holding down button ,from RUN mode, you can increase (by pressing the button  ) or decrease (by pressing  ) the LCD screen contrast according to your needs.

### 10.3 DISPLAY PAGE

The RBmag, in RUN mode, has two pages to display data and status, press  or  to change page.

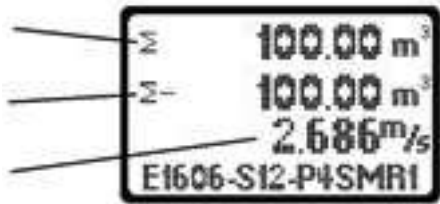
Primary page:

- Flow rate
- Forward total
- Flow % value indicator





Secondary page:






- Net total
- Reverse total
- Flow velocity



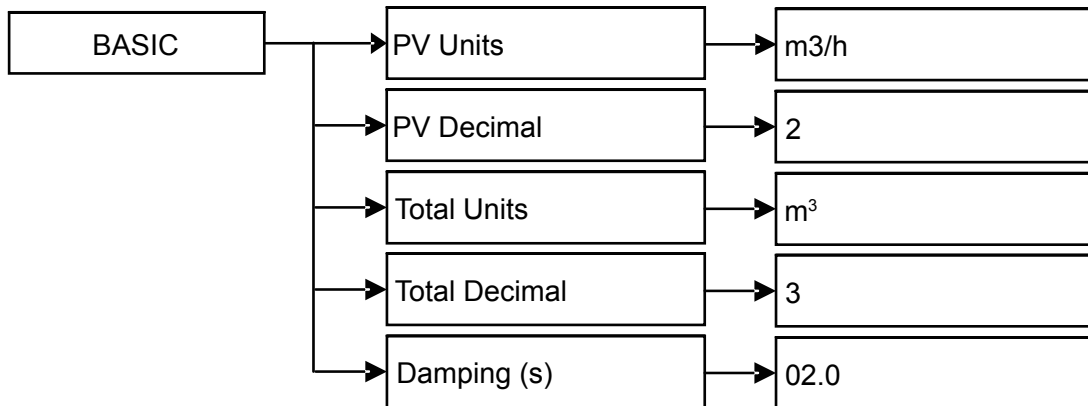
## 10.4 LOI MENU

Push  key from run mode: display will show the list of configuration menu as shown here next.



Press  or  keys to select the desired menu, then press  key to access.

	Basic	
	System	
	Calibration	
	Test	






### 10.4.1 BASIC



### 10.4.2 BASIC CONFIGURATION (BASIC)


Press  key from run mode: the display will be as shown here next, then press  to enter in "Basic" menu

Push  or  keys to select the desired function and press  key to access

	Basic	
	System	
	Calibration	
	Test	



#### 10.4.2.1 - PV Units







PV Units variable specifies the format in which the flow rate will be displayed.  
Default: m3/h.  
Range: L/s; m3/s; G/s; L/m; m3/m; G/m; L/h; m3/h; G/h.


Press , key the display will be as shown here next.


With  or  select the unit.

Push  to confirm, the display will be as shown here next.

Press  key to exit and confirm the selection; press  key to exit and delete the selection

	PV Units	
	PV Decimal	
	Total Units	
	Total Decimal	

PV Units	
	m3/h
	m3/h

PV Units	
	m3/h
←-ENT ESC-→	m3/h



#### 10.4.2.2 - PV Decimal







PV Decimal specifies how many decimals are displayed after the decimal point.  
Default: 2  
Range: 1÷3


Press , key: the display will be as shown here next.


With  or  select the decimal number places to display

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection..




	PV Units	
	PV Decimal	
	Total Units	
	Total Decimal	




PV Decimal	
	3
	3

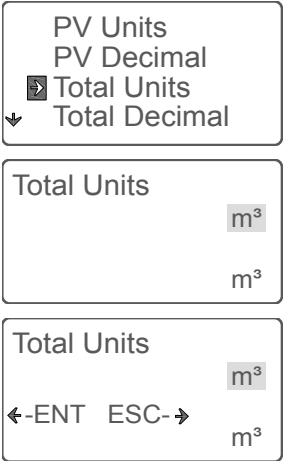
PV Decimal	
	3
←-ENT ESC-→	3

10.4.2.3 - Total Units

Total Units specifies the counter display unit  
Default: m3  
Range: L, Litri; m3, Metri cubi; G, galloni




Press the  key: the display will be as shown here next.  
With  or  select the counter display unit




Press  to confirm, the display will be as shown here next.  
press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

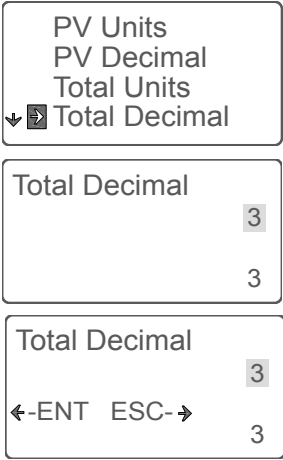


10.4.2.4 - Total Decimal

Total Decimal specifies how many decimals are displayed after decimal point.  
Default: 3  
Range: 1÷3





Press the  key: the display will be as shown here next.  
With  or  select the decimal number places to display.




Press  to confirm, the display will be as shown here next.  
Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

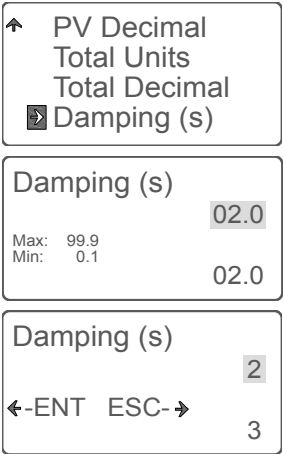


10.4.2.5 - Damping (s)

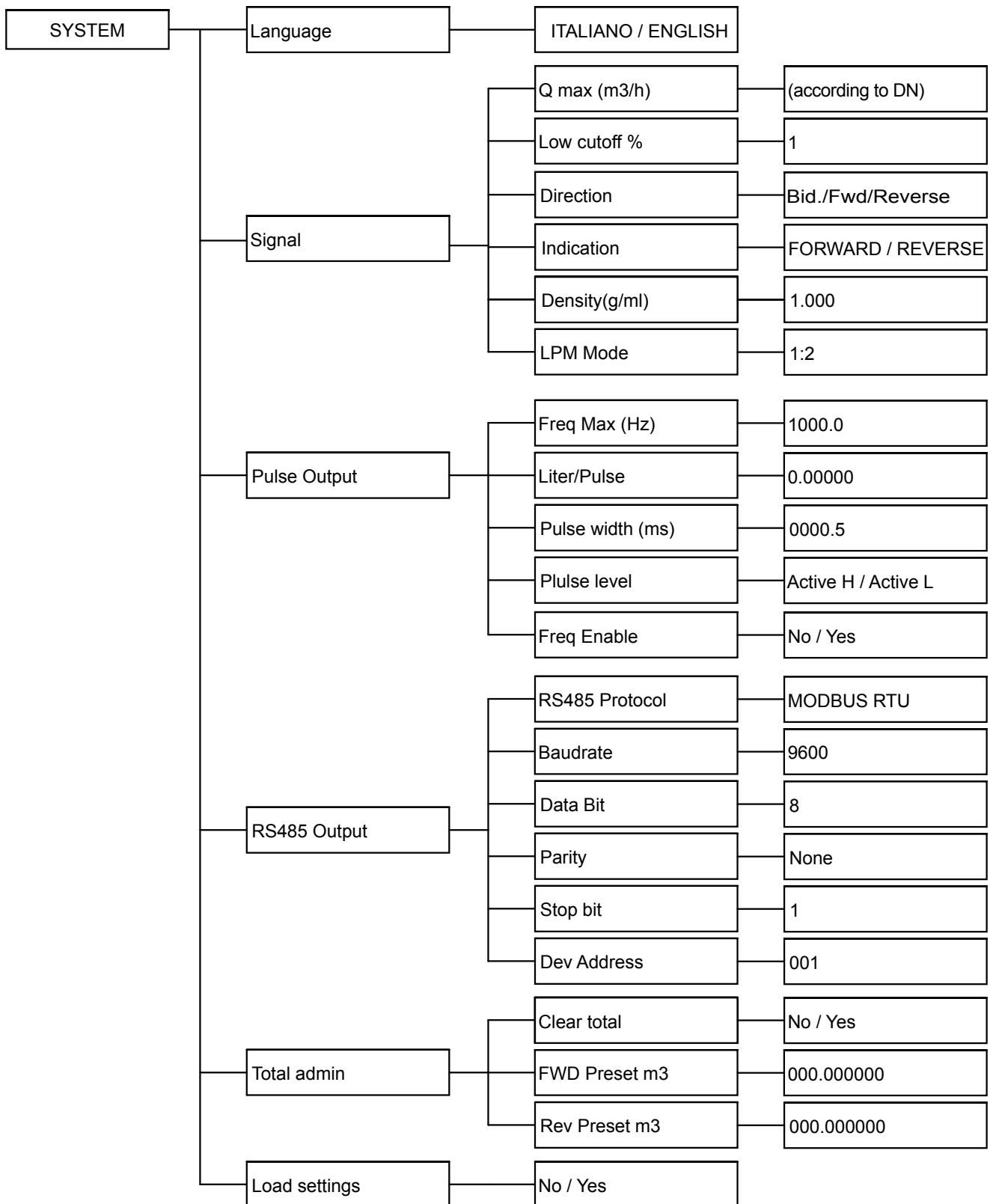
Damping(S) sets the delay time in seconds for changes in reading. It 'used to mitigate the fluctuations in flow measurement..  
Default: 2; Range: 0.1÷99.9

Press the  key the display will be as shown here next.  
With  or  change the digit, with  moves the cursor.







Press  to confirm, the display will be as shown here next.  
Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.






**10.4.3 SYSTEM SETUP**

**10.4.4 SYSTEM CONFIGURATION (SYSTEM)**

Press the  key from run mode, then press the  key to select "System" and press the  button to enter. Press the  or  keys to select the desired function and press the  key to access



Basic	→
 System	→
Calibration	→
Test	→


**10.4.4.1 - Language**



Allows menu language selection.


Default: ENGLISH; Range: ITALIANO - ENGLISH

Press  key: the display will be as shown here next.

With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.


 Language	
Signal	→
Pulse Output	→
↓ RS485 Output	→

Language	
ITALIANO	

Language	
←-ENT ESC-→	ENGLISH

**10.4.4.2 - Signal**

Press  key to enter the submenu "Signal"


Language	
 Signal	→
Pulse Output	→
↓ RS485 Output	→


**10.4.4.2.1 - Qmax (m3/h)**


Set the flow measurement 100%. This value adjusts the frequency output end scale. The range is related to the sensor DN

Press  key: the display will be as shown here next.

With  or  change the digit, with  moves the cursor.

Press  to confirm, the display will be as shown here next.

Press  key to exit and confirm the selection; press  key to exit and delete the selection.





 Qmax (m3/h)	
Low Cutoff %	
Direction	
↓ Indication	




Qmax (m3/h)	
100mm	282.74340
Max:	4 2 4 . 1 1 5 0 0
Min:	5 . 6 5 4 8 6 7
	282.74340

Qmax (m3/h)	
125mm	282.743
←-ENT ESC-→	182.743


**10.4.4.2.2 - LowCutoff %**

Low Cutoff specifies the Qmax% value below which the instantaneous flow measurement reading (direct or reverse) and the outputs are forced to zero.  
Default: 1.0 Range: 0.0÷9.9


Press  key: the display will be as shown here next.  
With  or  change the digit, with  moves the cursor.

Press  to confirm, the display will be as shown here next.  
Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Qmax (m3/h)

 Low Cutoff %

Direction

 Indication

Low Cutoff %

1.0

Max: 9.9

Min: 0.0

2.0

Low Cutoff %




1.0




←-ENT ESC-→

2.0

**10.4.4.2.3 - Direction**


This parameter enables the flow direction measurement  
Default: Bid (bidirectional)  
Range: Fwd (forward); Rev (reverse); Bid. (bidirectional)


Press the  key: the display will be as shown here next.  
With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.  
Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Qmax (m3/h)

Low Cutoff %

 Direction

 Indication

Direction

Bid

Fwd

Direction




Bid




←-ENT ESC-→

Fwd

**10.4.4.2.4 - Indication**

Set what is the positive flow direction compared to the arrow on the sensor.  
Default: Fwd (forward)  
Range: Fwd (forward); Rev (reverse)



Press the  key: the display will be as shown here next.  
With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.  
Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Qmax (m3/h)

Low Cutoff %

Direction

  Indication

Indication

FORWARD

REVERSE

Indication

FORWARD

←-ENT ESC-→

REVERSE

#### 10.4.4.2.5 - Density(g/ml)


Sets the fluid specific weight to convert the measured volume value by weight.



Default: 1;

Range: 0.100÷9.999

Press the  key: the display will be as shown here next.

With  or  change the digit, with  moves the cursor.

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

↑ Low Cutoff %  
Direction  
Indication  
Density (g/ml)

Density (g/ml)  
1.000  
Max: 9.999  
Min: 0.100  
1.000

Density (g/ml)  
1.000  
←-ENT ESC-→  
1.000

#### 10.4.4.2.6 - LPM Mode

Set the detection interval of flow measurement.

By setting the minimum detection interval of 1 s (1:0), the operation is similar to electromagnetic flowmeter with external power; increasing the detection interval (max. 32s) increases the maximum duration of the supply battery.



Default: 1:32 (measurement every 32s)

Range: 1:0 / 1:2 / 1:4 / 1:8 / 1:16 / 1:32

Press the  key: the display will be as shown here next.

With  or  change the digit, with  moves the cursor.

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

↑ Direction  
Indication  
Density (g/ml)  
LPM Mode

LPM Mode  
LPM MODE 1:2  
LPM MODE 1:2

LPM Mode  
LPM MODE 1:2  
←-ENT ESC-→  
LPM MODE 1:4

#### 10.4.4.3 - Pulse Output

Press the  key to enter the sub menu "Pulse Output".

Language  
Signal →  
Pulse Output →  
RS485 Output →

##### 10.4.4.3.1 - Freq Max (Hz)



Sets the maximum frequency in relation to Qmax. The digital output is active as a frequency output only when the parameter "Liter / Pulse" is set to 0.0.

Default: 1000.0; Range: 100.0÷5000.0

Press the  key: the display will be as shown here next.

With  or  change the digit, with  moves the cursor.

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Freq Max (Hz)  
Liter / pulse  
Pulsewidth (ms)  
Pulse Level

Freq Max (Hz)  
1000.0  
Max: 5000.0  
Min: 100.0  
1000.0

Freq Max (Hz)  
1000.0  
←-ENT ESC-→  
1000.0


**10.4.4.3.2 - Liter/Pulse**



Set the volume per pulse. When this parameter is set to 0.0, the digital output is active as a frequency output (see "Freq Max (Hz)").


Default: 0.0; Range: 0.0055÷max. according to the DN

Press the  key: the display will be as shown here next.

With  or  change the digit, with  moves the cursor.

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Freq Max (Hz)  
 Liter / pulse  
 Pulsewidth (ms)  
 Pulse Level

Liter / pulse  
 0.000000  
 Max: -----  
 Min: 0.01570  
 1.000000

Liter / pulse  
 0.000000  
 ←-ENT ESC-→  
 1.000000

**10.4.4.3.3 - Pulsewidth (ms)**

Sets the pulse width in ms.


Default: 000.5;



Range: 0000.0÷1000.0


Press the  key: the display will be as shown here next.

With  or  change the digit, with  moves the cursor.

**WARNING** - The "Pulsewidth (ms)" parameter must be set to 0.0 when the digital output is used as a frequency output

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Freq Max (Hz)  
 Liter / pulse  
 PulseWidth (ms)  
 Pulse Level

PulseWidth (ms)  
 000.5  
 Max: 500.0  
 Min: 0.0  
 001.0

PulseWidth (ms)  
 000.5  
 ←-ENT ESC-→  
 001.0


**10.4.4.3.4 - Pulse Level**



Sets the pulse output energy level. When set LOW the pulse count is low, when set HIGH, the pulse count is high.


Default: Active H (HIGH); Range: Active L (LOW) ÷ Active H (HIGH)

Press the  key: the display will be as shown here next.

With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Freq Max (Hz)  
 Liter / pulse  
 PulseWidth (ms)  
 Pulse Level

Pulse Level  
 Active L  
 Active H

Pulse Level  
 Active L  
 ←-ENT ESC-→  
 Active H

**10.4.4.3.5 - Freq Enable**

Enable (Yes) or disable (No) the open collector digital output to terminals F+ F-.



```

Liter / pulse
PulseWidth (ms)
Pulse Level
Freq. Enable
  
```

Default: No (disable digital output)


Range: No (disable digital output); Yes (enable digital output).



Press the  key: the display will be as shown here next.

With  or  select the parameter setting.

```

Freq Enable
No
No
  
```

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

```

Freq Enable
No
←-ENT  ESC-→
Yes
  
```

**10.4.4.4 - RS485 Output**

Press  key to enter the sub menu "RS485 Output".

```

Language
Signal →
Pulse Output →
RS485 Output →
  
```

**10.4.4.4.1 - RS Protocol**

Sets the RS485 output communication protocol.

Default: MOD-BUS RTU

Range: MOD-BUS RTU ÷ MOD-BUS ASC

```

RS Protocol
Baud Rate
Data Bit
Parity
  
```



Press the  key: the display will be as shown here next.

With  or  select the parameter setting.

```

RS485 Protocol.
MODBUS-RTU
MODBUS-ASC
  
```

Press  to confirm, the display will be as shown here next.

Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

```

RS485 Protocol.
MODBUS-RTU
←-ENT  ESC-→
MODBUS-ASC
  
```

**10.4.4.4.2 - Baudrate**

Sets the RS485 output Baud Rate.

Default: 9600

Range: 1200 - 2400 - 4800 - 9600

```

RS Protocol
Baud Rate
Data Bit
Parity
  
```



Press the  key: the display will be as shown here next.

With  or  select the parameter setting.

```

Baud Rate
9600
9600
  
```

Press  to confirm, the display will be as shown here next.




Press  key to exit and confirm the selection; press the  key to exit and delete the selection.




```


Baud Rate
9600
←-ENT  ESC-→
9600
  
```

**10.4.4.4.3 - Data Bit**

Sets the RS485 output Data Bit.  
Default 8  
Range: 8 - 7

Press  key: the display will be as shown here next.  
With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.  
Press  key to exit and confirm the selection; press the  key to exit and delete the selection.




RS Protocol  
Baud Rate  
 Data Bit  
↓ Parity




Data Bit  
8  
7


Data Bit  
8  
←-ENT ESC-→  
7

**10.4.4.4.4 - Parity**

Sets the RS485 output Parity.  
Default: NONE  
Range: EVEN; ODD; NONE

Press the  key: the display will be as shown here next.  
With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.  
Press  key to exit and confirm the selection; press the  key to exit and delete the selection.




RS Protocol  
Baud Rate  
Data Bit  
↓  Parity




Parity  
EVEN  
NONE


Parity  
EVEN  
←-ENT ESC-→  
NONE

**10.4.4.4.5 - Stop Bit**

Sets the RS485 output Stop Bit.  
Default: 1  
Range: 1 - 2

Press the  key: the display will be as shown here next.  
With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.  
Press  key to exit and confirm the selection; press the  key to exit and delete the selection.

↑ Baud Rate  
Data Bit  
Parity  
↓  Stop Bit

Stop Bit  
1  
2





Stop Bit  
1  
←-ENT ESC-→  
2

**10.4.4.4.6 - Dev Address**





Set the unity UID in RS485 network

Default: 001

Range: 001÷999

Press the  key: the display will be as shown here next.With  or  change the digit, with  moves the cursor.Press  to confirm, the display will be as shown here next.Press  key to exit and confirm the selection; press the  key to exit and delete the selection.
 Data Bit  
 Parity  
 Stop Bit  
 Dev Address




 Dev Address  
 001  
 002

 Dev Address  
 001  
 ←-ENT ESC-→ 002
**10.4.4.5 - Total Admin**Press the  key to enter the sub menu “Total Admin”.
 Signal →  
 Pulse Output →  
 RS485 Output →  
  Total Admin →
**10.4.4.5.1 - Clear Total**

Reset totalizer

Default: NO

Range: NO - YES

Press  key: the display will be as shown here next.With  or  select the parameter setting.Press  to confirm, the display will be as shown here next.Press  key to exit and confirm the selection; press the  key to exit and delete the selection.
 Clear Total  
 FWD Preset (m3)  
 REV Preset (m3)


 Clear Total  
 No  
 Yes

 Clear Total  
 No  
 ←-ENT ESC-→ Yes
**10.4.4.5.2 - FWD Preset (m3)**

Predetermines the positive totalizer value

Default: 0000000000

Range: 1÷9999999999







Press the  key: the display will be as shown here next.With  or  change the digit, with  moves the cursor.Press  to confirm, then press  key to exit and confirm the selection
 Clear Total  
 FWD Preset (m3)  
 REV Preset (m3)


 FWD Preset (m3)  
 000.000000  
 Max: \_\_\_\_\_  
 Min: \_\_\_\_\_  
 123.000000



**10.4.4.5.3 - REV Preset (m3)**

Predetermines the negative totalizer value  
Default: 0000000000  
Range: 1÷9999999999




Press the  key: the display will be as shown here next.  
With  or  change the digit, with  moves the cursor.  
Press  to confirm, then press  key to exit and confirm the selection




Clear Total  
FWD Preset (m3)  
REV Preset (m3)







REV Preset (m3)  
000.000000  
Max: \_\_\_\_\_  
Min: \_\_\_\_\_  
123.000000

**10.4.4.6 - Load Setting**

Load factory settings.  
Default: NO    Range: YES - NO

Press  key: the display will be as shown here next.  
With  or  select the parameter setting.

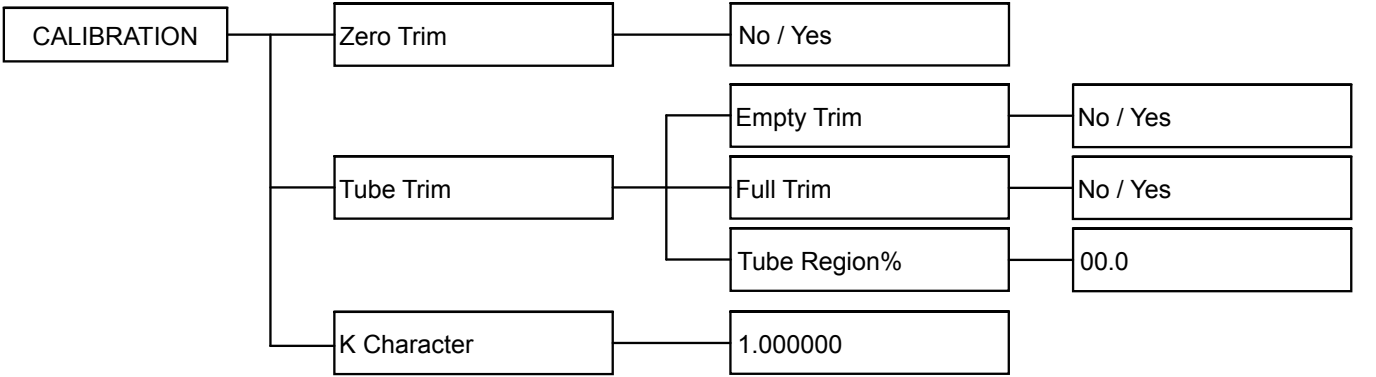
Press  to confirm, the display will be as shown here next.  
Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

 Pulse Output   
RS485 Output   
Total Admin   
  Load Settings

Load Settings  
No  
No

Load Settings  
No  
←-ENT   ESC-→  
Yes

10.4.5 CALIBRATION



10.4.6 SYSTEM CALIBRATION (CALIBRATION)

Press from run mode, then press to select “Calibration” and press button to enter. Press or to select the desired function and press key to access

Basic

System

Calibration

Test

10.4.6.1 - Zero Trim

Zero flow measurement calibrate. The sensor must be full and the flow stopped.  
Default: NO     Range: YES - NO

Press key: the display will be as shown here next.  
With or select the parameter setting.

Press to confirm, the display will be as shown here next.  
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

Zero Trim  
Tube Trim  
K Character

Zero Trim  

No

Yes

Zero Trim  

No

←-ENT   ESC-→

Yes

10.4.6.2 - Tube Trim

Push to enter in “Tube Trim” .

Zero Trim  
 Tube Trim  
K Character

10.4.6.2.1 - Empty Trim

**ATTENTION:** pipe must be empty before continue.  
Performs a empty pipe recognition self calibration.  
Default: NO

Range: NO - YES  
Press key: the display will be as shown here next.  
With or select the parameter setting.

Press to confirm, the display will be as shown here next.  
Press the key to exit and confirm the selection; press the key to exit and delete the selection.

Empty Trim  
Full Trim  
Tube Region %

Empty Trim  

No

No

Empty Trim  




No




←-ENT   ESC-→


Yes

**10.4.6.2.2 - Full Trim**

**ATTENTION:** pipe must be full before continue  
 Performs a full pipe recognition self calibration.  
 Default: NO Range: NO - YES

Press  key: the display will be as shown here next.  
 With  or  select the parameter setting.

Press  to confirm, the display will be as shown here next.  
 Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.




Empty Trim  
 Full Trim  
 Tube Region %




Full Trim  
 No  
 No


Full Trim  
 No  
 ←-ENT ESC-→  
 Yes

**10.4.6.2.3 - Tube Region %**

Sets the system sensitivity level to recognize the air presence in the sensor: higher the value, greater the sensitivity.  
 Default: 40.0; Range: 0.0÷97.9

Press  key: the display will be as shown here next.  
 With  or  select the parameter setting.


Press  to confirm, the display will be as shown here next.  
 Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.




Empty Trim  
 Full Trim  
 Tube Region %




Tube Region %  
 40.0  
 Max: 99.9  
 Min: 0.0  
 40.0


Tube Region %  
 40.0  
 ←-ENT ESC-→  
 80.0

**10.4.6.3 - K Character**

Press  to enter the function. "K Character" is the measure correction coefficient.  
 Default: 1. Range: 0.97÷1.03

Press  key: the display will be as shown here next.  
 With  or  select the parameter setting.

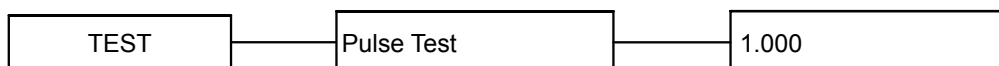
Press  to confirm, the display will be as shown here next.  
 Press the  key to exit and confirm the selection; press the  key to exit and delete the selection.

Zero Trim  
 Tube Trim  
 K Character

K Character  
 1.000000  
 Max: 1.0300000  
 Min: 0.9700000  
 000 1.000000

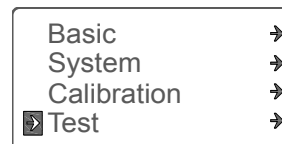
K Character  
 1.000000  
 ←-ENT ESC-→  
 000 1.025000

## 10.4.7 TEST



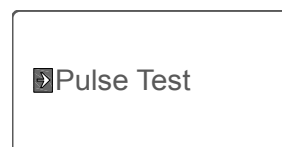
## 10.4.8 OUTPUT SIGNAL TEST (TEST)

Press from run mode, then press to select "Test" and press button to enter.  
Press or to select the desired function and press key to access.

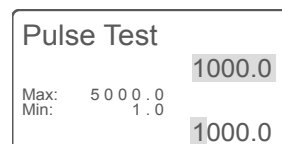


### 10.4.8.1 - Pulse Test

"Pulse Test" force the frequency signal output to the value set for the test.  
Example: Setting the testing value at 2000Hz, the actual output signal value is forced to 2000Hz. When exiting the TEST function, the frequency output signal returns to be a Qmax set function  
Default: 1000                      Range: 1.0÷5000.0



Press key: the display will be as shown here next.  
With or select the parameter setting. Press to exit.



# 11-TROUBLESHOOTING

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
Pulse output at zero, regardless of flow	No power to transmitter	Check battery and connection to the converter
	Wrong wiring	Check pulse output wiring at digital output terminals. Refer to wiring diagram for pulse output
	Reverse flow	Enable Reverse Flow 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, flowtube, communicator, and/or control system., Perform a loop test to check the integrity of the circuit
	Electrode Coating	Downsize flowtube to increase flowrate. Periodically clean flowtube
	Air in line	Move the flowtube to another location in the process line to ensure that it is full under all conditions
	Flow rate is below 1 ft/s (specification issue)	See accuracy specification for specific transmitter and flowtube
	Auto zero was not performed when the flowtube is full, or flowrate is zero	Perform the auto zero function
	Sensor pipe failure	Perform Sensor pipe tests electrode
	Sensor pipe failure—Shorted or open coil	Perform Sensor pipe tests coil
	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. Activating signal processing.

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, or move magnetic flowmeter
	Sludge flows—Mining/Coal/Sand/Slurries (other slurries with hard particles)	Decrease flow rate below 10 ft/s
	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 Magnetic Flowmeter Material Selection Guide for chemical compatibility with electrode material
	Improper grounding	Check ground wiring. See wiring and grounding procedures
	High local magnetic or electric fields	Move magnetic flowmeter (20–25 ft. away is usually acceptable)
	Control loop improperly tuned	Check control loop tuning
	Sticky valve (look for periodic oscillation of meter output)	Correct valve sticking
	Sensor pipe failure	Perform Sensor pipe Tests



# 12-FACTORY TEST AND QUALITY CERTIFICATE

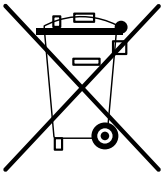


In conformity to the company and check procedures I certify that the equipment:

(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 Li/SOCI2 / 3.6V 16000mA/h; 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.