



Quick Guide



ACCUMAG

Software v4.2.2



WQG-10003-01

Revision History

Rev No.	Date	Description
Rev 01	06-FEB-2013	Initial Release

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Document: accuMAG Meter Quick Guide Software v4.2.2
Document Number: WQG-10003-01

Content

CHAPTER 1, SAFETY INSTRUCTIONS	1
1.1 Instructions for transportation and handling of batteries	1
CHAPTER 2, INSTALLATION	3
2.1 Scope of delivery	3
2.2 Device description	3
2.3 Nameplate	5
2.4 Storage	5
2.5 Transport	5
2.6 Pre-Installation Requirements	6
2.7 General requirements	6
2.7.1 Vibration	7
2.7.2 Magnetic field	7
2.8 Installation conditions	8
2.8.1 Inlet and outlet	8
2.8.2 T-section	8
2.8.3 Bends	9
2.8.4 Open discharge	10
2.8.5 Pump	10
2.8.6 Control valve	11
2.8.7 Air venting and vacuum forces	11
2.8.8 IP68	12
2.8.9 Mounting of the IP68 version	13
2.9 Mounting position and flange deviation	14
2.10 Mounting	15
2.10.1 Torques and pressures	15
2.11 Mounting of the field housing, remote version	17
2.11.1 Wall mounting	17
CHAPTER 3, ELECTRICAL CONNECTIONS	19
3.1 Safety Instructions	19
3.2 Grounding	20
3.3 Connection of the signal cable	21
3.3.1 IP 67 housing (field version)	21
3.4 Connection of the output cable	23
3.4.1 IP67 housing (compact and field version)	23
3.4.2 IP68 housing (compact version)	24
CHAPTER 4, START-UP	27
4.1 Connecting the battery	27

CHAPTER 5, OPERATION	29
5.1 Display and operating elements	29
5.1.1 Show counters and flow rate on the display	29
5.1.2 Show software version, diameter, meter constant and display test on the display	31
5.2 Tests	33
5.2.1 Automatic self-test	33
5.2.2 Flow verification on site	33
5.2.3 Test mode	34
 CHAPTER 6, SERVICE	 35
6.1 Spare parts availability	35
6.2 Availability of services	35
 CHAPTER 7, TECHNICAL DATA	 37
7.1 Dimensions and weights	37

1 Safety Instructions

1.1 Instructions for transportation and handling of batteries



The used lithium batteries are primary power sources with high energy content. If mistreated, they may present a potential risk.

Note: The manufacturer assumes no liability for customer failure.

Please observe the following instructions:

- Transport only in special packaging with special labels and transportation documents.
- Do not short-circuit, recharge, overcharge or connect with false polarity.
- Do not expose to temperature beyond the specified temperature range or incinerate the battery.
- Do not crush, puncture or open cells or disassemble battery packs.
- Do not weld or solder to the body of the battery.
- Do not expose contents of battery to water.
- Remove the battery from device before returning to the manufacturer for service or warranty reasons.
- Dispose of battery packs in accordance with local regulations; where possible, recycle used batteries.

2 Installation

2.1 Scope of delivery

Do a check of the packing list to make sure that you have all the elements given in the order. Inspect the cartons carefully for damages or signs of rough handling.

Report damage to the carrier and to the local office of the manufacturer.

The remote version will arrive in two cartons. One carton contains the converter and one carton contains the sensor.

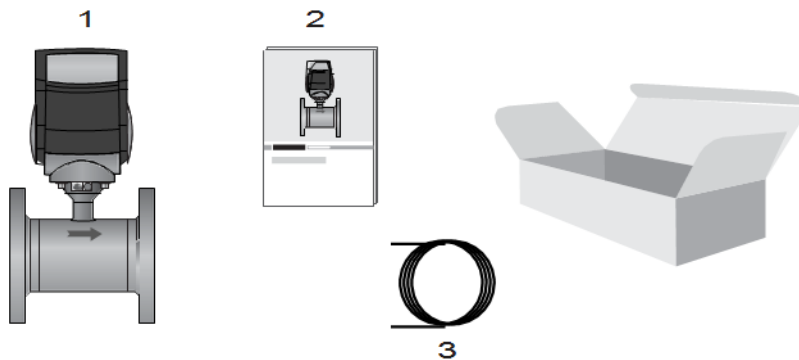


Figure 2-1: Scope of delivery

1. Ordered signal converter
2. Product documentation
3. Cable (remote versions only)

Note: Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with applicable occupational health and safety directives.

2.2 Device description

Your measuring device is supplied ready for operation. The factory settings for the operating data have been made in accordance with your order specifications.

The following versions are available:

- Compact version (the signal converter is mounted directly on the measuring sensor) in aluminium (IP67) or polycarbonate (IP68) housing.
- Remote version (measuring sensor with connection box and a signal converter in a remote (field) housing).

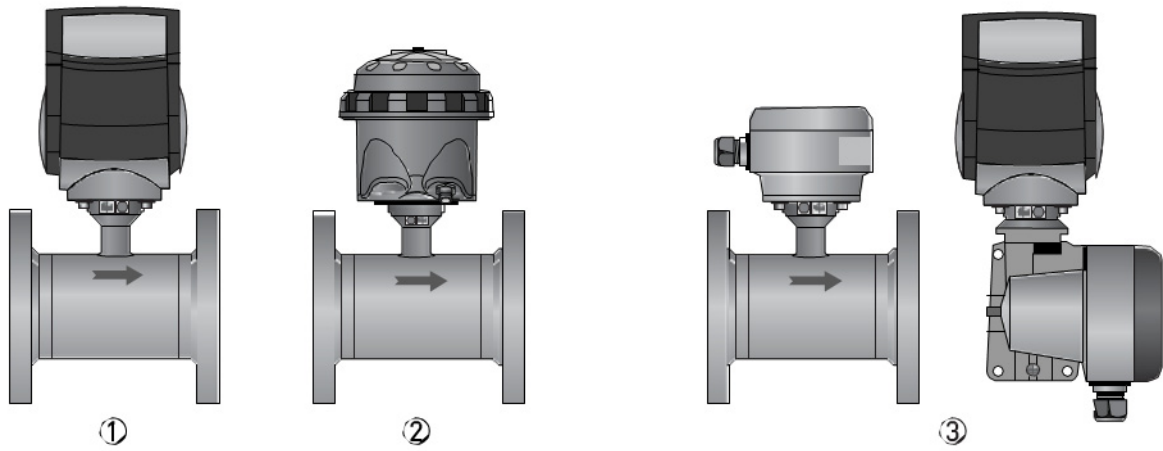


Figure 2-2: Device Versions

1. Compact version in aluminium (IP67) housing
2. Compact version in polycarbonate (IP68) housing
3. Remote version

2.3 Nameplate

Check the device nameplate to ensure that the device is delivered according to your order. Additional information (i.e. correct supply voltage) can be found in the documentation of the signal converter.

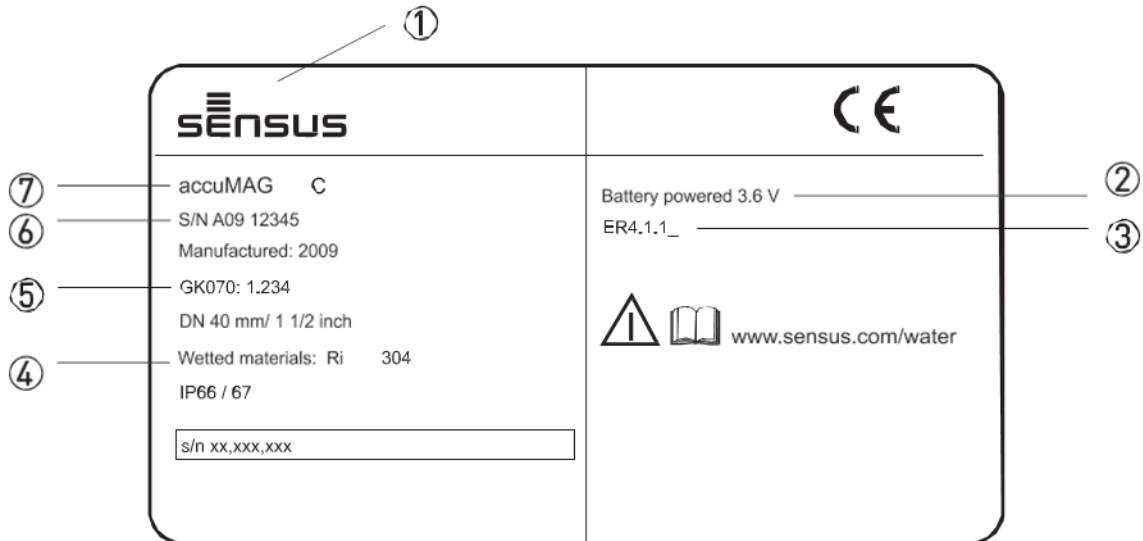


Figure 2-3: Example for nameplate

1. Manufacturer
2. Voltage information
3. Electronic Revision number
4. Material of wetted parts
5. Meter constant
6. Serial number
7. Device type

2.4 Storage

- Store the device in a dry and dust-free location.
- Avoid lasting direct exposure to the sun.
- Store the device in its original packaging.
- Storage temperature: -50 ...+70°C / -58...+158°F

2.5 Transport

Signal converter:

- No special requirements.

Compact version:

- Do not lift the device by the signal converter housing.

- Do not use lifting chains.
- To transport flange devices, use lifting straps. Wrap these around both process connections.

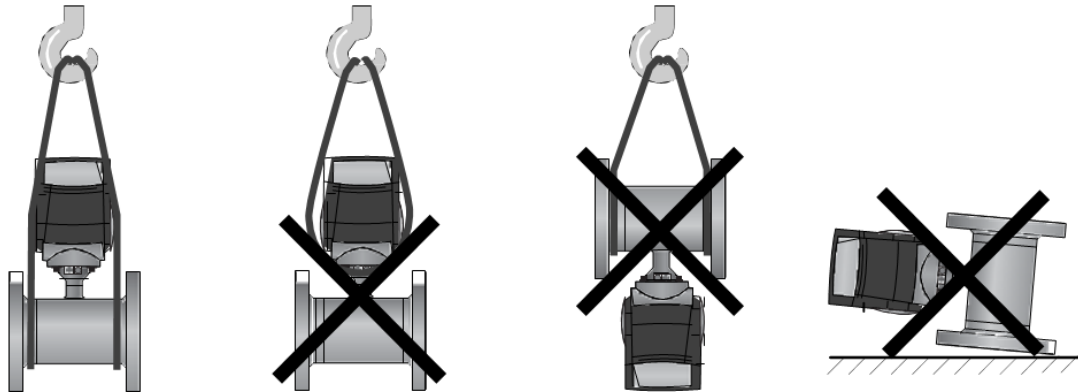


Figure 2-4: Transport

2.6 Pre-Installation Requirements

Make sure that you have all necessary tools available:

- Allen key (4 mm)
- Small screwdriver
- Wrench for cable glands
- Wrench for wall mounting bracket (remote version only)
- Torque wrench for installing flow meter in pipeline

2.7 General requirements

The following precautions must be taken to ensure reliable installation.

- Make sure that there is adequate space to the sides.
- Protect the signal converter from direct sunlight and install a sun shade if necessary.
- Signal converters installed in control cabinets require adequate cooling, e.g. by fan or heat exchanger.
- Do not expose the signal converter to intense vibration. The flow meters are tested for a vibration level in accordance with IEC 68-2-64.

2.7.1 Vibration

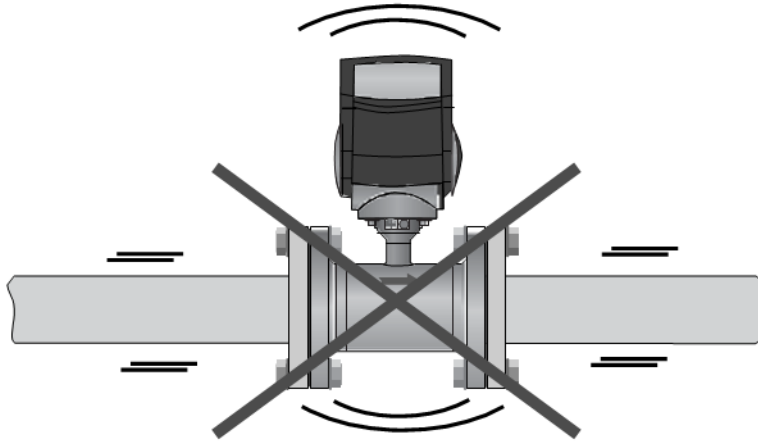


Figure 2-5: Avoid vibrations

2.7.2 Magnetic field

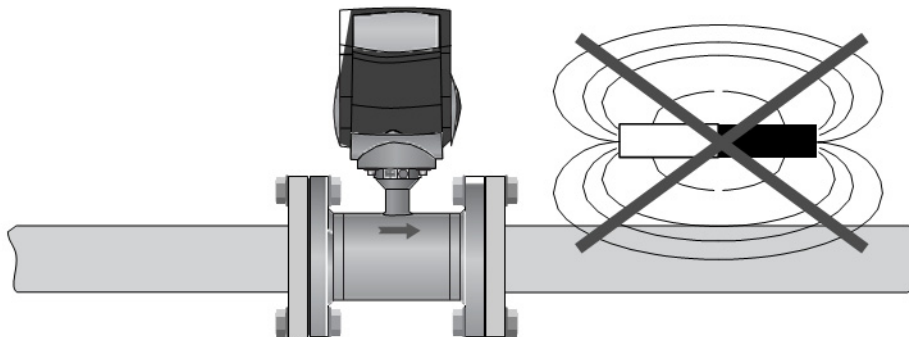


Figure 2-6: Avoid magnetic fields

2.8 Installation conditions

2.8.1 Inlet and outlet

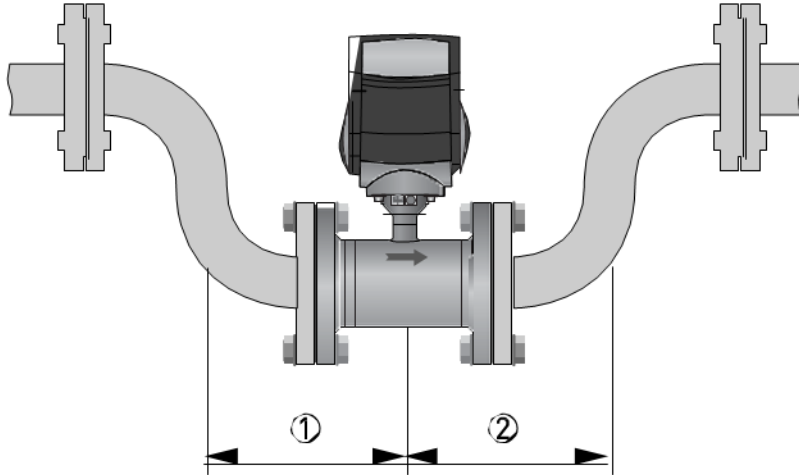


Figure 2-7: Recommended inlet and outlet

1. Inlet: ≥ 0 DN
2. Outlet: ≥ 0 DN

2.8.2 T-section

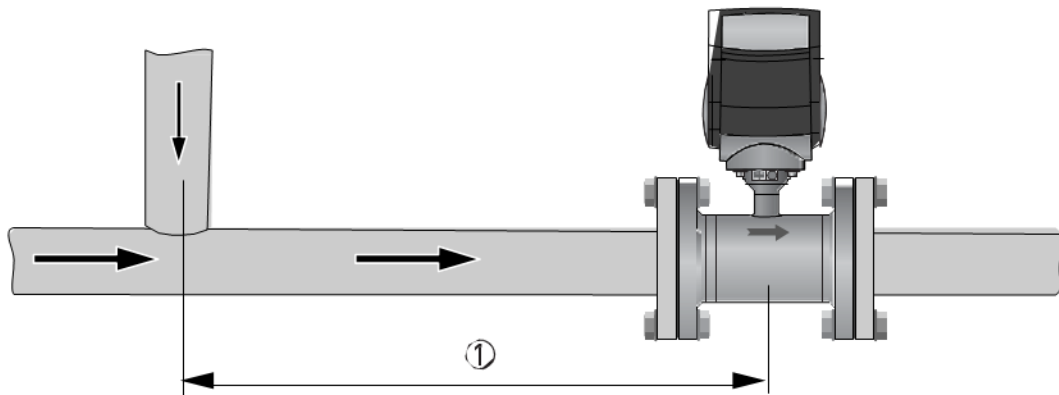


Figure 2-8: Distance behind a T-section

1. $1 \geq 0$ DN

2.8.3 Bends

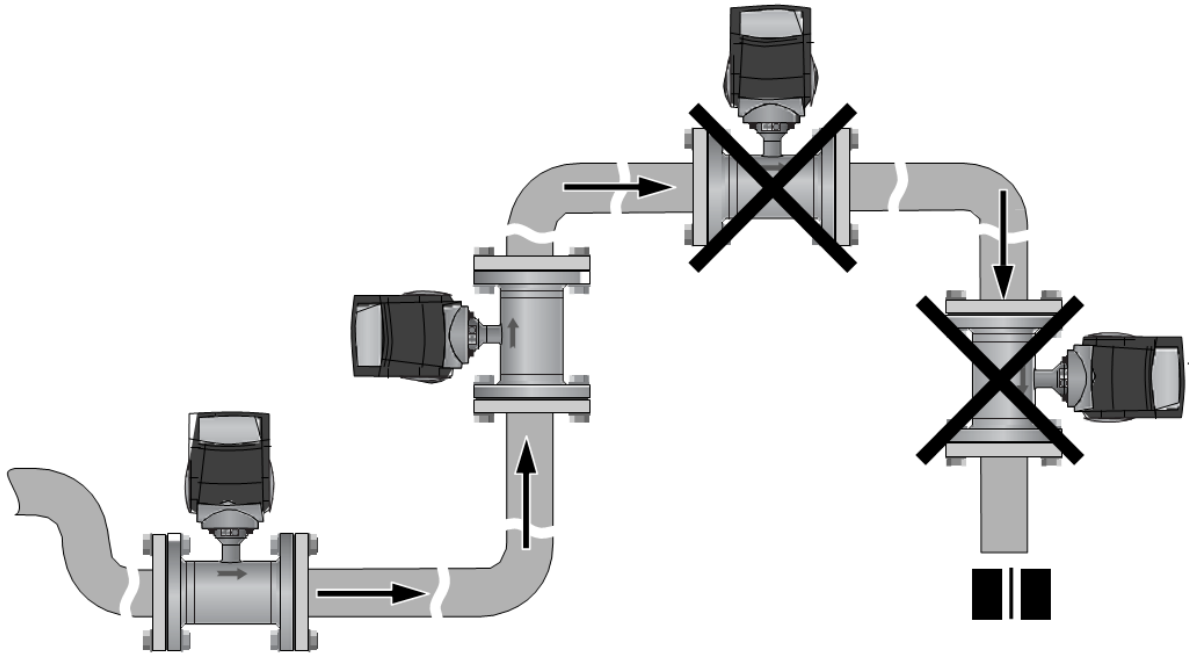


Figure 2-9: Installation in bending pipes

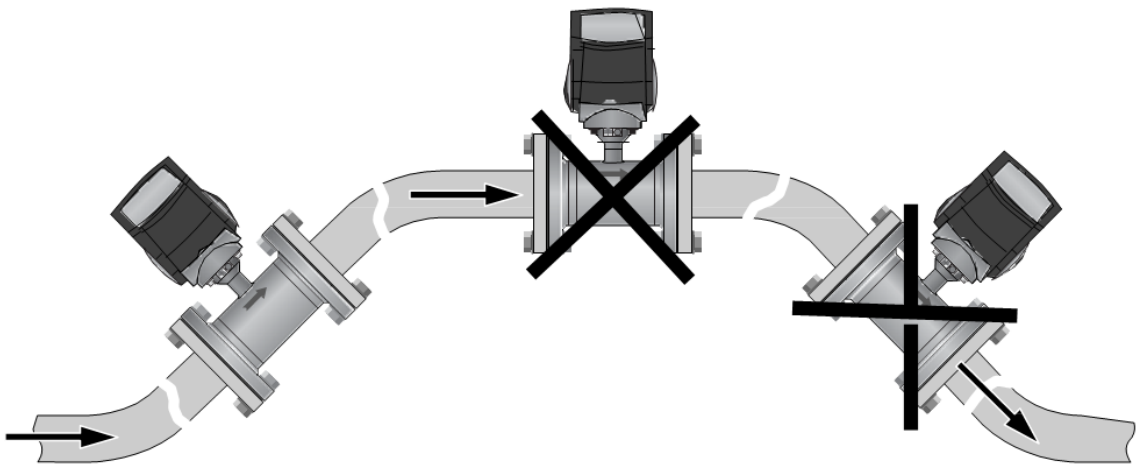


Figure 2-10: Installation in bending pipes

2.8.4 Open discharge

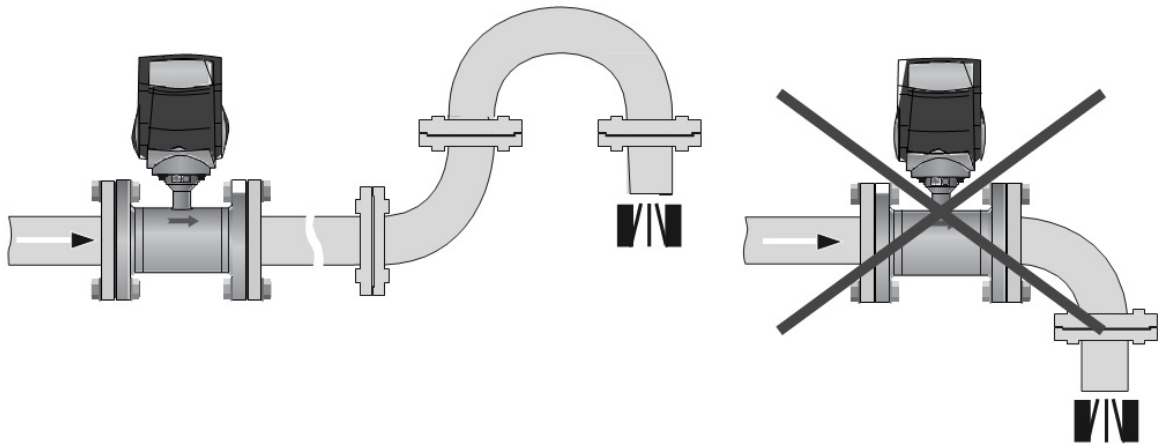


Figure 2-11: Installation in front of an open discharge

2.8.5 Pump

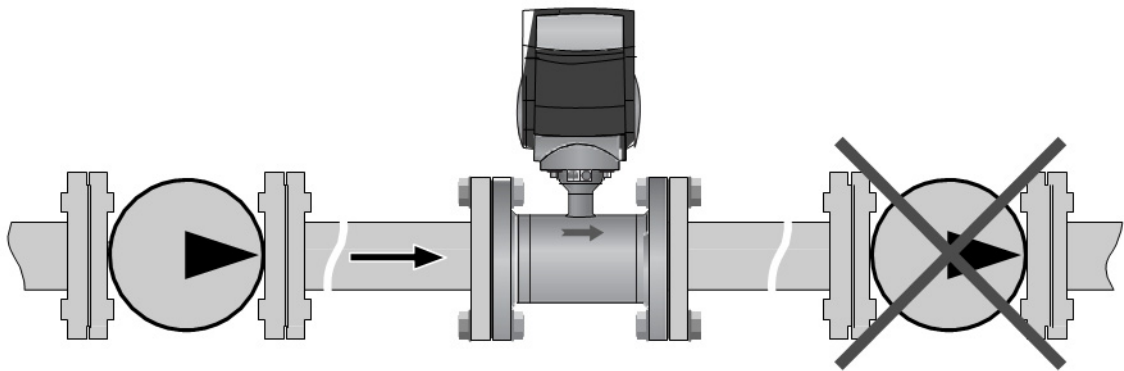


Figure 2-12: Recommended installation: after pump

2.8.6 Control valve

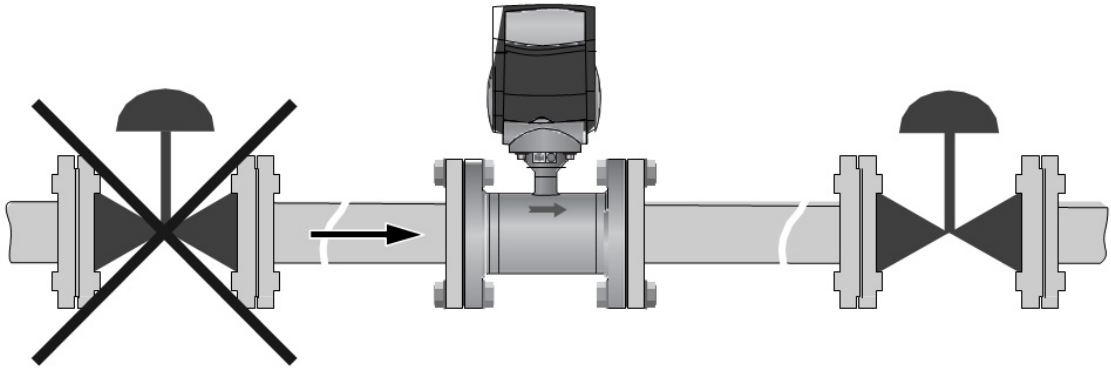


Figure 2-13: Recommended installation: in front of a control valve

2.8.7 Air venting and vacuum forces

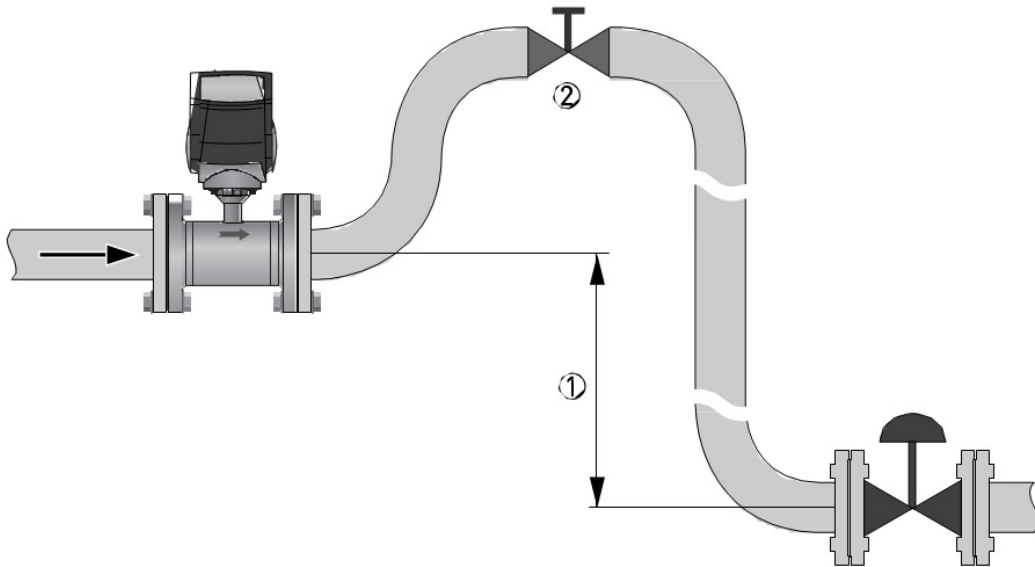


Figure 2-14: Air Venting

1. ≥ 5 m
2. Air ventilation point

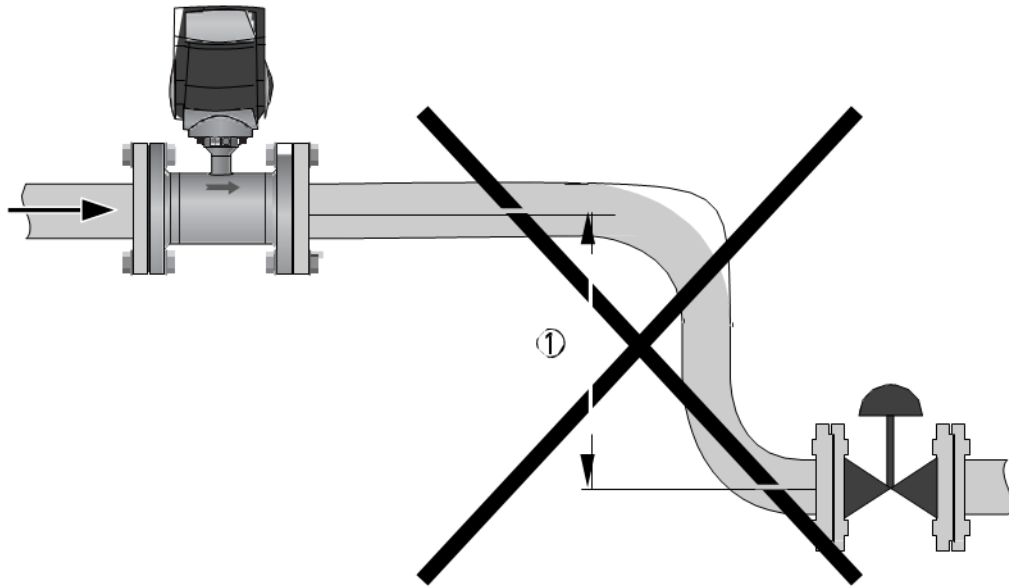


Figure 2-15: Vacuum

1. $\geq 5\text{m}$

2.8.8 IP68

The accuMag 3000 flow sensor is rated IP68 (NEMA 4X/6P). It is suitable for submersion in flooded measurement chambers and for subsurface installation.

The compact accuMag 070 signal converter is available in:

- an aluminium housing suitable for IP66/67, NEMA 4/4X/6
- a polycarbonate housing suitable for IP68, NEMA 4/4X/6.

This version is suitable for periodic submersion in flooded measurement chambers. The output cable has IP68 rated (military) connectors.

In case of continuous or long term submersion it is advised to select the field (remote) version (IP66/67). Submersion under water is possible down to a depth of 5 meters.

The remote accuMag 070 signal converter is available in:

- an aluminium housing suitable for IP66/67, NEMA 4/4X/6.

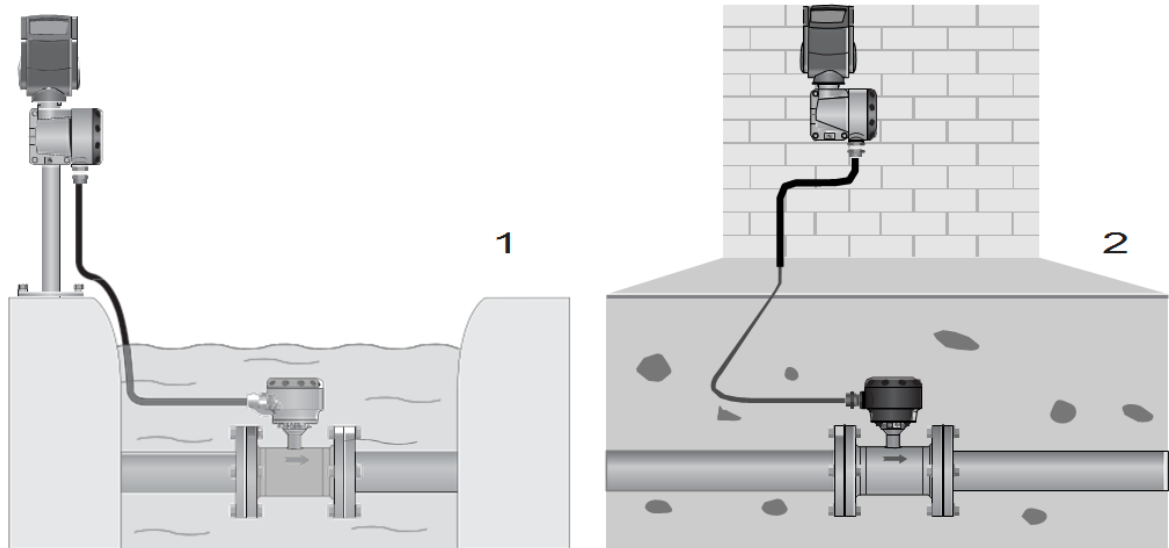


Figure 2-16: IP68 versions

1. Submersible
2. Buried

2.8.9 Mounting of the IP68 version

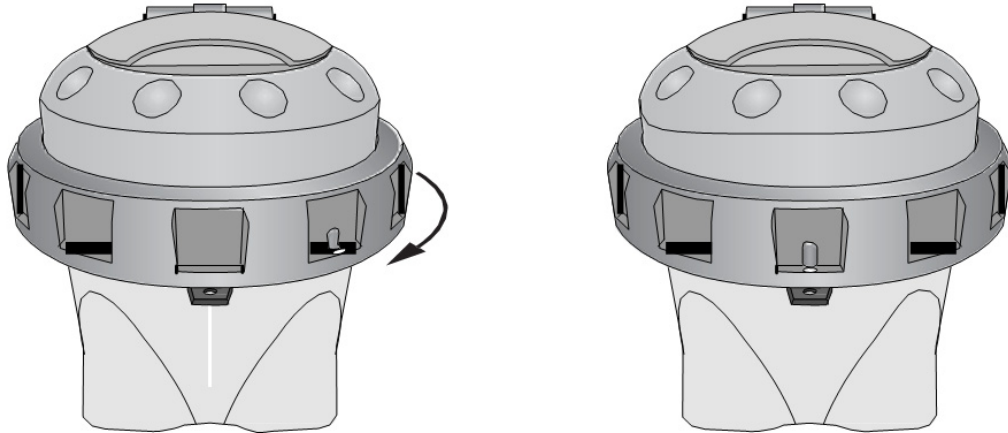


Figure 2-17: Closing of IP68 housing

1. Before closing the case of the converter, ensure that all surfaces in contact with the seals are clean.
2. Position the upper part of the case and tighten the lock ring.
3. Use the wrench to tighten the ring as shown.

2.9 Mounting position and flange deviation

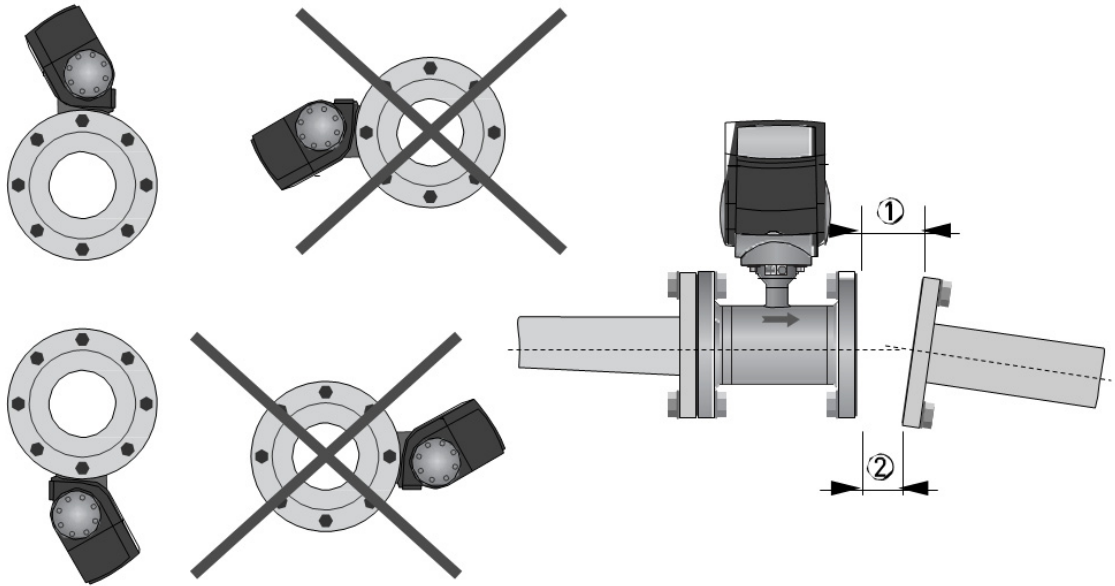


Figure 2-18: Mounting position and flange deviation

1. L_{\max}
2. L_{\min}



CAUTION!

Max. permissible deviation of pipe flange faces: $L_{\max} - L_{\min} \leq 0.5 \text{ mm} / 0.02''$.

2.10 Mounting

2.10.1 Torques and pressures

The maximum pressure and torque values for the flow meter are theoretical and calculated for optimum conditions and use with carbon steel flanges.

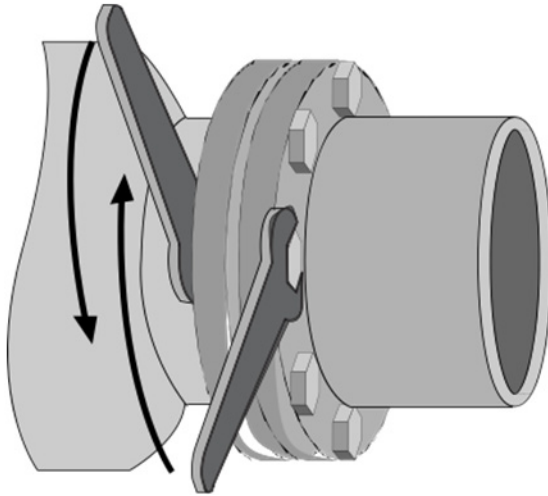


Figure 2-19: Tightening of bolts

Tightening of bolts

- Always tighten the bolts uniformly and in diagonally opposite sequence.
- Do not exceed the maximum torque value.
- Step 1: Apply approx. 50% of max. torque given in table.
- Step 2: Apply approx. 80% of max. torque given in table.
- Step 3: Apply 100% of max. torque given in table.

Table 2-1: Torque Values

Nominal size DN [mm]	Pressure rating	Bolts	Max. torque [Nm] ¹
25	PN 16	4 x M 12	12
40	PN 16	4 x M 16	30
50	PN 16	4 x M 16	36
65	PN 16	4 x M 16	50
80	PN 16	8 x M 16	30
100	PN 16	8 x M 16	32
125	PN 16	8 x M 16	40
150	PN10	8 x M20	55

Table 2-1: Torque Values

Nominal size DN [mm]	Pressure rating	Bolts	Max. torque [Nm] ¹
150	PN 16	8 × M 20	55
200	PN 10	8 × M 20	85
200	PN 16	12 × M20	57
250	PN 10	12 × M 20	80
250	PN 16	12 × M 24	100
300	PN 10	12 × M 20	95
300	PN 16	12 × M 24	136

¹ The torque values also depend on variables (temperature, bolt material, gasket material, lubricants, etc.) outside the control of the manufacturer. Therefore, these values should be regarded as indicative only.

Table 2-2: Torque Values

Nominal size [inches]	Flange class [lb]	Bolts	Max. torque [lbs.ft] ¹
1	150	4 x 1/2"	4
1½	150	4 x 1/2"	11
2	150	4 × 5/8"	18
2.5	150	4 × 5/8"	27
3	150	4 × 5/8"	33
4	150	8 × 5/8"	22
5	150	8 × 3/4"	33
6	150	8 × 3/4"	48
8	150	8 × 3/4"	66
10	150	12 x 7/8"	74
12	150	12 x 7/8"	106

¹ The torque values also depend on variables (temperature, bolt material, gasket material, lubricants, etc.) outside the control of the manufacturer. Therefore, these values should be regarded as indicative only.

**CAUTION!**

Pressures are applicable at 20°C / 68°F. For higher temperatures, the pressure ratings are as per ASME B16.5.

2.11 Mounting of the field housing, remote version

Note: Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

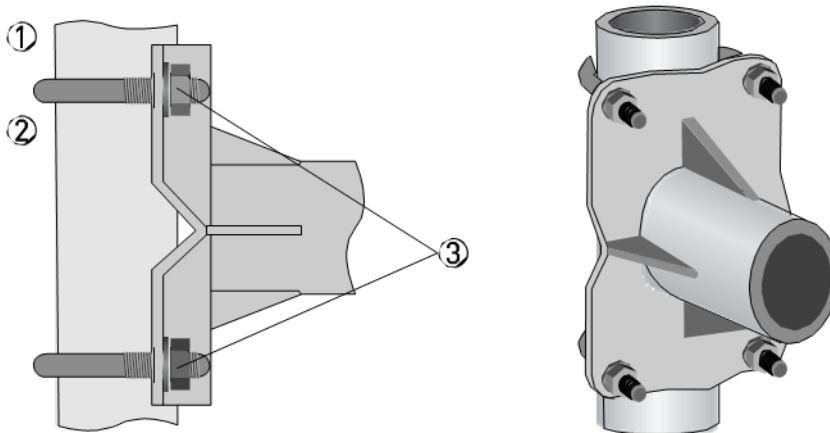


Figure 2-20: Pipe mounting of the field housing

1. Fix the signal converter to the pipe.
2. Fasten the signal converter using standard U-bolts and washers.
3. Tighten the nuts.

2.11.1 Wall mounting

No special requirements.

3 Electrical Connections

3.1 Safety Instructions

 **CAUTION!**

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

 **CAUTION!**

Observe the national regulations for electrical installations!

 **CAUTION!**

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Grounding

Grounding without grounding rings. The flow sensor is equipped with a reference electrode.

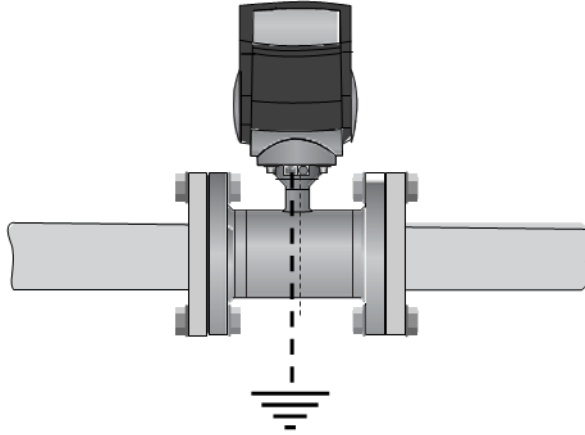


Figure 3-1: Grounding

3.3 Connection of the signal cable

3.3.1 IP 67 housing (field version)



CAUTION!

To ensure smooth functioning, always use the signal cables included in the delivery.

The signal cable is only used for remote versions. The standard cable includes both electrode and field current leads.

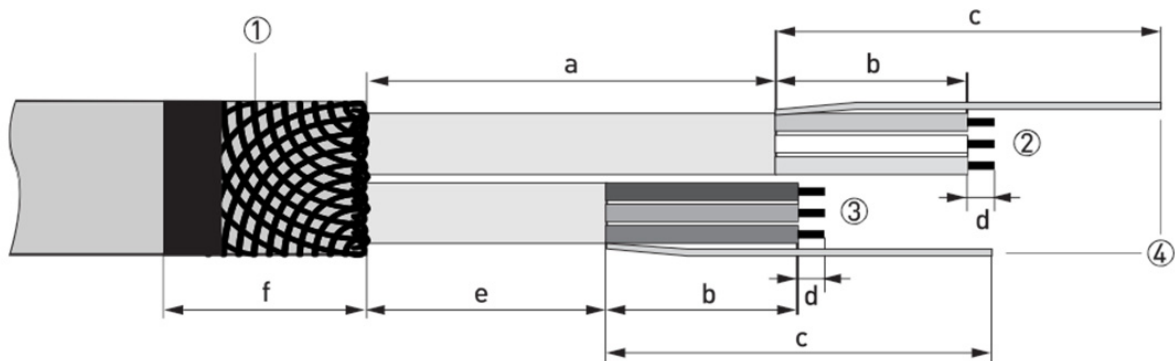


Figure 3-2: Preparation of standard cable (both sides)

1. Shielding
2. Blue + green + yellow cable, used for field current (terminals 7, 8, 9)
3. Brown + white + violet cable, used for electrode signals (terminals 1, 2, 3)
4. Drain wires

Table 3-1: Dimensions of cable

	a	b	c	d	e	f
mm	75	35	70	5	45	30
inch	3.0	1.4	2.8	0.2	1.8	1.2

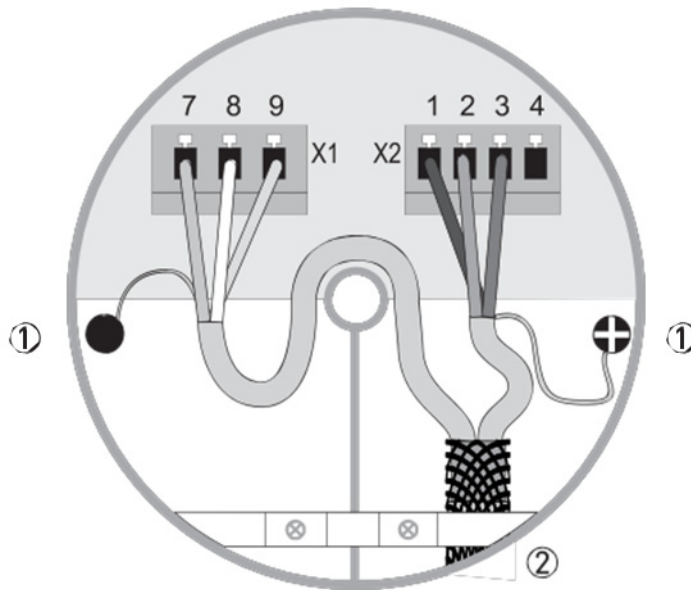


Figure 3-3: Cable connection at sensor side, standard cable

1. 1 Connect drain wires under screw.
2. 2 Connect shielding under clamp.

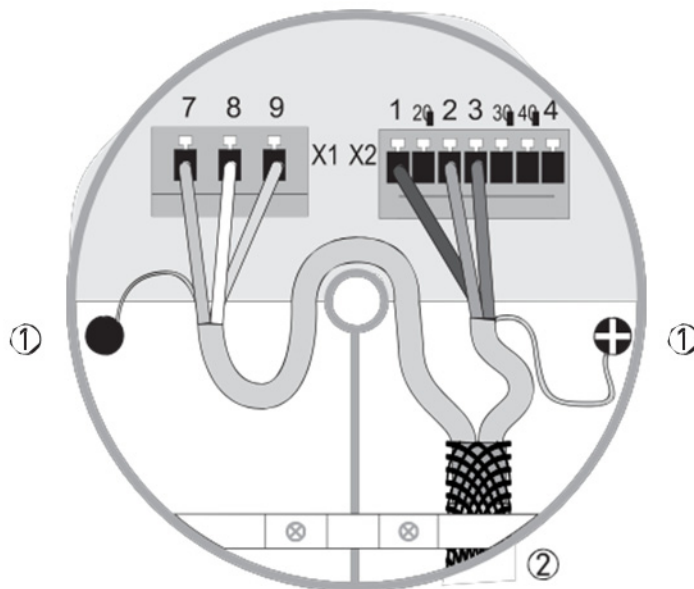


Figure 3-4: Cable connection at converter side, standard cable

1. Connect drain wires under screw.
2. Connect shielding under clamp.
 - a. Prepare appropriate cable lengths as shown.
 - b. Connect the wires as shown in the following table.

Table 3-2: Wire Color Definitions

Wire color	Terminal	Function
Brown	1	Reference electrode
White	2	Standard electrode signal
Violet	3	Standard electrode signal
Blue	7	Field current
Green	8	Field current
Yellow	9	No function
Drain wires	Screws	Shielding

3.4 Connection of the output cable

3.4.1 IP67 housing (compact and field version)

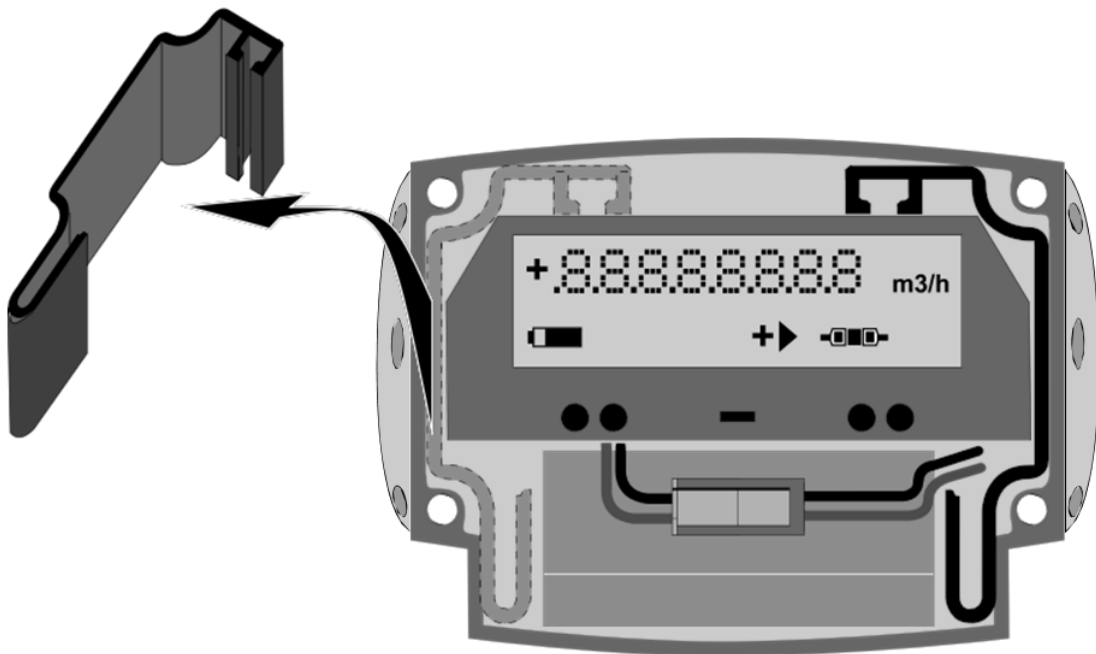


Figure 3-5: Removing side cap

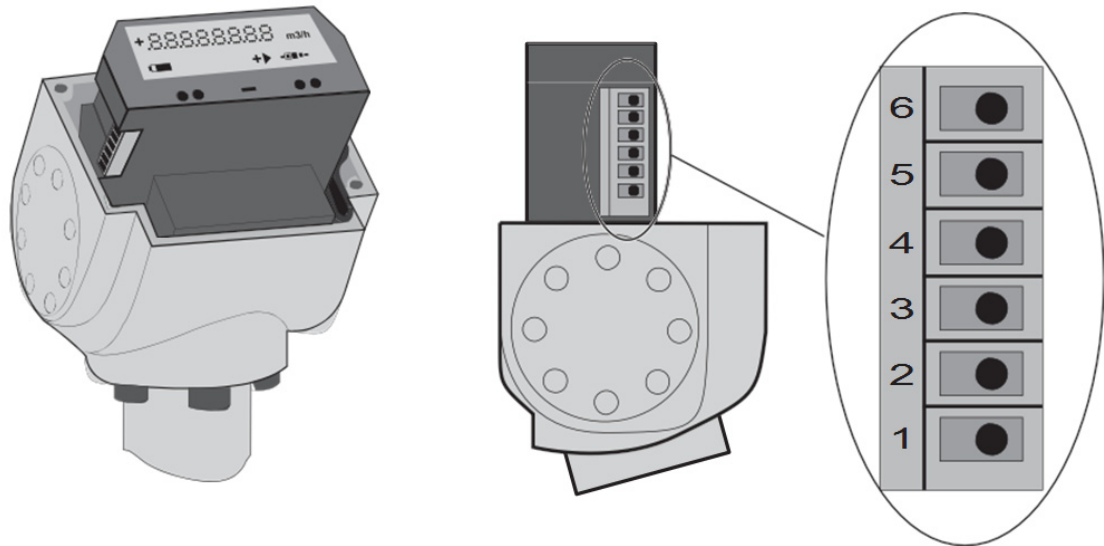


Figure 3-6: Terminal assignment

Electrical values

- Pulse output passive:
 $f \leq 100 \text{ Hz}$; $I \leq 10 \text{ mA}$; $U: 2.7 \dots 24 \text{ VDC}$ ($P \leq 100 \text{ mW}$)
- Status output passive:
 $I \leq 10 \text{ mA}$; $U: 2.7 \dots 24 \text{ VDC}$ ($P \leq 100 \text{ mW}$)

3.4.2 IP68 housing (compact version)

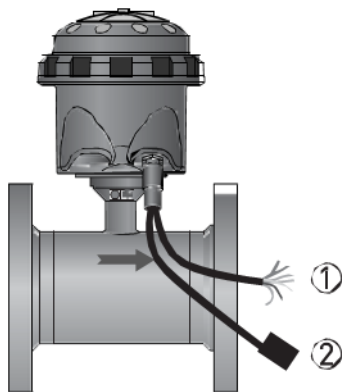


Figure 3-7: Output cable at IP68 compact version

1. Color coded leads of output cable
2. AMR module

Wire color	Contact on connector	Function
Yellow	A	Status output 1
White	G	Status output 2
Blue	H	Ground
Brown	B	Pulse output A
Green	F	Pulse output B

Electrical values

- Pulse output passive:
 $f \leq 100 \text{ Hz}$; $I \leq 10 \text{ mA}$; $U: 2.7 \dots 24 \text{ VDC}$ ($P \leq 100 \text{ mW}$)
- Status output passive:
 $I \leq 10 \text{ mA}$; $U: 2.7 \dots 24 \text{ VDC}$ ($P \leq 100 \text{ mW}$)

4 Start-up

4.1 Connecting the battery

! CAUTION!

Please connect the battery before first use. The signal converter is delivered with a disconnected battery. In case the meter is verified to MI-001, the batteries are already connected in the factory.

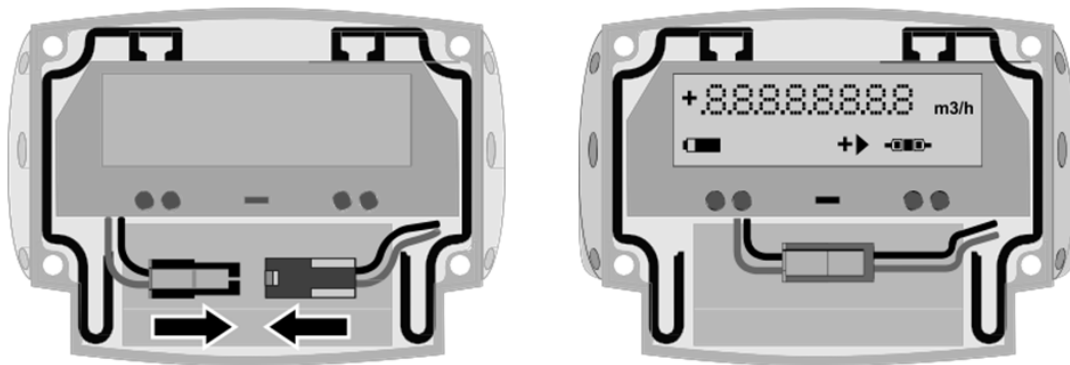


Figure 4-1: Connecting the battery

1. Remove the protective cap and loosen the 4 Allen bolts (4mm) (IP67 housing).
2. Remove the cover.
3. Fasten the battery connector to the internal connector in the converter.
4. Verify the display lights up.
5. Replace the cover.

! CAUTION!

Make sure that the battery cable is not jammed by the cover.

6. Tighten the 4 bolts and replace the protective cap (IP67 housing).
7. For closing the case of the converter in the IP68 housing, please refer to Mounting of the IP68 version in section [2.8.9](#).

The instrument now operates with default settings.

5 Operation

5.1 Display and operating elements

The signal converter has a display and two optical keys. The optical keys can be used to cycle the display and to access the menu.

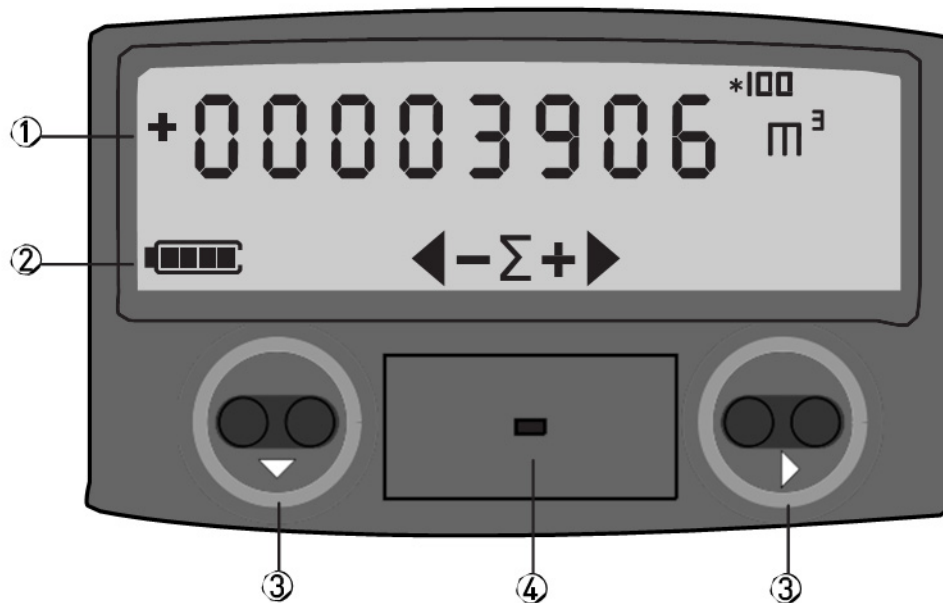


Figure 5-1: Display and operating elements

1. Counter value or flow rate
2. Status information including battery status, flow direction and counter settings
3. Optical keys ▼ and ► to navigate the menu and for display options
4. Reset button only accessible after removing the housing

5.1.1 Show counters and flow rate on the display

Depending on the settings, the display shows the sum counter and optionally the forward and reverse counter and the flow rate. In addition, the display shows the unit of measurement, direction of the flow, and if selected, a decimal point or a multiplier value.

Set display to a different counter or to flow rate:

1. Press the left optical key ▼ for 1 second to cycle to the next display.
2. Leave the optical key untouched, to keep the current display.
3. If the meter is set to AMR mode, the display will always switch back to the sum counter display.

Table 5-1: Display Settings





Display	Description	Menu Setting
	Sum counter (default)	Always available
	Forward counter	Available if Custody Transfer option is purchased.
	Reverse counter	Available if Custody Transfer option is purchased.
	Positive flow rate	Always available

Table 5-2: Display symbols for flow direction and counter settings

Flow direction is from left to right (default)	Flow direction is from right to left	Description
◀ - Σ + ▶	◀ + Σ - ▶	Sum counter
Σ + ▶	◀ + Σ	Forward counter
◀ - Σ	Σ - ▶	Reverse counter
+ ▶	◀ +	Positive flow rate
◀ -	- ▶	Negative flow rate

5.1.2 Show software version, diameter, meter constant and display test on the display

To cycle through the displays:

1. Press the right optical key ► for 1 second to cycle to the next display.
2. Leave the optical key untouched at any time to return to the main display.

Table 5-3: Display Descriptions




Display	Description
	<p>Example of the software version</p>
	<p>Example of the diameter (125) and the meter constant (4.160)</p>
	<p>Display test</p>

Table 5-4: Status information on the display




Display symbols	Description	Menu setting
	Battery status	Always available
	Automatic self-test	Automatically Please refer to Automatic self-test in section 5.2.1.
TEST	Test mode on	To activate Please refer to Test mode in section 5.2.3.

Table 5-5: Warning and error messages

Display	Description	Actions
	At the current consumption rate, the battery will be empty within 1 year.	Plan battery replacement. This sign can also appear for a short period if the battery consumption is temporarily very high.
E-00	Battery voltage too low	Replace the battery.
! (flashing)	<ul style="list-style-type: none"> Warning 	<ul style="list-style-type: none"> Check all connections. If the exclamation mark does not disappear, contact the service department.
E-X (X = 1...511)	Impaired software integrity	The meter has stored the last counter values and went to sleep mode. Contact the service department.
-EP-	Empty pipe	Fill the pipe with water.

5.2 Tests

5.2.1 Automatic self-test

On regular basis the meter performs automatic self-tests. Tests done include an integrity check of the hardware and the software including a memory self-test, a calculation of the remaining battery lifetime, the battery current and checking of the coils current.

5.2.2 Flow verification on site



CAUTION!

Activating flow verification on site affects the measurement and the counter values during the test procedure.

The requirements of OIML R49 and EN14154 specify that the device shall provide means for verification testing and calibration. In order to run the test as described in the regulations, the meter can be set to a verification mode (menu number A2 should be set to 1).

In verification mode, the display indicates Pxxxxxxx and shows the counters with a modified number of decimals for a higher accuracy. The number of decimals depends on the size of the meter.

In addition, the measurement interval is automatically set to 1 measurement per second and the unit of volume to m³. The meter will automatically return to the previous menu settings before activating the verification mode.

5.2.3 Test mode

In addition, a test mode is available where by a special second sum counter is activated. This special counter starts counting from 0 the moment the test starts to run. For a better accuracy, the resolution of the special sum counter is 100 times higher than the resolution of the sum counter. Activating the special sum counter has no effect on the measurement and does not affect the forward, reverse or the sum counter. The maximum test time is 3 hours. After 3 hours the meter returns to its normal measuring mode.

Table 5-6: Test Mode Functions

Function	Keys	Display
To start the programming mode	Hold the ▼ and the ► key for 5 seconds.	The display flashes.
To enter the test mode	Press the ▼ key within 3 seconds.	The display shows: - TEST
To start the test / the special counter	Press the ▼ key.	The test symbol starts to flash. The special counter starts at 0.
To reset the special counter	Press the ▼ key.	The special counter starts at 0.
To stop the test / the special counter	Press the ► key.	The TEST symbol stops flashing.
To leave the test mode	Hold the ▼ and the ► key for 5 seconds.	The display flashes.
	Press the ▼ key within 3 seconds.	The special counter and the test symbol will disappear. The display returns to normal mode.

6 Service

6.1 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

6.2 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

For more information, please contact your local sales office.

7 Technical Data

7.1 Dimensions and weights

Table 7-1: Dimensions and weights

Part	Illustration	Dimensions
Remote flow sensor		a = 88 mm / 3.1"
		b = 139 mm / 5.5" 1
		c = 106 mm / 4.2"
		Total height = H + a
Remote version in aluminium housing (IP67)		b = 132 mm / 5.2"
		c = 235 mm / 9.3"
		H = 310 mm / 12.2"
		Weight = 3.3 kg / 7.3 lb
Compact version in aluminium housing (IP67)		a = 170 mm / 6.7"
		b = 132 mm / 5.2"
		c = 140 mm / 5.5"
		Total height = H + a
Compact version in polycarbonate housing (IP68)		a = 159 mm / 6.3"
		b = 161 mm / 6.3"
		Total height = H + a

- All data given in the following tables are based on standard versions of the sensor only.
- Especially for smaller nominal sizes of the sensor, the converter can be bigger than the sensor.
- Note that for other pressure ratings than mentioned, the dimensions may be different.
- For full information on converter dimensions see relevant documentation.

Table 7-2: EN 1092-1

Nominal size DN [mm]	Dimensions [mm]			Approx weight [kg]
	L	H	W	
25	150	150.5	115	5
40	150	165.5	150	5.7
50	200	186	165	13
65	200	200	185	11
80	200	209	200	17
100	250	237	220	17
125	250	266	250	21
150	300	300	285	29
200	350	361	340	36
250	400	408	395	50
300	500	458	445	60

Table 7-3: ASME B16.5 / 150 lb

Nominal size [inches]	Dimensions [inches]			Approx weight [lb]
	L	H	W	
1	5.91	5.83	4.33	18
1½	5.91	6	4.92	21
2	7.87	7.05	5.98	34
3	7.87	8.03	7.50	42
4	9.84	9.49	9.00	56
5	9.84	10.55	10.00	65
6	11.81	11.69	11.00	80
8	13.78	14.25	13.50	100
10	15.75	16.30	16.00	148
12	19.69	18.78	19.00	212