



WATERFLUX 3000 Technical Datasheet

Electromagnetic flow / water meter

- Engineered and manufactured for the water and wastewater industry
- All relevant approvals for potable water
- Long time reliability and durability

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1.1 The battery powered water meter

The unique flow sensor design with rectangular cross-section allows for a significant reduction of magnetic field excitation. The coils are arranged so that a strong, homogeneous magnetic field is formed. The measurement is therefore independent of the flow profile and measurements are very stable. This results in a very good low flow performance and allows for very short inlet and outlet runs.

The Rilsan® liner of the flow sensor is highly resistant to pressure or vacuum, to corrosion and aging. The coating is widely used in the water industry and accepted for potable water applications according to ACS, DVGW, KTW, NSF and WRc.

The optional data logger and GSM module allows for remote meter reading and wireless transmission of measurement data and status information.



Highlights

- Battery operated, stand alone water meter; battery life up to 15 years
- Excellent performance in low flow conditions and over wide flow range
- Easy installation, short inlet and outlet runs, no filters and bi-directional flow
- Buriable (IP68), installation in chambers is not required
- Maintenance free operation, no moving parts, no wear and obstruction free
- Optional battery powered data logger / GSM module for remote data transfer

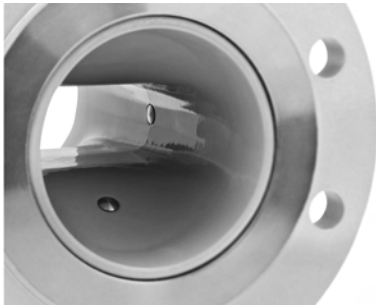
Industries

- Water abstraction
- Distribution of potable water
- Irrigation

Applications

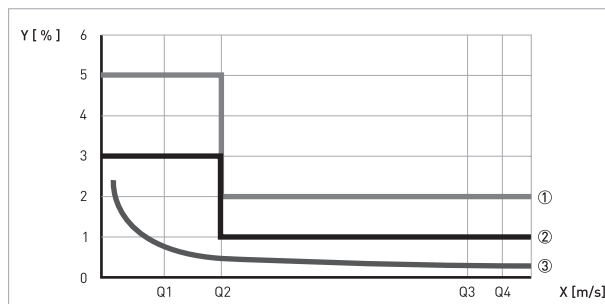
- Raw water, potable water, irrigation water
- Well chambers
- Water revenue metering for accurate billing
- Monitoring of distribution networks
- Pipeline leak detection
- Measuring water consumption

1.2 Options



Construction

The measuring tube of the sensor has a specific shape, transient from round to rectangular and back to round. This design, consisting of an obstruction less cross section (no internal or moving parts) and a homogeneous magnetic field, provides reliable measurements that are largely independent of the flow profile. This design allows the sensor to measure the flow bidirectional. As an additional benefit, it optimizes the precision of the measurement results, thanks to high sampling rates. The power consumption is minimal; an indispensable advantage, for example during night time operation. In addition, the required straight inlet and outlet runs are minimum. The liner of the measuring tube is made of Rilsan® or hard rubber and is resistant to corrosion, aging and abrasion. As a result, this meter is a water meter in accordance with all common drinking water approvals. The surface and shape of the measuring tube also minimize mineral deposits, resulting in exemplary measurement quality - even over the long term.



Design and performance

Electromagnetic water meters have many important advantages over their mechanical counterparts: outstanding long-term stability, maximum process reliability, no maintenance - to name just a few. As a result, these meters can deliver precise and reliable measurements for many years. The water meter has extensive factory-set diagnostic functions that provide continuous self diagnosis in accordance with the applicable standards such as OIML R-49, EN 14154, ISO 4064 and MI-001. Converter operation is also monitored continuously, as are the sensor electrodes and electronic functions. Malfunctions and irregularities are detected and immediately displayed on the high contrast, high-resolution display.

**Communication**

Bulk water meters are installed in places like remote shafts, deep well-connecting chambers and public drinking water networks. The ability to read the measured results on-site may be standard, but it does not always meet the current and actual needs of the user or operator. That is why this meter comes with an optional, state-of-the-art data logger and GSM modem.

Water meter or flow meter

The battery powered solution is ideal for those locations where there is no (electrical) infrastructure. The instrument is then to be seen as a water meter, counting bulk amounts of water passing through. Nevertheless, the concept is modular, thus the flow sensor can be combined with the well known mains powered signal converters IFC 100 or -300, making the instrument a flowmeter with all its typical properties, functionalities, advantages and benefits.

1.3 Measuring principle

An electrically conductive fluid flows inside an electrically insulating pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils. Inside of the fluid, a voltage U is generated:

$$U = v * k * B * D$$

in which:

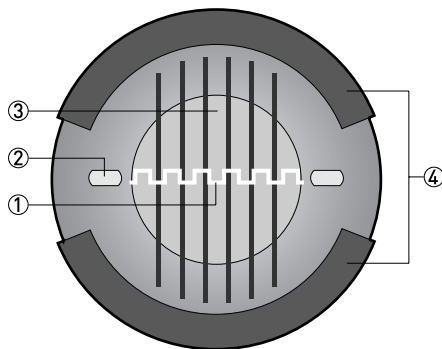
v = mean flow velocity

k = factor correcting for geometry

B = magnetic field strength

D = inner diameter of flow meter

The signal voltage U is picked off by electrodes and is proportional to the mean flow velocity v and thus the flow rate q . The signal voltage is quite small (typically 1 mV at $v = 3$ m/s / 10 ft/s and field coil power of 1 W). Finally, a signal converter is used to amplify the signal voltage, filter it (separate from noise) and convert it into signals for totalising, recording and output processing.



- ① Voltage (induced voltage proportional to flow velocity)
- ② Electrodes
- ③ Magnetic field
- ④ Field coils

2.1 Technical data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).

Measuring system

Measuring principle	Faraday's law
Application range	Electrically conductive fluids
Measured value	
Primary measured value	Flow velocity
Secondary measured value	Volume flow, mass flow, electrical conductivity, coil temperature

Design

Features	Fully welded maintenance free sensor
	Standard wet calibration
Modular construction	The measurement system consists of a flow sensor and a signal converter. It is available as compact and as separate version. More information about the signal converter can be found in the relevant documentation.
Compact version	With IFC 100 converter: WATERFLUX 3100 C
	With IFC 070 converter: WATERFLUX 3070 C
	With IFC 300 converter: WATERFLUX 3300 C
Remote version	In wall (W) mount version with IFC 100 converter: WATERFLUX 3100 W
	In field (F) mount version with IFC 070 converter: WATERFLUX 3070 F
	In field (F), wall (W) or rack (R) mount version with IFC 300 converter: WATERFLUX 3300 F, W or R
Nominal diameter	DN25...600 / 1...24"
Measurement range	in pipeline: -9...9 m/s / -30...30 ft/s
	in sensor: -18...18 m/s / -59...59 ft/s

Measuring accuracy

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Inlet section: 5 DN
	Operating pressure: 1 bar / 14.5 psig
Maximum measuring error	For detailed information on the measuring accuracy, see chapter "Measuring accuracy".

Operating conditions

Temperature	
Process temperature	Rilsan liner: -5...+70°C / +23...+158°F
	Hard rubber liner: -5...+80°C / +23...+176°F
Ambient temperature	-40...+65°C / -40...+149°F
Storage temperature	-50...+70°C / -58...+158°F
Pressure	
Ambient	Atmospheric
Nominal flange pressure	up to PN16
DIN (EN 1092-1)	PN10 for DN200...600
	PN16 for DN25...150
ISO insertion length	Standard
	DN25...200 / ASME 1...8"
	DN300 / ASME 12"
	DN400...600 / ASME 16...24"
	Option
	DN250 / ASME 10"
ASME B16.5	DN350 / ASME 14"
	150 lbs RF for ASME1...24"
Vacuum load	For information on pressure limits depending on liner material see chapter "Vacuum load".
Chemical properties	
Physical condition	Liquids
Electrical conductivity	≥ 20 µS/cm
Recommended flow velocity	in pipeline: -9...9 m/s / -30...30 ft/s
	in sensor: -18...18 m/s / -59...59 ft/s
Other conditions	
Protection category acc. to IEC 529 / EN 60529	Standard
	IP 66/67 (NEMA 4/4X/6)
	Optional
	IP 68 field (NEMA 6P)
	IP 68 factory (NEMA 6P)
Vibration resistance	IP68 is only available with a stainless steel connection box.
	IEC 68-2-3

Installation conditions

Installation	For detailed information see chapter "Installation"
Inlet run	≥ 3DN
Outlet run	≥ 1DN
Dimensions and weights	For detailed information see chapter "Dimensions and weights".

Materials

Sensor housing	Sheet steel, polyurethane coated
Measuring tube	Non-magnetic alloy
Flanges	Standard: steel 1.0460 / 1.0038 (RSt37-2)
Liner	DN50...300: Rilsan
	DN350...600: Hard rubber
Connection box (remote versions only)	Standard: Die-cast aluminium, polyurethane coated
	Option: stainless steel
Measuring electrodes	Stainless steel 1.4301 / AISI 304
	Other materials on request
Grounding electrode	Stainless steel 1.4301 / AISI 304
	Other materials on request

Process connections

DIN	DN25...600 in PN 10...16
ASME	1...24" in 150 lbs
JIS	DN25...600 in JIS 10 K
	For information on available combinations of nominal flange pressure and nominal diameter see chapter "Dimensions and weights".

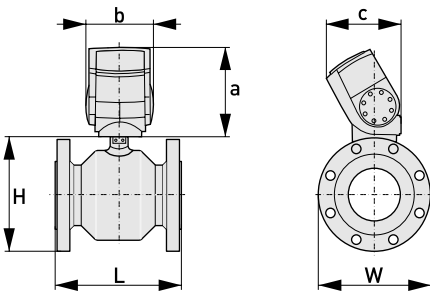
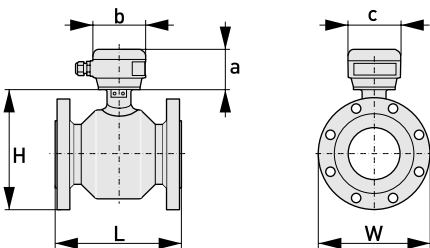
Electrical connections

Electrical connections	For full details, including: power supply, power consumption etc., see technical data for the relevant converter.
I/O	For full details of I/O options, including data streams and protocols, see technical data for the relevant converter.

Approvals and certifications

CE Sign	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
Hazardous areas	
Non-Ex	Standard
ATEX	not available
Other approvals and standards	
Electromagnetic compatibility	Directive: 89/336/EEC
	Harmonized standard: EN 61326-1 : 2006
Low voltage directive	Directive: 2006/95/EC
	Harmonized standard: EN 61010 : 2001
Pressure equipment directive	Directive: 97/23/EC
	Category I, II or SEP
	Fluid group 1
	Production module H
Drinking water approvals	ACS, DVGW, KTW, NSF, WRc pending
Custody transfer	Standard: without
	Europe: MI-001 pending
	Worldwide: OIML R-49 pending

2.2 Dimensions and weights

Compact version	
	$a = 170 \text{ mm} / 6.7''$
	$b = 122 \text{ mm} / 4.8''$
	$c = 140 \text{ mm} / 5.5''$
	Total height = $H + a$
Remote version, sensor	
	$a = 77 \text{ mm} / 3.1''$
	$b = 139 \text{ mm} / 5.5''$
	$c = 106 \text{ mm} / 4.2''$
	Total height = $H + a$

Dimensions and weights [metric]

Flanges acc. EN 1092-1		Dimensions [mm]			Approx. weight [kg]
DN	PN	L	H	W	
25	16	200	140	115	5
50	16	200	186	165	13
65	16	200	200	185	11
80	16	200	209	200	17
100	16	250	237	220	17
125	16	250	266	250	21
150	16	300	300	285	29
200	10	350	361	340	36
250	10	400	408	395	50
300	10	500	458	445	60
350	10	500	510	505	80
400	10	600	568	565	103
450	10	600	618	615	113
500	10	600	671	670	132
600	10	600	781	780	167

Dimensions and weights [imperial]

Flanges acc. ASME B16.5		Dimensions for 150 lbs flanges [inches]			Approx. weight [lbs]
DN	PN	L	H	W	
1	150	5.91	5.39	4.25	18
2	150	7.87	7.05	5.98	34
3	150	7.87	8.03	7.50	42
4	150	9.84	9.49	9.00	56
5	150	9.84	10.55	10.00	65
6	150	11.81	11.69	11.00	80
8	150	13.78	14.25	13.50	100
10	150	15.75	16.30	16.00	148
12	150	19.69	18.78	19.00	212
14	150	27.56	20.67	21.00	289
16	150	31.50	22.95	23.50	369
18	150	31.50	24.72	25.00	415
20	150	31.50	26.97	27.50	497
24	150	31.50	31.38	32.00	680

2.3 Measuring accuracy

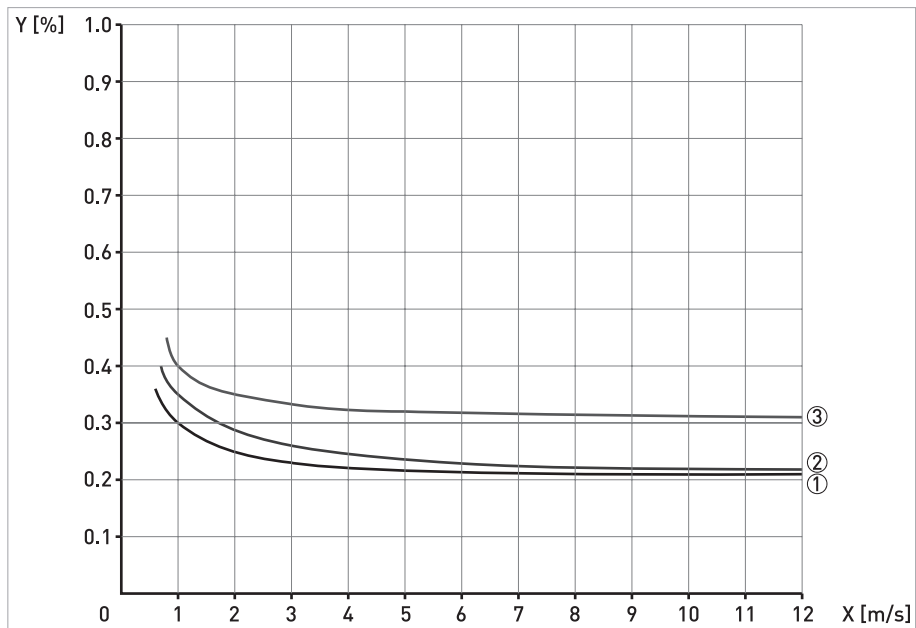


Figure 2-1: X [m/s]: flow velocity
Y [%]: deviation from the actual measured value (MV)

- ① with IFC 300 signal converter
- ② with IFC 070 signal converter
- ③ with IFC 100 signal converter

2.4 Vacuum load

Diameter	Minimum operating pressure absolute in mbar (abs) at process temperature			
[mm]	20°C	40°C	60°C	80°C
Rilsan				
DN25...300	0	0	0	0
Hardrubber				
DN350...600	500	500	600	600

Diameter	Minimum operating pressure absolute in psia at process temperature			
[inches]	68°F	104°F	140°F	176°F
Rilsan				
1 ...12"	0	0	0	0
Hardrubber				
14...24"	7.3	7.3	8.7	8.7

3.1 Notes on installation

Inspect the cartons carefully for damage or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

Check the packing list to check if you received completely all that you ordered.

*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 Inlet and outlet

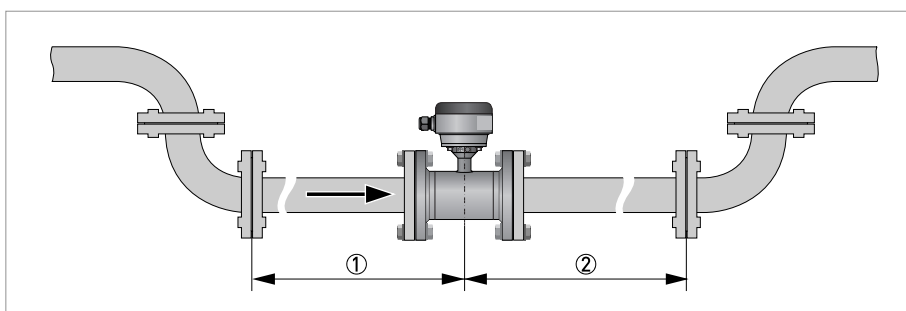


Figure 3-1: Recommended inlet and outlet

① $\geq 3\text{DN}$

② $\geq 1\text{DN}$

3.3 Mounting position

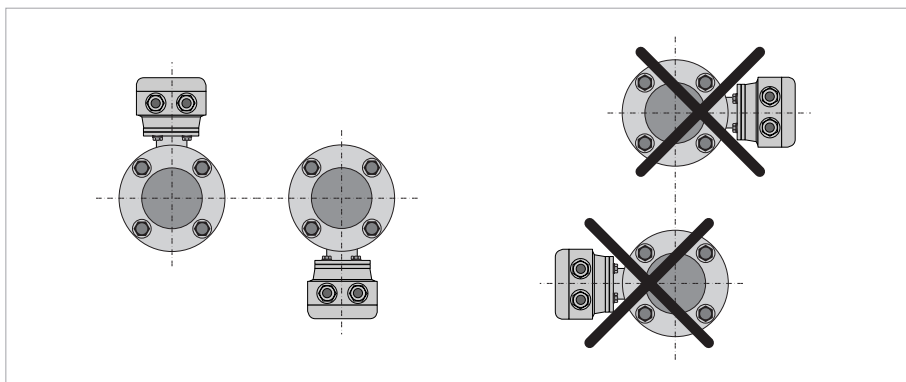


Figure 3-2: Mounting position

3.4 Flange deviation

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

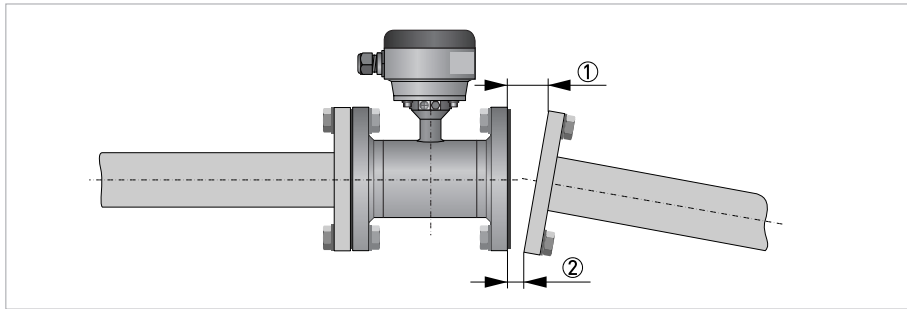


Figure 3-3: Flange deviation

- ① L_{max}
- ② L_{min}

3.5 T-section

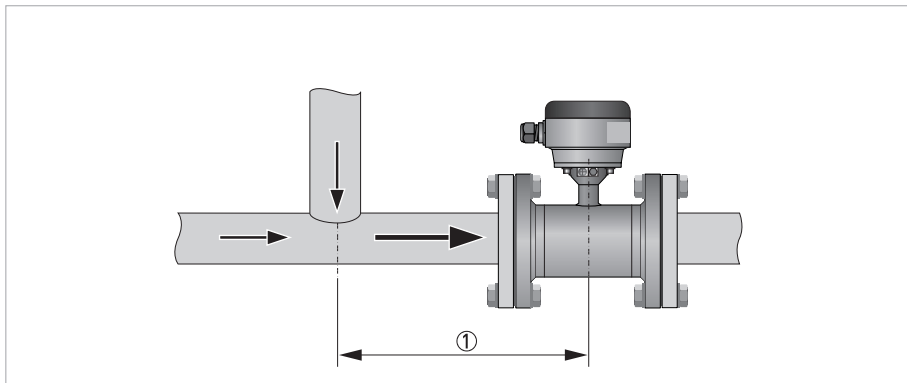


Figure 3-4: Distance after T-sections

- ① $\geq 10DN$

3.6 Vibration

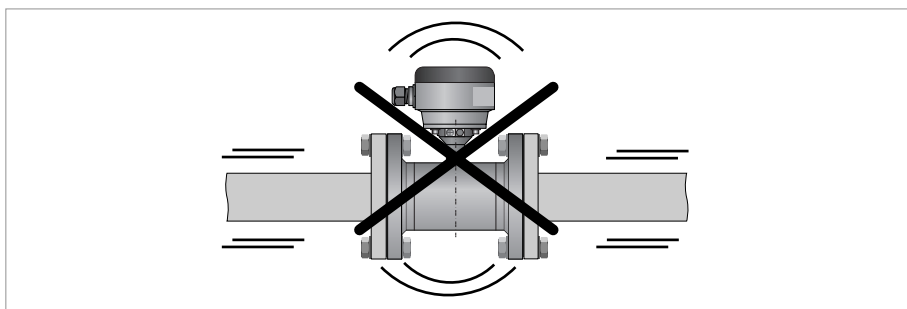


Figure 3-5: Avoid vibrations

3.7 Magnetic field

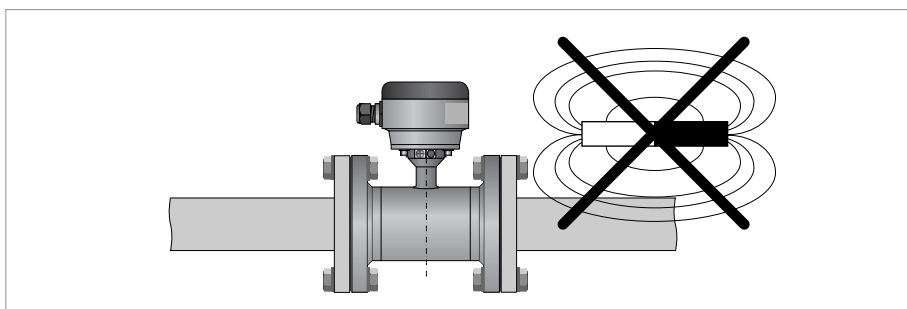


Figure 3-6: Avoid magnetic fields

3.8 Bends

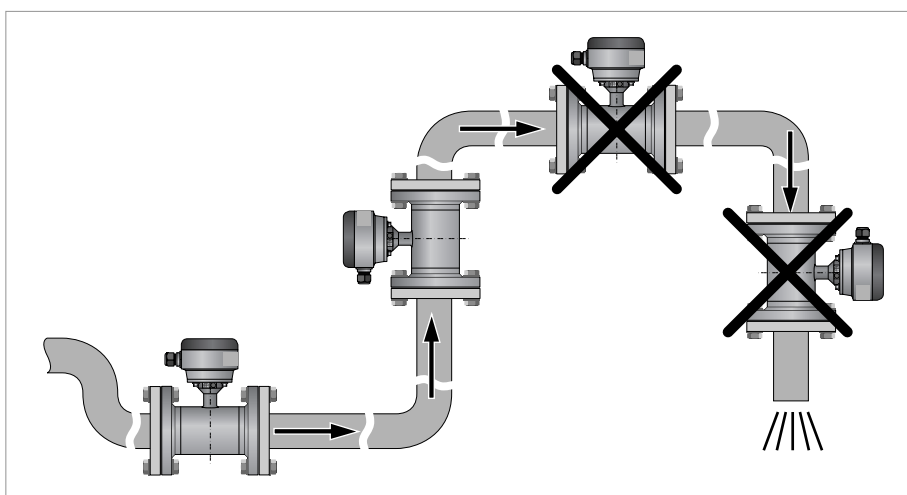


Figure 3-7: Installation in bending pipes

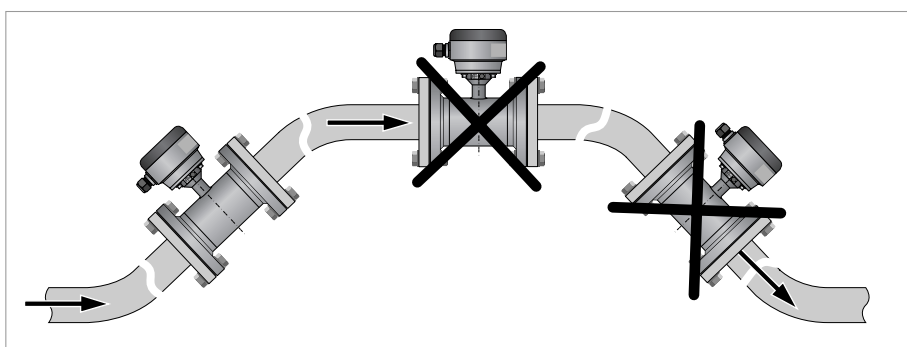


Figure 3-8: Installation in bending pipes

3.9 Open discharge

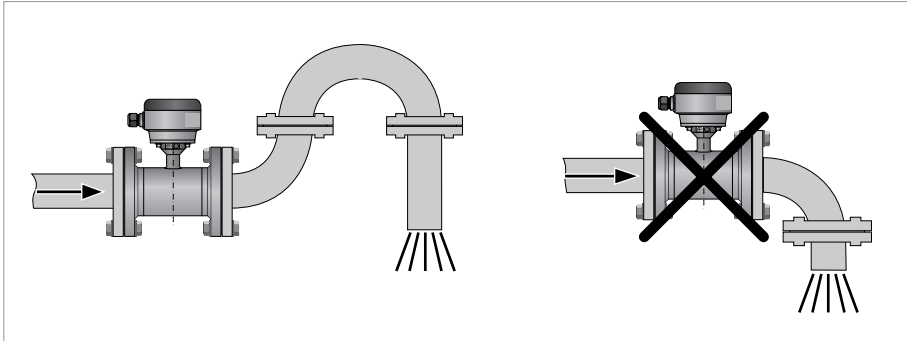


Figure 3-9: Installation before an open discharge

3.10 Control valve

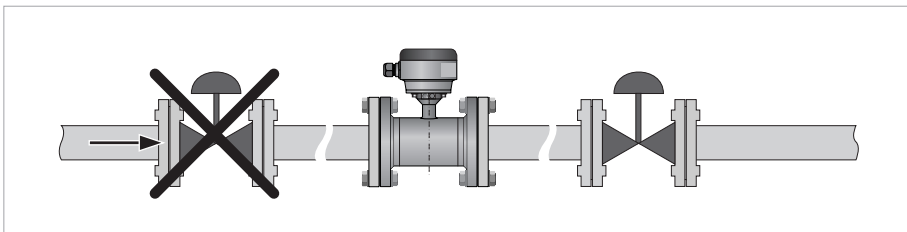


Figure 3-10: Installation before control valve

3.11 Air venting

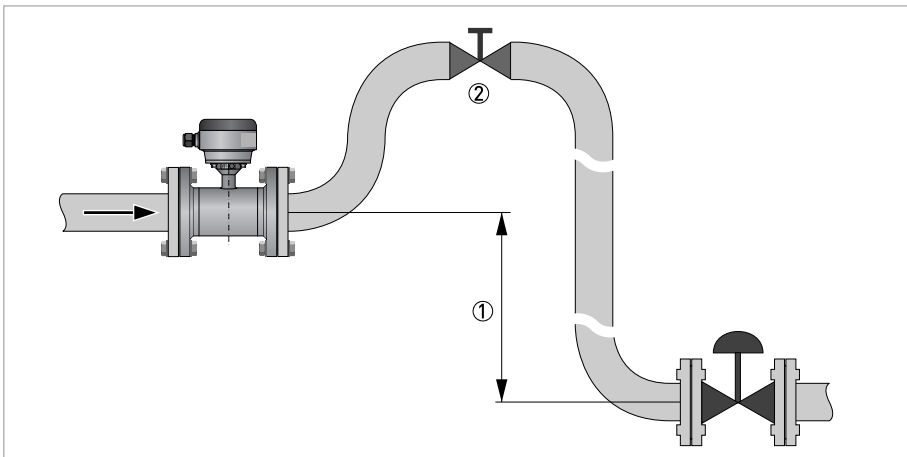


Figure 3-11: Air venting

① ≥ 5 m

② Air ventilation point

3.12 Pump

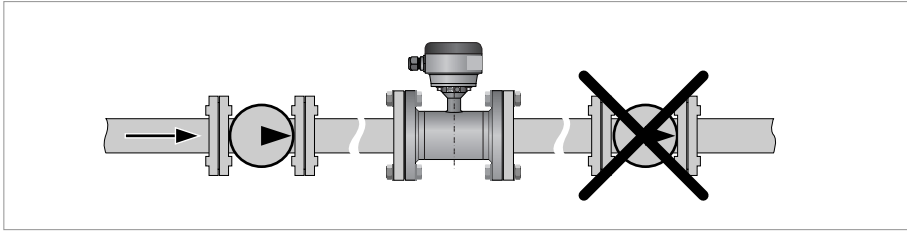


Figure 3-12: Installation after pump

4.1 Safety instructions

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

Observe the national regulations for electrical installations!

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.

4.2 Grounding

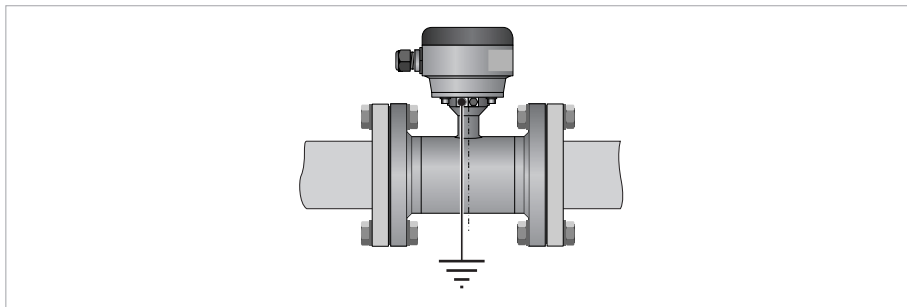


Figure 4-1: Grounding

The flow sensor is equipped with a grounding electrode. Grounding rings are not necessary!

4.3 Connection of signal cable

The signal cable is only used with remote versions. The standard cable includes both electrode and field current leads, the optional type A / B cable is only used for the electrodes. In that case, the field current cable is no part of the supply.

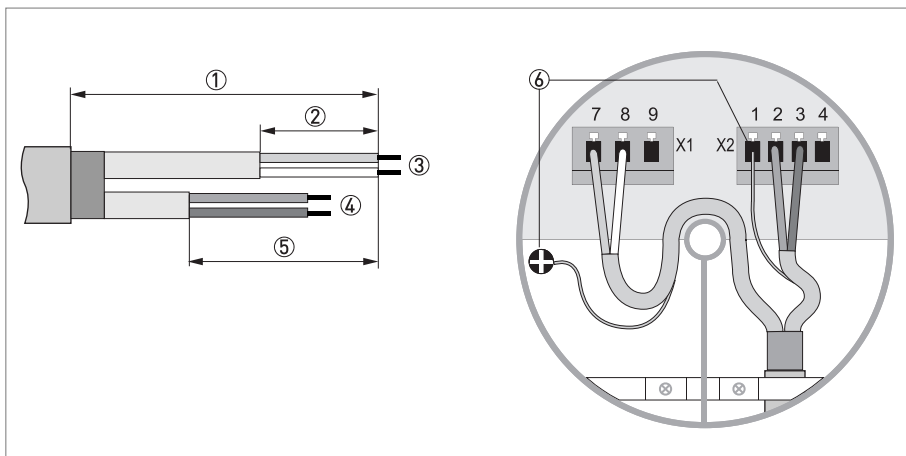
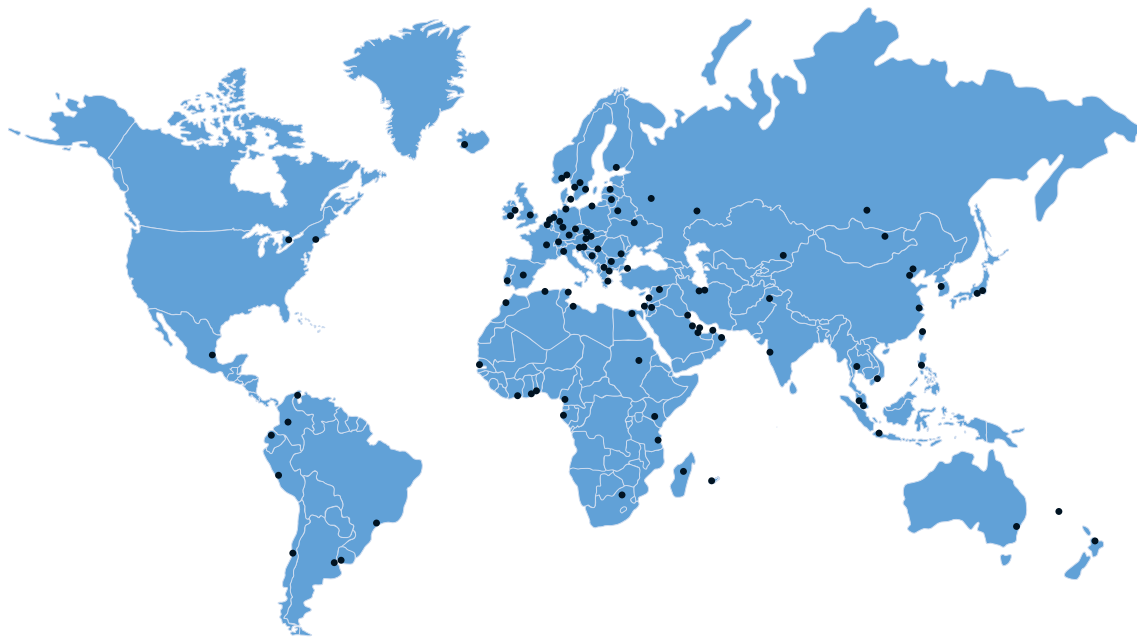


Figure 4-2: Cable connection at sensor side, standard cable

- ① cable length: 13 cm / 5"
- ② cable length: 5 cm / 2"
- ③ brown + white cable, used for field current
- ④ purple and blue cable, used for electrode signals
- ⑤ cable length: 8 cm / 3"
- ⑥ Shield (terminal 1 of connector X2 + U-clamp)

- Prepare appropriate cable lengths (①...③)
- Connect the shield to the U-clamp, the brown cable to terminal 7 and the white to terminal 8.
- Connect the shield to terminal 1, the purple cable (red in case of type A or B cable) to terminal 2 and the blue (white in case of type A or B cable) to terminal 3.





KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Measuring systems for the oil and gas industry
- Measuring systems for sea-going tankers

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