OPTIFLUX 1000 Technical Datasheet

Electromagnetic flowmeter in sandwich version

- Basic and fully functional flow sensor
- Excellent price performance ratio
- Quick and easy to install and operate

The documentation is only complete when used in combination with the relevant documentation for the converter.

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1.1 Economic and ecological solution for various industries

The **OPTIFLUX 1000** electromagnetic flow sensor is the economic and ecological solution for various industries, ranging from agriculture to utilities and from fire fighting to machinery.

The instrument is economical due to low investment and maintenance costs; it is ecological due to accurate measurements and no waste.

① Sandwich design
② Hastelloy electrodes
③ PFA liner

Highlights

- sandwich design
- easy to install and operate
- maintenance free

Industries

- agriculture
- fire-fighting
- machinery and apparatus construction
- swimming pools and recreational facilities

Applications

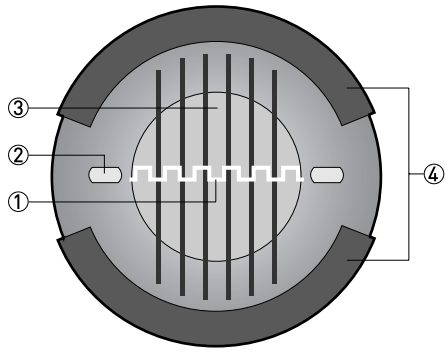
- precise dosing of liquid fodder, liquid fertilizers, measurement of liquid manure, sprinkler irrigation systems
- vehicles, fire extinguishing systems: foam mixing, control of sprinkler systems
- heat counters, energy allocation to buildings and workshops
- water recirculation and treatment

1.2 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 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	Sandwich version
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 documentation of the signal converter.
Compact version	With IFC 100 converter: OPTIFLUX 1100 C
	With IFC 300 converter: OPTIFLUX 1300 C
Remote version	In wall (W) mount version with IFC 100 converter: OPTIFLUX 1100 W
	In field (F), wall (W) or rack (R) mount version with IFC 300 converter: OPTIFLUX 1300 F, W or R
Nominal diameter	DN10...150 / 3/8...6"
Measurement range	-12...+12 m/s / -40...+40 ft/s

Measuring accuracy

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Inlet section: 10 DN
	Outlet section: 5 DN
	Flow velocity: > 1 m/s / > 3 ft/s
	Operating pressure: 1 bar / 14.5 psig
	Valve closing time variation: < 1 ms
	Wet calibrated on EN 17025 accredited calibration rig by direct volume comparison
Maximum measuring error	Related to volume flow (MV = Measured Value)
	These values are related to the pulse / frequency output
	The additional typical measuring deviation for the current output is ±10 µA
	With IFC 100 converter:
	± 0.4% of MV + 1 mm/s
	With IFC 300 converter:
	± 0.3% of MV + 2 mm/s
Repeatability	± 0.1% of MV, minimum 1 mm/s
Long term stability	± 0.1% of MV
Special calibration	On request

Operating conditions

Temperature	
Process temperature	PFA: -40...+180°C / -40...+356°F (remote versions, compact versions are limited to +140°C / 284°F).
Maximum temperature change (shock)	120°C / 248°F
Ambient temperature	-40…+65°C / -40…+149°F
Storage temperature	-50…+70°C / -58…+158°F

Pressure	
Ambient	Atmospheric
Nominal flange pressure	**Standard:**
DIN (EN 1092-1)	PN16 for DN100... DN150
	PN40 for DN10...80
ASME B16.5	**Standard:**
	150 lbs RF for ASME 3/8...6"
	Option:
	300 lbs RF for ASME 3/8...4"
JIS	20K for DN10...100 / 3/8...4"
	10K for DN150 / 6"
Vacuum load	0 mbar / 0 psi absolute
Pressure ranges for secondary containment	Pressure resistant up to 40 bar / 580 psi
	Burst pressure up to approx. 160 bar / 2320 psi
Chemical properties	
Physical condition	Liquids
Electrical conductivity	**Non water:**
	≥ 5 µS/cm
	Water:
	≥ 20 µS/cm
Permissible gas content (volume)	IFC 100 ≤ 3% IFC 300 ≤ 5%
Permissible solid content (volume)	IFC 100 ≤ 10% IFC 300 ≤ 70%
Recommended flow velocity	-12...+12 m/s / -40...+40 ft/s
Other conditions	
Protection category acc. to IEC 529 / EN 60529	Standard: IP66/67 (NEMA 4/4X/6)
	Optional: IP68 (NEMA 6P)
Vibration resistance	IEC 68-2-6

Installation condtitions

Inlet run	≥ 5 DN (without disturbing flow, after a single 90° bend)
	≥ 10 DN (after a double bend 2x 90°)
	≥ 10 DN (behind a control valve)
Outlet run	≥ 2 DN
Dimensions and weights	For detailed information see chapter "Dimensions and weights".

Materials

Sensor housing	DN10...40 GTW-S 38
	DN50...150 sheet steel
Measuring tube	PFA
Connection box	Die-cast aluminium (polyurethane coated)
	Option: stainless steel
Grounding rings	DN10...15 Integrated st. st. 1.4571 (AISI 316 Ti)
	DN25...150 Separate st. st. 1.4571 (AISI 316 Ti)
	Also available as alternative for grounding rings (IFC 300 only): Virtual Reference.
Stud bolts and nuts	DN40...150: rubber centering sleeves
	Option: Steel, Stainless steel
Measuring electrodes	Hastelloy C4

Process connections

DIN	DN10...150 in PN16...40
ASME	3/8...6" in 150...300 lbs
JIS	DN10...150 in JIS 10...20 K

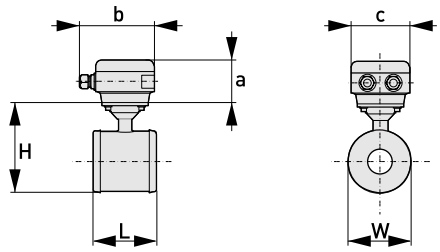
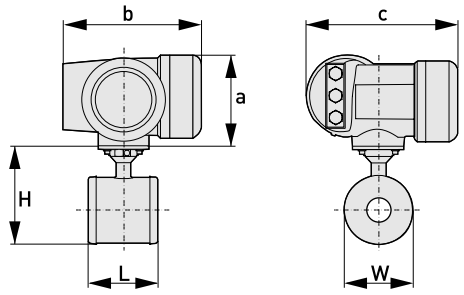
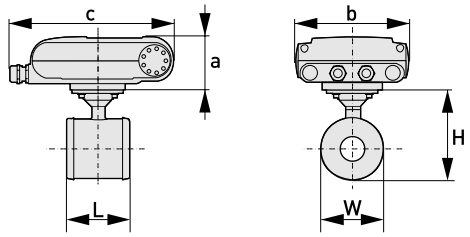
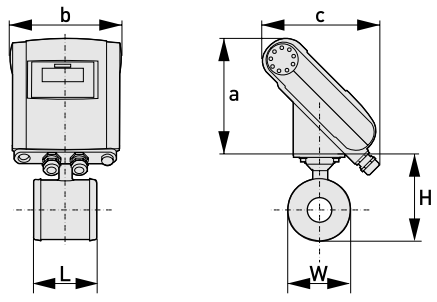
Electrical connections

Signal cable	Only for remote systems
Type A	Standard cable, double shielded. Max. length: 600 m / 1950 ft (dep. on electrical conductivity and measuring sensor). See documentation of the converter for more information.
Type B	Optional cable, triple shielded. Max. length: 600 m / 1950 ft (dep. on electrical conductivity and measuring sensor). See documentation of the converter for more information.

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.
Other approvals and standards	
Electromagnetic compatibility	Directive: 89/336/EEC and A1,A2 NAMUR NE21/04
	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

2.2 Dimensions and weights

Remote version		a = 77 mm / 3.1" b = 139 mm / 5.5" ① c = 106 mm / 4.2" Total height = H + a
Compact version with IFC 300		a = 155 mm / 6.1" b = 230 mm / 9.1" ① c = 260 mm / 10.2" Total height = H + a
Compact version with IFC 100 (0°)		a = 82 mm / 3.2" b = 161 mm / 6.3" ① c = 257 mm / 10.1" Total height = H + a
Compact version with IFC 100 (45°)		a = 186 mm / 7.3" b = 161 mm / 6.3" c = 184 mm / 2.7" Total height = H + a

① The value may vary depending on the used cable glands.

- *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.*

Nominal size		Dimensions [mm]			Approx. weight [kg]
DN	PN [bar]	L	H	W	
10	40	68	137	47	1.7
15	40	68	137	47	1.7
25	40	54	147	66	1.7
40	40	78	162	82	2.6
50	40	100	151	101	4.2
80	40	150	180	130	5.7
100	16	200	207	156	10.5
150	16	200	271	219	15.0

Nominal size		Dimensions [inches]			Approx. weight [lbs]
ASME	PN [psi]	L	H	W	
3/8"	580	2.68	5.39	1.85	3.7
½"	580	2.68	5.39	1.85	3.7
1"	580	2.13	5.79	2.6	3.7
1½"	580	3.07	6.38	3.23	5.7
2"	580	3.94	5.94	3.98	9.3
3"	580	5.91	7.08	5.12	12.6
4"	232	7.87	8.15	6.14	23.1
6"	232	7.87	10.67	8.62	33.1

- *Pressures are applicable at 20° C / 68° F.*
- *For higher temperatures, the pressure and temperature ratings are as per ASME B16.5 (up to 24").*
- *Dimensions for other sizes on request.*

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 Intended use

The OPTIFLUX 1000 flowmeter measures the volumetric flow rate of electrically conductive liquids, acids, alkaline solutions, pastes and slurries, also with very high solid contents.

3.3 Installation conditions

3.3.1 Inlet and outlet

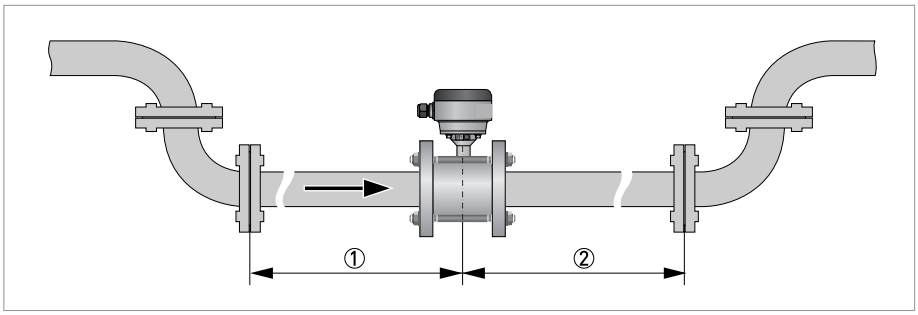


Figure 3-1: Recommended inlet and outlet

① ≥ 5 DN
② ≥ 2 DN

3.3.2 Mounting position

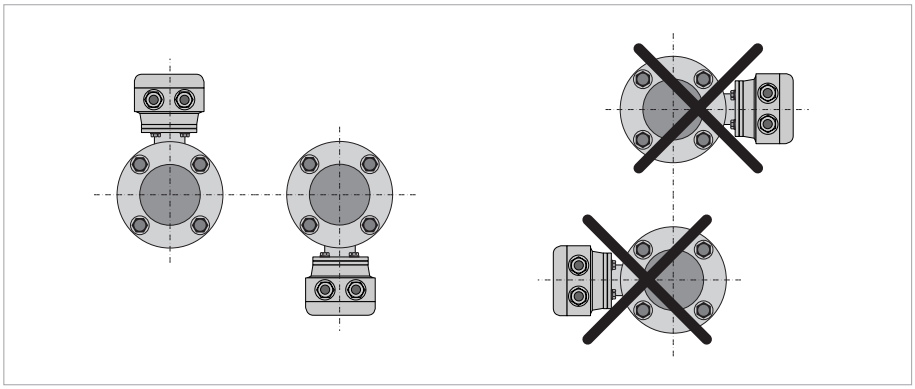


Figure 3-2: Mounting position

3.3.3 Flange deviation

Max. permissible deviation of pipe flange faces:
L_{max} - L_{min} ≤ 0.5 mm / 0.02"

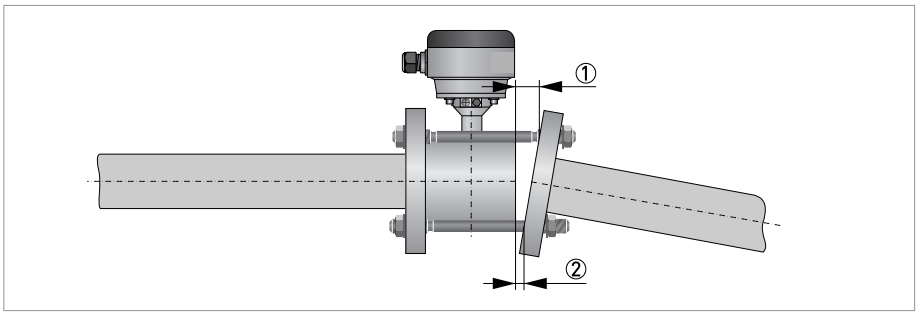


Figure 3-3: Flange deviation

① L_{max}
② L_{min}

3.3.4 T-section

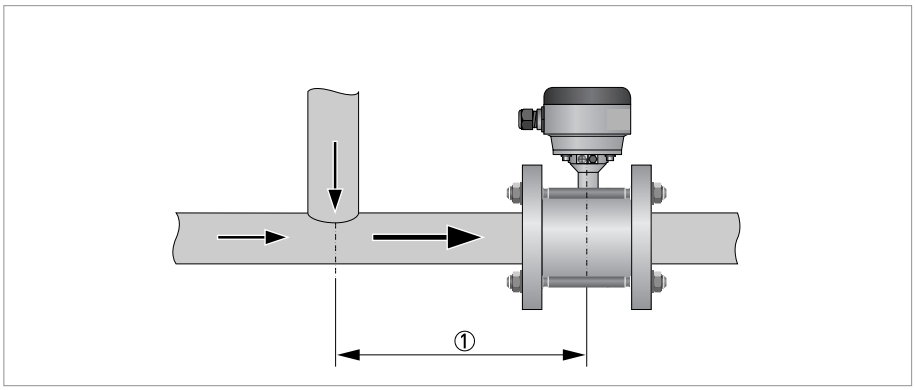


Figure 3-4: Distance after T-sections

① ≥ 10 DN

3.3.5 Vibration

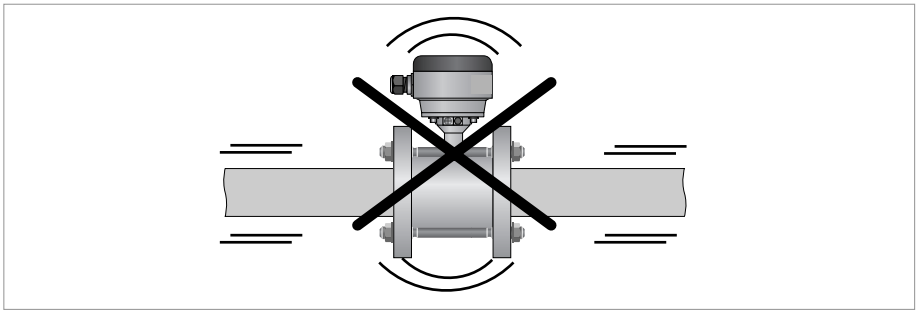


Figure 3-5: Avoid vibrations

3.3.6 Magnetic field

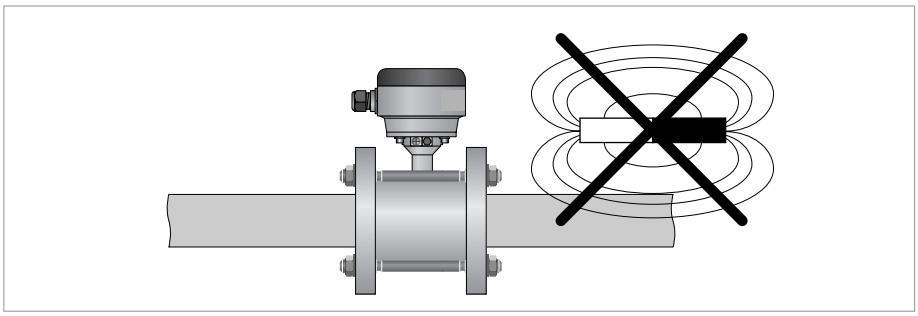


Figure 3-6: Avoid magnetic fields

3.3.7 Bends

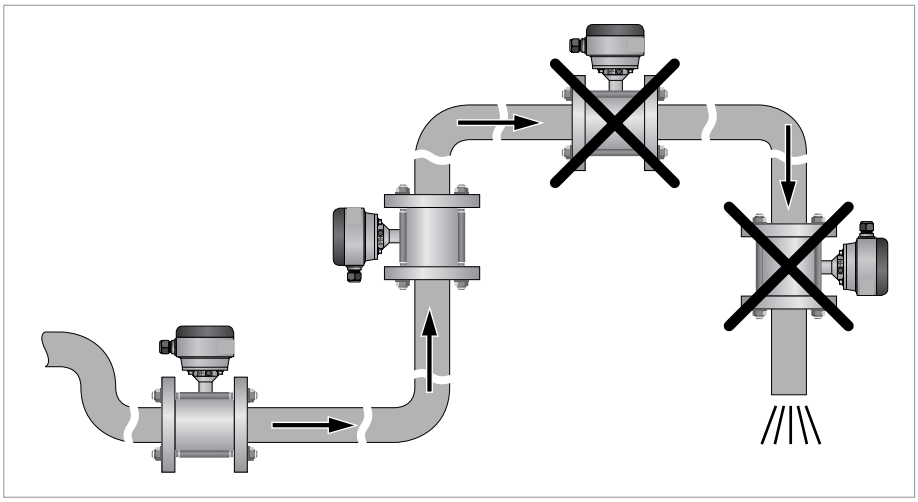


Figure 3-7: Installation in bending pipes

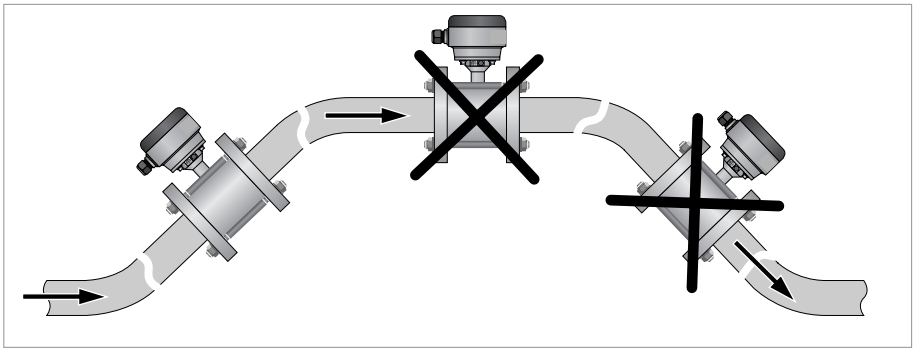


Figure 3-8: Installation in bending pipes

3.3.8 Open discharge

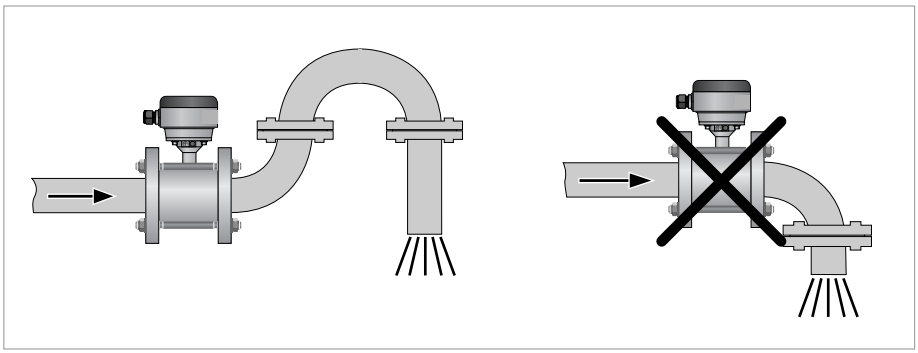


Figure 3-9: Installation before an open discharge

3.3.9 Control valve

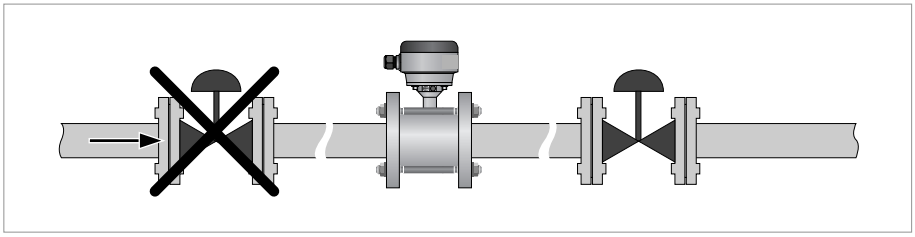


Figure 3-10: Installation before control valve

3.3.10 Air venting

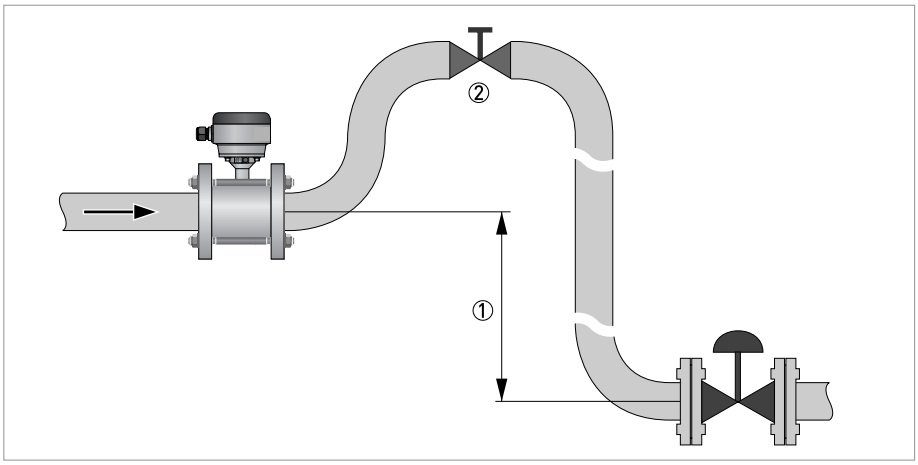


Figure 3-11: Air venting

① ≥ 5 m
② Air ventilation point

3.3.11 Pump

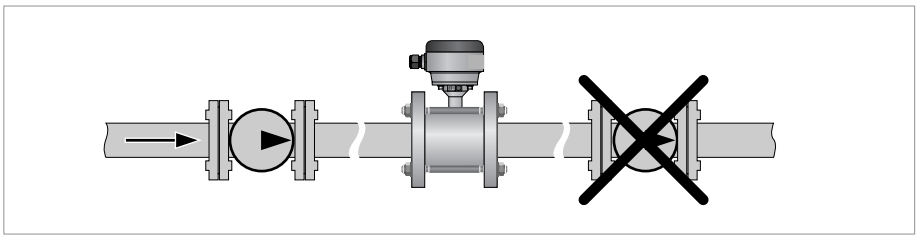


Figure 3-12: Installation after pump

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!

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

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

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

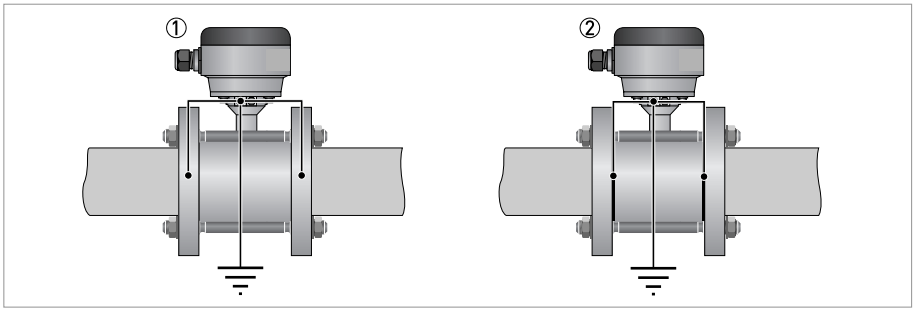


Figure 4-1: Grounding

① Metal pipelines, not internally coated. Grounding without grounding rings!
② Metal pipelines with internal coating and non-conductive pipelines. Grounding with grounding rings!

4.3 Virtual reference for IFC 300 (C, W and F version)

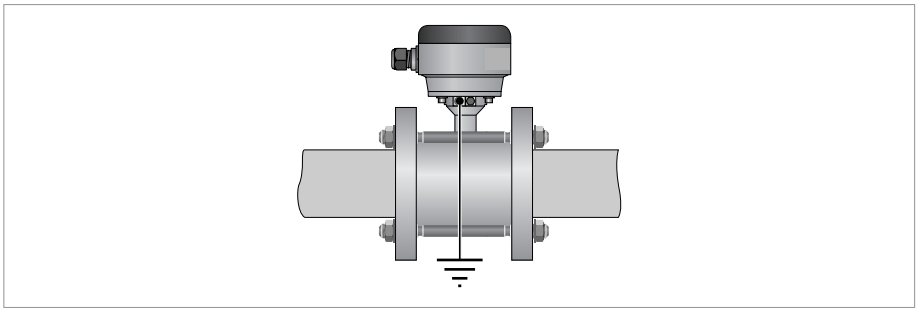


Figure 4-2: Virtual reference

Possible if:
≥ DN10
Electrical conductivity ≥ 200 µS/cm

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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