OPTIFLUX 5000 Quick Start

Electromagnetic flowmeter in sandwich version

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

KROHNE

Warnings and symbols used

DANGER!
This information refers to the immediate danger when working with electricity.

DANGER!
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.

WARNING!
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.

CAUTION!
Disregarding these instructions can result in damage to the device or to parts of the operator's plant.

INFORMATION!
These instructions contain important information for the handling of the device.

HANDLING

- This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➲ RESULT
This symbol refers to all important consequences of the previous actions.

Safety instructions for the operator

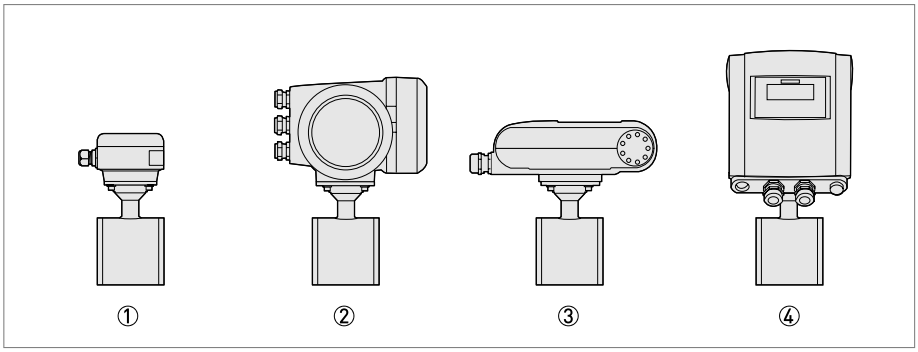
CAUTION!
Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.

LEGAL NOTICE!
The responsibility as to the suitability and intended use of this device rests solely with the user. The supplier assumes no responsibility in the event of improper use by the customer. Improper installation and operation may lead to loss of warranty. In addition, the "Terms and Conditions of Sale" apply. They appear on the back of the invoice and form the basis of the purchase contract.

INFORMATION!

- *Further information can be found on the supplied CD-ROM in the manual, on the data sheet, in special manuals, certificates and on the manufacturer's website.*
- *If you need to return the device to the manufacturer or supplier, please fill out the form contained on the CD-ROM and send it with the device. Unfortunately, the manufacturer cannot repair or inspect the device without the completed form.*

2.1 Scope of delivery



① Remote version
② Compact version with IFC 300 signal converter
③ Compact version with IFC 100 (0°) signal converter
④ Compact version with IFC 100 (45°) signal converter

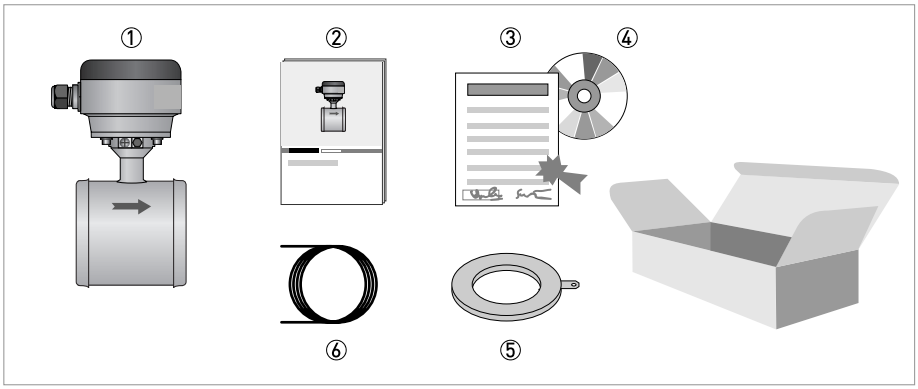


Figure 2-1: Scope of delivery

① Ordered flowmeter
② Product documentation
③ Factory calibration report
④ CD-ROM with product documentation
⑤ Grounding rings (optionally)
⑥ Cable (remote versions only)

2.2 Nameplates

INFORMATION!
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.

2.3 Storage

- Store the device in a dry and dust-free location.
- Avoid lasting direct exposure to the sun.
- Store the device in its original packing.

2.4 Transport

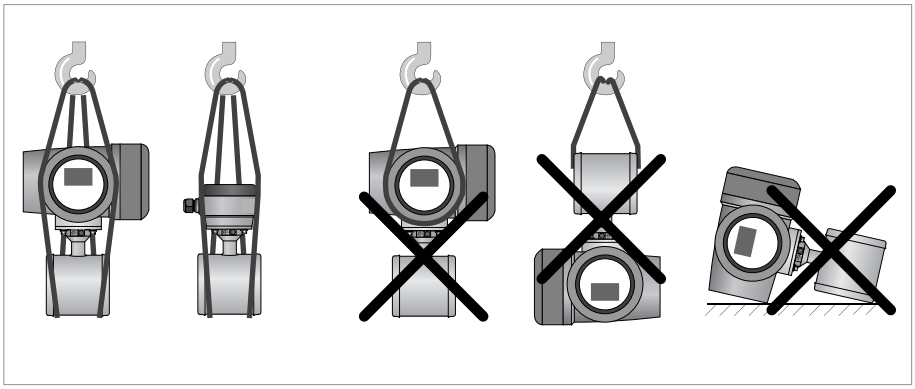


Figure 2-2: Transport

2.5 Installation conditions

2.5.1 Inlet and outlet

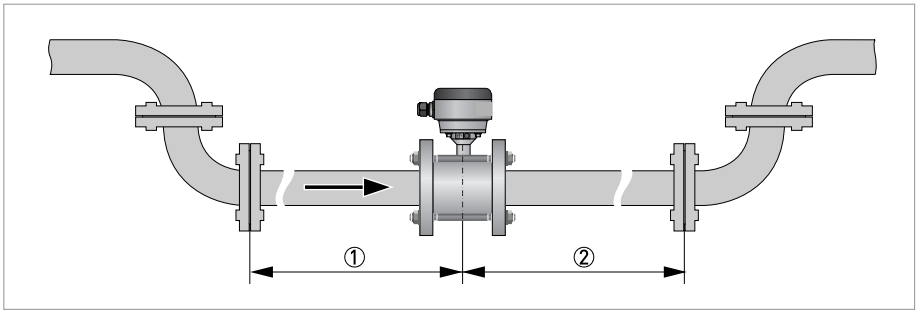


Figure 2-3: Recommended inlet and outlet

① ≥ 5 DN
② ≥ 2 DN

2.5.2 Mounting position

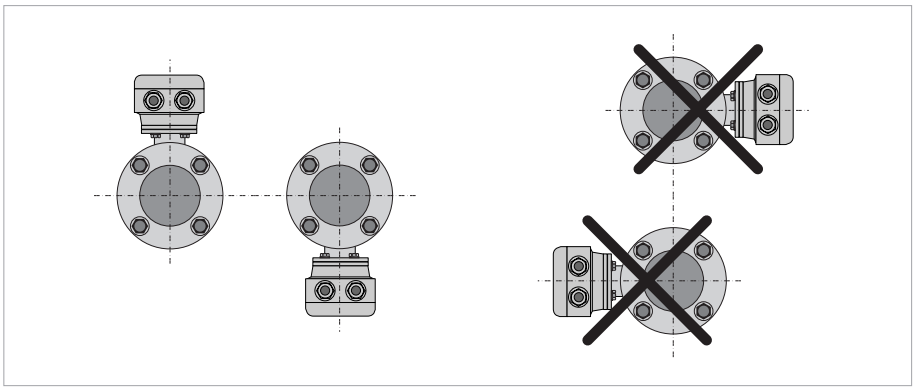


Figure 2-4: Mounting position

2.5.3 Flange deviation

CAUTION!
Max. permissible deviation of pipe flange faces:
$L_{max} - L_{min} \leq 0.5$ *mm / 0.02"*

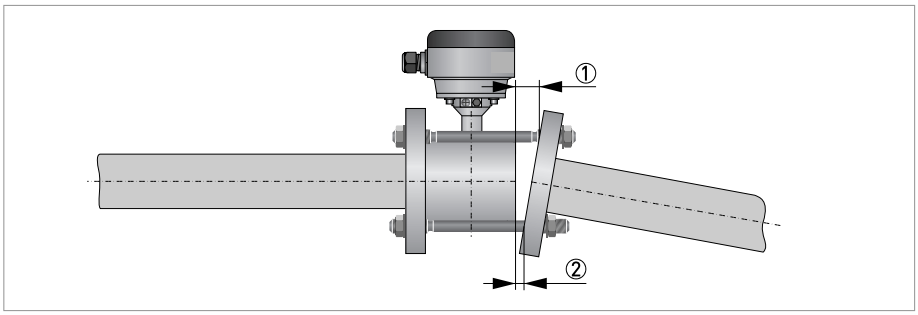


Figure 2-5: Flange deviation

① L_{max}
② L_{min}

2.5.4 T-section

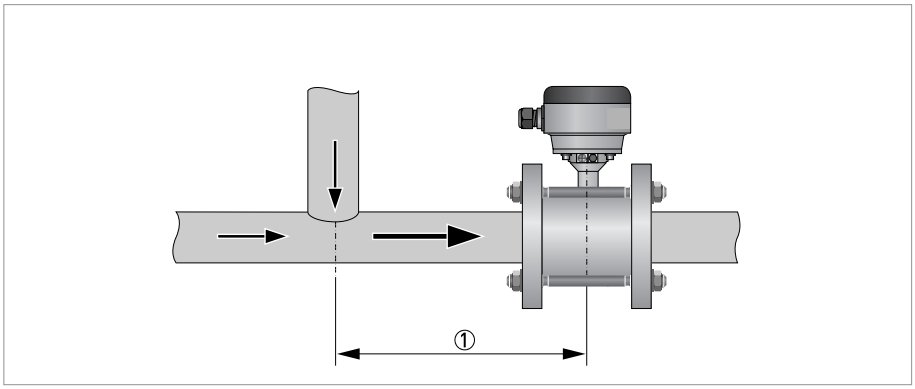


Figure 2-6: Distance after T-sections

① ≥ 10 DN

2.5.5 Vibration

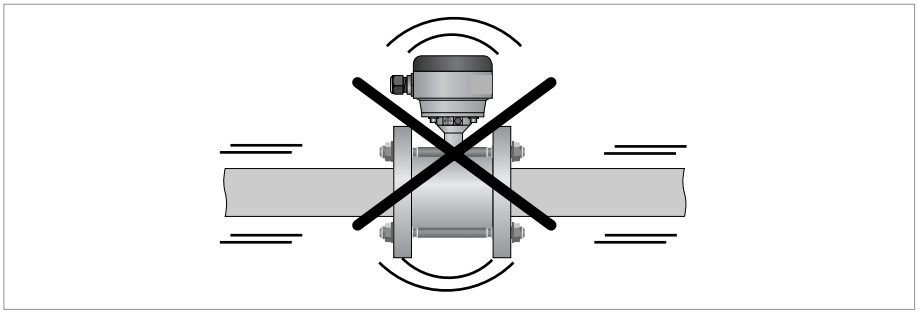


Figure 2-7: Avoid vibrations

2.5.6 Magnetic field

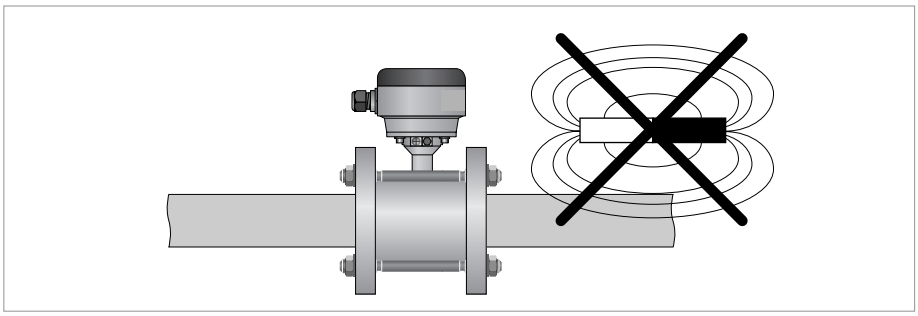


Figure 2-8: Avoid magnetic fields

2.5.7 Bends

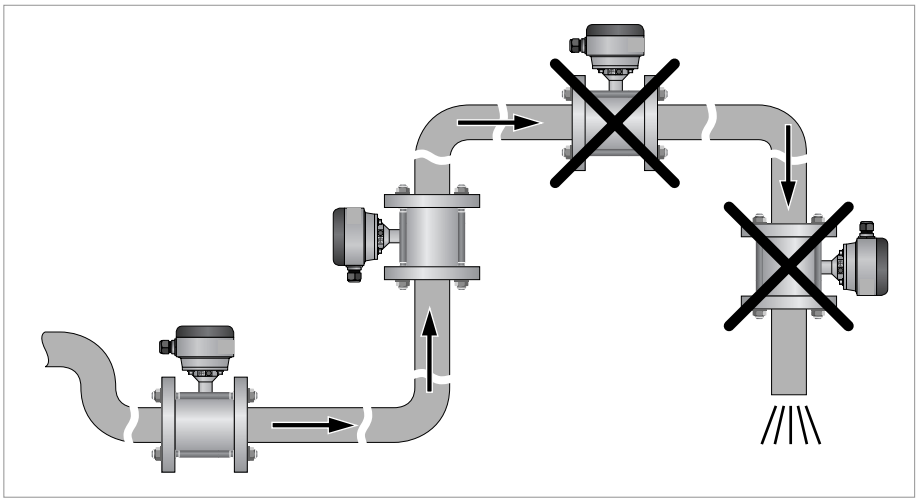


Figure 2-9: Installation in bending pipes

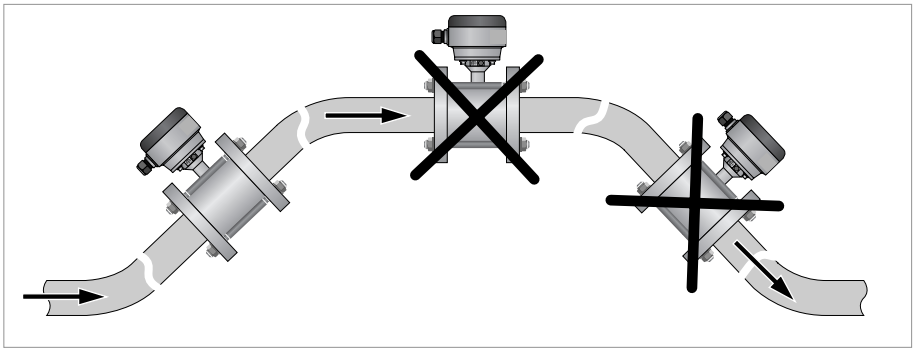


Figure 2-10: Installation in bending pipes

2.5.8 Open discharge

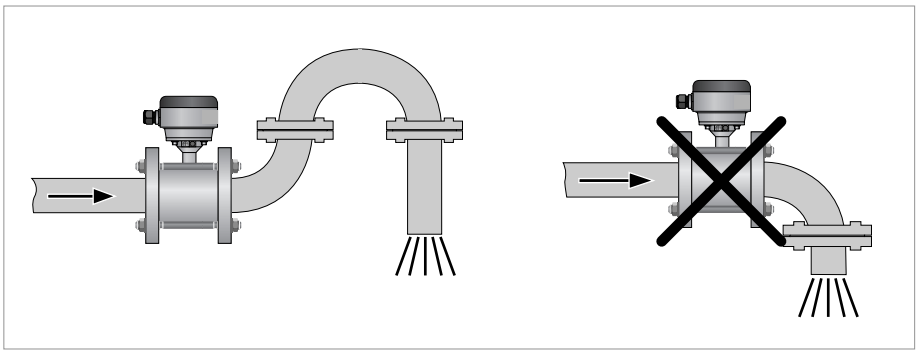


Figure 2-11: Installation before an open discharge

2.5.9 Control valve

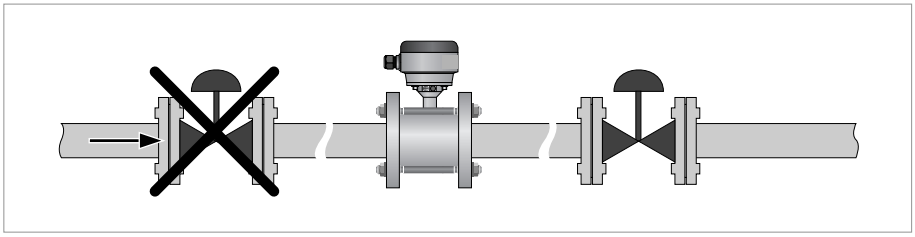


Figure 2-12: Installation before control valve

2.5.10 Air venting

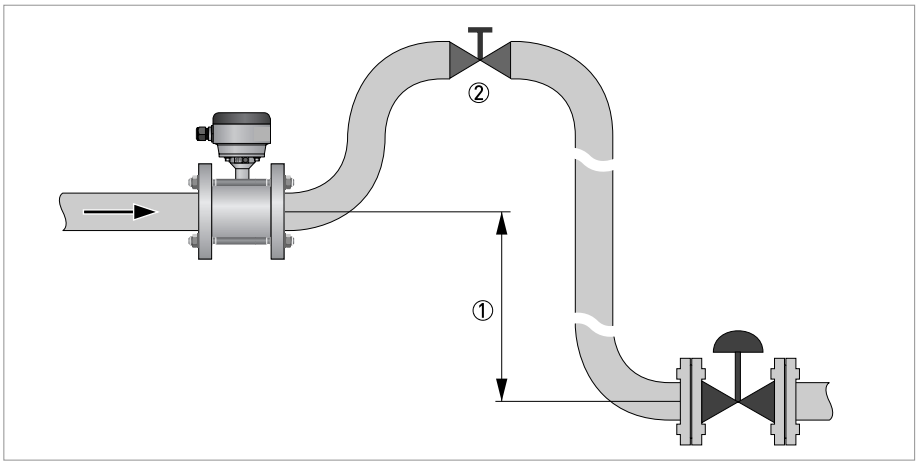


Figure 2-13: Air venting

① ≥ 5 m
② Air ventilation point

2.5.11 Pump

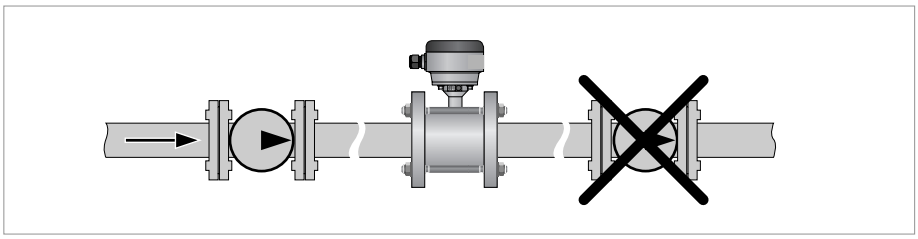


Figure 2-14: Installation after pump

2.5.12 Temperatures

CAUTION!
Protect the device from direct sunlight.

Temperature range	Process [°C]		Ambient [°C]		Process [°F]		Ambient [°F]	
	min.	max.	min.	max.	min.	max.	min.	max.
Separate flow sensor	-60	180	-40	65	-76	356	-40	149
Compact + IFC 300	-60	140	-40	65	-76	284	-40	149
Compact + IFC 100	-60	140	-40	65	-76	284	-40	149

2.6 Mounting

2.6.1 Torques and pressure

WARNING!

- *Please use stainless steel A2 / 6.9 class bolts.*
- *Make sure the connecting flanges are of type raised face (RF).*

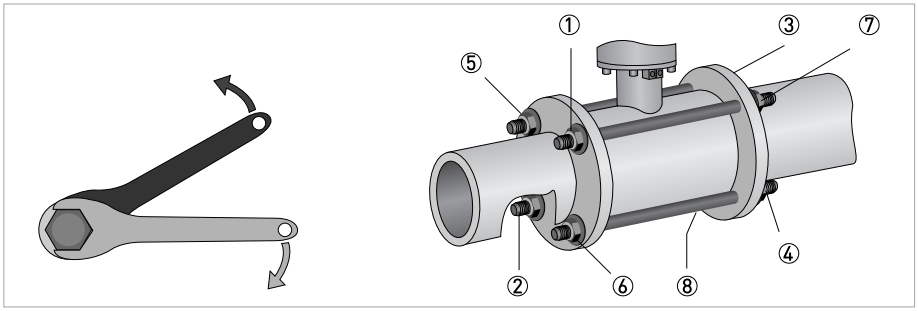


Figure 2-15: Tighten the bolts in fixed order, see picture.

Max. torque:

- Step 1: approx. 50% of max. torque
- Step 2: approx. 80% of max. torque
- Step 3: 100% of max. torque given in tables

EN 1092-1

Nominal size DN [mm]	Pressure rating	Max. allowable operating pressure	
		bar	psig
2.5...80	PN 40	16	580
100	PN 16	16	230
100	PN 25	25	360

ASME B 16.5

Nominal size [inch]	Pressure rating	Max. allowable operating pressure	
		bar	psig
1/10...4"	150 lb	16	230
1/10...3"	300 lb	40	580
4"	300 lb	25	360

EN 1092-1

Nominal size DN [mm]	Pipe flanges	Max. allowable torque with gaskets made of					
		Gylon		Chemotherm		FPM / FKM ①	
	Rating	Nm	ftlb	Nm	ftlb	Nm	ftlb
2.5...10	PN 40	-	-	-	-	32	24
15	PN 40	-	-	-	-	36	27
25	PN 40	22	16	32	24	-	-
40	PN 40	47	35	66	49	-	-
50	PN 40	58	43	82	60	-	-
80	PN 40	48	35	69	51	-	-
100	PN 16	75	55	106	78	-	-
100	PN 25	94	69	133	98	-	-
① according DIN ISO 1629 / ASTM D 1418							

ASME B 16.5

Nominal size DN [mm]	Pipe flanges	Max. allowable torque with gaskets made of					
		Gylon		Chemotherm		FPM / FKM ①	
	Rating	Nm	ftlb	Nm	ftlb	Nm	ftlb
1/10...3/8"	150 lb	-	-	-	-	35	26
1/2"	150 lb	-	-	-	-	35	26
1"	150 lb	24	18	33	24	-	-
1 1/2"	150 lb	38	28	54	40	-	-
2"	150 lb	58	43	83	61	-	-
3"	150 lb	98	72	138	102	-	-
4"	150 lb	75	55	108	80	-	-
① according DIN ISO 1629 / ASTM D 1418							

3.1 Safety instructions

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

DANGER!
Observe the national regulations for electrical installations!

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

WARNING!
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.

INFORMATION!
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

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

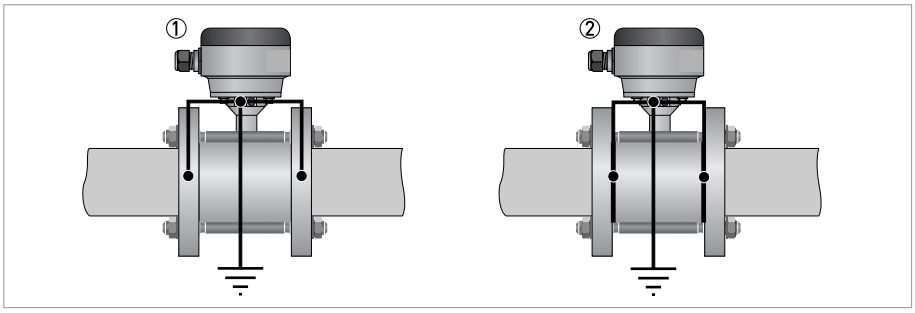


Figure 3-1: Grounding

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

Figure 3-2: Grounding ring number 1

Grounding ring number 1 (Optional for DN25...100):

- 3 mm / 0.1" thick (tantalum: 0.5 mm / 0.1")

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

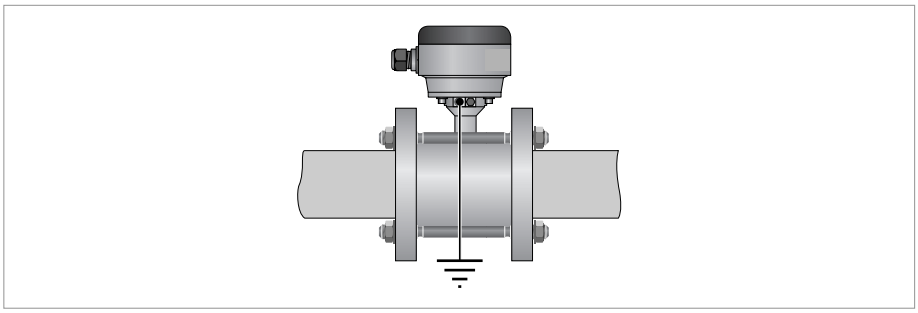


Figure 3-3: Virtual reference

Possible if:

- ≥ DN10
- Electrical conductivity ≥ 200 µS/cm
- Electrode cable max. 50m.

3.4 Connection diagram for measuring sensor, field housing

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

- If a shielded field current cable is used, the shield must **NOT** be connected.
- The outer shield of signal cable A or B in the signal converter housing is connected via the strain relief terminal.
- Bending radius of signal and field current cable: ≥ 50 mm / 2"
- The following illustration is schematic. The positions of the electrical connection terminals may vary depending on the housing version.

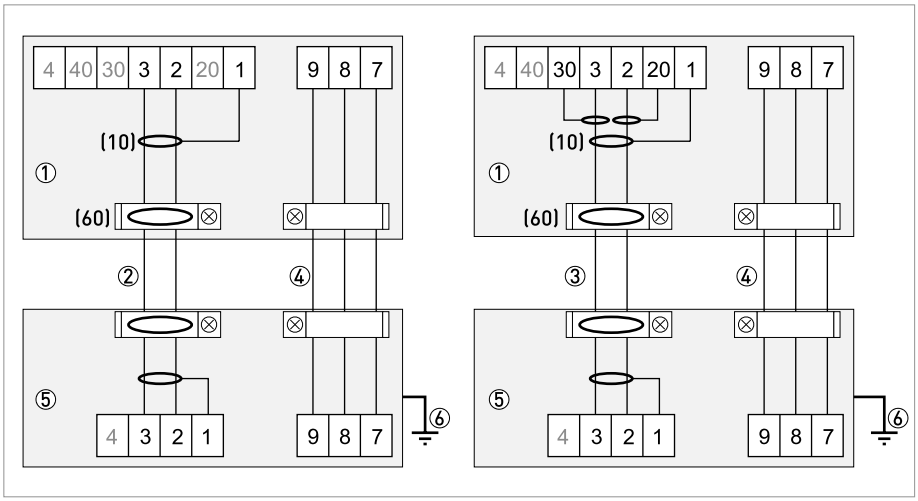


Figure 3-4: Connection diagram for measuring sensor, field housing

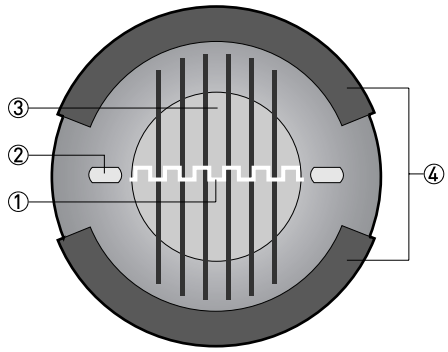
① Electrical terminal compartment in housing of the signal converter for signal and field current cable.
② Signal cable A
③ Signal cable B
④ Field current cable C
⑤ Connection box of measuring sensor
⑥ Functional ground FE

4.1 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

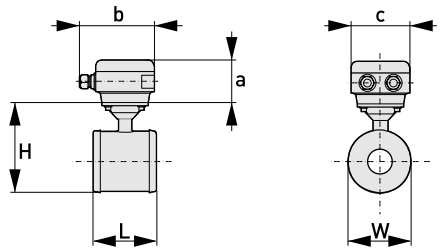
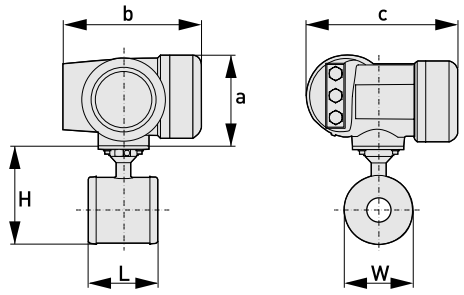
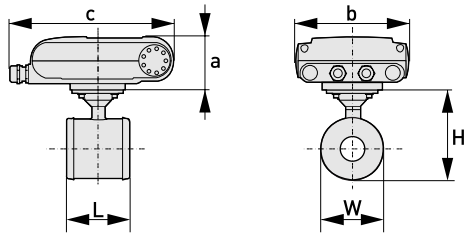
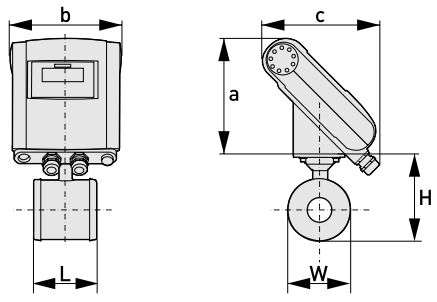
in which:
v = mean flow velocity
k = factor correcting for geometry
B = magnetic field strength
D = inner diameter of flow meter

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

4.2 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" c = 257 mm / 10.1" 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" ① Total height = H + a

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

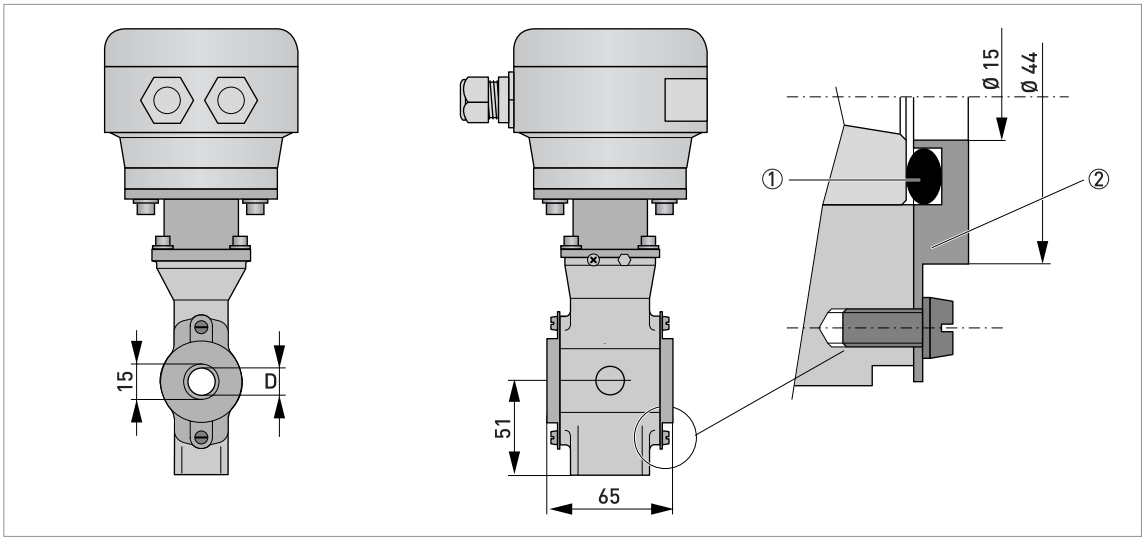


Figure 4-1: Contruction details DN2.5...15

① O-ring
② Grounding ring

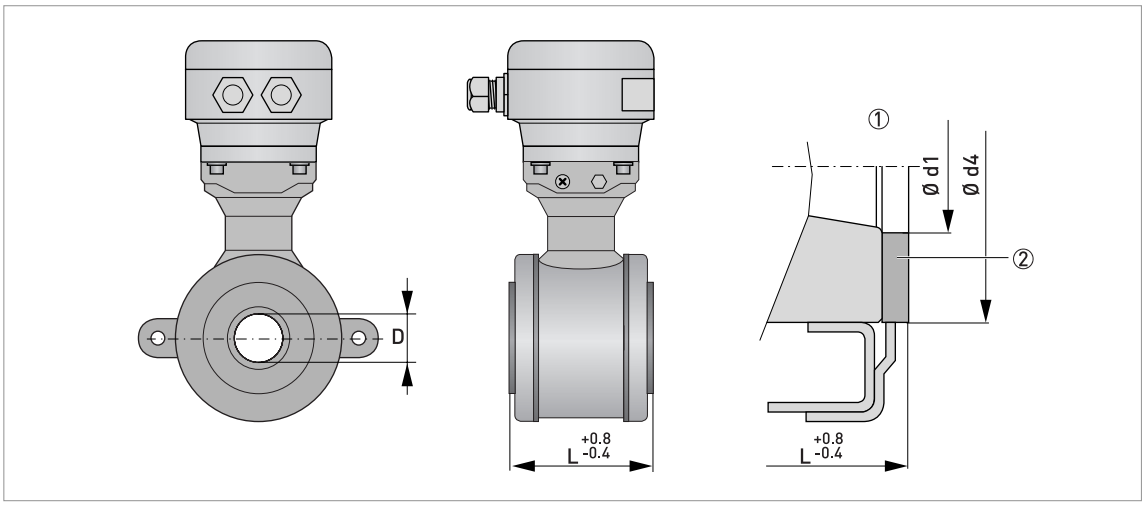


Figure 4-2: Construction details DN25...100

① Situation without grounding rings
② Gasket

INFORMATION!

- *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	Ød1	Ød4	
2.5	40	65 ①	123	44	-	-	1.6
4	40	65 ①	123	44	-	-	1.6
6	40	65 ①	123	44	-	-	1.6
10	40	65 ①	123	44	-	-	1.6
15	40	65 ①	123	44	-	-	1.6
25	40	58 ②	116	68	26	46	1.6
40	40	83 ②	131	83	39	62	2.4
50	40	103 ②	149	101	51	74	2.9
80	40	153 ②	181	133	80	106	6.4
100	16	203 ②	206	158	101	133	8.8

① Total fitting length of flowmeter with integrated rings: Dim. L + 2 x gasket thickness.
② Total fitting length of flowmeter without rings: Dim. L only (no gaskets required).

Nominal size		Dimensions [inches]					Approx. weight [lbs]
ASME	PN [psi]	L	H	W	Ød1	Ød4	
1/10"	580	2.56 ①	4.84	1.73	-	-	3.53
1/8"	580	2.56 ①	4.84	1.73	-	-	3.53
¼"	580	2.56 ①	4.84	1.73	-	-	3.53
3/8"	580	2.56 ①	4.84	1.73	-	-	3.53
½"	580	2.56 ①	4.84	1.73	-	-	3.53
1"	580	2.28 ②	4.57	2.68	1.02	1.81	3.53
1½"	580	3.27 ②	5.16	3.27	1.54	2.44	5.29
2"	580	4.06 ②	5.87	3.98	2.01	2.91	6.39
3"	580	6.02 ②	7.13	5.24	3.15	4.17	14.11
4"	232	7.99 ②	8.11	6.22	3.98	5.24	19.40

① Total fitting length of flowmeter with integrated rings: Dim. L + 2 x gasket thickness.
② Total fitting length of flowmeter without rings: Dim. L only (no gaskets required).

CAUTION!

- *Pressures at 20° C / 68° F.*
- *For higher temperatures, the pressure and temperature ratings are as per ASME B16.5 (up to 24") or ASME B16.47 (>24").*
- *Dimensions for other sizes on request.*

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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