



# POWERFLUX 4000

Quick Start

Electromagnetic flow sensor

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

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## 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 which 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 General notes on installation



### **INFORMATION!**

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



### **INFORMATION!**

Do a check of the packing list to make sure that you have all the elements given in the order.



### **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.

## 2.2 Scope of delivery



### **INFORMATION!**

Do a check of the packing list to make sure that you have all the elements given in the order.



### **INFORMATION!**

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



### **INFORMATION!**

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

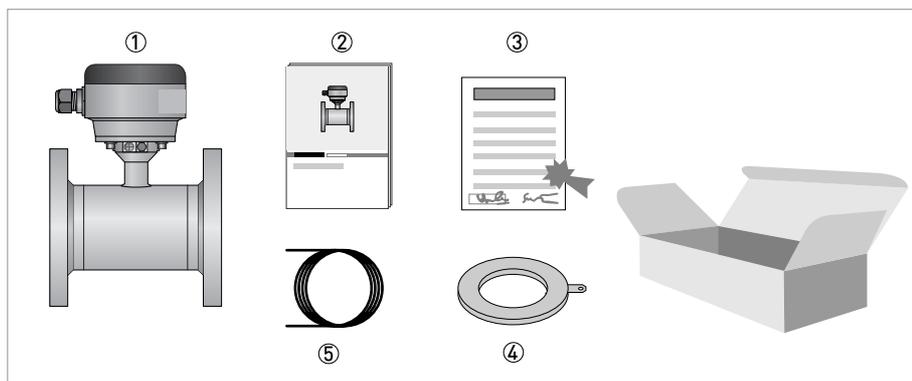


Figure 2-1: Scope of delivery

- ① Ordered flowmeter
- ② Product documentation
- ③ Factory calibration report
- ④ Grounding rings (optional)
- ⑤ Signal cable (remote versions only)



### **INFORMATION!**

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.

## 2.3 Device description

Electromagnetic flowmeters are designed exclusively to measure the flow and conductivity of electrically conductive, liquid media.

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



### **INFORMATION!**

Product specific information and extensive product specification is available using PICK, the Product Information Center KROHNE web-tool.



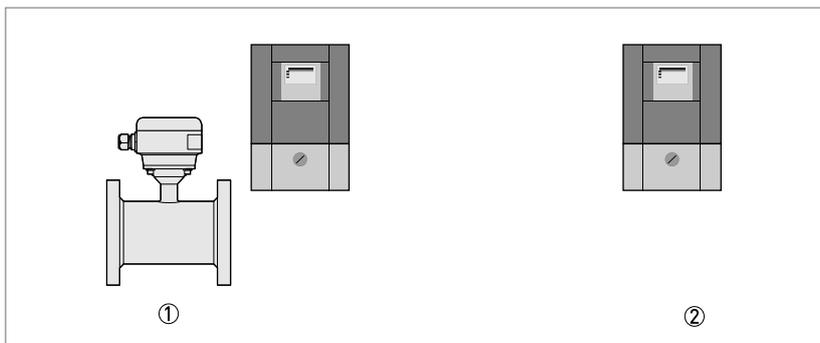
PICK can be found via the service menu button on the KROHNE.com website.

The POWERFLUX is available in different sizes and constructions;

### **The following versions are available:**

- Sensor and converter (remote version)
- Converter only

In both cases an electrical connection to the measuring sensor is made via field current and signal cable.



**Figure 2-2: Device version**

- ① Sensor and converter
- ② Only converter

## 2.4 Nameplate measuring sensor (example)

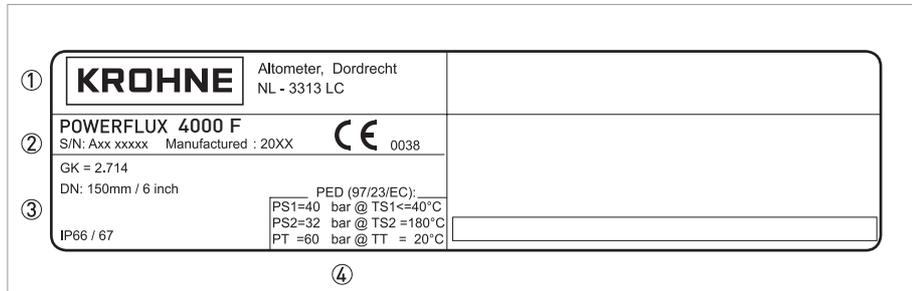


Figure 2-3: Example nameplate sensor

- ① Name and address of the manufacture
- ② Type designation and CE sign with number of notified body
- ③ Calibration / GK / Size and protection class data
- ④ PED data

## 2.5 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

## 2.6 Transport

### Signal converter

- No special requirements.

### Flowmeter

- Do not lift the device by the connection box housing.
- Do not use lifting chains.
- To transport flange devices, use lifting straps. Wrap these around both process connections.

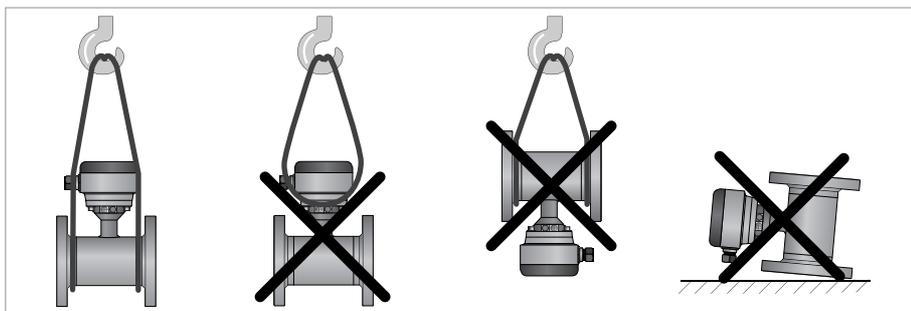


Figure 2-4: Transport

## 2.7 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 flowmeter in pipeline

## 2.8 General requirements



### **INFORMATION!**

*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 flowmeters are tested for a vibration level in accordance with IEC 68-2-64.*

### 2.8.1 Vibration

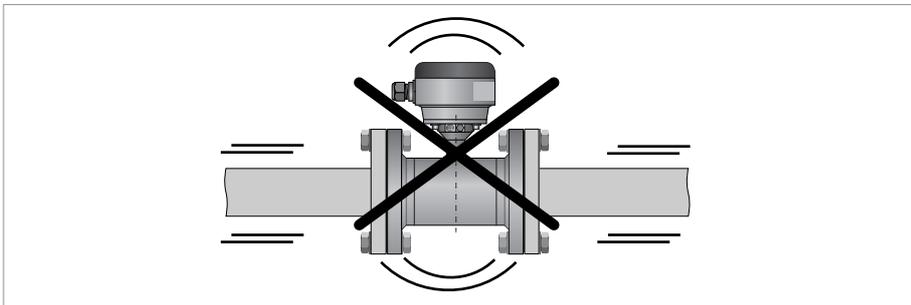


Figure 2-5: Avoid vibrations

### 2.8.2 Magnetic field

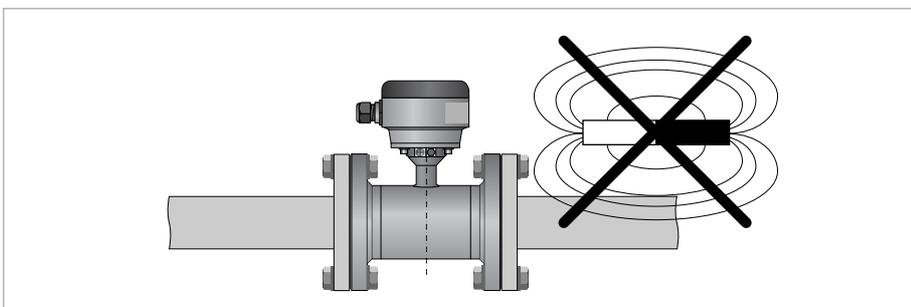


Figure 2-6: Avoid magnetic fields

## 2.9 Installation conditions



### CAUTION!

*Install in a slightly descending pipe section to prevent air from collecting and to avoid faulty measurements (meter can drain).*

### 2.9.1 Inlet and outlet

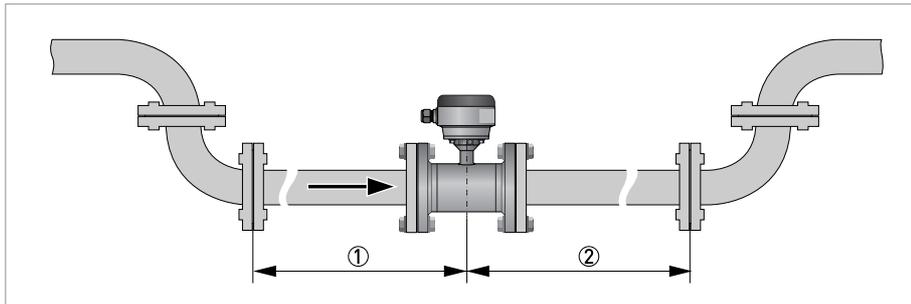


Figure 2-7: Recommended inlet and outlet

- ① Refer to chapter "Bends in 2 or 3 dimensions"
- ②  $\geq 2$  DN

### 2.9.2 Bends in 2 or 3 dimensions

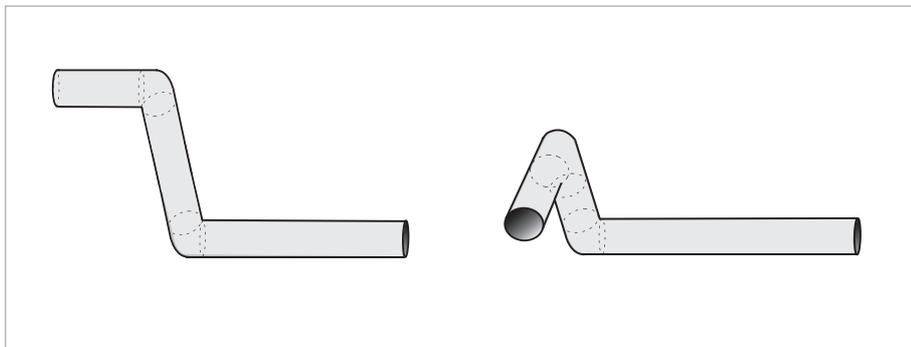


Figure 2-8: Inlet when using 2 and/or 3 dimensional bends upstream of the flowmeter

Inlet length: using bends in 2 dimensions:  $\geq 5$  DN; when having bends in 3 dimensions:  $\geq 10$  DN



### INFORMATION!

*2 Dimensional bends in a vertical plane only, while 3 Dimensional bends both occur in a vertical **and** horizontale plane.*

### 2.9.3 T-section

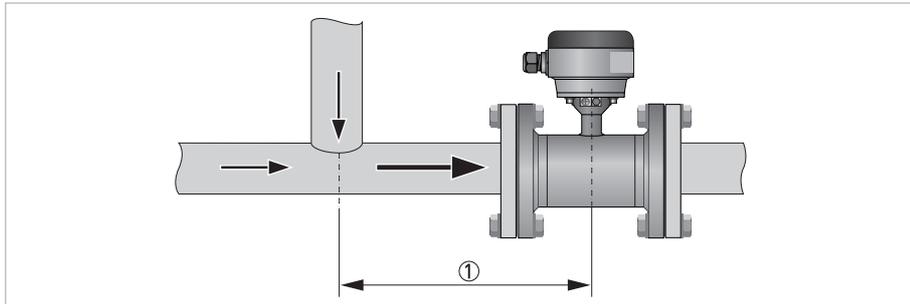


Figure 2-9: Distance behind a T-section

①  $\geq 10$  DN

### 2.9.4 Bends

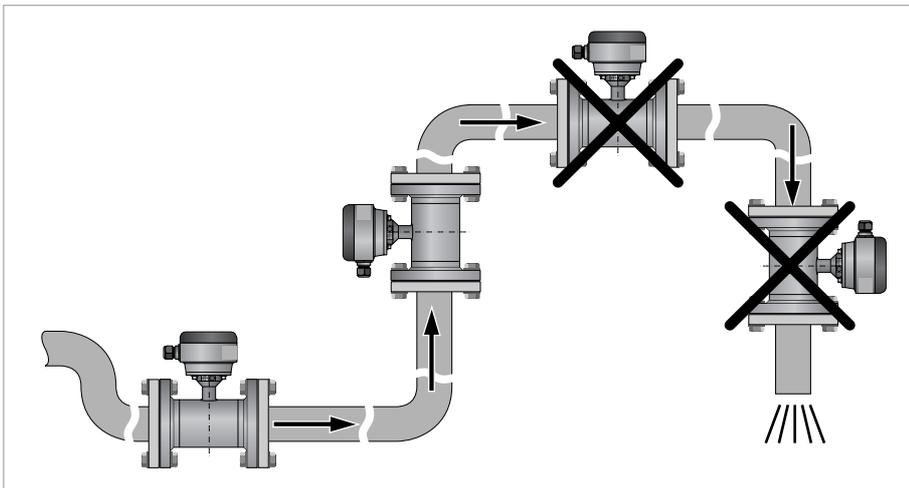


Figure 2-10: Installation in bending pipes

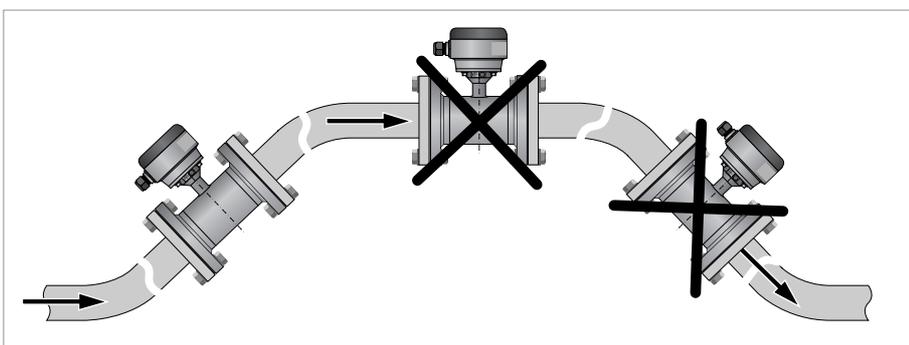


Figure 2-11: Installation in bending pipes



**CAUTION!**  
Avoid draining or partial filling of the flow sensor

2.9.5 Open feed or discharge

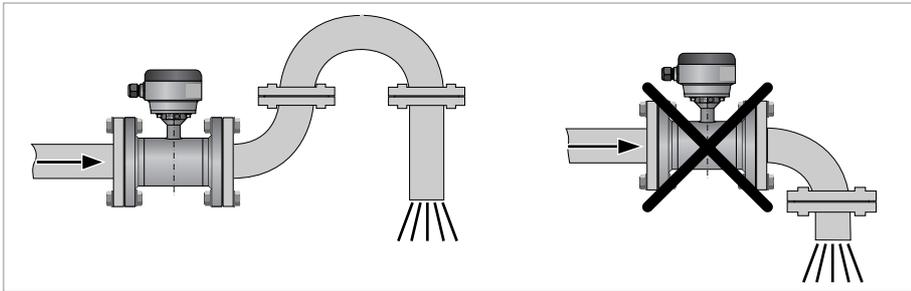


Figure 2-12: Installation in front of an open discharge

2.9.6 Flange deviation



**CAUTION!**

Max. permissible deviation of pipe flange faces:

$$L_{max} - L_{min} \leq 0.5 \text{ mm} / 0.02''$$

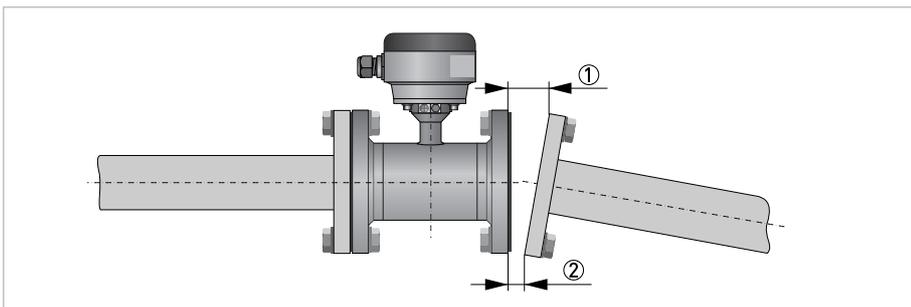


Figure 2-13: Flange deviation

- ①  $L_{max}$
- ②  $L_{min}$

2.9.7 Control valve

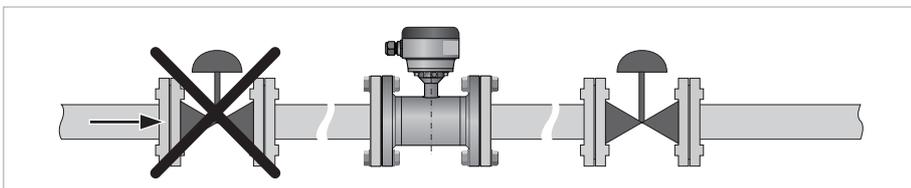


Figure 2-14: Installation in front of a control valve

### 2.9.8 Pump

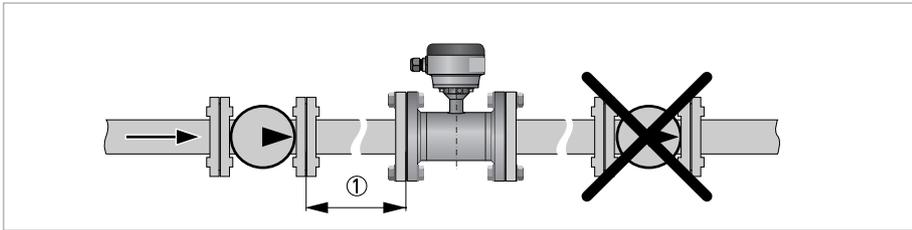


Figure 2-15: Installation behind a pump

① Inlet:  $\geq 3$  DN

### 2.9.9 Air venting and vacuum forces

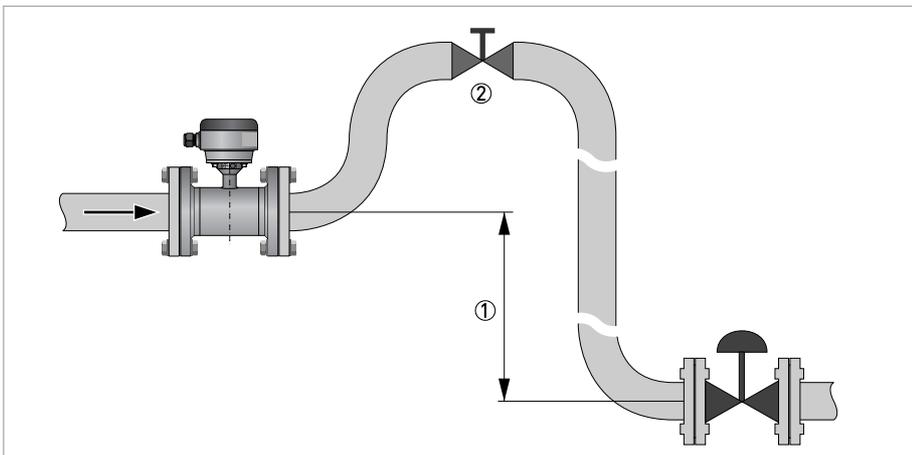


Figure 2-16: Air venting

①  $\geq 5$  m

② Air ventilation point

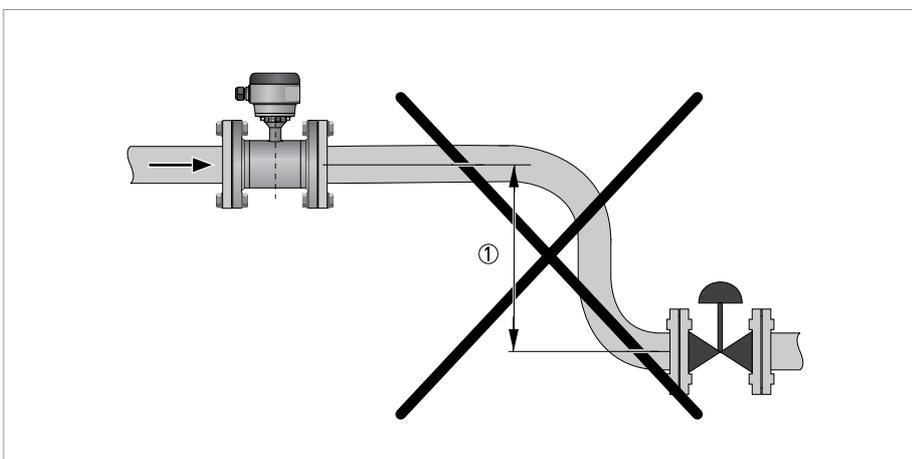


Figure 2-17: Vacuum

①  $\geq 5$  m

## 2.9.10 Mounting position

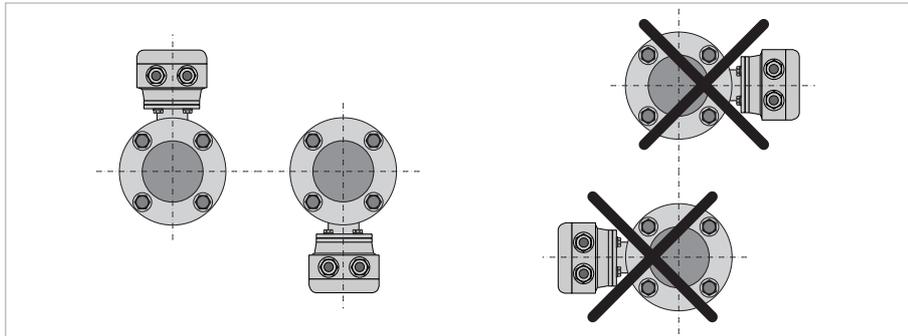


Figure 2-18: Mounting position

- Install flow sensor in line with the pipe axis.
- Pipe flange faces must be parallel to each other.

## 2.10 Mounting

**CAUTION!**

Please take care to use the proper gasket to prevent damaging the liner of the flowmeter. In general, the use of spiral wound gaskets is not advised, as it could severely damage the liner of the flowmeter.

### 2.10.1 Torques and pressures

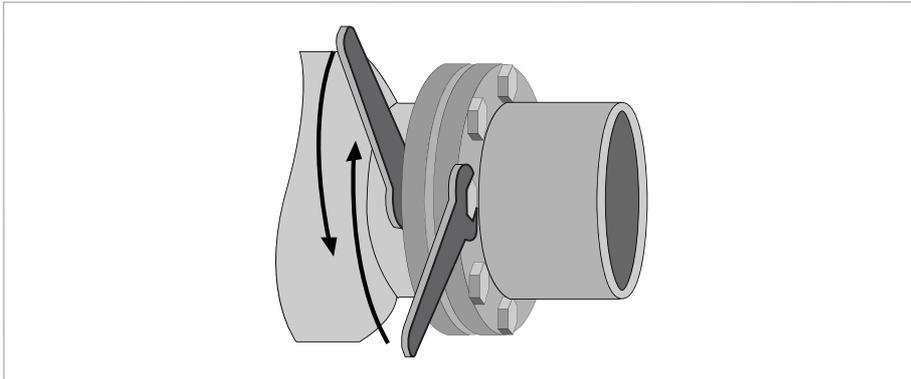


Figure 2-19: Tightening of bolts

**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.

**INFORMATION!**

*Other sizes / pressure ratings on request.*

Nominal size DN [mm]	Pressure rating	Bolts	Max. torque [Nm] ①
2.5...6	PN 40	4 x M 12	32
10	PN 40	4 x M 12	7.6
15	PN 40	4 x M 12	9.3
25	PN 40	4 x M 12	22
32	PN 40	4 x M 16	37
40	PN 40	4 x M 16	43
50	PN 40	4 x M 16	55
65	PN 16	4 x M 16	51
65	PN 40	8 x M 16	38
80	PN 40	8 x M 16	47
100	PN 16	8 x M 16	39
125	PN 16	8 x M 16	53
150	PN 16	8 x M 20	68
200	PN 10	8 x M 20	84
200	PN 16	12 x M 20	68
250	PN 10	12 x M 20	78
250	PN 16	12 x M 24	116
300	PN 10	12 x M 20	88
300	PN 16	12 x M 24	144
350	PN 10	16 x M 20	97
400	PN 10	16 x M 24	139
450	PN 10	20 x M 24	127
500	PN 10	20 x M 24	149
600	PN 10	20 x M 27	205
700	PN 10	20 x M 27	238
800	PN 10	24 x M 30	328
900	PN 10	28 x M 30	308
1000	PN 10	28 x M 35	392

① The specified torque values are dependent on variables (temperature, bolt material, gasket material, lubricants, etc.) which are not within the control of the manufacturer. Therefore the values should be regarded as indicative only.

Values are based on: F= ASTM gr B7 Studbolts - F=0.14 - Carbon steel flanges

Nominal size [inch]	Flange class [lb]	Bolts	Max. torque [in-lb] ①
1/10, 3/8, 1/4, 3/4	150	4 x 1/2"	39
1/2	150	4 x 1/2"	34
3/4	150	4 x 1/2"	50
1	150	4 x 1/2"	67
1 1/4	150	4 x 1/2"	97
1 1/2	150	4 x 1/2"	138
2	150	4 x 5/8"	225
3	150	4 x 5/8"	43
4	150	8 x 5/8"	34
6	150	8 x 3/4"	61
8	150	8 x 3/4"	979
10	150	12 x 7/8"	1104
12	150	12 x 7/8"	1478
14	150	12 x 1"	1835
16	150	16 x 1"	1767
18	150	16 x 1 1/8"	2605
20	150	20 x 1 1/8"	2365
24	150	20 x 1 1/4"	3419
28	150	28 x 1 1/4"	2904
32	150	28 x 1 1/2"	4560
36	150	32 x 1 1/2"	② *
40	150	36 x 1 1/2"	② *

① The specified torque values are dependent on variables (temperature, bolt material, gasket material, lubricants, etc.) which are not within the control of the manufacturer. Therefore the values should be regarded as indicative only.

Values are based on: F= ASTM gr B7 Studbolts - F=0.14 - Carbon steel flanges

② Information \* ; please contact the support service department



### INFORMATION!

*Other sizes / pressure ratings on request.*



### CAUTION!

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

### 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.

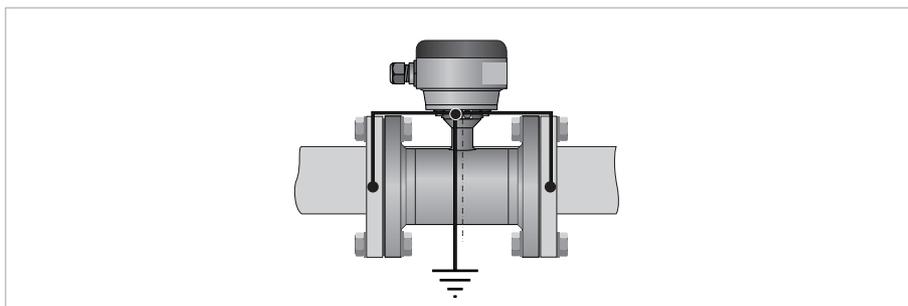


Figure 3-1: Grounding

- ① Metal pipelines, not internally coated. Grounding without grounding rings.

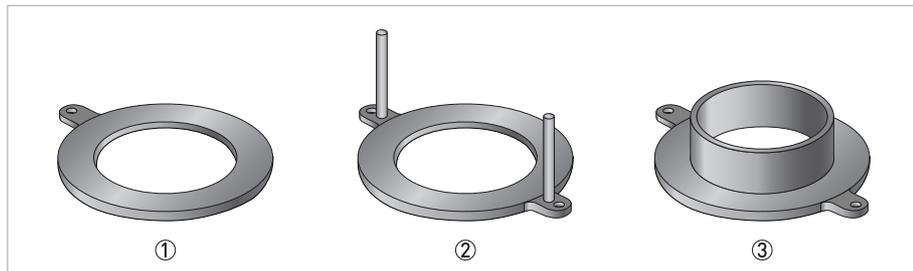


Figure 3-2: Different types of grounding rings

- ① Grounding ring number 1
- ② Grounding ring number 2
- ③ Grounding ring number 3

#### Grounding ring number 1:

- thickness : 3 mm / 0.1" (tantalum: 0.5 mm / 0.02")

#### Grounding ring number 2:

- thickness : 3 mm / 0.1"
- Prevents damage to the flanges during transport and installation
- Especially for flow sensors with PTFE liner

#### Grounding ring number 3:

- thickness : 3 mm / 0.1"
- With cylindrical neck (length 30 mm / 1.25" for DN10...150 / 3/8...6")
- Offers liner protection against abrasive fluids

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

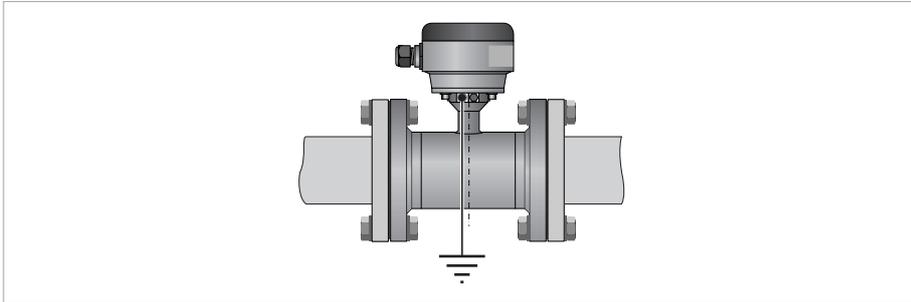


Figure 3-3: Virtual reference

**Minimum requirements:**

- Size:  $\geq$  DN10
- Electrical conductivity:  $\geq$  200  $\mu$ S/cm
- Signal cable: max. 50 m / 164 ft, type DS

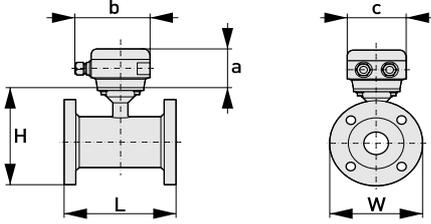
### 3.4 Connection diagrams



**INFORMATION!**

*For the connection diagrams please refer to the documentation of the applicable signal converter.*

## 4.1 Dimensions and weights

	a = 88 mm / 3.5"
	b = 139 mm / 5.5" ①
	c = 106 mm / 4.2"
	Total height = H + a

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



### INFORMATION!

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

## EN 1092-1

Nominal size		Dimensions [mm]				Approx. weight [kg]
DN	PN [bar]	L		H	W	
		PFA	EFTE			
2.5...6	40	130	-	142	90	3
10	40	130 ①	-	106	90	6
15	40	130 ①	-	106	95	6
25	40	-	200	140	115	4
32	40	-	250	157	140	5
40	40	-	250	166	150	5
50	40	-	250	186	165	9
65	16	-	250	200	185	9
80	40	-	250	209	200	12
100	16	-	250	237	220	15
125	16	-	300	266	250	19
150	16	-	300	300	285	27
200	10	-	350	361	340	34
250	10	-	400	408	395	48
300	10	-	500	458	445	58
350	10	-	500	510	505	78
400	10	-	600	568	565	101
450	10	-	600	618	615	111
500	10	-	600	671	670	130
600	10	-	600	781	780	165
700	10	-	700	898	895	248
800	10	-	800	1012	1015	331
900	10	-	900	1114	1115	430
1000	10	-	1000	1225	1230	507

## 150 lb flanges

Nominal size		Dimensions [inches]					Approx. weight [lb]
ASME	PN [psi]	L		H	W		
		PFA	ETFE				
1/10 ... 1/4	284	5.12	-	5.59	3.50	6	
3/8 ... 1/2	284	5.12 ①	-	5.08	3.50	6	
3/4	284	5.91	-	5.28	3.50	6	
1"	284	-	7.87	5.39	4.25	7	
1 1/4"	284	-	9.84	5.98	4.62	7	
1 1/2"	284	-	9.84	6.10	5.00	11	
2"	284	-	9.84	7.05	5.98	18	
2 1/2"	284	-	9.84	7.72	7.00	24	
3"	284	-	9.84	8.03	7.50	26	
4"	284	-	9.84	9.49	9.00	40	
5"	284	-	11.81	10.55	10.0	49	
6"	284	-	11.81	11.69	11.0	64	
8"	284	-	13.78	14.25	13.5	95	
10"	284	-	15.75	16.3	16.0	143	
12"	284	-	19.69	18.78	19.0	207	
14"	284	-	27.56	20.67	21.0	284	
16"	284	-	31.50	22.95	23.5	364	
18"	284	-	31.50	24.72	25.0	410	
20"	284	-	31.50	26.97	27.5	492	
24"	284	-	31.50	31.38	32.0	675	

**CAUTION!**

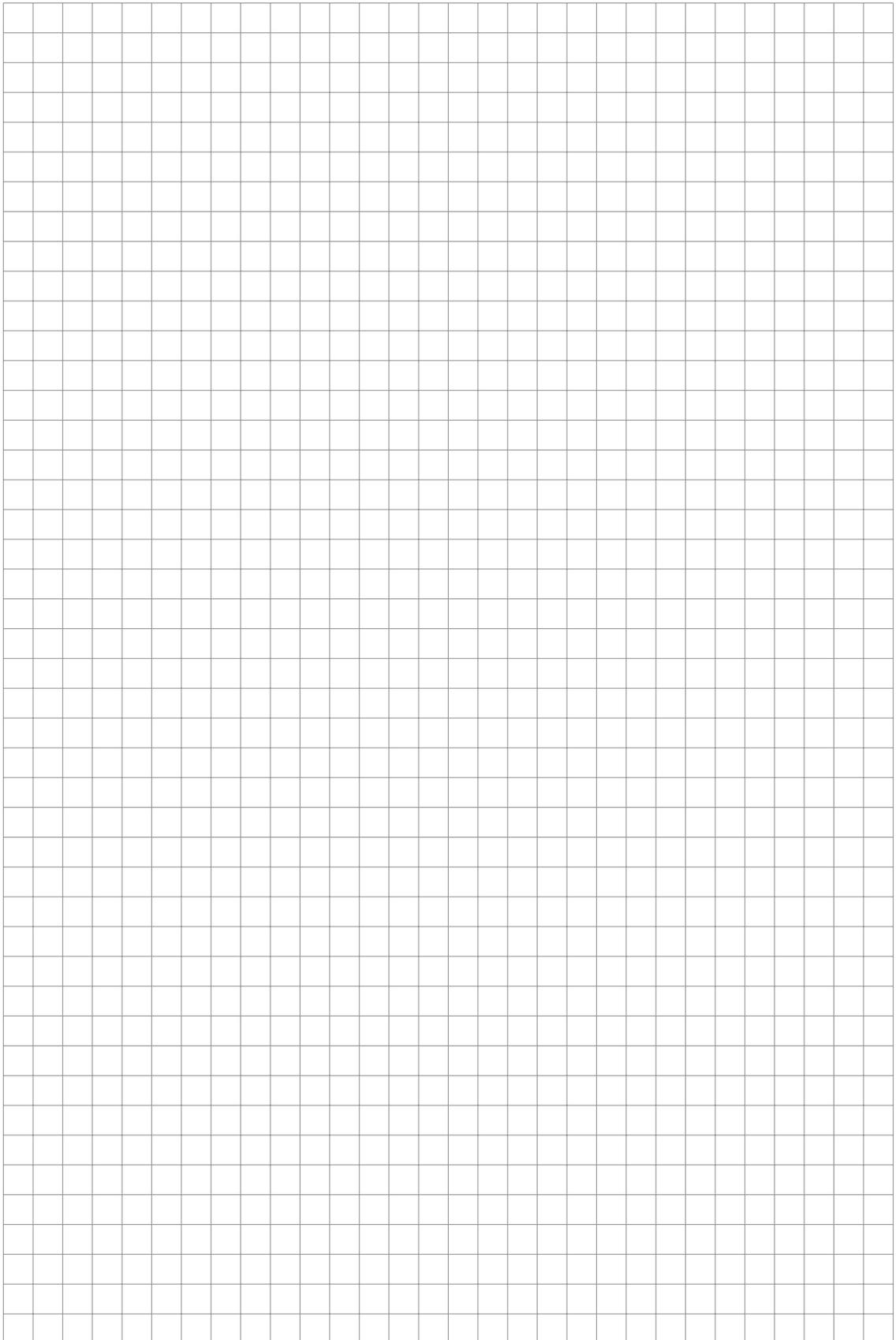
- Pressures at 20°C / 68°F.
- For higher temperatures, the pressure and temperature ratings are as per ASME B16.5.

## 300 lb flanges

Nominal size		Dimensions [inches]				Approx. weight [lb]
ASME	PN [psi]	L		H	W	
		PFA	ETFE			
1/10 ... 1/4	741	5.12	-	5.59	3.75	6
3/8 ... 1/2	741	5.12 ①	-	5.24	3.75	6
3/4	741	5.91	-	5.67	3.75	6
1"	741	-	9.84	5.71	4.87	11
1 1/2"	741	-	11.81	6.65	6.13	13
2"	741	-	11.81	7.32	6.50	22
3"	741	-	11.81	8.43	8.25	31
4"	741	-	11.81	10.00	10.0	44
6"	741	-	13.78	12.44	12.5	73
8"	741	-	15.75	15.04	15.0	157
10"	741	-	19.69	17.05	17.5	247
12"	741	-	23.62	20.00	20.5	375
14"	741	-	27.56	21.65	23.0	474
16"	741	-	31.50	23.98	25.5	639
20"	741	-	31.50	28.46	30.5	937
24"	741	-	31.50	33.39	36.0	1345

**CAUTION!**

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





## KROHNE – Process instrumentation and measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process Analysis
- Services

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