

GR/PRINTO

OPTIFLUX 5000

Electromagnetic Flow Sensor

The most accurate and abrasion resistant flowmeter

- **0.15 % accuracy**
- **For most aggressive and abrasive fluids**
- **Full vacuum resistant**
- **For dosing applications**



Electromagnetic flowmeters

Variable area flowmeters

Mass flowmeters

Ultrasonic flowmeters

Vortex flowmeters

Flow controllers

Level measuring instruments

Pressure and temperature

Heat metering

Communications technology

Switches, counters, displays and recorders

Engineering systems & solutions



OPTIFLUX 5000

The most accurate and abrasion resistant

The electromagnetic flow sensor OPTIFLUX 5000 is considered to be the most accurate and hard-wearing, robust flowmeter available in the market today. This is the result of a special flow tube design with conical parts, streamlining distorted flow profiles.

Leading test institutes use OPTIFLUX 5000 as their master meter.



Fields of application

Industries

- Chemical
- Water & Wastewater
- Metals & Mining
- Food & Beverages
- Paper & Pulp
- Machinery

Application examples

- Precise dosing applications
- For acids (even HF), alkalies, pastes, slurries and many other aggressive media, even with high solid contents
- Master or transfer meter for calibration of other flow-meters

OPTIFLUX 5000

The most accurate and abrasion resistant

Highlights

- Highly accurate
- Long-term measuring stability even under tough conditions
- Highly corrosive and abrasive resistant
- Robust and dimensionally stable
- Sandwich design for quick and easy installation
- Absolutely vacuum resistant

Product features

- Accuracy: $< \pm 0.15\%$ of measured value
- Repeatability: $< 0.06\%$
- Unique flow tube design, with profile-optimizing cross-section
- Ceramic flow tube
- Fused-in-place Cermet or platinum electrodes; bonded electrodes in the flow tube are absolutely leakproof
- Stainless steel housing



The complete OPTIFLUX - range

OPTIFLUX converters

All converters fit to all sensors

IFC 300

One for all applications



IFC 010

Economic converter



OPTIFLUX sensors

OPTIFLUX 2000

Water and waste-water specialist



OPTIFLUX 4000

All-round process specialist



OPTIFLUX 5000

Highly accurate & abrasion resistant



OPTIFLUX 1000

Economical solution



OPTIFLUX 6000

Sanitary and hygienic solution



Special-purpose flowmeters

OPTIFLUX 4040 C

The 2-wire EMF



OPTIFLUX 7300 C

The electrode-free EMF



TIDALFLUX 4110 PF

For partially filled pipelines



BATCHFLUX 5015 C

For volumetric filling



Technical data		● Standard		○ Optional		- On request										
Nominal diameter	ANSI [inch]	1/10"	1/8"	1/4"	3/8"	1/2"	1"	1 1/2"	2"	3"	4"	6"	8"	10"		
	DN [mm]	2,5	4	6	10	15	25	40	50	80	100	150	200	250		
Nominal process	EN 1092-1 - PN 40	●	●	●	●	●	●	●	●	●	-	-	-	-		
flange pressure	EN 1092-1 - PN 25	-	-	-	-	-	-	-	-	-	○	-	-	-		
1/10...3/8" has 1/2"	EN 1092-1 - PN 16	-	-	-	-	-	-	-	-	-	●	●	-	-		
connection (DN)	EN 1092-1 - PN 10	-	-	-	-	-	-	-	-	-	-	-	●	●		
2.5...10 has DN 15	ANSI B 16.5 - 150 lbs / JIS 10 K	●	●	●	●	●	●	●	●	●	●	●	●	●		
connection)	ANSI B 16.5 - 300 lbs / JIS 20 K	○	○	○	○	○	○	○	○	○	○	-	-	-		
Measuring tube	Aluminum Oxide (Al ₂ O ₃), ZrO ₂ stabilized	●	●	●	●	●	●	●	●	●	●	●	●	●		
Electrodes	Cermet	●	●	●	●	●	-	-	-	-	-	-	-	-		
	Platinum	-	-	-	-	-	●	●	●	●	●	○	○	○		
	Stainless steel 1.4571 (316 Ti)	-	-	-	-	-	-	-	-	-	-	●	●	●		
	HC4, Low-noise (basis HC4, Ta, Ti)	-	-	-	-	-	-	-	-	-	-	○	○	○		
Rings / gaskets (all rings always type #1)	Stainless steel 1.4571 (AISI 316 Ti) / Viton	●	●	●	●	●	-	-	-	-	-	-	-	-		
	Without / Gylon	-	-	-	-	-	●	●	●	●	●	-	-	-		
	Stainless steel 1.4404 (AISI 316 L) / Viton	-	-	-	-	-	-	-	-	-	-	●	●	●		
	Hastelloy C4 / Viton	○	○	○	○	○	-	-	-	-	-	○	○	○		
	HC4 / EPDM, HC4 / Kalrez, st.st. 1.4571 (AISI 316 Ti) / EPDM, Ti / EPDM, Ti / Kalrez	○	○	○	○	○	-	-	-	-	-	-	-	-		
	Tantalum / PTFE-PF 29	○	○	○	○	○	○	○	○	○	○	-	-	-		
	Without / Chemotherm, HC4 / Chemotherm, HC4 / Gylon, st.st. / Chemotherm, st.st. / Gylon	-	-	-	-	-	○	○	○	○	○	-	-	-		
Stud bolts and nuts**	Steel	●	●	●	●	●	●	●	●	●	●	-	-	-		
	Stainless steel, Rubber centering sleeves	○	○	○	○	○	○	○	○	○	○	-	-	-		
** Gaskets not included.																
Flanges	Steel 37 - C22	-	-	-	-	-	-	-	-	-	-	●	●	●		
Materials used (other materials on request)	Measuring tube	High density Aluminum oxide (Al ₂ O ₃), ZrO ₂ fine grain stabilized														
	Housing (polyurethane coated)	St.st. 1.4462/Duplex				St.st. 1.4301/SS 304-AISI				Steel						
	Connection box (polyurethane coated)	Die-cast aluminum (Option: Stainless steel)														
Protection category	Standard	IP 66 / 67 eq. NEMA 4/4X / 6														
	Optional	IP 68 field / IP 68 factory eq. NEMA 6 (Connection box: Stainless steel)														
Insulation class	H															
Approvals****	non-Ex	●	●	●	●	●	●	●	●	●	●	●	●	●		
	EEx zone 1 / 2	○	○	○	○	○	○	○	○	○	○	-	-	-		
	FM - class I div. 1 / 2*****	○	○	○	○	○	○	○	○	○	○	-	-	-		
	CSA - GP / class I div. 1 / 2*****	○	○	○	○	○	○	○	○	○	○	-	-	-		
	SAA - Aus Ex zone 1 / 2	○	○	○	○	○	○	○	○	○	○	-	-	-		
	TIIS - zone 1 / 2	○	○	○	○	○	○	○	○	○	○	-	-	-		
**** Available approvals for flow sensor. Note: contact KROHNE for more approval details																
Versions	Compact + IFC 300 C	●	●	●	●	●	●	●	●	●	●	-	-	-		
	Separate + IFC 300 F, R, W	●	●	●	●	●	●	●	●	●	●	●	●	●		
	Compact + IFC 010 C (non-Ex)	-	●	●	●	●	●	●	●	●	●	-	-	-		
	Separate + IFC 010 W (non-Ex)	-	●	●	●	●	●	●	●	●	●	-	-	-		
Vacuum load	0 psig / 0 mbar absolute															
Electrical conductivity	Non-water (DN 2.5 ≥ 10 μS/cm)	-	≥ 5 μS/cm					≥ 1 μS/cm								
	Demineralsed cold water	≥ 20 μS/cm														

***** Approvals should read the same as OPTIFLUX 2000

Temperature range

1/10...4"	Process		Ambient	
	min.	max.	min.	max.
Al₂O₃				
Separate flow sensor	-76°F	356°F	-40°F	149°F
Compact with IFC 300 OPTIFLUX 5300 C	-76°F	284°F	-40°F	149°F
Compact with IFC 010 OPTIFLUX 5010 C	-13°F	248°F	-13°F	140°F

6" ...10"	Process		Ambient	
	min.	max.	min.	max.
Al₂O₃				
Separate flow sensor	-76°F	248°F	-13°F	140°F

DN 2.5...100	Process		Ambient	
	min.	max.	min.	max.
Al₂O₃				
Separate flow sensor	-60°C	180°C	-40°C	65°C
Compact with IFC 300 OPTIFLUX 5300 C	-60°C	140°C	-40°C	65°C
Compact with IFC 010 OPTIFLUX 5010 C	-25°C	120°C	-25°C	60°C

DN 150...250	Process		Ambient	
	min.	max.	min.	max.
Al₂O₃				
Separate flow sensor	-60°C	120°C	-25°C	60°C

	Max. permissible temperature change in °F			
	10 minutes		Sudden change	
	1/10" - 1/2"	1" - 4"	1/10" - 1/2"	1" - 4"
Rising	302	302	248	248
Falling	248	212	194	176

	Max. permissible temperature change in °C			
	10 minutes		Sudden change	
	DN 2.5 - 15	DN 25 - 100	DN 2.5 - 15	DN 25 - 100
Rising	150	150	120	120
Falling	120	100	90	80

Dimensions and weights

Nominal size		Dimensions in inches						Approx. weight in lbs**
ANSI	[psig]	L*	H	W	T _{box}	T ₀₁₀	T ₃₀₀	
1/10"	580	2,56	4,84	1,73	7,87	8,98	10,94	3,5
1/8"	580	2,56	4,84	1,73	7,87	8,98	10,94	3,5
1/4"	580	2,56	4,84	1,73	7,87	8,98	10,94	3,5
3/8"	580	2,56	4,84	1,73	7,87	8,98	10,94	3,5
1/2"	580	2,56	4,84	1,73	7,87	8,98	10,94	3,5
1"	580	2,28	4,57	4,02	7,60	8,70	10,67	3,5
1 1/2"	580	3,27	5,16	4,61	8,19	9,29	11,26	5,3
2"	580	4,06	5,87	5,31	8,90	10,00	11,97	6,4
3"	580	6,02	7,13	6,57	10,16	11,26	13,23	14,1
4"	232	7,99	8,11	7,56	11,14	12,24	14,21	19,4
6"	145	10,43	14,21	11,14	20,31	-	-	81,6
8"	145	12,40	15,82	13,46	21,92	-	-	116,8
10"	145	14,37	18,26	16,02	24,36	-	-	191,8

All flanges according ANSI B 16.5.

≤ ANSI 4" flangeless (sandwich) version; ≥ ANSI 6" flanged version.

* Total fitting length:

- ANSI 1/10"-1/2" flow meter with integrated rings: Dim. L + 2 x gasket thickness.
- ANSI 1"-4" flow meter without rings: Dim. L only (no gaskets required).
- ANSI 6"-10" flow meter with separate rings: Dim. L + 2 x 0.12 + 2 x gasket thickness.

** Approx. weight of meter body.

Nominal size		Dimensions in mm						Approx. weight in kg**
DN [mm]	PN [bar]	L*	H	W	T _{box}	T ₀₁₀	T ₃₀₀	
2,5	40	65	123	44	200	228	278	1,6
4	40	65	123	44	200	228	278	1,6
6	40	65	123	44	200	228	278	1,6
10	40	65	123	44	200	228	278	1,6
15	40	65	123	44	200	228	278	1,6
25	40	58	116	102	193	221	271	1,6
40	40	83	131	117	208	236	286	2,4
50	40	103	149	135	226	254	304	2,9
80	40	153	181	167	258	286	336	6,4
100	16	203	206	192	283	311	361	8,8
150	10	265	355	283	432	-	-	37
200	10	315	396	342	473	-	-	53
250	10	365	458	395	535	-	-	87

All flanges according (EN 1092 -1).

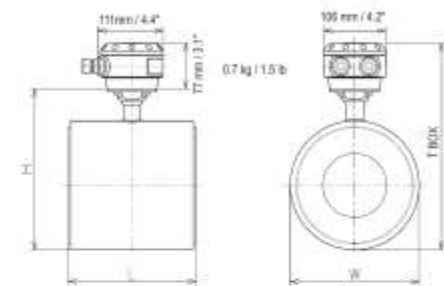
≤ DN 100 flangeless (sandwich) version; ≥ DN 150 flanged version.

* Total fitting length:

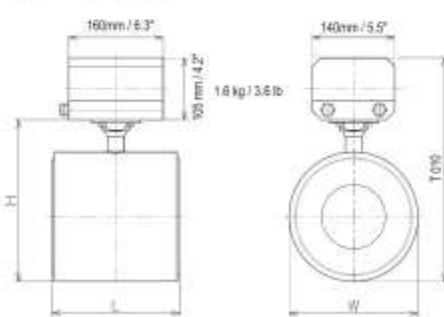
- DN 2.5-15 flow meter with integrated rings: Dim. L + 2 x gasket thickness.
- DN 25-100 flow meter without rings: Dim. L only (no gaskets required).
- DN 150-250 flow meter with separate rings: Dim. L + 2 x 3 mm + 2 x gasket thickness

** Approx. weight of meter body.

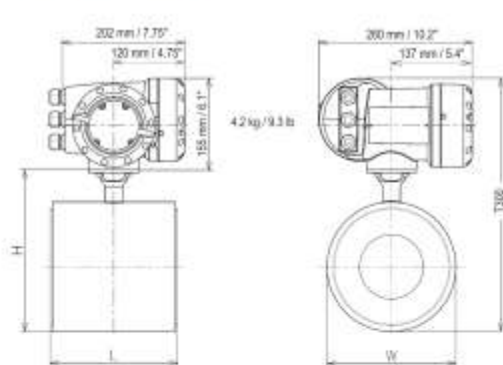
OPTIFLUX 5000 F



OPTIFLUX 5010 C



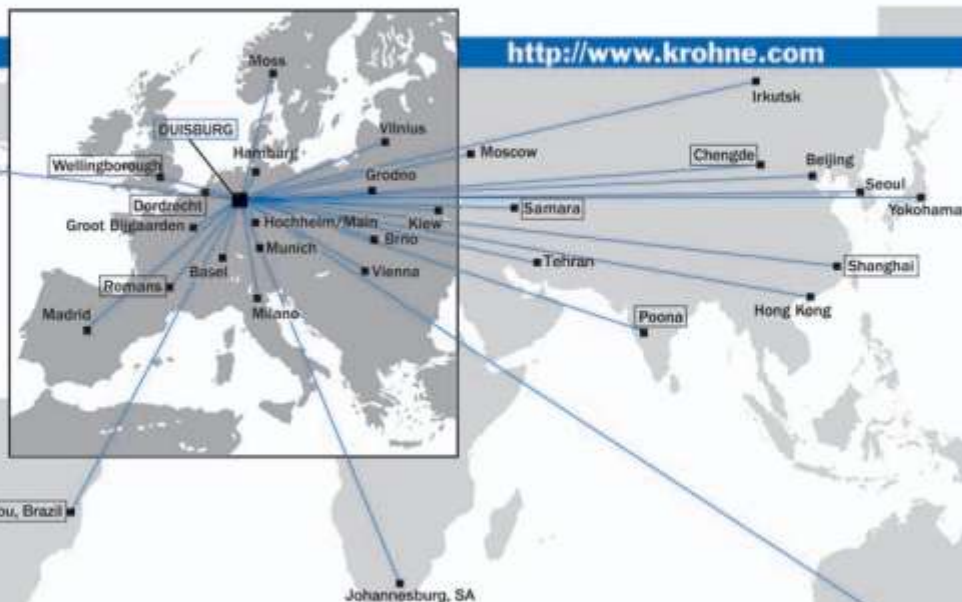
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| Canada | Morocco |
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Subject to change without notice



OPTIFLUX 5000 **Technical Datasheet**

Electromagnetic flowmeter in sandwich version

- Exceptional long-term stability and accuracy
- For highly aggressive and abrasive fluids
- Fully vacuum-resistant with high-tech ceramics liner



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

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1.1 Solution with high-tech ceramics

The **OPTIFLUX 5000** is one of the most accurate flowmeters available in the market today. This is the result of a special tube design with conical parts, optimizing the flow profile. Leading metrological institutes use the **OPTIFLUX 5000** as their master meter in combination with the high-end signal converter IFC 300.



- ① Sandwich design
- ② Ceramic liner
- ③ Cermet electrodes

Highlights

- Excellent long-term stability and accuracy
- Unique flow tube
- Fused in-place Cermet electrodes
- Custody transfer standard of international metrological authorities
- For highly aggressive and abrasive fluids
- Fully vacuum-resistant
- High-tech ceramics liner
- Insensitive against temperature shocks

Industries

- Chemical
- Paper & Pulp
- [Waste] water
- Minerals & Mining
- Food & beverage
- Machinery

Applications

- Master transfer meter
- Precise volumetric dosing of additives
- Chemical injection
- For acids, alkaline, abrasive slurries and many other aggressive media

1.2 Options and variants



The OPTIFLUX 5000 sandwich version is available in a diameter range of DN2.5 up to DN100.

The flow sensor is offered in a large range of pressure ratings and is configurable with the IFC 100 and the IFC 300 signal converter.

Can be ordered in stainless steel version and is also optionally suitable in hazardous areas.

Grounding rings are available in high grade alloy's.

The installation of the OPTIFLUX 5000 can be further eased by choosing for the virtual reference. Grounding rings can then be omitted. This can only be combined with the IFC 300 signal converter.

1.3 Measuring principle

An electrically conductive fluid flows inside an electrically insulated 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:

$$U = v \cdot k \cdot B \cdot D$$

in which:

v = mean flow velocity

k = factor correcting for geometry

B = magnetic field strength

D = inner diameter of flowmeter

The signal voltage U is picked off by electrodes and is proportional to the mean flow velocity v and thus the flow rate Q . A signal converter is used to amplify the signal voltage, filter it and convert it into signals for totalizing, recording and output processing.

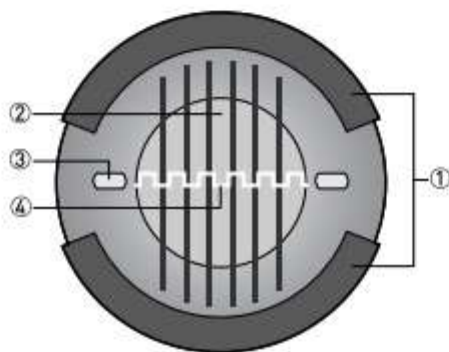


Figure 1-1: Measuring principle

- ① Field coils
- ② Magnetic field
- ③ Electrodes
- ④ Induced voltage [proportional to flow velocity]

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 sales office.
- 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 with optimized flow tube
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 5100 C With IFC 300 converter: OPTIFLUX 5300 C DN2.5...15 is only available with aluminum converter housing
Remote version	In wall (W) mount version with IFC 100 converter: OPTIFLUX 5100 W In field (F), wall (W) or rack (R) mount version with IFC 300 converter: OPTIFLUX 5300 F, W or R
Nominal diameter	DN2.5...100 / 1/10...4"

Measuring accuracy

Reference conditions	Medium: water
	Temperature +10...+30°C / +50...+86°F
	Operating pressure: 1 bar / 14.5 psi
	Inlet section ≥ 10 DN
	Electrical conductivity: ≥ 300 μ S/cm
Maximum measuring error	IFC 100: down to 0.3% of the measured value ± 1 mm/s
	IFC 300: down to 0.15% of the measured value ± 1 mm/s
	The maximum measuring error depends on the installation conditions.
	For detailed information refer to <i>Measuring accuracy</i> on page 12.
Repeatability	$\pm 0.1\%$ of MV, minimum 1 mm/s
Calibration	Standard: 2 point calibration by direct volume comparison. Optional: special calibration on request.

Operating conditions

Temperature	
Process temperature	Compact version: -40...+140°C / -40... +284°F Size DN 2.5...15: -20...+120°C / -4... +248°F
	Remote version: -40...+180°C / -40...+356°F Size DN 2.5...15: -20...+180°C / -4... +356°F
	For Ex versions different temperature ranges are applicable. Please see the relevant Ex documentation for details.
Maximum temperature change (shock)	DN2.5...25: < 3 K/s DN40...100: < 0.2 K/s
Ambient temperature	-40...+65°C / -40...+149°F
	For Ex versions different temperature ranges are applicable. Please see the relevant Ex documentation for details.
Storage temperature	-50...+70°C / -58...+158°F
Measurement range	-12...+12 m/s / -40...+40 ft/s
Pressure	
Ambient	Atmospheric
Nominal flange pressure	
EN 1092-1	Standard:
	DN100: PN 16
	DN2.5...80: PN 40
	Option:
DN100: PN 25	
ASME B16.5	Standard:
	1/10...4": 150 lb
	Option:
1/10...4": 300 lb	
Vacuum load	0 mbar / 0 psi
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:
	DN25...100: $\geq 1 \mu\text{S/cm}$
	DN4...15: $\geq 5 \mu\text{S/cm}$
	DN2.5: $\geq 10 \mu\text{S/cm}$
	Demineralised cold water:
DN2.5...100: $\geq 20 \mu\text{S/cm}$	
Permissible gas content (volume)	$\leq 5\%$
Permissible solid content (volume)	IFC 100: $\leq 10\%$
	IFC 300: $\leq 70\%$

Installation conditions

Installation	Take care that flow sensor always fully filled.
	For detailed information refer to <i>Installation</i> on page 16.
Flow direction	Forward and reverse.
	Arrow on flow sensor indicates positive flow direction.
Inlet run	≥ 5 DN (without disturbing flow, after a single 90° bend)
	≥ 10 DN (after a double bend = 2 x 90°)
Outlet run	≥ 2 DN
Dimensions and weights	For detailed information refer to <i>Dimensions and weights</i> on page 13.

Materials

Sensor housing	DN2.5...15: stainless steel 1.4408
	DN25...100: stainless steel 1.4306
Measuring tube	Ceramic
Connection box (remote versions only)	Standard: Polyurethane coated die-cast aluminum
	Option: Stainless steel
Grounding rings	Standard: Stainless steel
	Option: Hastelloy® C, titanium, tantalum
	Other materials on request.
	Grounding rings can be omitted with virtual reference option for the IFC 300 converter.
Mounting materials	Standard: rubber centering sleeves
	Option: stud bolts and nuts in stainless steel or galvanized steel
Gaskets	DN2.5...15; O-rings : FKM, EPDM, FFKM DN25...100; flat gaskets: filled PTFE, Graphite, PTFE / PF-29
	Other materials on request.
Measuring electrodes	DN2.5...25: Cermet
	DN40...100: Platinum

Process connections

EN 1092-1	Standard:
	DN100: PN 16
	DN2.5...80: PN 40
	Option:
	DN100: PN 25
ASME	Standard:
	1/10...4": 150 lb
	Option:
	1/10...4": 300 lb
JIS	DN2.5...100: 10...20 K

Electrical connections

For full detail; see the relevant documentation of the signal converter

Signal cable (remote versions only)	
Type A (DS)	In combination with the IFC 100 and IFC 300 signal converter Standard cable, double shielded. Max. length: 600 m / 1950 ft (dep. on electrical conductivity and measuring sensor).
Type B (BTS)	Only in combination with the IFC 300 signal converter Optional cable, triple shielded. Max. length: 600 m / 1950 ft (dep. on electrical conductivity and measuring sensor).
I/O	For full details of I/O options, including data streams and protocols, see technical datasheet of the relevant signal converter.

Approvals and certifications

CE	
This device fulfills the statutory requirements of the EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
	For full information of the EU directives & standards and the approved certifications, please refer to the CE declaration or the manufacturer website.
Hazardous areas	
Non-Ex	Standard
ATEX	KEMA 04 ATEX 2126 X
	ATEX II 2 GD EEx me ia IIC T6...T3
	ATEX II 2 GD EEx de ia IIC T6...T3
	For more details, see Ex documentation of flow sensor and signal converter.
FM	Class I, Div 2, groups A, B, C and D
	Class II, Div 2, groups F and G
	Class III, Div 2, groups F and G
CSA	Class I, Div 2, groups A, B, C and D
	Class II, Div 2, groups F and G
IECEX	Pending
NEPSI	GYJ05240
	Ex me ia IIC T6...T3 and Ex de ia IIC T6...T3
Other approvals and standards	
Custody transfer	Standard:
	Without verification
	Option:
	Cold water: MI-001 type examination for DN25...100
	Liquids other than water: MI-005 type examination for DN25...100
Only in combination with IFC 300 signal converter.	
Protection category acc. to IEC 529 / EN 60529	Standard:
	IP 66/67 [NEMA 4/4X/6]
	Option:
	IP 68 [NEMA 6P]
IP 68 is only available for separate design and with a stainless steel connection box.	
Hygiene	FDA approved materials.
Shock test	IEC 68-2-27
	30 g for 18 ms
Vibration test	IEC 68-2-64
	f = 20 - 2000 Hz, rms = 4.5 g, t = 30 min.

2.2 Measuring accuracy

Each flowmeter is standard wet calibrated under reference conditions by direct volume comparison before leaving the factory. The performance of the flowmeter is defined and documented in an individual calibration certificate.

Reference conditions

- Medium: water
- Temperature: +10...30°C / +50...86°F
- Operating pressure: 1 bar / 14.5 psi
- Inlet section: ≥ 5 DN
- Electrical conductivity: $\geq 300 \mu\text{S/cm}$

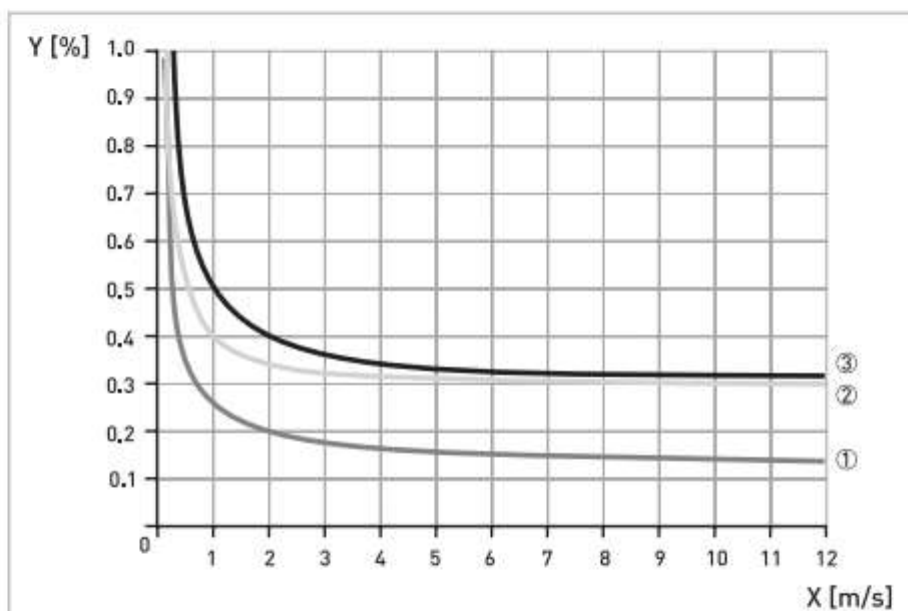


Figure 2-1:
X [m/s]: flow velocity
Y [%]: deviation from the actual measured value (mv)

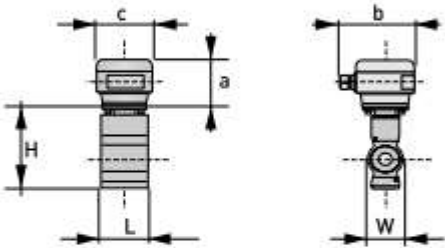
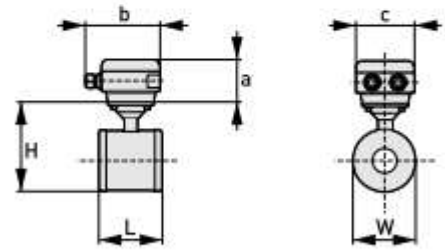
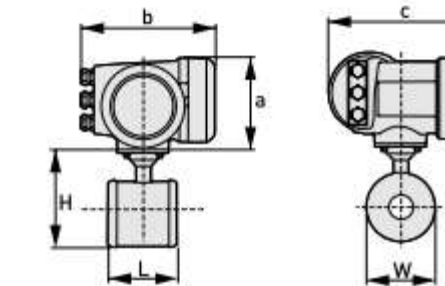
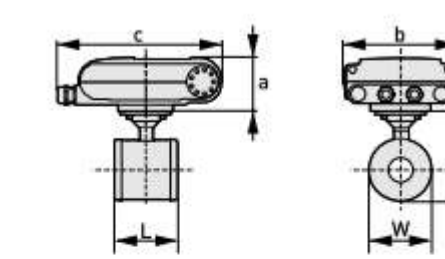
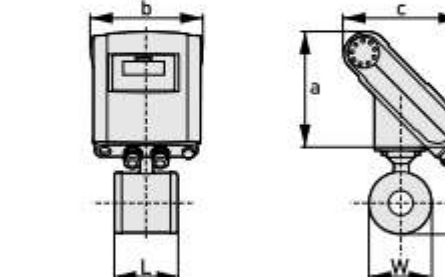
In combination with the IFC 300

	Accuracy	Curve
DN2.5...6 / 1/10...1/4"	0.3% of mv + 2 mm/s	③
DN10...100 / 3/8... 4"	0.15% of mv + 1 mm/s	①

In combination with the IFC 100

	Accuracy	Curve
DN2.5...6 / 1/10...1/4"	0.4% of mv + 1 mm/s	As ② + 0.1%
DN10...100 / 3/8...4"	0.3% of mv + 1 mm/s	②

2.3 Dimensions and weights

Remote version: DN2.5...15		$a = 88 \text{ mm} / 3.5''$ $b = 139 \text{ mm} / 5.5''$ ① $c = 106 \text{ mm} / 4.2''$ Total height = $H + a$
Remote version: DN25...100		$a = 88 \text{ mm} / 3.5''$ $b = 139 \text{ mm} / 5.5''$ ① $c = 106 \text{ mm} / 4.2''$ Total height = $H + a$
Compact version with IFC 300		$a = 155 \text{ mm} / 6.1''$ $b = 230 \text{ mm} / 9.1''$ ① $c = 260 \text{ mm} / 10.2''$ Total height = $H + a$
Compact version with IFC 100 (0°)		$a = 82 \text{ mm} / 3.2''$ $b = 161 \text{ mm} / 6.3''$ $c = 257 \text{ mm} / 10.1''$ ① Total height = $H + a$
Compact version with IFC 100 (45°)		$a = 186 \text{ mm} / 7.3''$ $b = 161 \text{ mm} / 6.3''$ $c = 184 \text{ mm} / 7.3''$ ① Total height = $H + a$

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

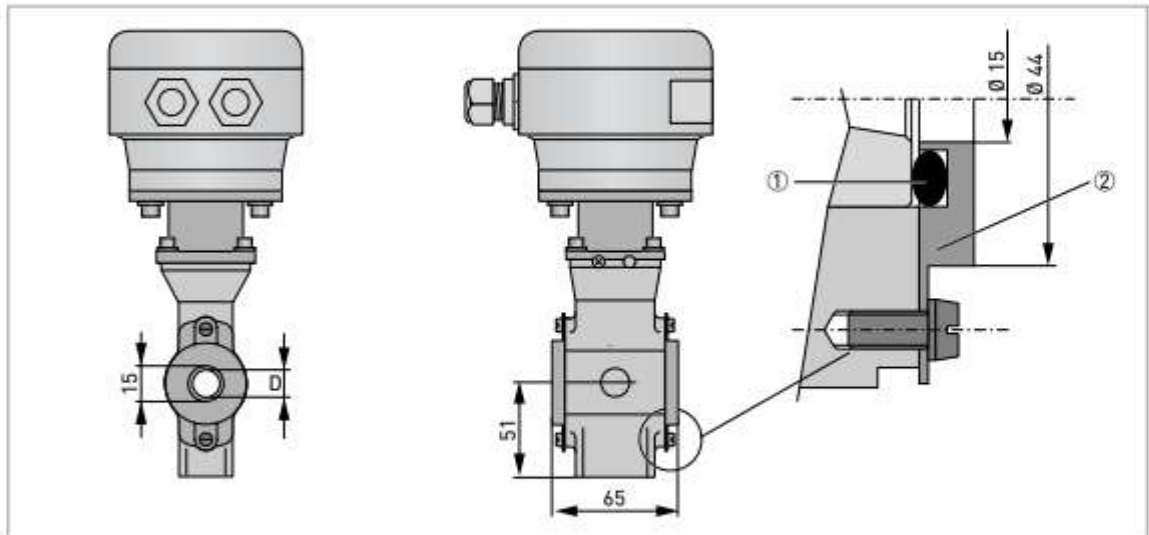


Figure 2-2: Construction details DN2.5...15

- ① O-ring
- ② Grounding ring

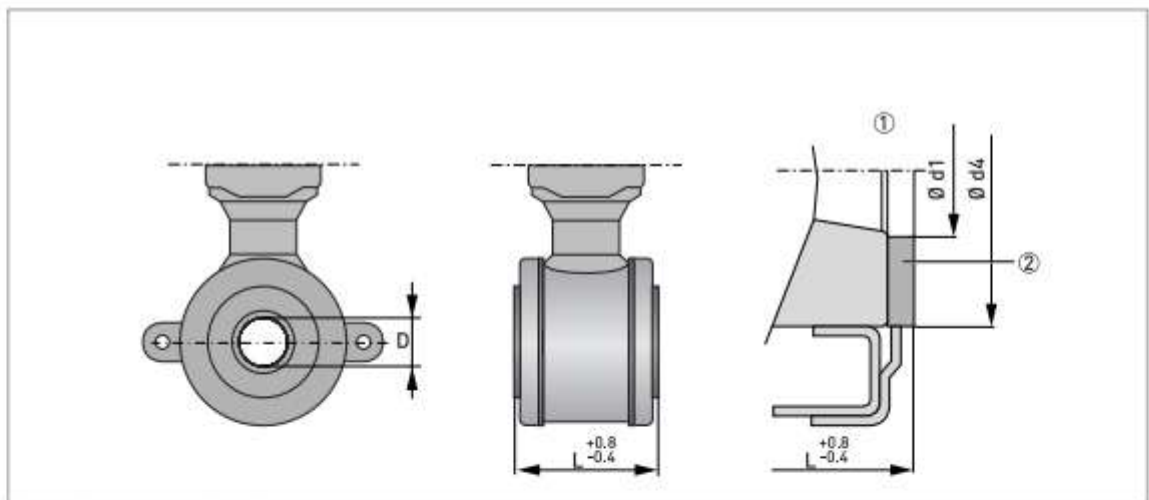


Figure 2-3: Construction details DN25...100

- ① Situation without grounding rings
- ② Gasket

- 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.

Nominal size	Dimensions [mm]						Approx. weight [kg]	
	DN	L	H	W	D	Ød1		Ød4
2.5	65 ①	123	44			-	-	1.6
4	65 ①	123	44			-	-	1.6
6	65 ①	123	44			-	-	1.6
10	65 ①	123	44			-	-	1.6
15	65 ①	123	44			-	-	1.6
25	58 ②	116	68	20	26	46		1.6
40	83 ②	131	83	30	39	62		2.4
50	103 ②	149	101	40	51	74		2.9
80	153 ②	181	133	60	80	106		6.4
100	203 ②	206	158	80	101	133		8.8

① Total fitting length of flowmeter with integrated rings: dimension L + 2 x gasket thickness.

② Total fitting length of flowmeter without rings: dimension L only.

Nominal size	Dimensions [inches]						Approx. weight [lb]	
	ASME	L	H	W	D	Ød1		Ød4
1/10"	2.56 ①	4.84	1.73			-	-	3.53
1/8"	2.56 ①	4.84	1.73			-	-	3.53
¼"	2.56 ①	4.84	1.73			-	-	3.53
3/8"	2.56 ①	4.84	1.73			-	-	3.53
½"	2.56 ①	4.84	1.73			-	-	3.53
1"	2.28 ②	4.57	2.68	0.79	1.02	1.81		3.53
1½"	3.27 ②	5.16	3.27	1.18	1.54	2.44		5.29
2"	4.06 ②	5.87	3.98	1.57	2.01	2.91		6.39
3"	6.02 ②	7.13	5.24	2.36	3.15	4.17		14.11
4"	7.99 ②	8.11	6.22	3.15	3.98	5.24		19.40

① Total fitting length of flowmeter with integrated rings: dimension L + 2 x gasket thickness.

② Total fitting length of flowmeter without rings: dimension L only.

3.1 Intended use

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The **OPTIFLUX 5000** flowmeter measures the volumetric flow rate of electrically conductive liquids, acids, alkaline solutions, pastes and slurries, also with very high solid contents.

3.2 General notes on installation

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

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

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.

3.2.1 Vibration

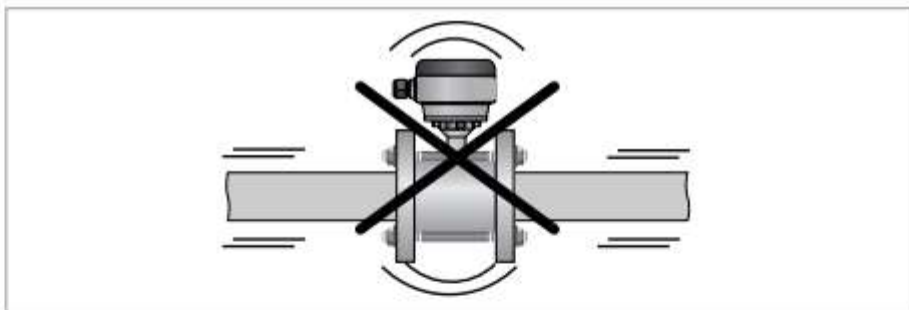


Figure 3-1: Avoid vibrations

3.2.2 Magnetic field

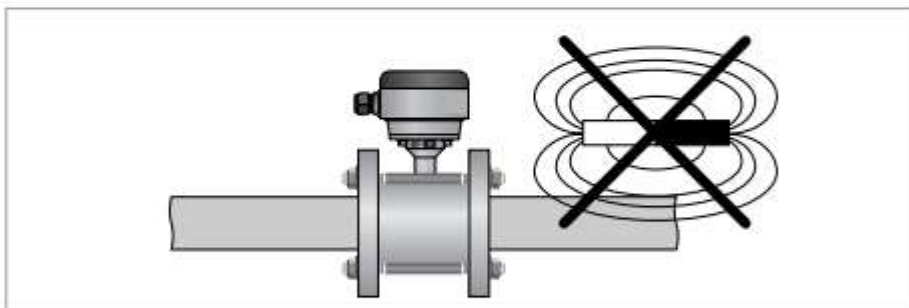


Figure 3-2: Avoid magnetic fields

3.3 Installation conditions

3.3.1 Inlet and outlet

Use straight inlet and outlet pipe sections to prevent flow distortion or swirl, caused by bends and T-sections.

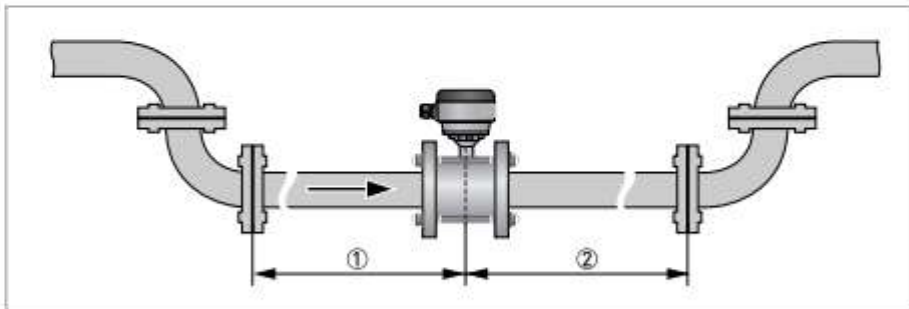


Figure 3-3: Recommended inlet and outlet section

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

3.3.2 Bends in 2 or 3 dimensions

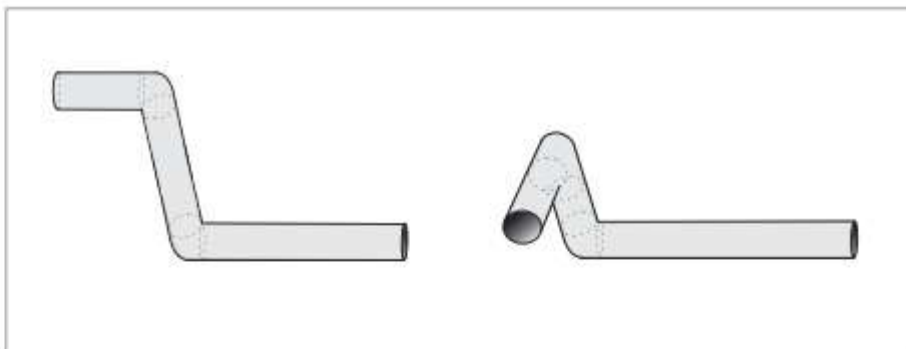


Figure 3-4: Inlet when using 2 and/or 3 dimensional bends in front of the flowmeter

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

3.3.3 T-section

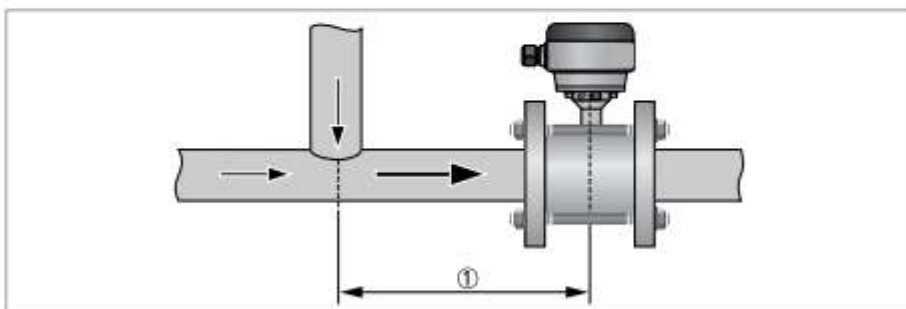
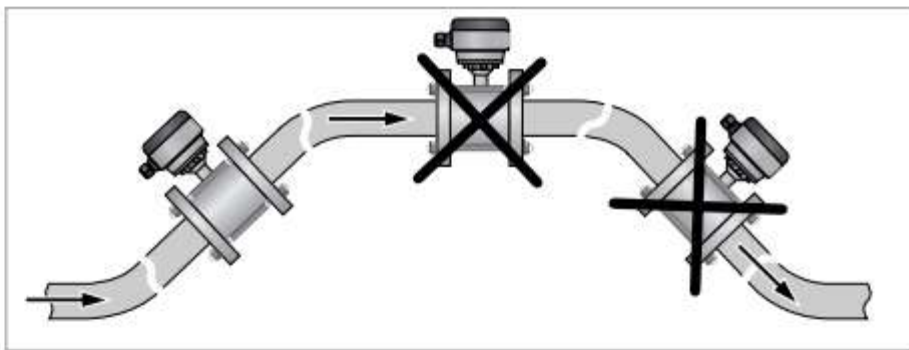
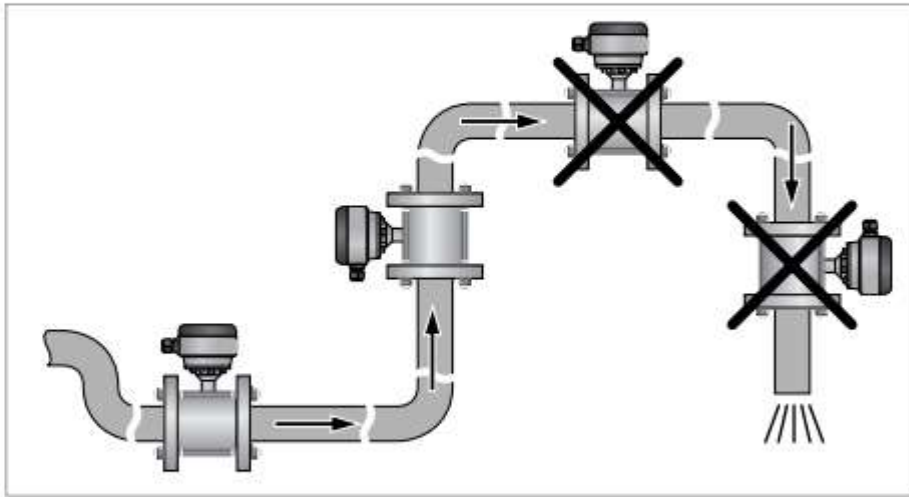


Figure 3-5: Distance behind a T-section

- ① $\geq 10 \text{ DN}$

3.3.4 Bends



Avoid draining or partial filling of the flow sensor

3.4 Open feed or discharge

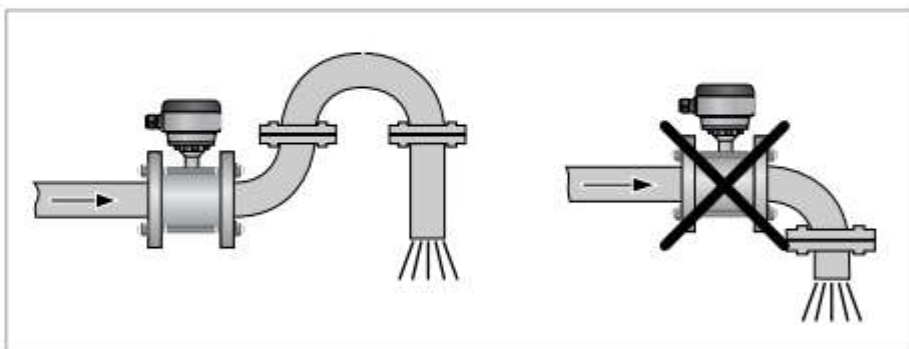


Figure 3-6: Installation in front of an open discharge

3.5 Flange deviation

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

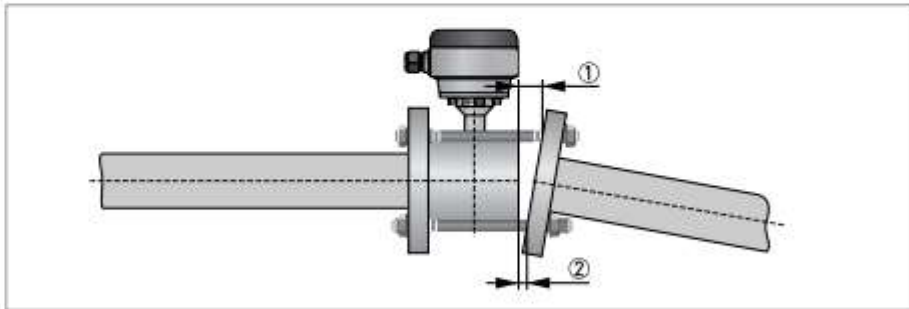


Figure 3-7: Flange deviation

- ① L_{max}
- ② L_{min}

3.6 Pump

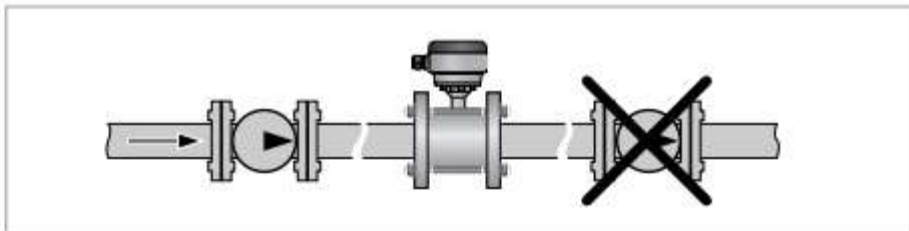


Figure 3-8: Installation behind a pump

3.7 Control valve

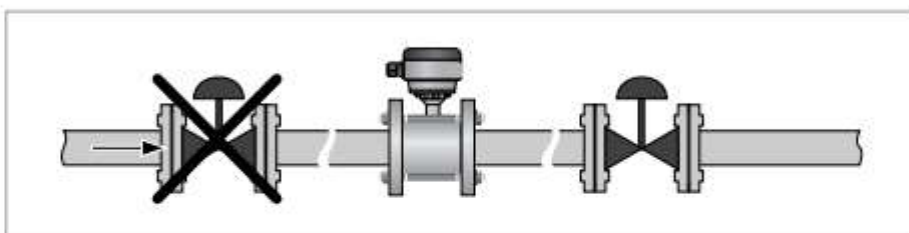


Figure 3-9: Installation in front of a control valve

3.8 Air venting and vacuum forces

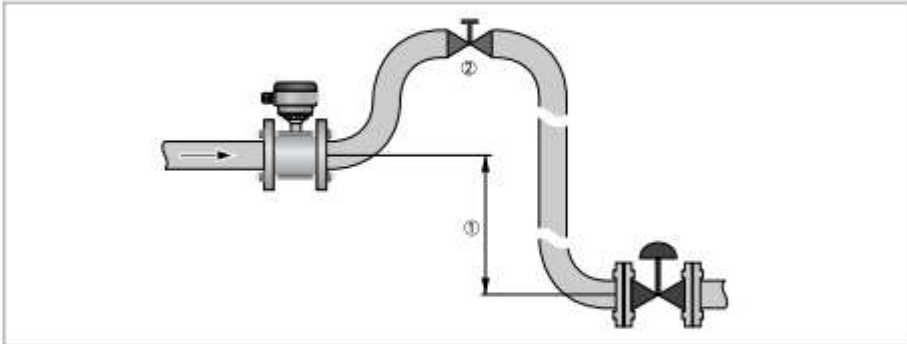


Figure 3-10: Air venting

- ① ≥ 5 m
- ② Air ventilation point

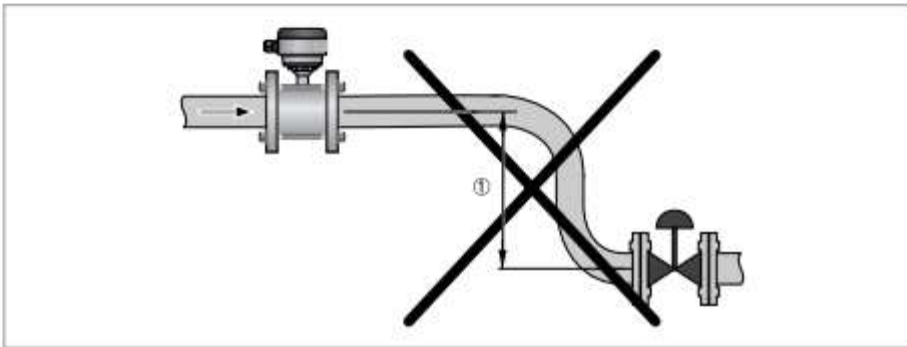


Figure 3-11: Vacuum

- ① ≥ 5 m

3.9 Mounting position

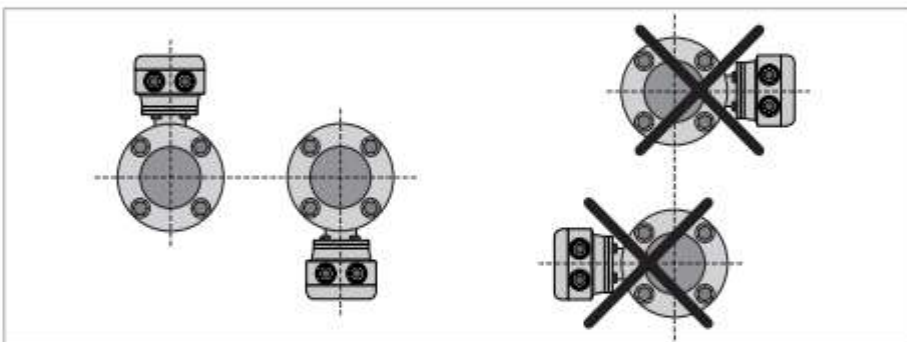


Figure 3-12: Mounting position

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

3.10 Mounting

3.10.1 Torques and pressure

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

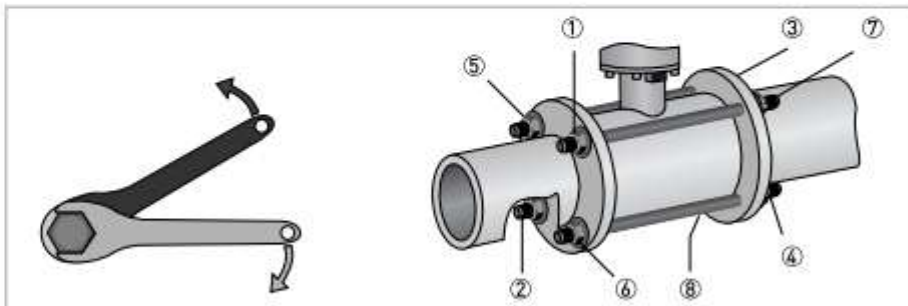


Figure 3-13: Tighten the bolts in fixed order, see picture.

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]
2.5...80	PN 40	40
100	PN 16	16
100	PN 25	25

ASME B 16.5

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

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

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.

EN 1092-1

Nominal size DN [mm]	Counter flanges & bolts		Max. allowable torque					
			Gasket: Filled PTFE / PTFE / PF29		Gasket: Graphite		O-ring	
	Rating	Size	Nm	ftlb	Nm	ftlb	Nm	ftlb
2.5...10	PN 40	M12 x 141	-	-	-	-	32	24
15	PN 40	M12 x 141	-	-	-	-	36	27
25	PN 40	M12 x 141	22	16	32	24	-	-
40	PN 40	M16 x 176	47	35	66	49	-	-
50	PN 40	M16 x 203	58	43	82	60	-	-
80	PN 40	M16 x 261	48	35	69	51	-	-
100	PN 16	M16 x 303	75	55	106	78	-	-
100	PN 25	M20 x 176	94	69	133	98	-	-

ASME B 16.5

Nominal size DN [mm]	Counter flanges & bolts		Max. allowable torque					
			Gaskets: Filled PTFE / PTFE / PF29		Gaskets: Graphite		O-ring	
	Rating	Size	Nm	ftlb	Nm	ftlb	Nm	ftlb
1/10...3/8"	150 lb	1/2"UNC x 142	-	-	-	-	35	26
1/2"	150 lb	1/2"UNC x 142	-	-	-	-	35	26
1"	150 lb	1/2"UNC x 142	24	18	33	24	-	-
1 1/2"	150 lb	1/2"UNC x 174	38	28	54	40	-	-
2"	150 lb	5/8"UNC x 215	58	43	83	61	-	-
3"	150 lb	5/8"UNC x 268	98	72	138	102	-	-
4"	150 lb	5/8"UNC x 318	75	55	108	80	-	-

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.

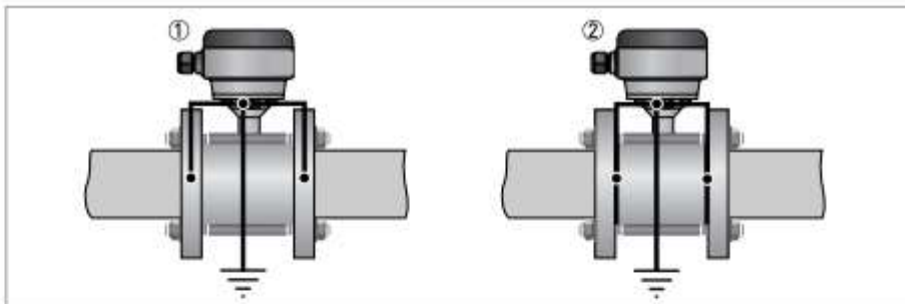


Figure 4-1: Grounding

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



Figure 4-2: Grounding ring number 1

Grounding ring number 1 (optional for DN25...150): Thickness: 3 mm / 0.1" (tantalum: 0.5 mm / 0.02")

For diameter DN10 and DN15, grounding rings are integrated as standard in the flow sensor construction.

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

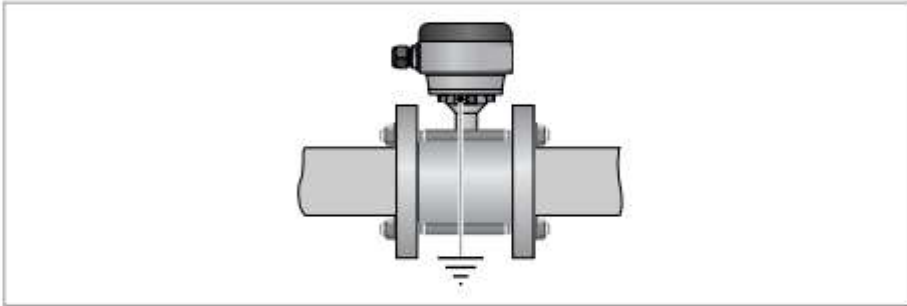


Figure 4-3: Virtual reference

Minimum requirements:

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



KROHNE – Process instrumentation and measurement solutions

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

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