



## OPTIFLUX 1000 Handbook

Electromagnetic flow sensor in sandwich design

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

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## 1.1 Intended use

**CAUTION!**

*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.*

**INFORMATION!**

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

The electromagnetic flowmeter is designed exclusively to measure the flow of electrically conductive, liquid media.

**WARNING!**

*If the device is not used according to the operating conditions (refer to chapter Technical data), the intended protection could be affected.*

## 1.2 Certification

CE marking



**The device fulfils the statutory requirements of the following EC directives:**

- EMC Directive 2004/108/EC in conjunction with EN 61326-1: 2006
- Low Voltage Directive 2006/95/EC in conjunction with EN 61010-1: 2010
- Pressure Equipment Directive 97/23/EC

The manufacturer certifies successful testing of the product by applying the CE marking.

## 1.3 Safety instructions from the manufacturer

### 1.3.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

### 1.3.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

### 1.3.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation and operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

### 1.3.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of underneath icons.

### 1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.



**DANGER!**

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



**DANGER!**

*This warning refers to the immediate danger of burns caused by heat or hot surfaces.*



**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.*



**LEGAL NOTICE!**

*This note contains information on statutory directives and standards.*



• **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.

## 1.4 Safety instructions for the operator



**WARNING!**

*In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.  
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.*

## 2.1 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.

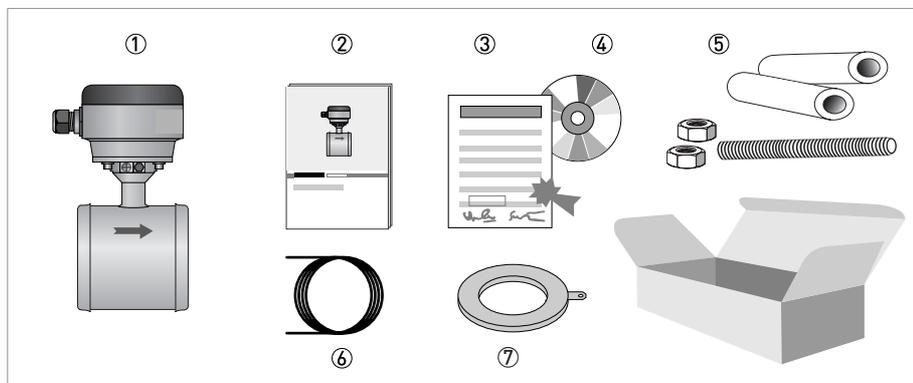


Figure 2-1: Scope of delivery

- ① Ordered flowmeter
- ② Product documentation
- ③ Factory calibration report
- ④ CD-ROM with product documentation in available languages
- ⑤ Mounting material (rubber sleeves). Optional; studs and bolts.
- ⑥ Signal cable (remote versions only)
- ⑦ Grounding rings (optional)



**INFORMATION!**

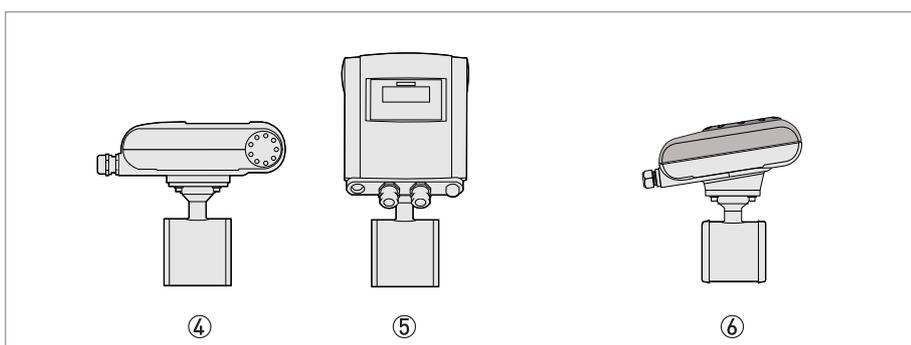
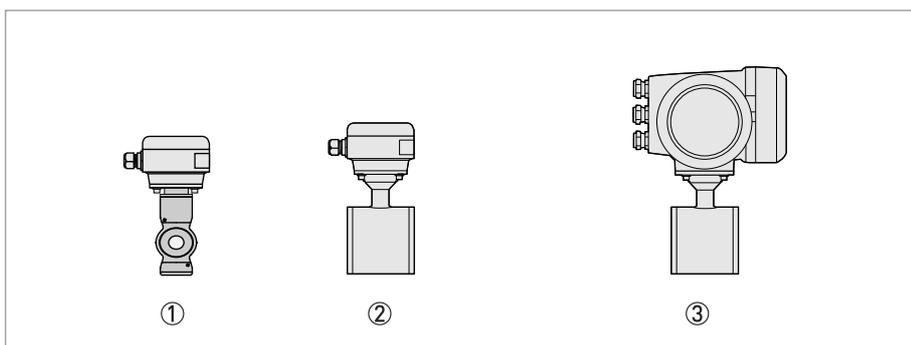
Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

## 2.2 Device description

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

The following versions are available:

- Compact version (the signal converter is mounted directly on the measuring sensor)
- Remote version (a measuring sensor with a connection box and a separate signal converter)



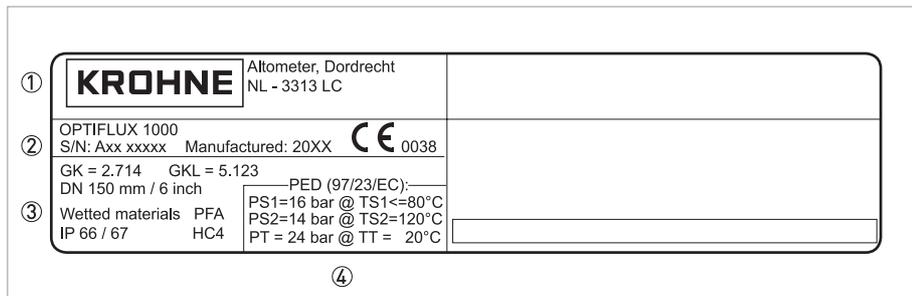
- ① Remote version (DN15...40)
- ② Remote version (DN50...150)
- ③ Compact version with IFC 300 signal converter
- ④ Compact version with IFC 100 (0°) signal converter
- ⑤ Compact version with IFC 100 (45°) signal converter
- ⑥ Compact version with IFC 050 (10°) signal converter

## 2.3 Nameplate



### INFORMATION!

Check the device nameplate to ensure that the device is delivered according to your order. Additional information (a.o correct supply voltage), can be found in the documentation of the signal converter.



- ① Name and address of the manufacturer
- ② Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
- ③ Calibration data
- ④ PED data

### 3.1 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.

### 3.2 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

### 3.3 Transport

#### Signal converter

- No special requirements.

#### Compact version

- Do not lift the device by the signal converter housing.
- Do not use lifting chains.
- To transport the device, use lifting straps.

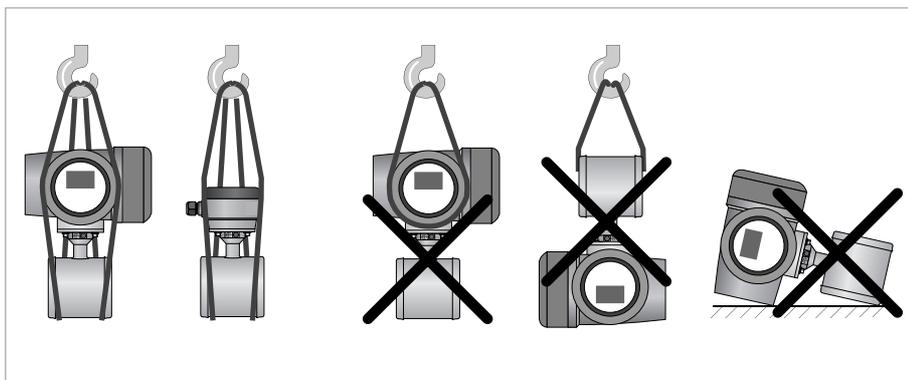


Figure 3-1: Transport

### 3.4 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

### 3.5 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.*

#### 3.5.1 Vibration

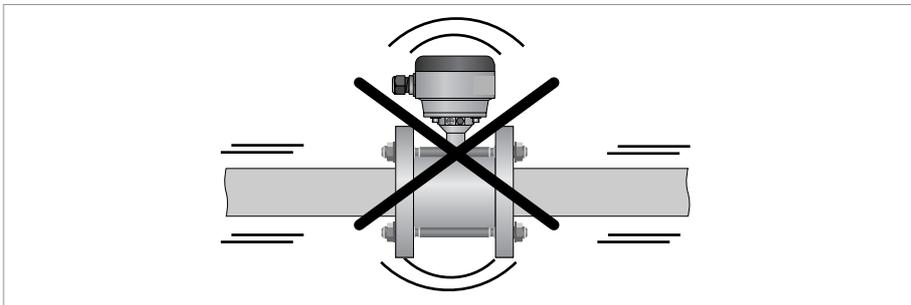


Figure 3-2: Avoid vibrations

#### 3.5.2 Magnetic field

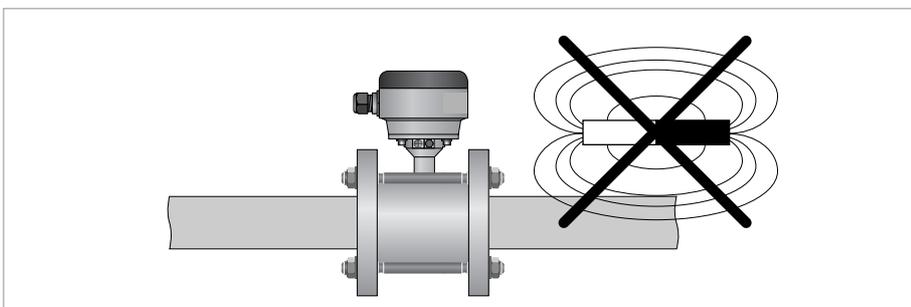


Figure 3-3: Avoid magnetic fields

## 3.6 Installation conditions

### 3.6.1 Inlet and outlet

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

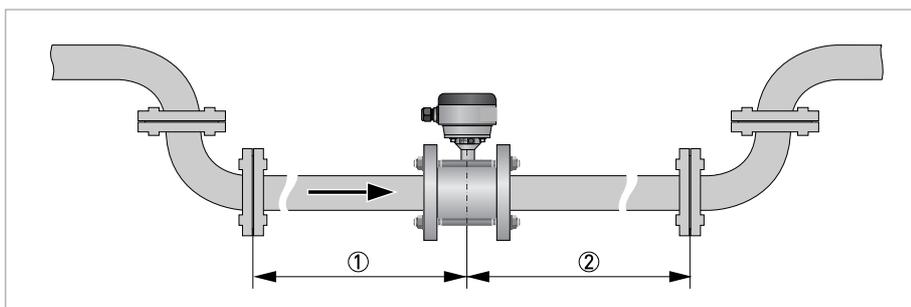


Figure 3-4: Recommended inlet and outlet section

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

### 3.6.2 Bends in 2 or 3 dimensions

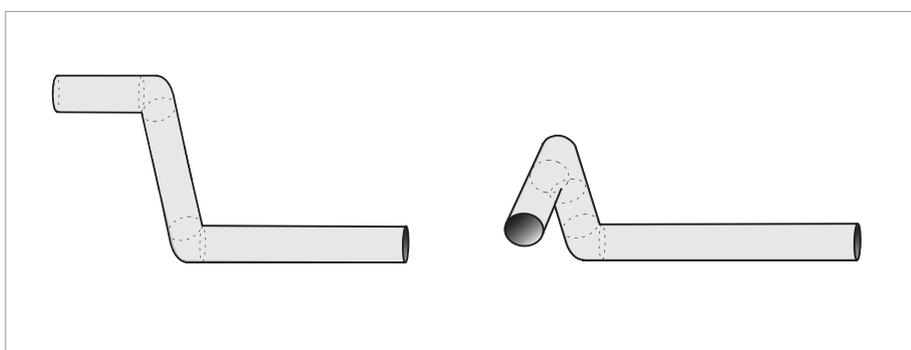


Figure 3-5: 2 and 3 dimensional bends, in front of flowmeter

- ① Bends in 2 dimensions:  $\geq 5$  DN; bends in 3 dimensions:  $\geq 10$  DN

### 3.6.3 T-section

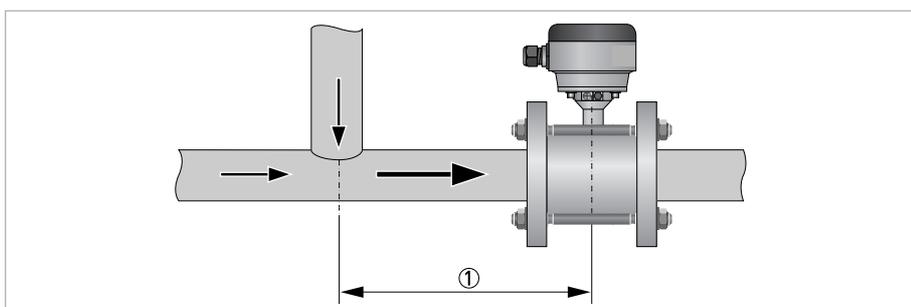


Figure 3-6: Distance behind a T-section

- ①  $\geq 10$  DN

### 3.6.4 Bends

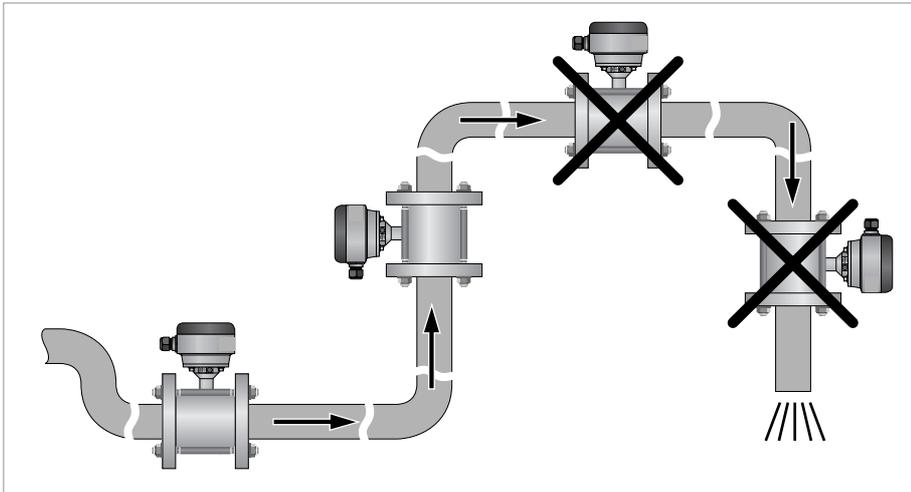


Figure 3-7: Installation in bending pipes

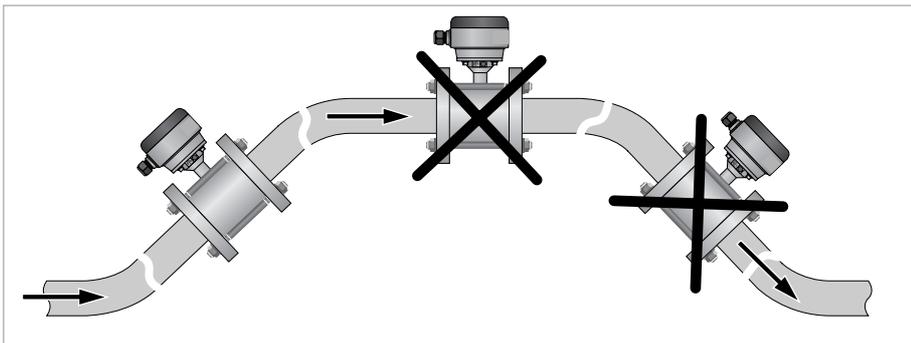


Figure 3-8: Installation in bending pipes



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

### 3.6.5 Open feed or discharge

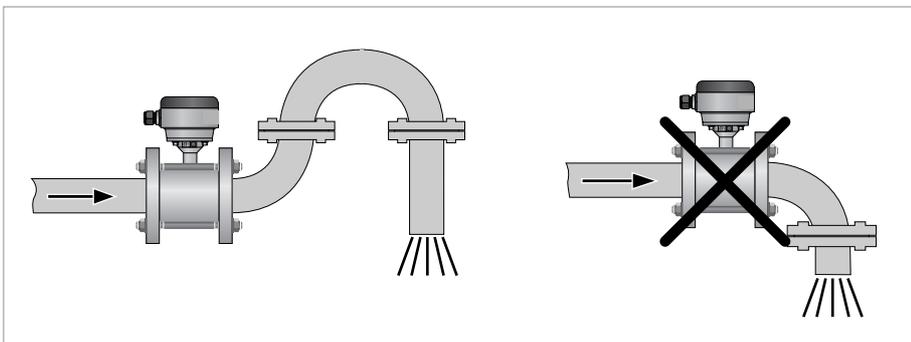


Figure 3-9: Installation in front of an open discharge

### 3.6.6 Flange deviation



**CAUTION!**

Max. permissible deviation of pipe flange faces:

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

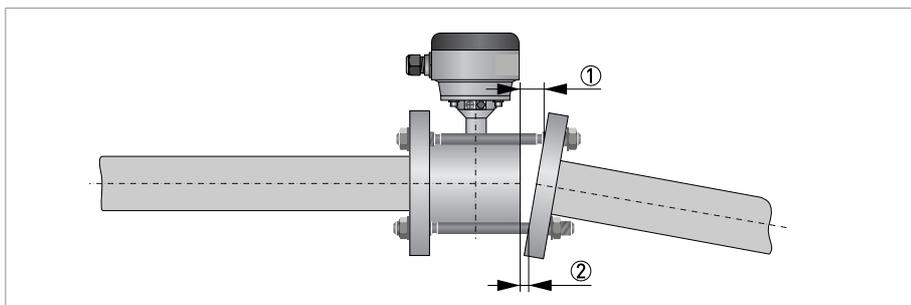


Figure 3-10: Flange deviation

- ①  $L_{max}$
- ②  $L_{min}$

### 3.6.7 Pump

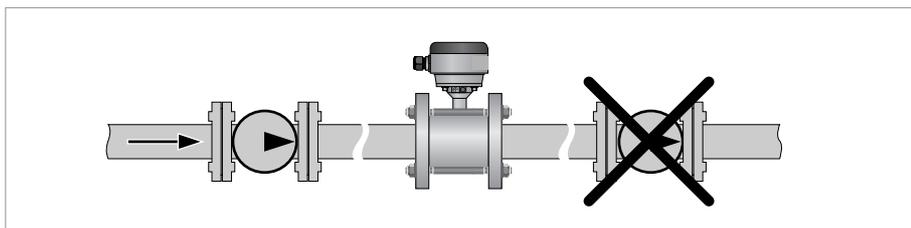


Figure 3-11: Installation behind a pump

### 3.6.8 Control valve

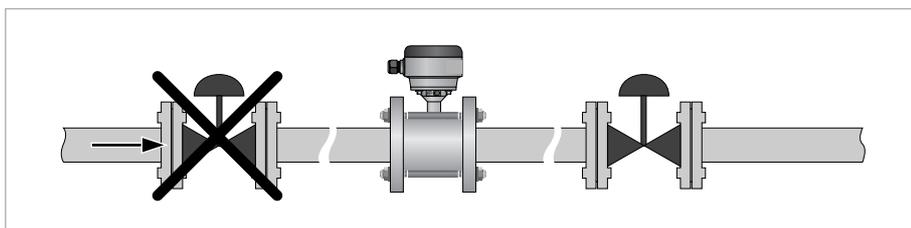


Figure 3-12: Installation in front of a control valve

### 3.6.9 Air venting and vacuum forces

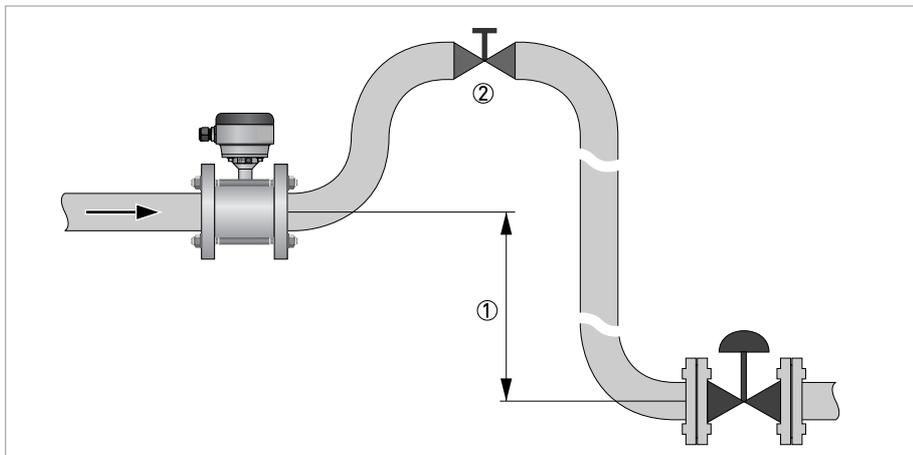


Figure 3-13: Air venting

①  $\geq 5$  m

② Air ventilation point

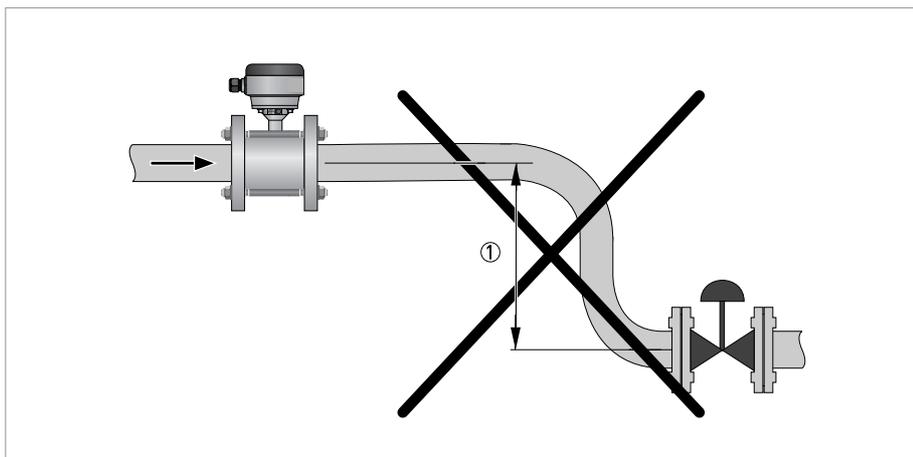


Figure 3-14: Vacuum

①  $\geq 5$  m

### 3.6.10 Mounting position

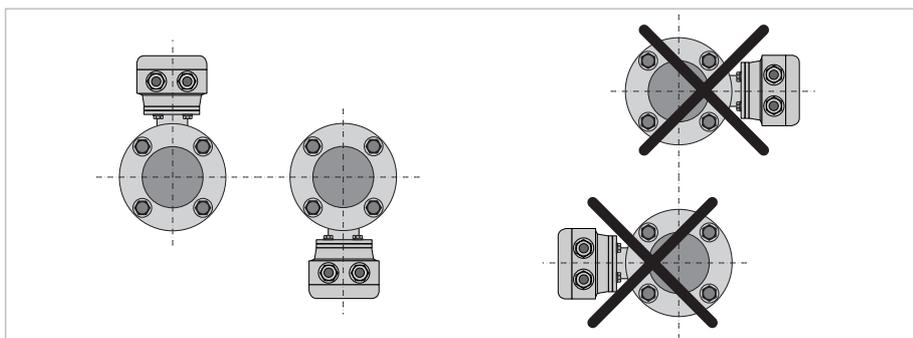


Figure 3-15: Mounting position

## 3.7 Mounting

### 3.7.1 Torques and pressures

The maximum pressure and torques values for the flowmeter are theoretical and calculated for optimum conditions and use with carbon steel flanges.

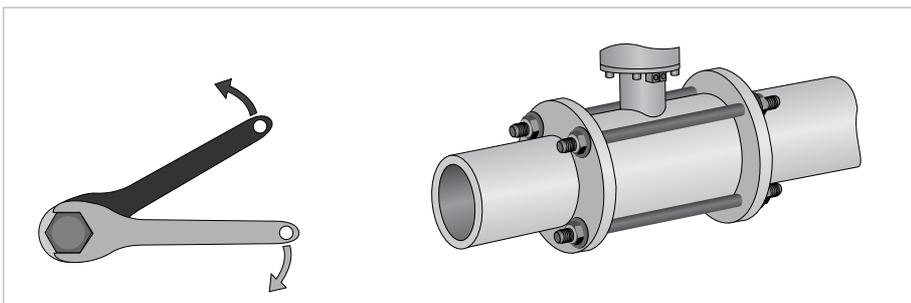


Figure 3-16: Tightening of bolts



#### 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.

## EN 1092-1

Nominal size DN [mm]	Counter flanges		Maximum operating pressure [bar]	Bolts	Max. torque [Nm] ②
	Flange size DN [mm]	Flange class [lb]			
10	15 ①	PN 16/40	≤16	4 x M12	16
15	15	PN 16/40	≤16	4 x M12	16
25	25	PN 16/40	≤16	4 x M12	16
40	40	PN 16/40	≤16	4 x M16	25
50	50	PN 16/40	≤16	4 x M16	45
80	80	PN 16/40	≤16	4 x M16	25
100	100	PN 16	≤16	8 x M16	33
100	100	PN 40	≤16	8 x M20	33
150	150	PN 16	≤16	8 x M20	82
150	150	PN 40	≤16	8 x M24	82

① For DN10 and 15 sizes use DN15 counter (pipe) flanges.

② 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.

## ASME B 16.5

Nominal size DN [inch]	Counter flanges		Max. operating pressure [psig]	Bolts	Max. torque [lbs.ft] ②
	Flange size DN [inch]	Flange class[lb]			
3/8"	1/2" ①	150/300 lb	230	4 x 1/2"	11.6
1/2"	1/2"	150/300 lb	230	4 x 1/2"	11.6
1"	1"	150/300 lb	230	4 x 1/2"	10.8
1 1/2"	1 1/2"	150/300 lb	230	4 x 1/2"	18.1
2"	2"	150/300 lb	230	4 x 5/8"	32.5
3"	3"	150 lb	230	4 x 5/8"	40.5
3"	3"	300 lb	230	8 x 5/8"	20.5
4"	4"	150/300 lb	230	8 x 5/8"	26
6"	6"	150 lb	230	8 x 3/4"	72.3
6"	6"	300 lb	230	12 x 3/4"	47.7

① For DN3/8" and 1/2" use DN1/2" counter (pipe) flanges.

② 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.

**CAUTION!**

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

## 4.1 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!



**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.

## 4.2 Grounding



**DANGER!**

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

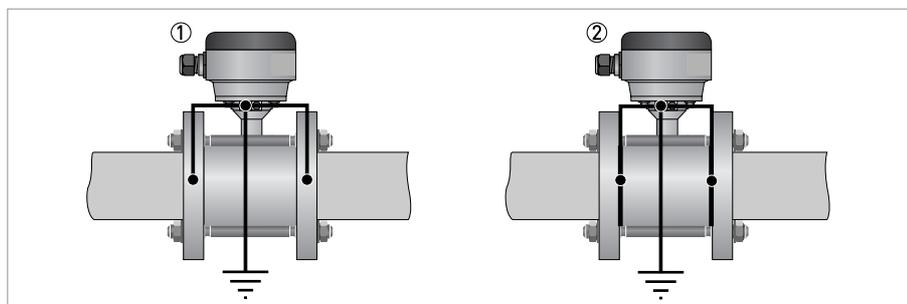


Figure 4-1: Grounding

- 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")

**Note:** 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)

The virtual reference option on the IFC 300 flow converter provides complete isolation of the measurement circuit.

#### Benefits of virtual reference:

- Grounding rings or grounding electrodes can be omitted.
- Safety increases by reducing the number of potential leakage points.
- The installation of the flowmeters is much easier.

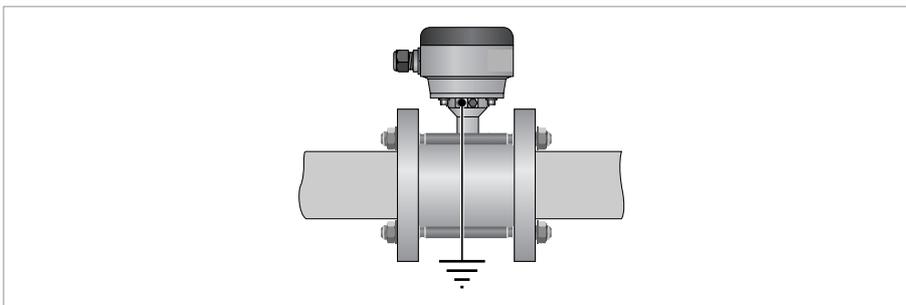


Figure 4-3: Virtual reference

#### Minimum requirements:

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

### 4.4 Connection diagrams



#### **INFORMATION!**

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

## 5.1 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

## 5.2 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.



### **INFORMATION!**

*For more precise information, please contact your local sales office.*

## 5.3 Returning the device to the manufacturer

### 5.3.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.



### **CAUTION!**

*Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:*

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*



### **CAUTION!**

*If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:*

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that is safe to handle and stating the product used.*

### 5.3.2 Form (for copying) to accompany a returned device

Company:		Address:	
Department:		Name:	
Tel. no.:		Fax no.:	
Manufacturer's order no. or serial no.:			
The device has been operated with the following medium:			
This medium is:	water-hazardous		
	toxic		
	caustic		
	flammable		
	We checked that all cavities in the device are free from such substances.		
	We have flushed out and neutralized all cavities in the device.		
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.			
Date:		Signature:	
Stamp:			

### 5.4 Disposal



**CAUTION!**

*Disposal must be carried out in accordance with legislation applicable in your country.*

## 6.1 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:

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

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  $q$ . A signal converter is used to amplify the signal voltage, filter it and convert it into signals for totalising, recording and output processing.

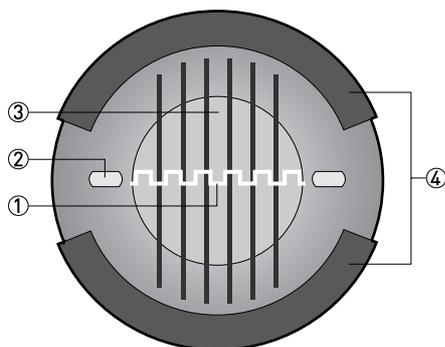


Figure 6-1: Measuring principle

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

## 6.2 Technical data



### INFORMATION!

- 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 (Download Center).

### Measuring system

Measuring principle	Faraday's law of induction
Application range	Electrically conductive fluids
<b>Measured value</b>	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

### Design

Features	Sandwich (wafer) design
	PFA liner and Hastelloy® electrodes
	Light weight and compact
Modular construction	The measurement system consists of a flow sensor and a signal converter. It is available as compact and as separate version. Additional information can be found in the documentation of the signal converter.
Compact version	With IFC 050 converter: OPTIFLUX 1050 C
	With IFC 100 converter: OPTIFLUX 1100 C
	With IFC 300 converter: OPTIFLUX 1300 C
Remote version	In wall (W) mount version with IFC 050 converter: OPTIFLUX 1050 W
	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"

### Measuring accuracy

Reference conditions	Medium: water
	Temperature +10...+30°C / +50...+86°F
	Operating pressure: 1 bar / 14.5 psi
	Inlet section $\geq 5$ DN
	Electrical conductivity: $\geq 300 \mu\text{S/cm}$
Maximum measuring error	IFC 050: down to 0.5% of the measured value above 0.5 m/s below 0.5 m/s; deviation $\pm 2.5$ mm/s
	IFC 100: down to 0.4% of the measured value $\pm 1$ mm/s
	IFC 300: down to 0.3% of the measured value $\pm 2$ mm/s
	The maximum measuring error depends on the installation conditions.
	For detailed information refer to <i>Measuring accuracy</i> on page 29.
Repeatability	$\pm 0.1\%$ of MV, minimum 1 mm/s
Calibration	2 point calibration by direct volume comparison.

### Operating conditions

<b>Temperature</b>	
Process temperature	-25...+120°C / -13...+248°F
Ambient temperature	-25...+65°C / -13...+149°F
Protect electronics against self-heating at ambient temperatures above +55° C / +131°F	
Storage temperature	-50...+70°C / -58...+158°F
<b>Measurement range</b>	-12...+12 m/s / -40...+40 ft/s
<b>Pressure</b>	
Ambient pressure	Atmospheric
Operating pressure	Up to 16 bar / 230 psi
Vacuum load	0 mbar / psi absolute
Pressure loss	Negligible
Pressure ranges for secondary containment	Pressure resistant up to 40 bar / 580 psi
	Burst pressure up to approx. 160 bar / 2320 psi
<b>Chemical properties</b>	
Physical condition	Electrically conductive liquids
Electrical conductivity	Standard: $\geq 5 \mu\text{S}/\text{cm}$
	Demineralized water: $\geq 20 \mu\text{S}/\text{cm}$
Permissible gas content (volume)	IFC 050: $\leq 3\%$
	IFC 100: $\leq 3\%$
	IFC 300: $\leq 5\%$
Permissible solid content (volume)	IFC 050: $\leq 10\%$
	IFC 100: $\leq 10\%$
	IFC 300: $\leq 70\%$

### Installation conditions

Installation	Assure that the flow sensor is always fully filled.
	For detailed information refer to <i>Installation</i> on page 12
Flow direction	Forward and reverse
	Arrow on flow sensor indicates positive flow direction.
Inlet run	$\geq 5 \text{ DN}$
Outlet run	$\geq 2 \text{ DN}$
Dimensions and weights	For detailed information refer to <i>Dimensions and weights</i> on page 30

## Materials

Sensor housing	DN10...40: malleable iron ( GTW-S-38-12)
	DN50...150: sheet steel
Measuring tube	Austenitic stainless steel
Liner	PFA
Protective coating	On exterior of the meter: housing, signal converter (compact version) and/or connection box (field version)
	Polyurethane coating
Connection box	Only for remote versions
	Standard: die-cast aluminium
	Option: stainless steel
Measuring electrodes	Hastelloy <sup>®</sup> C
Grounding rings	Standard: for DN10...15 (integrated in flow sensor construction) Optional: for DN25...150
	Stainless steel 316 (1.4571) (AISI 316 Ti)
	Grounding rings can be omitted with virtual reference option for the IFC 300 converter.
Mounting material	DN40...150:
	Standard: rubber centering sleeves
	Option: galvanized steel or stainless steel stud bolts and nuts

## Process connections

Counter flanges	
EN 1092-1	DN10...80: PN16 or PN40 DN100...150: PN16 (standard) PN40 on request
ASME	3/8...6" : 150 lb / RF 3/8...4" : 300 lb / RF
JIS	DN10...100: JIS 20K [ $\leq 16$ bar] / DN150: JIS 10K [ $\leq 10$ bar]

## Electrical connections

	For full detail; see the relevant documentation of the signal converter.
Signal cable ( for remote systems only)	
Type A (DS)	<b>In combination with the IFC 050, IFC 100 and IFC 300 signal converter</b>
	Standard cable, double shielded. Max. length: 600 m / 1950 ft (depends on electrical conductivity and measuring sensor).
Type B (BTS)	<b>Only in combination with the IFC 300 signal converter</b>
	Optional cable, triple shielded. Max. length: 600 m / 1950 ft (depends 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

<b>CE</b>	
	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
Electromagnetic compatibility	Directive: 2004/108/EC
	Harmonized standard: EN 61326-1 : 2006
Low Voltage Directive	Directive: 2006/95/EC
	Harmonized standard: EN 61010 : 2010
Pressure Equipment Directive	Directive: 97/23/EC
	Category I, II, III or SEP
	Fluid group 1
	Production module H
<b>Hazardous areas</b>	
FM	<b>In combination with IFC 300 C &amp; F</b>
	Class I, Div. 2, Groups A, B, C and D
	Class II, Div. 2, Groups F and G
	Class III, Div. 2
CSA	<b>In combination with IFC 300 C &amp; F</b>
	Class I, Div. 2, Groups A, B, C and D
	Class II, Div. 2, Groups F and G
<b>Other approvals and standards</b>	
Custody transfer	Only in combination with IFC 300 signal converter
	<b>Cold water</b>
	MID Annex MI-001 type examination certificate
	<b>Liquids other than water</b>
	MID Annex MI-005 type examination certificate
Protection category acc. to IEC 529 / EN 60529	Standard: IP66/67 (NEMA 4/4X/6)
Shock test	IEC 68-2-27
	30 g for 18 ms
Vibration test	IEC 60068-2-24
	f = 20-2000 Hz, rms = 4.5 g, t = 30 min.
<b>Safety Approvals</b>	
CSA OL	Valid for IFC 100 C/W and IFC 300 C/F/W signal converter

## 6.3 Measuring accuracy

Each flowmeter is standard wet calibrated under reference conditions by direct volume comparison. 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
- Pressure: 1 bar / 14.5 psi
- Inlet section:  $\geq 5$  DN
- Electrical conductivity:  $\geq 300 \mu\text{S/cm}$

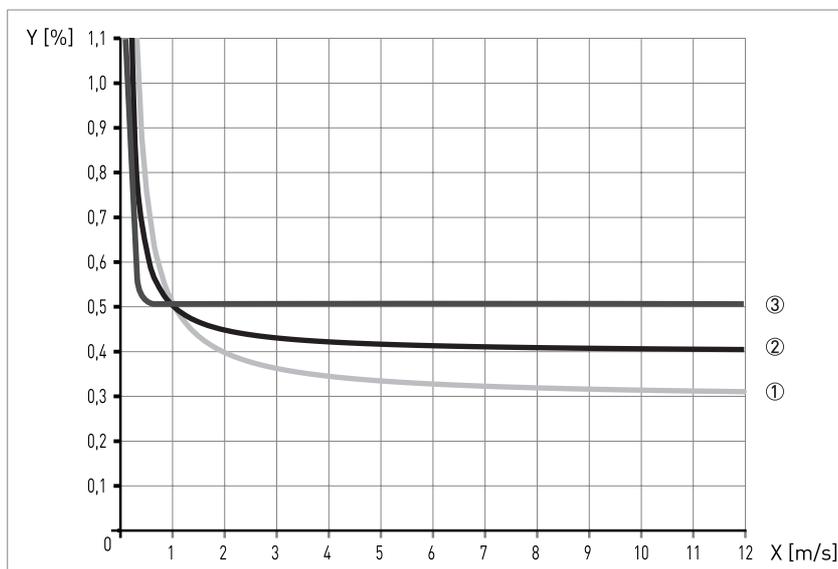


Figure 6-2: Flow velocity vs. accuracy

X [m/s]: flow velocity

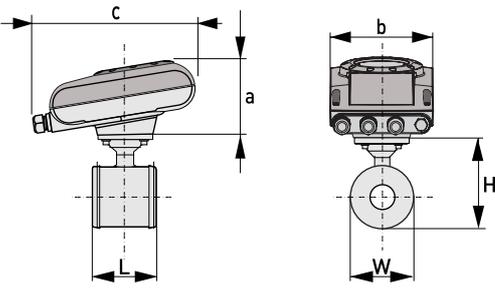
Y [%]: deviation from the actual measured value (mv)

### Accuracy

Sensor diameter	Converter type	Accuracy	Curve
DN10...150 / 3/8...6"	IFC 050	0.5% of mv above 0.5 m/s below 0.5 m/s, deviation $\pm 2.5$ mm/s	③
DN10...150 / 3/8...6"	IFC 100	0.4% of mv + 1 mm/s	②
DN10...150 / 3/8...6"	IFC 300	0.3% of mv + 2 mm/s	①

6.4 Dimensions and weights

<p>Remote version; DN15...40</p>		<p>a = 88 mm / 3.5"                      b = 139 mm / 5.5" ①                      c = 106 mm / 4.2"                      Total height = H + a</p>
<p>Remote version; DN50...150</p>		<p>a = 88 mm / 3.5"                      b = 139 mm / 5.5" ①                      c = 106 mm / 4.2"                      Total height = H + a</p>
<p>Compact version with IFC 300</p>		<p>b = 139 mm / 5.5" ①                      c = 106 mm / 4.2"                      Total height = H + a                      Total height = H + a</p>
<p>Compact version with IFC 100 (0°)</p>		<p>a = 82 mm / 3.2"                      b = 161 mm / 6.3"                      c = 257 mm / 10.1" ①                      Total height = H + a</p>
<p>Compact version with IFC 100 (45°)</p>		<p>a = 186 mm / 7.3"                      b = 161 mm / 6.3"                      c = 184 mm / 7.2" ①                      Total height = H + a</p>

Compact version with IFC 050 (10°)		a = 101 mm / 3.98"
		b = 157 mm / 6.18"
		c = 260 mm / 10.24" ①
		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 DN	Dimensions [mm]			Approx. weight [kg]
	L	H	W	
10	68	137	47	1.7
15	68	137	47	1.7
25	54	147	66	1.7
40	78	162	82	2.6
50	100	151	101	4.2
80	150	180	130	5.7
100	200	207	156	10.5
150	200	271	219	15.0

#### ASME B16.5

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



### KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature assemblies
- Pressure transmitters
- Analysis products
- Products and systems for the oil & gas industry
- Measuring systems for the marine industry

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