

OPTIFLUX 5000 Handbook

Electromagnetic flowmeter in flanged version

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

1.2 Certification

CE marking



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

This device fulfils the statutory requirements of the relevant EU directives.

For full information of the EU directives and standards and the approved certifications, please refer to the EU Declaration of Conformity or the website of the manufacturer.

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 or 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 icons as shown below.

1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.



DANGER!

This warning 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!

This warning refers to the immediate danger when using this device in a hazardous atmosphere.



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 Grounding rings (optional)
- ⑥ 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.

2.2 Device description

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



INFORMATION!

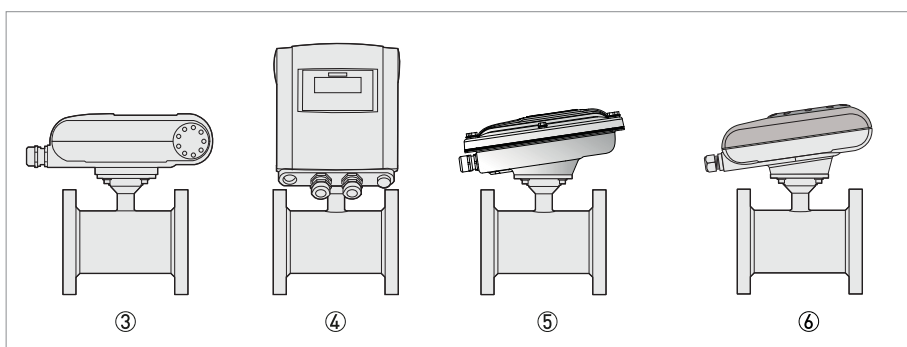
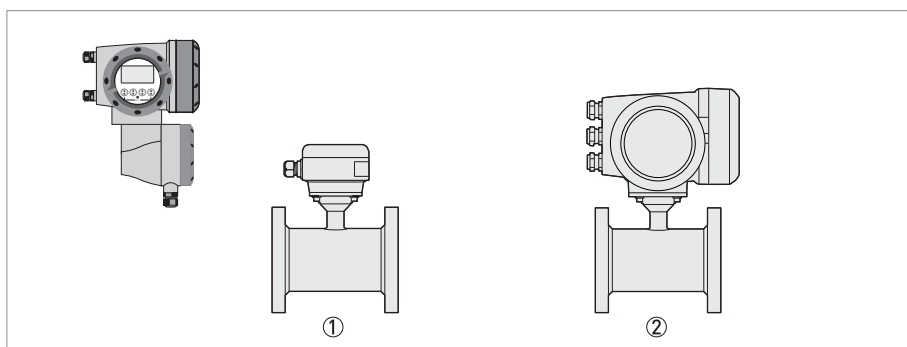
Product specific information and extensive product specification is available using PICK, the Product Information Center KROHNE web-tool.

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



The following versions are available:

- Compact version (the signal converter is mounted directly on the measuring sensor)
- Remote version (electrical connection to the measuring sensor via field current and signal cable)



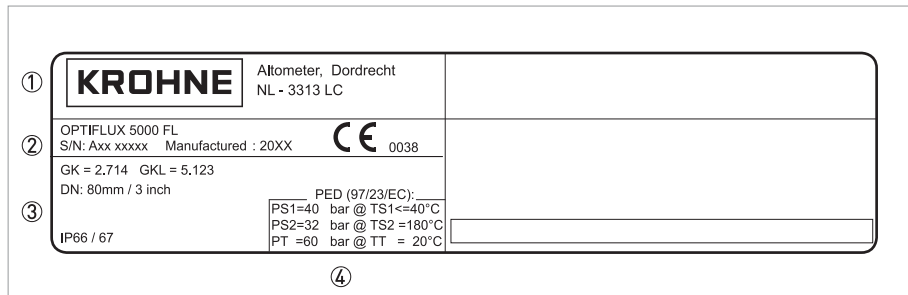
- ① Remote version
- ② Compact version with IFC 300 signal converter
- ③ Compact version with IFC 100 (0°) signal converter
- ④ Compact version with IFC 100 (45°) signal converter
- ⑤ Compact version with stainless steel IFC 100 (10°) signal converter
- ⑥ Compact version with IFC 050 (10°) signal converter

2.3 Nameplates (examples)



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.



- 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 flange devices, use lifting straps. Wrap these around both process connections.

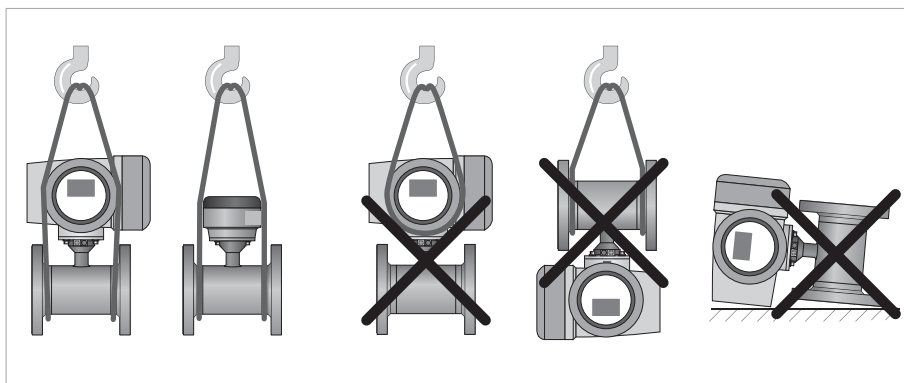


Figure 3-1: Transport

3.4 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.

3.4.1 Vibration

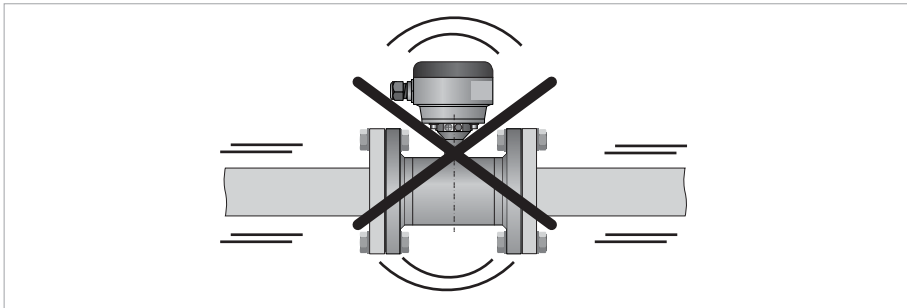


Figure 3-2: Avoid vibrations

3.4.2 Magnetic field

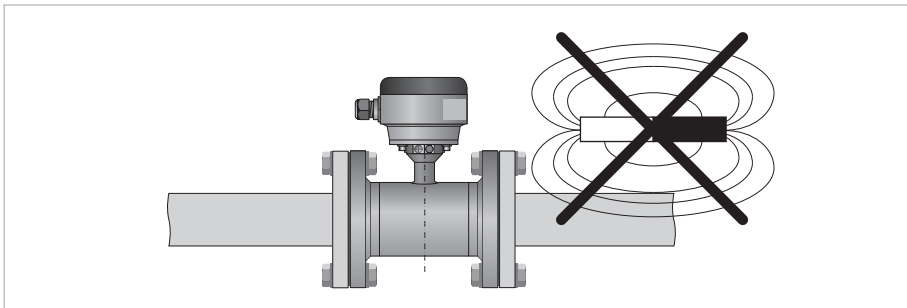


Figure 3-3: Avoid magnetic fields

3.5 Installation conditions

3.5.1 Inlet and outlet

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

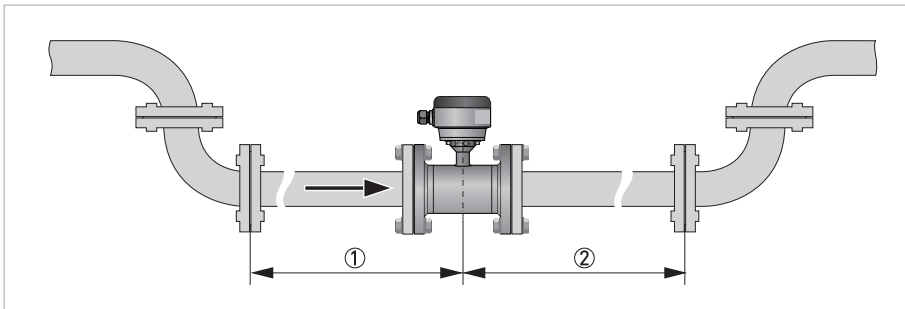


Figure 3-4: Recommended inlet and outlet section

- ① Refer to chapter "Bends in 2 or 3 dimensions"
- ② ≥ 2 DN

3.5.2 Bends in 2 or 3 dimensions

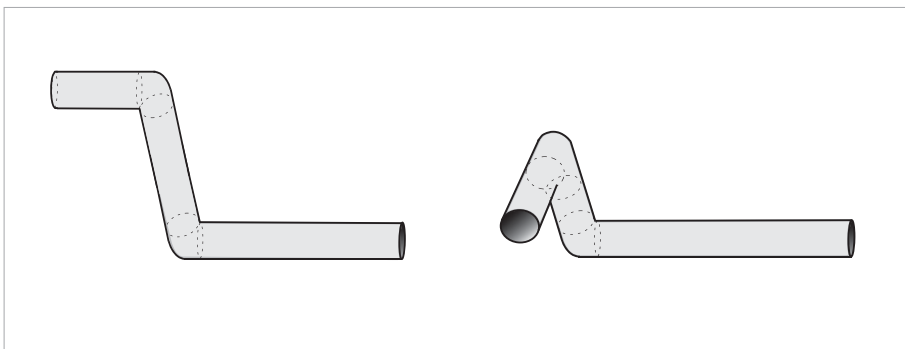


Figure 3-5: Inlet when using 2 and/or 3 dimensional bends upstream of the flowmeter

Inlet length: using bends in 2 dimensions: ≥ 5 DN; when having bends in 3 dimensions: ≥ 10 DN



INFORMATION!

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

3.5.3 T-section

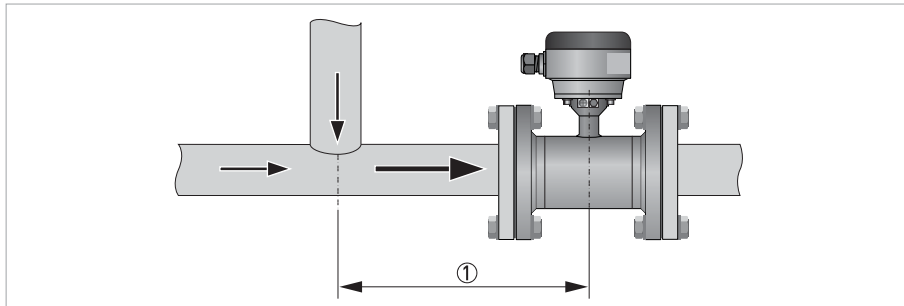


Figure 3-6: Distance behind a T-section

① ≥ 10 DN

3.5.4 Bends

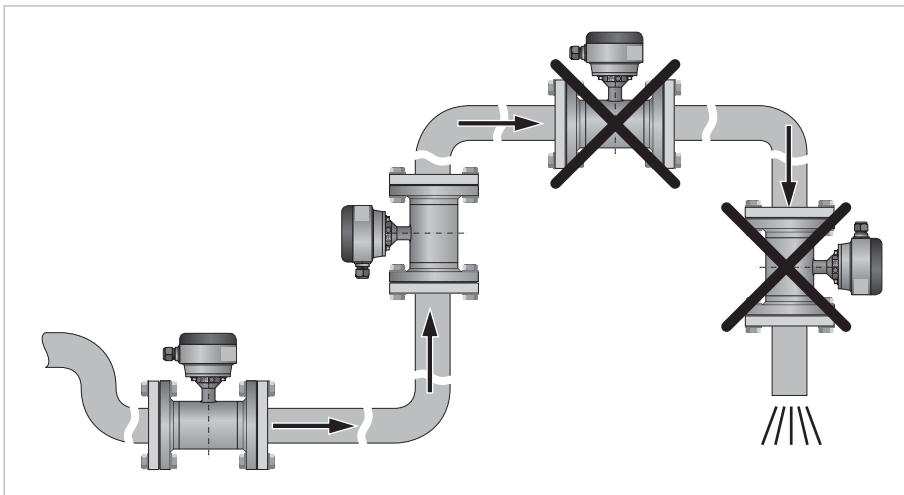


Figure 3-7: Installation in bending pipes

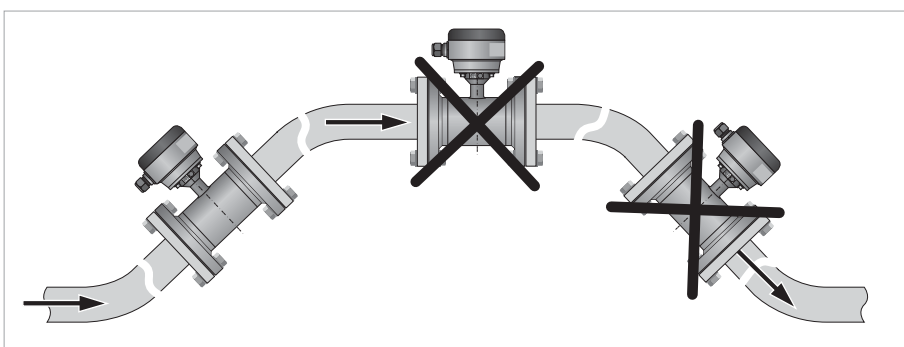


Figure 3-8: Installation in bending pipes



CAUTION!
Avoid draining or partial filling of the flow sensor

3.5.5 Open feed or discharge

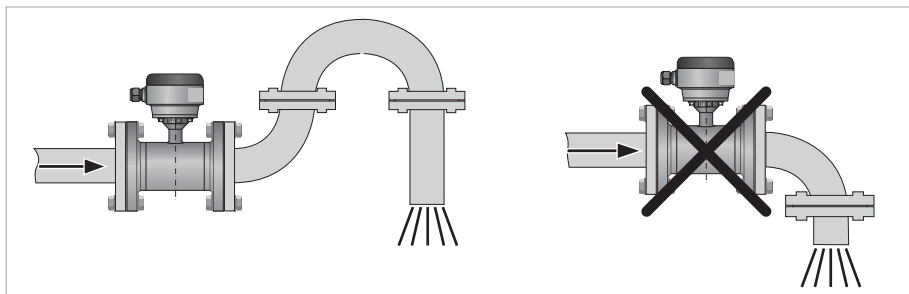


Figure 3-9: Installation in front of an open discharge

3.5.6 Control valve

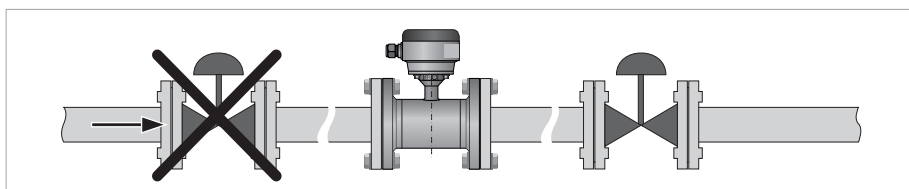


Figure 3-10: Installation in front of a control valve

3.5.7 Pump

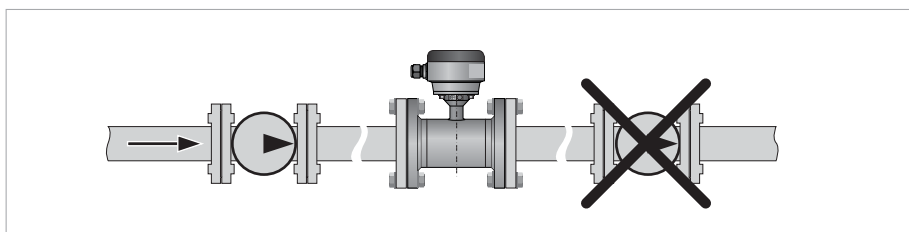


Figure 3-11: Installation behind a pump

3.5.8 Air venting and vacuum forces

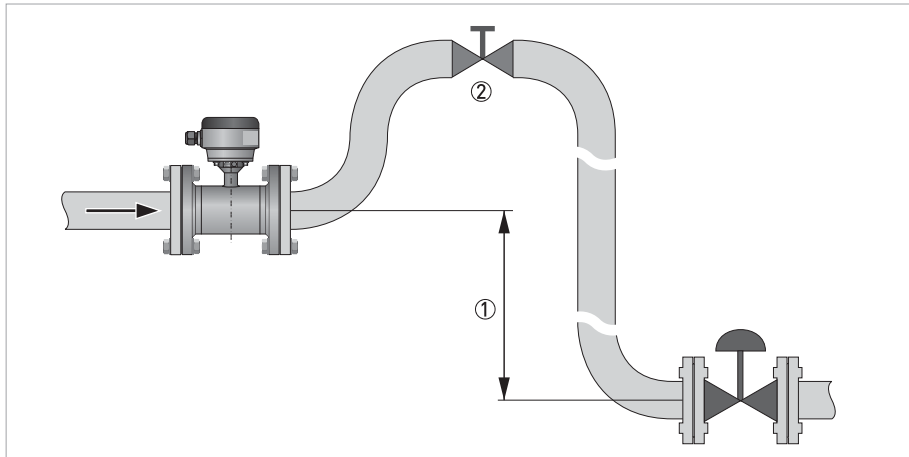


Figure 3-12: Air venting

- ① $\geq 5 \text{ m} / 17 \text{ ft}$
- ② Air ventilation point

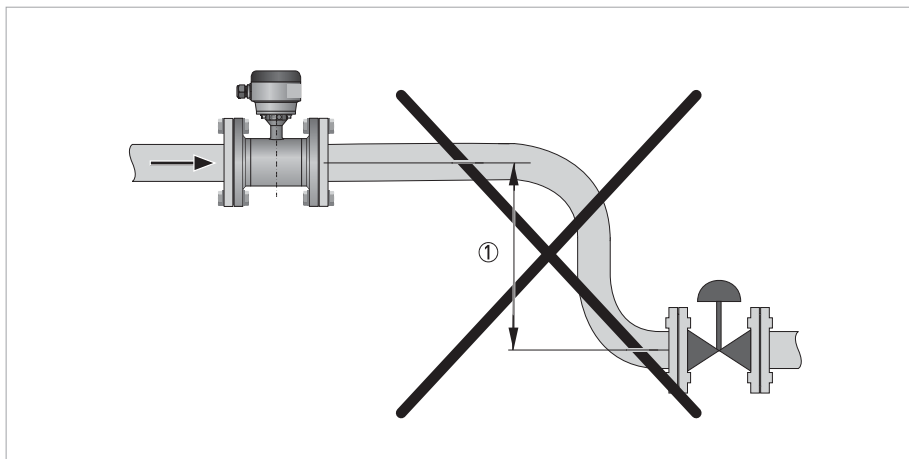


Figure 3-13: Vacuum

- ① $\geq 5 \text{ m} / 17 \text{ ft}$

3.5.9 Flange deviation



CAUTION!

Max. permissible deviation of pipe flange faces:

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

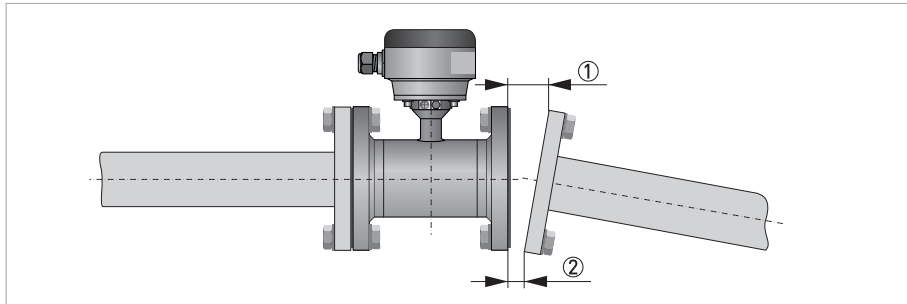


Figure 3-14: Flange deviation

- ① L_{max}
- ② L_{min}

3.5.10 Mounting position

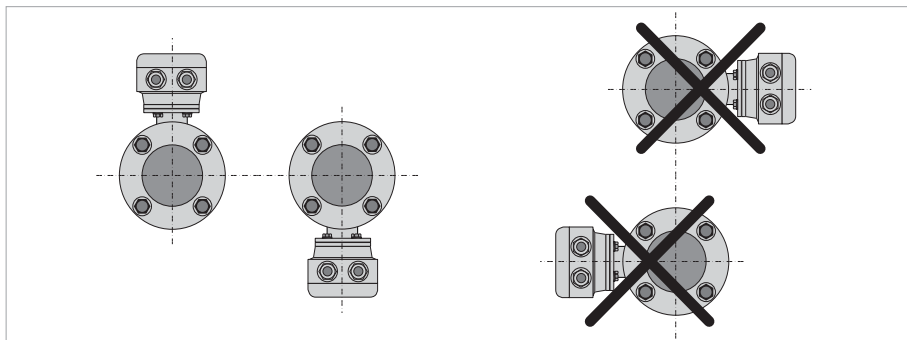


Figure 3-15: Mounting position

3.6 Mounting



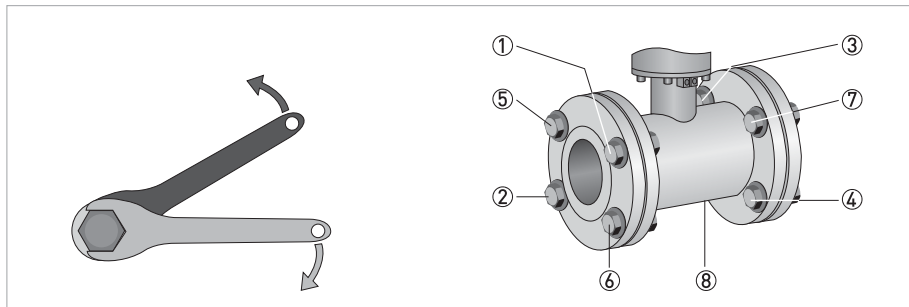
CAUTION!

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.

3.6.1 Torques and pressures

Tighten the bolts in fixed order, see picture:

- Step 1: by hand
- Step 2: approx. 10% of max. torque
- Step 3: approx. 25% of max. torque
- Step 4: approx. 50% of max. torque
- Step 5: approx. 80% of max. torque
- Step 6: 100% of max. torque given in table



INFORMATION!

Diameters DN80 to DN300 have more bolts than the drawing in the picture above shows. Please continue in the same sequence to tighten the other bolts.



CAUTION!

With the instrument, 4 PTFE gaskets are delivered (2 to be used with installation, 2 as spare). There are no other gaskets required.

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.

The torque values in the following tables are based 8.8 bolts and a friction coefficient 0.14.

EN 1092-1

Nominal size DN [mm]	Pressure rating	Bolts	Recommended torque [Nm]	
			Min.	Max.
15	PN 40	4 x M 12	50	70
25	PN 40	4 x M 12	50	70
40	PN 40	4 x M 16	100	175
50	PN 40	4 x M 16	100	175
80	PN 40	8 x M 16	100	175
100	PN 16	8 x M 16	100	175
150	PN 16	8 x M 20	200	340
200	PN 10	8 x M 20	200	340
250	PN 10	12 x M 20	250	340
300	PN 10	12 x M 20	250	340

ASME B 16.5

Nominal size [inch]	Flange class [lb]	Bolts	Recommended torque [ftlb]	
			Min.	Max.
1/2	300	4 x 1/2"	40	80
1	150 / 300	4 x 1/2"	40	80
1 1/2	150 / 300	4 x 1/2"	60	80
2	150 / 300	4 x 5/8"	80	160
3	150 / 300	4 x 5/8"	100	160
4	150	8 x 5/8"	100	160
6	150	8 x 3/4"	150	280
8	150	8 x 3/4"	200	280
10	150	12 x 7/8"	250	450
12	150	12 x 7/8"	300	450

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!



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.

4.2 Grounding



DANGER!

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

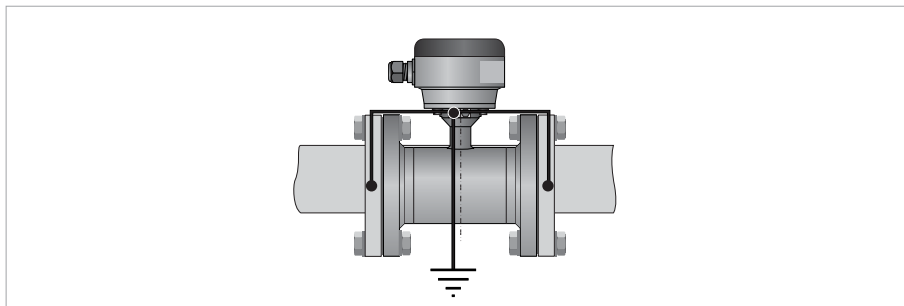


Figure 4-1: Grounding

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



INFORMATION!

Grounding can be omitted with Virtual Reference (option on IFC 300 converter). For detailed information refer to Virtual reference for IFC 300 (C, W and F version) on page 22

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

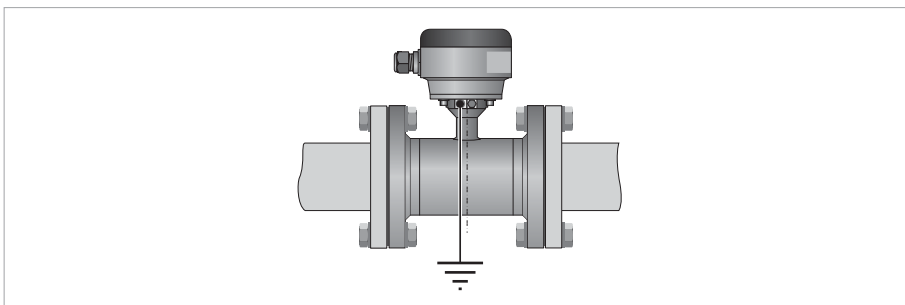


Figure 4-2: Virtual reference

Minimum requirements:

- Size: \geq DN10 / 3/8"
- Electrical conductivity: \geq 200 μ S/cm
- Signal 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 signal 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 Repairs

Repairs must be carried out exclusively by the manufacturer or the manufacturer authorised specialist companies.

5.4 Returning the device to the manufacturer

5.4.1 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.



WARNING!

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 the personnel, the 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.*



WARNING!

If the device has been operated with toxic, caustic, radioactive, 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 it is safe to handle and stating the product used.*

5.4.2 Form (for copying) to accompany a returned device



CAUTION!

To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:		Address:	
Department:		Name:	
Tel. no.:		Fax no. and/or Email address:	
Manufacturer's order no. or serial no.:			
The device has been operated with the following medium:			
This medium is:	<input type="checkbox"/>	radioactive	
	<input type="checkbox"/>	water-hazardous	
	<input type="checkbox"/>	toxic	
	<input type="checkbox"/>	caustic	
	<input type="checkbox"/>	flammable	
	<input type="checkbox"/>	We checked that all cavities in the device are free from such substances.	
	<input type="checkbox"/>	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:			

5.5 Disposal



LEGAL NOTICE!

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

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:



According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**.

The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

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 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.

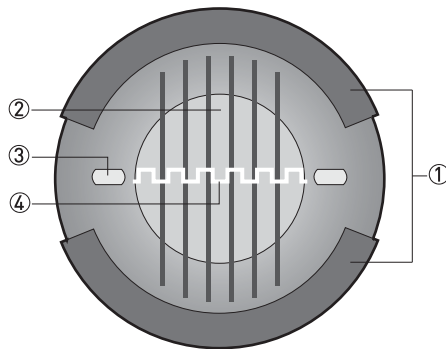


Figure 6-1: Measuring principle

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

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 (Downloadcenter).

Measuring system

Measuring principle	Faraday's law of induction
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	Flanged 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 relevant documentation.
Compact version	With IFC 050 signal converter : OPTIFLUX 5050 C
	With IFC 100 signal converter : OPTIFLUX 5100 C
	With IFC 300 signal converter : OPTIFLUX 5300 C
Remote version	In wall (W) mount version with IFC 050 converter : OPTIFLUX 5050 W
	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	DN15...300 / ½...12"

Measuring accuracy

Maximum measuring error	IFC 050: down to 0.5% of the measured value ± 1 mm/s
	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 36.
Repeatability	$\pm 0.1\%$ of MV, minimum 1 mm/s
Long term stability	$\pm 0.1\%$ of MV
Special calibration	On request

Operating conditions

Temperature	
Process temperature	Compact version: -40...+140°C / -40...+284°F
	Remote version: -40...+180°C / -40...+356°F
	For Ex versions different temperatures are valid. Please check the relevant Ex documentation for details.
Maximum temperature change (shock)	DN2.5...25 / 1/10...1": < 3 K/s
Ambient temperature	Standard: -40...+65°C / -40...+149°F
	Option: stainless steel version -40...+55°C / -40...+130°F
	For Ex versions different temperatures are valid. Please check the relevant Ex documentation for details.
Protect electronics against self-heating at ambient temperatures above +55°C / +131°F.	
Storage temperature	-50...+70°C / -58...+158°F
Measurement range	-12...+12 m/s / -40...+40 ft/s
Pressure	
Ambient	Atmospheric
Nominal flange pressure	Standard:
EN 1092-1	DN200...300: PN10
	DN100...150: PN16
	DN15...80: PN40
ASME B16.5	Standard:
	1...12": 150 lb
	½": 300 lb
	Option:
	1", 2", 3": 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	Conductive liquids
Electrical conductivity	Non water:
	DN25...300 / 1...12": $\geq 1 \mu\text{S/cm}$
	DN15 / 1/2": $\geq 5 \mu\text{S/cm}$
	Demineralised cold water:
	DN15...300 / 1/2...12": $\geq 20 \mu\text{S/cm}$
Permissible gas content (volume)	IFC 050 : $\leq 3\%$ IFC100 and IFC 300 : $\leq 5\%$
Permissible solid content (volume)	IFC 050 and 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	≥ 5 DN (without disturbing flow, after a single 90° bend)
	≥ 10 DN (after a double bend = 2x 90°)
Outlet run	≥ 2 DN
Dimensions and weights	For detailed information refer to <i>Dimensions and weights</i> on page 31.

Materials

Sensor housing	DN15...100 / 1/2...4": stainless steel AISI 316 (1.4408)
	DN150...300 / 6...12": sheet steel (carbon steel)
Measuring tube	ceramic
Connection box (only remote versions)	Standard: polyurethane coated die-cast aluminium
	Option: stainless steel
Grounding rings	Standard:
	Not included
	Option:
	Virtual reference: only with IFC 300 signal converter
Gaskets	PTFE, white
	Option: filled PTFE, blue
Measuring electrodes	Standard:
	Cermet

Process connections

EN 1092-1	DN200...300: PN10
	DN100..150: PN16
	DN15...80: PN40
ASME	Standard:
	1...12": 150 lb
	½": 300 lb
	Option:
	1", 2", 3": 300 lb

Electrical connections

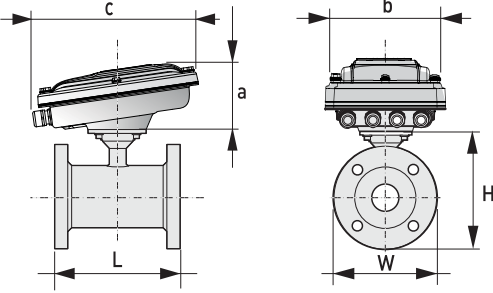
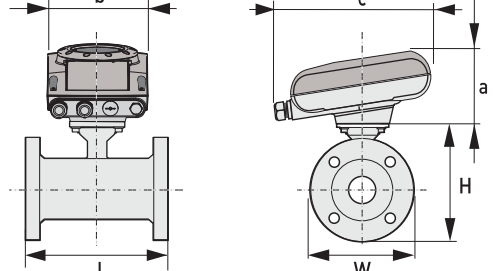
For full detail; see the relevant documentation of the signal converter	
Signal cable for remote systems only.	
Type A (DS)	In combination with the IFC 050, IFC 100 and IFC 300 signal converter
	Standard cable, double shielded. Max. length: 600 m / 1950 ft (dep. on electrical conductivity and measuring 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 more details of the I/O options, including data streams and protocols, see technical datasheet of the relevant signal converter.

Approvals and certifications

CE Sign	
This device fulfills the statutory requirements of the EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
	For more information on the EU directives & standards and the approved certifications, please refer to the EU Declaration of Conformity or the manufacturer website.
Hazardous areas	
ATEX	Please check the relevant Ex documentation for details.
	In combination with IFC 050 and IFC 100 converter: II 2 GD
	In combination with IFC 300 converter: II 2 GD or II 2 (1) GD
	Remote version: II 2 GD
	Consult IFC 300 manual for EEx i and non-EEx i I/O modules
FM	Only for diameters DN15...100 / 1/2...4" In combination with IFC 300 C or F converter
	Class I, Div. 2, groups A, B, C and D
	Class II, Div. 2, groups F and G
	Class III, Div. 2
CSA	Only for diameters DN15...100 / 1/2...4" In combination with IFC 300 C or F converter
	Class I, Div. 2, groups A, B, C and D
	Class II, Div. 2, groups F and G
IEC-Ex	pending
NEPSI	OPTIFLUX 5000 F: GYJ101206
	Ex me ia IIC T6...T3
	OPTIFLUX 5300 C: GYJ101207
	Ex de ia IIC T6...T3
Other approvals and standards	
Custody transfer	Standard: without verification
	Only in combination with IFC 300 converter.
	Option: MI-001, MI-005 type examination certificate
Protection category acc. to IEC 529 / EN 60529	Standard: IP 66/67 (NEMA 4/4X/6) IFC100 Stainless Steel: IP 67/69
	Option: IP 68 (NEMA 6P)
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.

6.3 Dimensions and weights

Remote version		<p>a = 88 mm / 3.5"</p> <p>b = 139 mm / 5.5" ①</p> <p>c = 106 mm / 4.2"</p> <p>Total height = H + a</p>
Compact version with : IFC 300		<p>a = 155 mm / 6.1"</p> <p>b = 230 mm / 9.1" ①</p> <p>c = 260 mm / 10.2"</p> <p>Total height = H + a</p>
Compact version with : IFC 100 (0°)		<p>a = 82 mm / 3.2"</p> <p>b = 161 mm / 6.3"</p> <p>c = 257 mm / 10.1" ①</p> <p>Total height = H + a</p>
Compact version with : IFC 100 (45°)		<p>a = 186 mm / 7.3"</p> <p>b = 161 mm / 6.3"</p> <p>c = 184 mm / 7.3" ①</p> <p>Total height = H + a</p>

<p>Compact version with stainless steel IFC 100 (10°)</p>		<p>a = 100 mm / 4" b = 187 mm / 7.36" ① c = 270 mm / 10.63" Total height = H + a</p>
<p>Compact version with : IFC 050 (10°)</p>		<p>a = 100mm / 4" b = 157 mm / 6.18" ① c = 260 mm / 10.24" Total height = H + a</p>

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

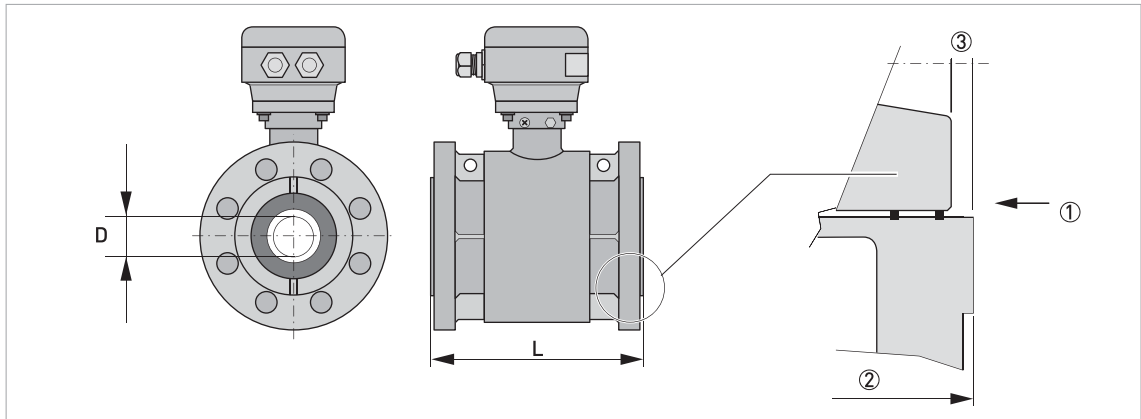


Figure 6-2: Construction details

- ① Detail ceramics / flange / gaskets, see options in following illustration
- ② Length tolerances (see table on following pages)
- ③ Gasket area

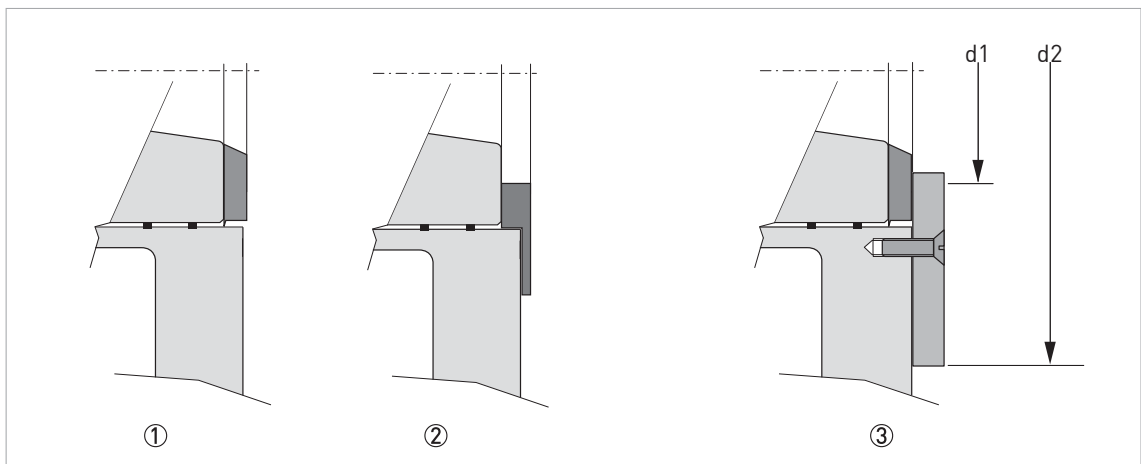


Figure 6-3: Details of gasket options

- ① PTFE (white) sealing ring
- ② Filled (blue) PTFE sealing ring
- ③ DN150...300 / 6...12" ; optional spacer ring with gasket



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

Size	Dimensions [mm]							Approx. weight [kg]
DN	L + *	tolerance	H	W	D	Ød1	Ød2	
15	150	A	127	95	12	-	-	3
25	150	A	143	115	20	-	-	4
40	150	A	168	150	30	-	-	6
50	200	A	184	165	40	-	-	9
80	200	A	217	200	60	-	-	15
100	250	A	242	220	80	-	-	21
150	250	B	355	283	150	150	215	37
200	300	B	396	342	200	198	270	53
250	350	B	458	395	250	250	322	87
300	450	B	493	445	300	300	375	145

**INFORMATION!***L + **

- Add approximately 2 x 7.5 mm to L when using spacer rings (option for DN150...300)
- Add approximately 2 x 1.45 mm to L when using filled blue PTFE gaskets (optional)

**INFORMATION!***Tolerances A & B*

- *A = +0.8 / -0.4 mm (+0.031 / -0.016 inches)*
- *B = +0.5 / -1.0 mm (+0.02 / -0.04 inches)*

ASME B 16.5 150 lb

Size	Dimensions [inches]							Approx. weight [lb]
inch	L + *	tolerance	H	W	D	Ød1	Ød2	
1"	5.91	A	5.47	4.25	0.79	-	-	8.8
1½"	5.91	A	6.18	5	1.18	-	-	13.2
2"	7.87	A	6.89	6	1.57	-	-	19.8
3"	7.87	A	8.39	7.5	2.36	-	-	33.1
4"	9.84	A	9.65	9	3.15	-	-	46.3
6"	9.84	B	13.98	11	5.91	6.06	8.46	81.6
8"	11.81	B	15.59	13.5	7.80	7.99	10.63	116.8
10"	13.78	B	18.03	16	9.84	10.08	12.68	191.8
12"	17.72	B	19.41	19	11.81	12.05	14.76	366

ASME B 16.5 300 lb

Size	Dimensions [inches]							Approx. weight [lb]
inch	L + *	tolerance	H	W	D	Ød1	Ød2	
½"	5.91	A	5.0	3.74	0.47	-	-	6.8
1"	5.91	A	5.91	4.92	0.79	-	-	8.8
2"	7.87	A	7.20	6.50	1.57	-	-	22.9
3"	7.87	A	8.86	8.27	2.36	-	-	40.6
1½": not possible because of ASTM-NUT								

**INFORMATION!***L + **

- Add approximately 2 x 0.3 " to L when using spacer rings (option for 6"...12")
- Add approximately 2 x 0.055 " to L when using filled blue PTFE gaskets (optional)

**INFORMATION!***Tolerances A & B*

- *A = +0.8 / -0.4 mm (+0.031 / -0.016 inches)*
- *B = +0.5 / -1.0 mm (+0.02 / -0.04 inches)*

**CAUTION!**

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

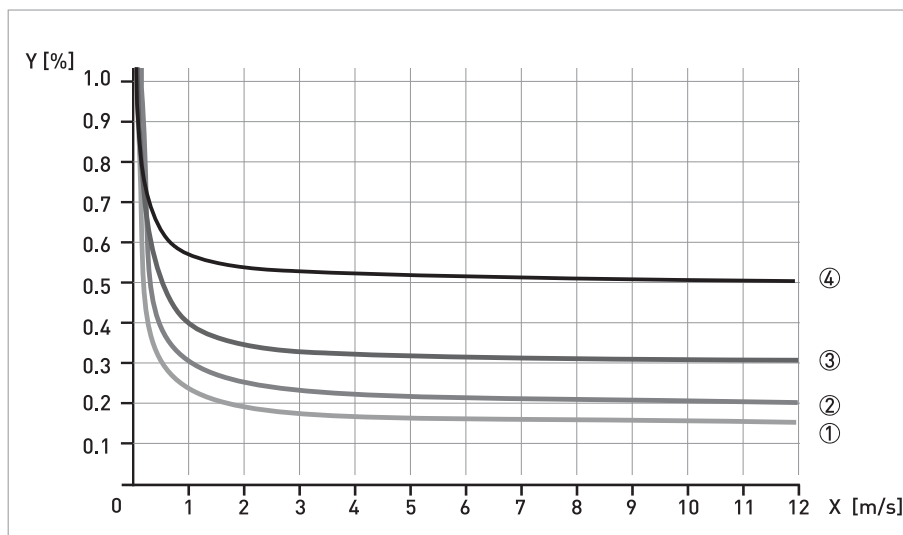
6.4 Measuring accuracy

Every electromagnetic flowmeter is calibrated by direct volume comparison. The wet calibration validates the performance of the flowmeter under reference conditions against accuracy limits.

The accuracy limits of electromagnetic flowmeters are typically the result of the combined effect of linearity, zero point stability and calibration uncertainty.

Reference conditions

- Medium: water
- Temperature: +5...35°C / +41...95°F
- Operating pressure: 0.1...5 barg / 1.5...72.5 psig
- Inlet section: ≥ 5 DN
- Outlet section: ≥ 2 DN



Y [m/s]: flow velocity

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

Compact with IFC 300	Accuracy	Curve
DN15...100 / ½...4"	$\pm 0.15\%$ of MV + 1 mm/s	①
DN150...300 / 6...12"	$\pm 0.2\%$ of MV + 1 mm/s	②

Compact with IFC 100	Accuracy	Curve
DN15...300 / ½...12"	$\pm 0.3\%$ of MV + 1 mm/s	③

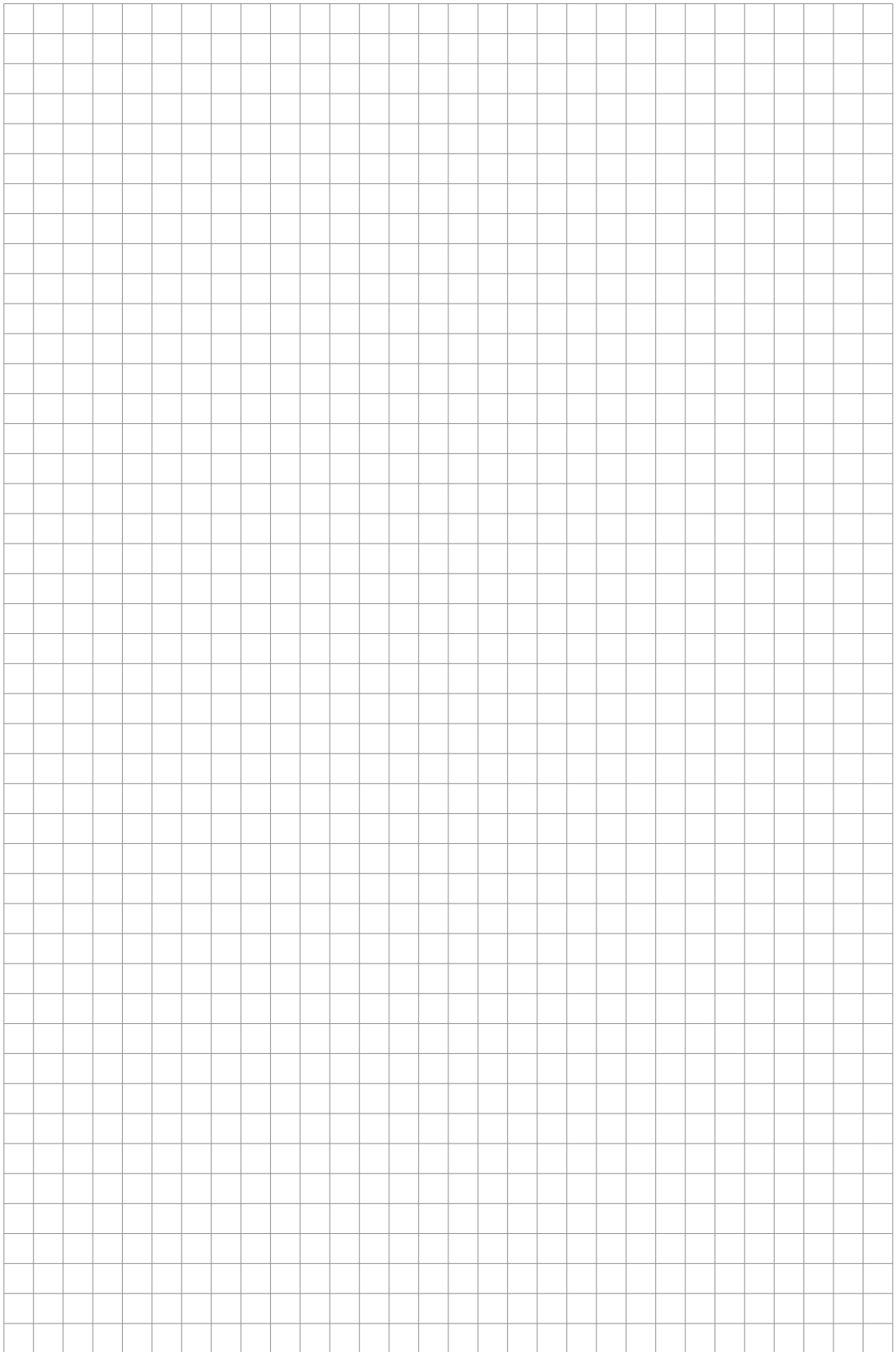
Compact with IFC 050	Accuracy	Curve
DN15...300 / ½...12"	$\pm 0.5\%$ of MV + 1 mm/s	④



INFORMATION!

Optionally for IFC 050 and IFC 100; extended calibration at 2 points for optimised accuracy. For more details on optimised accuracy, see the concerning signal converter documentation.









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