



POWERFLUX 4000 Handbook

Electromagnetic flow sensor

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 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 CE declaration 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 Grounding rings (optional)
- ⑤ Signal cable (remote versions only)

**INFORMATION!**

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

2.2 Device description

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

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

**INFORMATION!**

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



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

The POWERFLUX is available in different sizes and constructions;

The following versions are available:

- Sensor and converter (remote version)
- Converter only

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

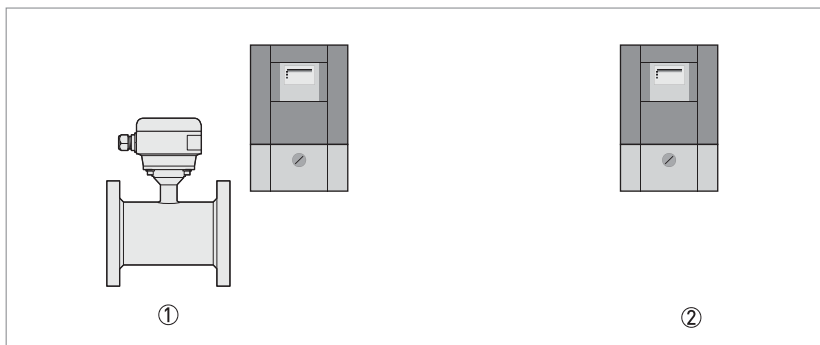


Figure 2-2: Device version

- ① Sensor and converter
② Only converter

2.3 Nameplate measuring sensor (example)

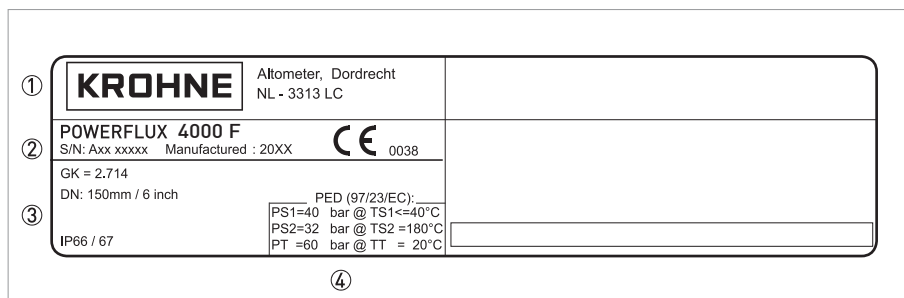


Figure 2-3: Example nameplate sensor

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

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.

Flowmeter

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

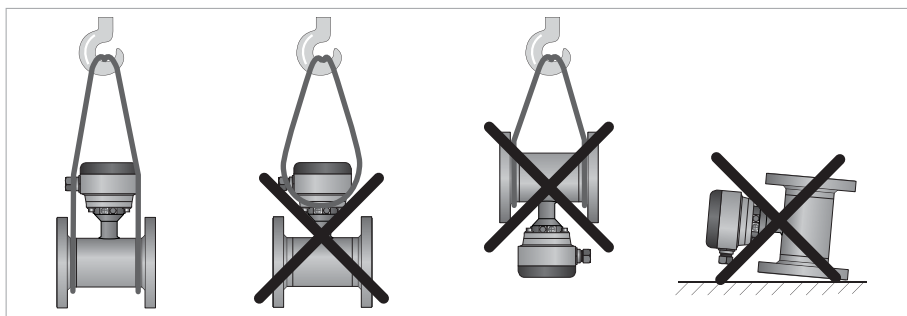


Figure 3-1: Transport

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

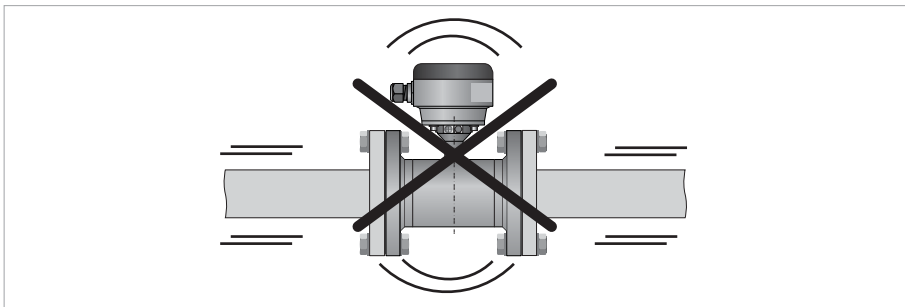


Figure 3-2: Avoid vibrations

3.5.2 Magnetic field

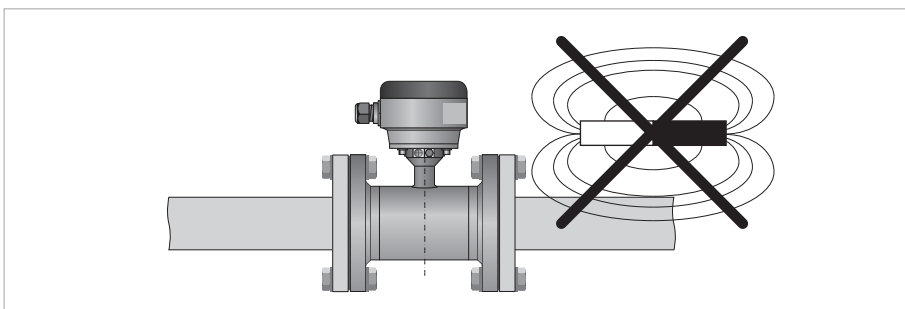


Figure 3-3: Avoid magnetic fields

3.6 Installation conditions



CAUTION!

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

3.6.1 Inlet and outlet

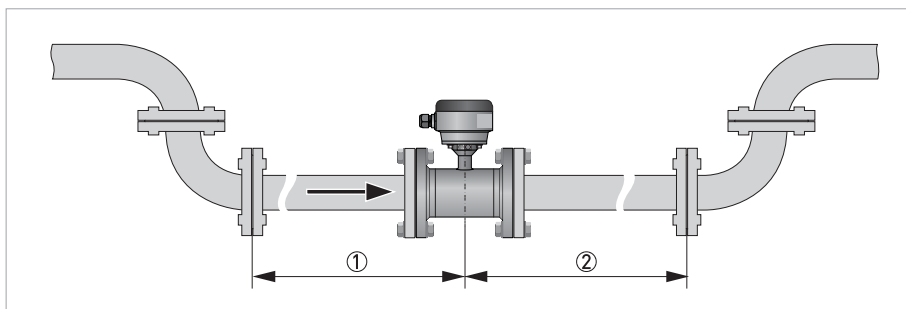


Figure 3-4: Recommended inlet and outlet

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

3.6.2 Bends in 2 or 3 dimensions

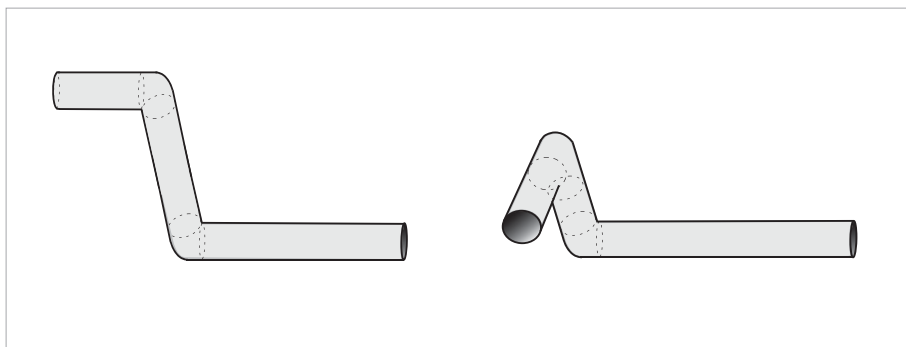


Figure 3-5: Inlet when using 2 and/or 3 dimensional bends upstream of the flowmeter

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



INFORMATION!

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

3.6.3 T-section

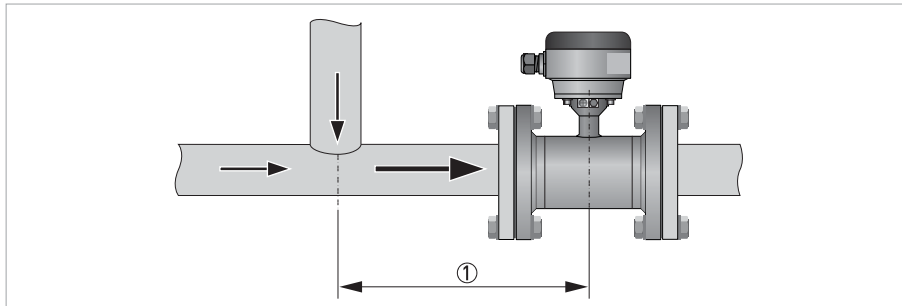


Figure 3-6: Distance behind a T-section

① $\geq 10 \text{ DN}$

3.6.4 Bends

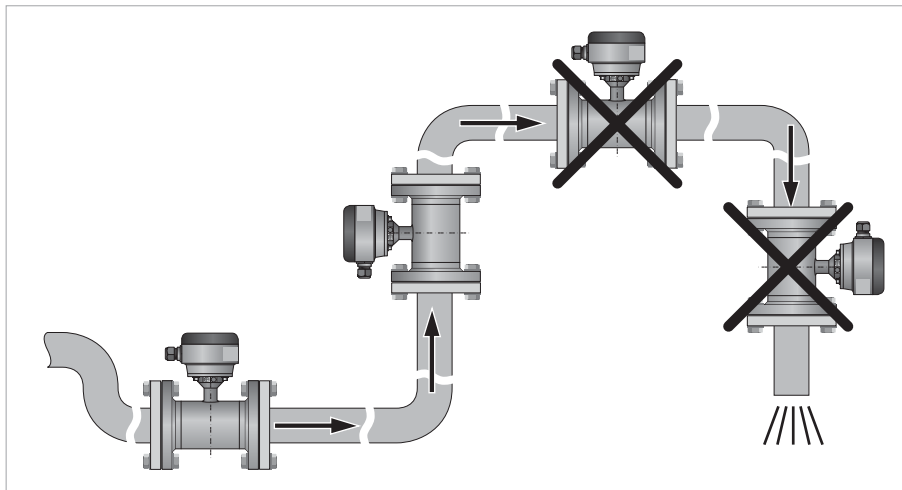


Figure 3-7: Installation in bending pipes

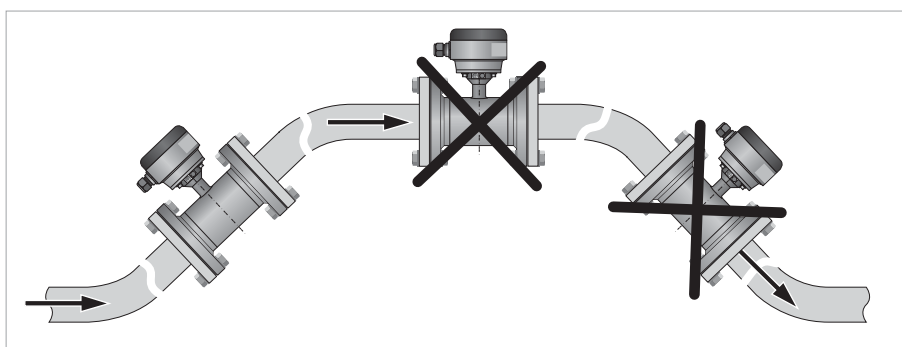


Figure 3-8: Installation in bending pipes



CAUTION!
Avoid draining or partial filling of the flow sensor

3.6.5 Open feed or discharge

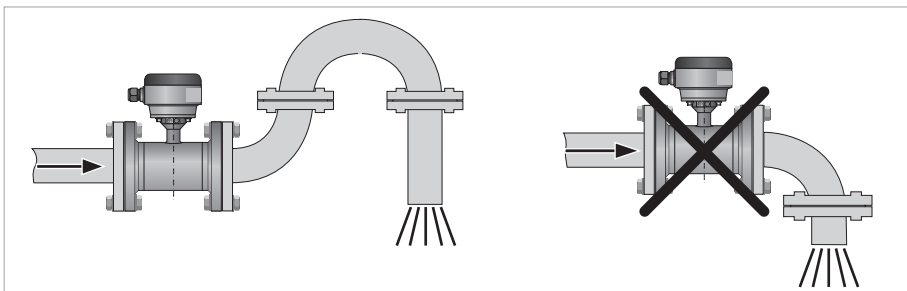


Figure 3-9: Installation in front of an open discharge

3.6.6 Flange deviation

**CAUTION!**

Max. permissible deviation of pipe flange faces:

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

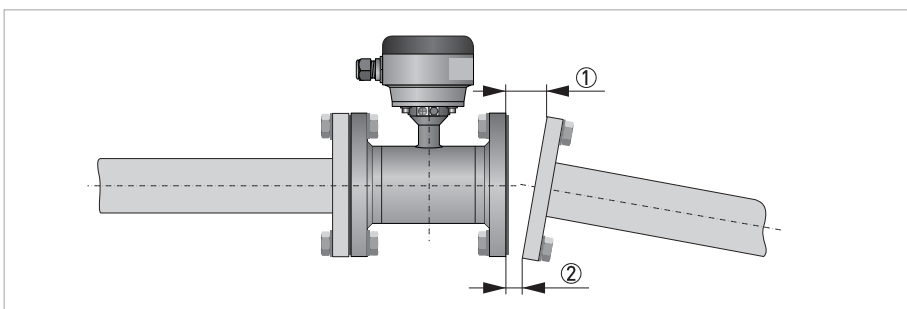


Figure 3-10: Flange deviation

- ① L_{max}
- ② L_{min}

3.6.7 Control valve

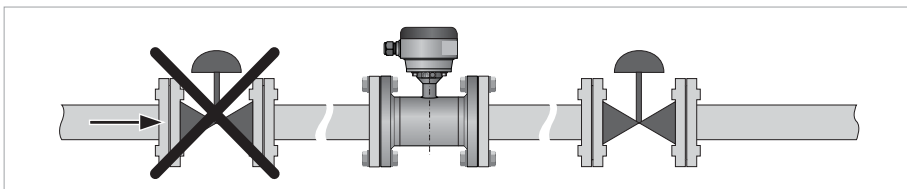


Figure 3-11: Installation in front of a control valve

3.6.8 Pump

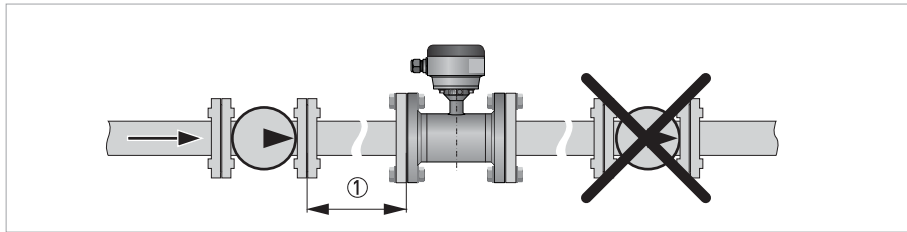


Figure 3-12: Installation behind a pump

① Inlet: ≥ 3 DN

3.6.9 Air venting and vacuum forces

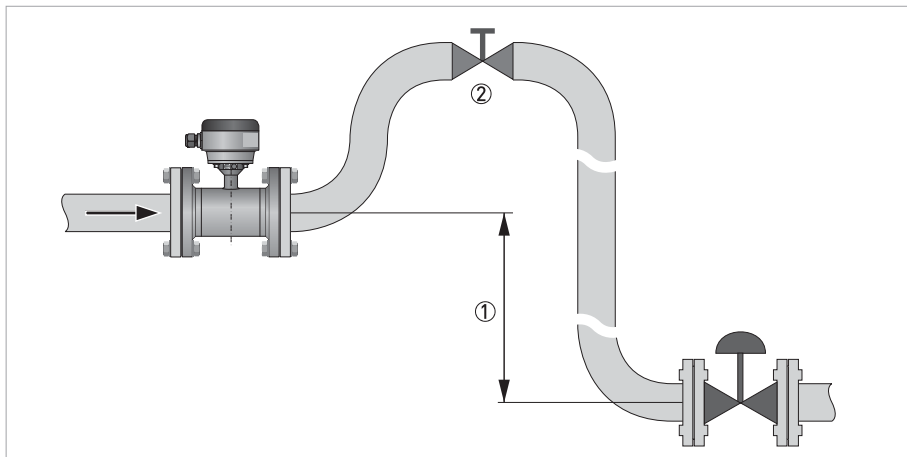


Figure 3-13: Air venting

① ≥ 5 m

② Air ventilation point

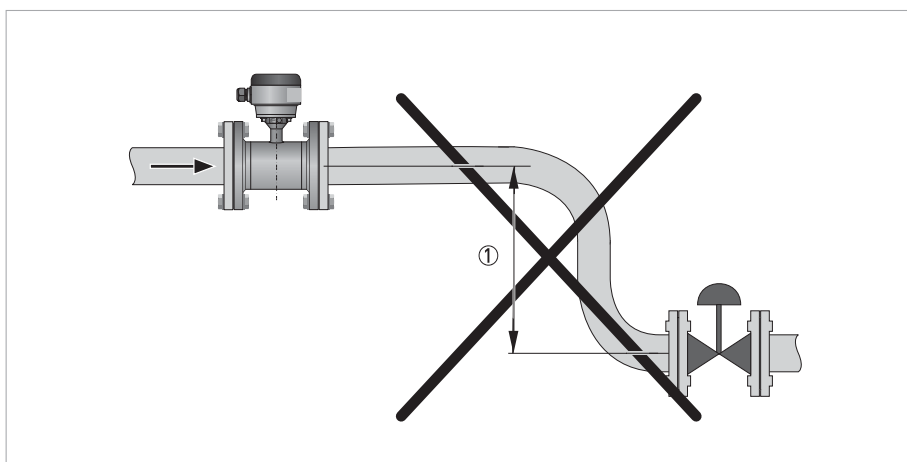


Figure 3-14: Vacuum

① ≥ 5 m

3.6.10 Mounting position

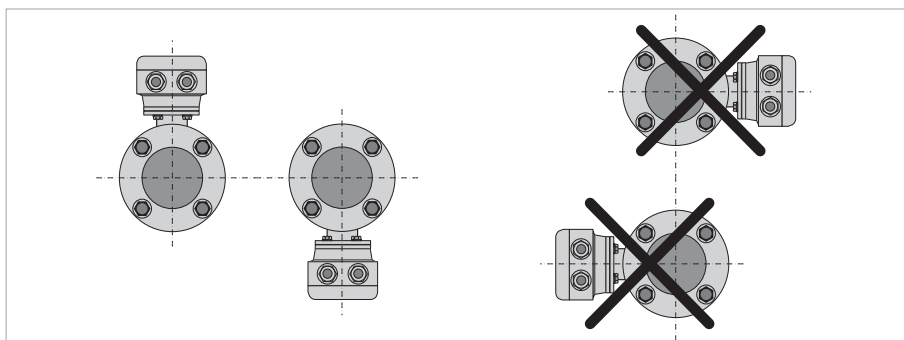


Figure 3-15: Mounting position

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

3.7 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.

3.7.1 Torques and pressures

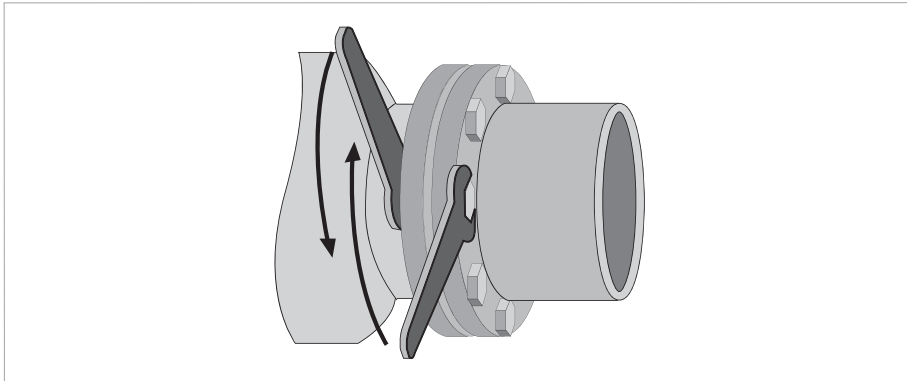


Figure 3-16: Tightening of bolts

**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.

**INFORMATION!**

Other sizes / pressure ratings on request.

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

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

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

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

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

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

② Information *; please contact the support service department



INFORMATION!

Other sizes / pressure ratings on request.



CAUTION!

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

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.

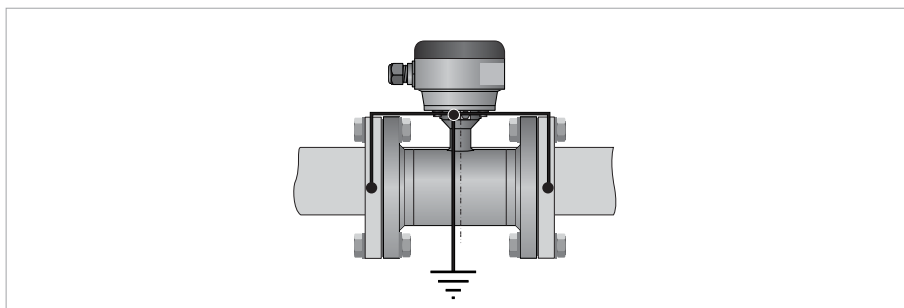


Figure 4-1: Grounding

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

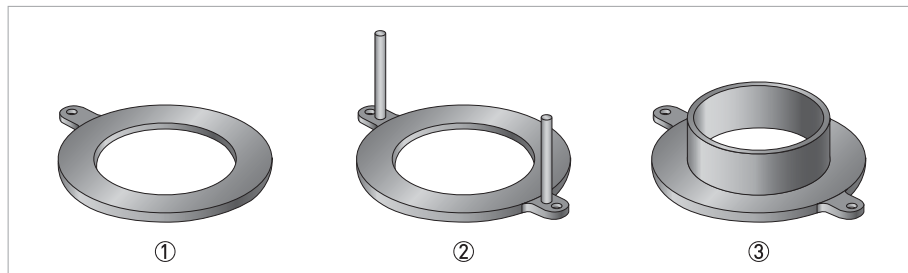


Figure 4-2: Different types of grounding rings

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

Grounding ring number 1:

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

Grounding ring number 2:

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

Grounding ring number 3:

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

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

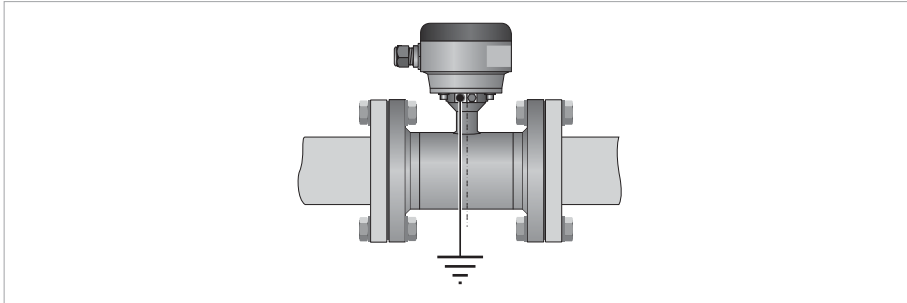


Figure 4-3: Virtual reference

Minimum requirements:

- Size: $\geq \text{DN}10$
- Electrical conductivity: $\geq 200 \mu\text{S/cm}$
- 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 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 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.*



CAUTION!

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 is safe to handle and stating the product used.*

5.3.2 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:	☐	radioactive	
	☐	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.

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.

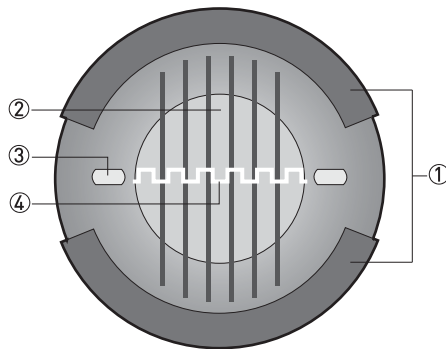


Figure 6-1: Measuring principle

- 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
Application range	Electrically conductive fluids
Measured value	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

Design

Features	Fully welded maintenance-free sensor.
	Flange version with full bore flow tube.
	Standard as well as higher pressure ratings.
	Broad range of nominal sizes.
	Industry specific insertion lengths.
Modular construction	The measurement system consists of a flow sensor and a signal converter. It is only available as a separate version.
Remote version	With AFC 030 converter: POWERFLUX 4030 W In field (F) version with IFC 300: POWERFLUX 4300 F
Nominal diameter	DN25...1000 / 1...40"

Measuring accuracy	
Maximum measuring error	These values are related to the pulse / frequency output.
	Related to volume flow (MV = Measured Value)
	With AFC 030 converter:
	DN2.5:...1000 $\pm 1\%$ of MV + 2.5 mm/s
	With IFC 300 converter:
	DN2.5:...15 $\pm 0.3\%$ of MV + 2 mm/s
	DN25:...1000 $\pm 0.2\%$ of MV + 1 mm/s
	The additional typical measuring deviation for the current output is $\pm 10 \mu\text{A}$.
	The maximum measuring error depends on the installation conditions.
	For detailed information refer to <i>Measurement accuracy</i> on page 32
Repeatability	$\pm 0.5\%$ of MV, minimum 1 mm/s
Calibration	Standard:
	Two point calibration by direct volume comparison.
Long term stability	$\pm 0.3\%$ of MV
Special calibration / Verification	On request.

Operating conditions

Temperature	
Process temperature	ETFE: -40...+120°C / -40...+248°F PFA: -40...+180°C / -40...+356°F
Ambient temperature	Standard (with stainless steel connection box) : -40...+55°C / -40...+130°F
Storage temperature	-50...+70°C / -58...+158°F
Measurement range	-12...+12 m/s / -40...+40 ft/s
Pressure	
EN 1092-1	DN200...700: PN 10
	DN65 and DN100...150: PN 16
	DN2.5...50 and DN80: PN 40
	Other pressures on request.
ASME B16.5	1/10...24": 150 lb RF
	Other pressures on request.
JIS	DN50...1000: 10 K
	DN2.5...40: 20 K
	Other pressures on request.
Vacuum load	ETFE:
	100 mbara (+40...+120°C), $P_{\max}$; 150 bar
	1.5 psia (+104...+248°F), $P_{\max}$; 2176 psi
	PFA
	0 mbara (+40...+180°C), $P_{\max}$; 50 bar
	0 psia (+104...+356°F), $P_{\max}$; 725 psi
Pressure loss	Negligible

Chemical properties	
Physical condition	Electrically conductive liquids
Electrical conductivity	Water: $\geq 20 \mu\text{S/cm}$
	Other than water: $\geq 1 \mu\text{S/cm}$

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 33

Materials

Sensor housing	Standard: Stainless steel
	Other materials on request.
Measuring tube	Austenitic stainless steel
Flanges	Standard: Stainless steel
	Other materials on request.
Liner	Standard: ETFE, DN25...1000
	Option: PFA, DN2.5...15
Protective coating	On exterior of the meter: flanges, housing, signal converter (compact version) and / or connection box (field version)
	Standard: siloxane coating
	according: ISO 12944-2 :2007 Category 3, Medium / C4 Low
Connection box	Stainless steel
Measuring electrodes	Standard: Hastelloy® C
	Option: Platinum, stainless steel, titanium, tantalum, low noise
	Other materials on request.
Grounding rings	Standard : Stainless steel
	Option: Hastelloy® C, titanium, tantalum
	Grounding rings can be omitted with virtual reference option for the IFC 300 converter.
Reference electrode (optional)	Standard: Hastelloy® C
	Option: Platinum, stainless steel, titanium, tantalum, low noise
	Other materials on request.

Process connections

Flange	
EN 1092-1	DN2.5...1000 in PN 6...40
ASME	1/10...40" in 150...900 lbs RF
JIS	DN2.5...1000 in JIS 10...20 K
Design of gasket surface	RF
	Other sizes or pressure ratings on request.

Electrical connections	
Signal cable	
Type A (DS and DS-L)	In combination with the IFC 300 and AFC 030 signal converter
	Standard cable, double shielded. Max. length: 600 m / 1950 ft (dep. on electrical conductivity and measuring sensor).
	For detailed information refer to the documentation of the relevant signal converter.
Type B (BTS)	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).
	For detailed information refer to the documentation of the relevant signal converter.
I/O	For full details of I/O options, including data streams and protocols, see the technical data sheet of the relevant signal converter.
Others	For detailed information of the connection cables of the AFC 030 see the manual of the signal converter.

Approvals and certificates	
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.
Nuclear approvals	
EMC	IEC 61000-4
Radiation	ETFE: TID 5E+06 Rad
	PFA: TID 1E+06 Rad
Vibration	EN 60068-2-6
Seismic	IEC 60980 - 1989 [300 m/s ²]
Fire	Nf C32-070: C1 (on request, for non-standard cabling only)
Other approvals and standards	
Protection category acc. to IEC 529 / EN 60529	Standard:
	IP 66/67 [NEMA 4/4X/6]
Vibration resistance	IEC 68-2-64
Random vibration test	IEC 68-2-34
Shock test	IEC 68-2-27

6.3 Measurement 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

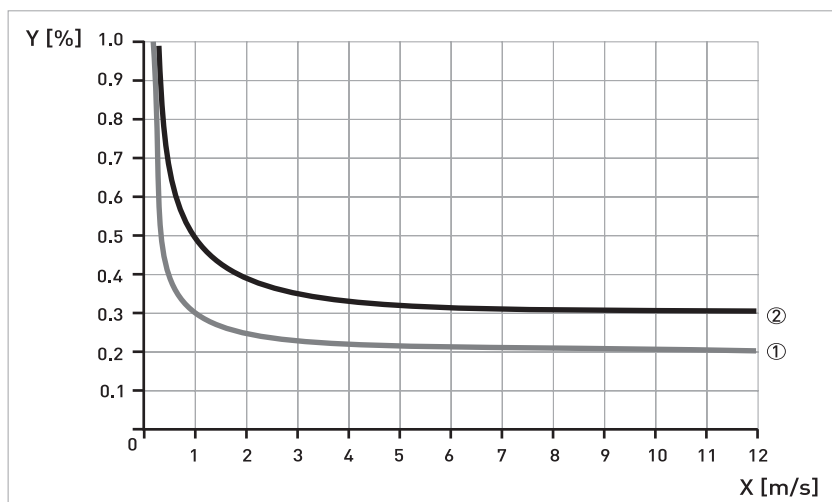


Figure 6-2: X [m/s] : flow velocity
Y [%]: deviation from the actual measured value (mv)

Accuracy with signal converter IFC 300

Flow sensor diameter	Accuracy	Curve
DN25...1000 / 1...40"	0.2% + 1 mm/s	①
DN2.5...15 / 1/10.. 1/2"	0.3% + 2 mm/s	②

AFC 030 accuracy

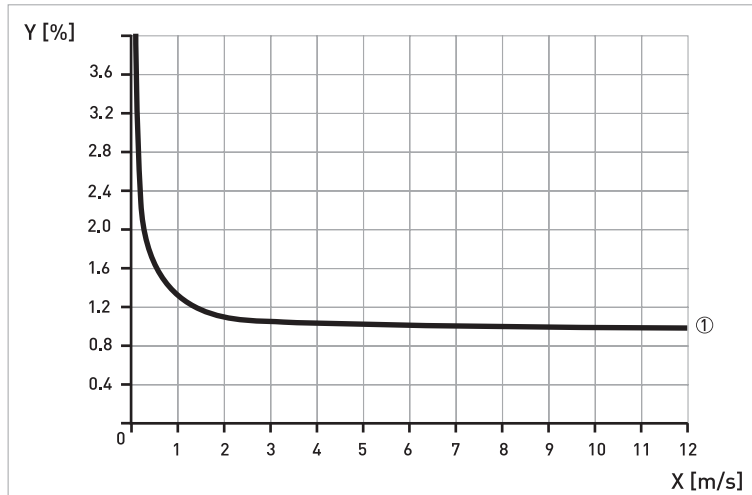
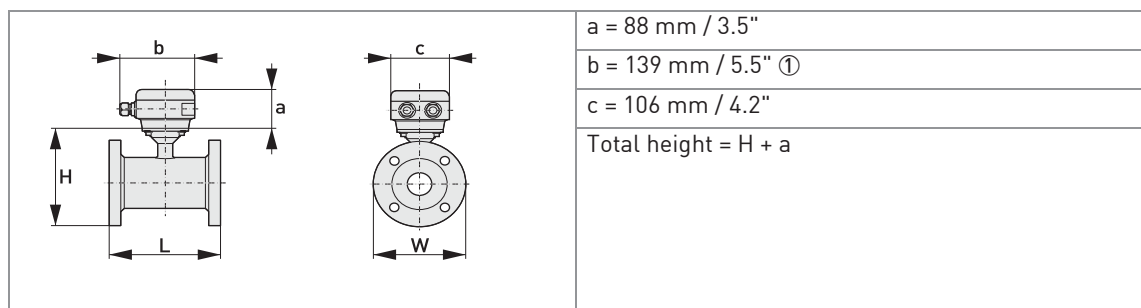


Figure 6-3: X [m/s] : flow velocity

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

① Minimal accuracy 1% of measured value + 2.5 mm/s

6.4 Dimensions and weights



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

**INFORMATION!**

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

EN 1092-1

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

Table 6-1: ① 150 mm for construction according to order code VN03 (contact sales).

150 lb flanges

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

Table 6-2: ① 5.91" for construction according to order code VN03 (contact sales).

**CAUTION!**

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

300 lb flanges

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

Table 6-3: ① 5.91" for construction according to order code VN03 (contact sales).

**CAUTION!**

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









KROHNE – Process instrumentation and measurement solutions

- Flow
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