WATERFLUX 3000 Technical Datasheet

Electromagnetic flowmeter

- Easy installation without straight inlet or outlet lengths
- For installation in small spaces
- Wide range of approvals for potable water

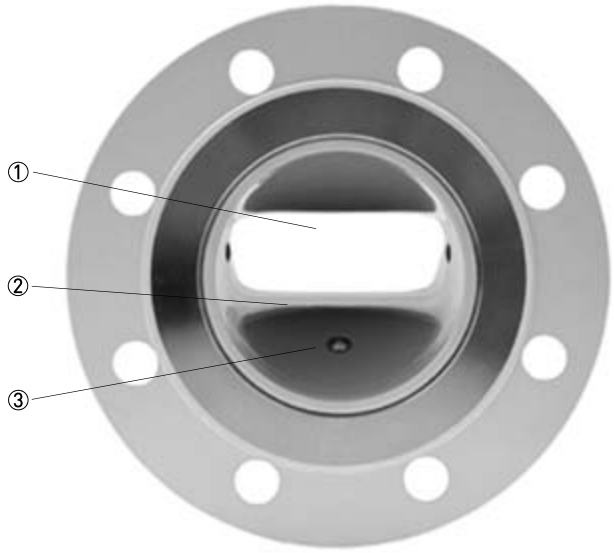
The documentation is only complete when used in combination with the relevant documentation for the signal converter.

1.1 The flow sensor with an unique rectangular design

The strenghts of the **WATERFLUX 3000** sensor lies in its unique construction with a rectangular and reduced cross section and its efficient coil construction. The coils provide a stronger and more homogeneous magnetic field, leading to an improved signal to noise ratio. The measurement is therefore independent of the flow profile and measurements are very stable. This results in a very good low flow performance.

Because of the unique WATERFLUX 3000 flow sensor design, whereby the mean flow velocity and flow profile are optimized within the rectangular and reduced cross section, the additional uncertainty for upstream disturbances is drastically reduced. The water meter can be installed directly behind an elbow or reducer in the pipe without straight inlet or outlet lengths. A substantial reduction of inlet and outlet sections means smaller measurement pits.

The Rilsan® coating of the flow sensor is chemically resistant, durable and maintenance-free, flexible and tough, smooth and pore-free and free of solvents. The coating is widely used in the water industry and has received a wide range of drinking water certifications.



① Unique flow sensor design with rectangular cross section
② Rilsan® coating
③ Built-in reference electrode

Highlights

- Unique rectangular sensor construction results in good low flow performance and a large turndown ratio
- Large measuring range. High accuracy at peak flows during the day and at low flows during the night
- Compliant with requirements for custody transfer (MID MI-001, IS4064, EN 14154)
- Standard inhouse wet calibration
- Optional verification to MID Annex MI-001 for water meters (Module B and D)
- No inlet or outlet sections required when installed e.g. behind an elbow or reducer
- Bi-directional flow measurements
- Reference electrode. No grounding rings needed
- Suitable for subsoil installation and constant flooding (IP68).
- Special subsoil coating for subsurface installation
- Rilsan® polymer coating
- Drinking water approvals including ACS, DVGW, NSF, TZW and WRAS
- Long term reliability and maintenance free.
  No moving parts, no wear and no obstruction in the flow

Industries

- Water abstraction
- Distribution networks
- District metering
- Revenue metering

Applications

- Measurement of potable water
- Measurement of raw water and irrigation water
- Outlet of water purification plants
- Monitoring of distribution networks
- Water consumption and billing

1.2 Options

Remote or compact version
The WATERFLUX 3100 or 3300 is available in a compact or remote (field) version. The remote version of the signal converter can be installed on a wall, a pipe or in a rack. The functionality of the compact and the remote version is identical.

Mains or battery powered
Where mains power is available, the WATERFLUX 3000 sensor can be combined with the IFC 100 and IFC 300 signal converter. The WATERFLUX 3000 sensor can also be combined with the battery powered IFC 070 signal converter. For detailed information on the battery powered WATERFLUX 3070 please refer to the relevant documentation.

Maintenance free and buriable
The flow sensor (IP68) is suitable for submersible in flooded measurement chambers. With its robust construction it can also be buried underground. This can be a major cost saving as it eliminates the need for a measurement chamber. To protect the flow sensor a special coating can be ordered as an option. The remote version has an IP68 stainless steel connection box.

EC type-examination Certificate

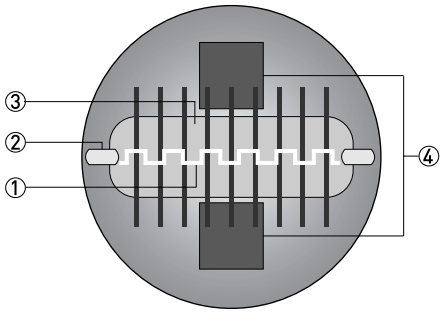
Custody transfer
In combination with the IFC 300 signal converter the WATERFLUX 3000 can be used for custody transfer applications. Optionally the WATERFLUX 3300 can be verified according to Annex MI-001 of the Measuring Instrument Directive (MID). All water meters for legal metrology purposes in Europe require certification under the MID.

1.3 Measuring principle

An electrically conductive fluid flows inside an electrically insulated pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils. Inside of the fluid, a voltage U is generated:
U = v * 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.



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

Rectangular cross section

The minimal height of the measuring tube decreases the distance between the field coils (4), resulting in a stronger and more homogeneous magnetic field (3). In addition, the mean flow velocity v increases due to the rectangular and reduced cross section. The large electrode spacing (D) and the increased flow velocity results in a higher magnetic signal voltage, also in the presence of a low flow rate.

2.1 Technical data

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.*
- *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
Measured value	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

Design

Features	Unique rectangular flow tube design providing improved flow profile and signal to noise ratio resulting in highest accuracy and large turndown ratio
	Rilsan® polymer coated flow tube approved for drinking water
	No internal or moving parts
	Built-in reference electrode with floating potential design
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 100 converter: WATERFLUX 3100 C
	With IFC 300 converter: WATERFLUX 3300 C
	With IFC 070 converter: WATERFLUX 3070 C (For detailed information refer to the documentation of the WATERFLUX 3070)
Remote version	In wall (W) mount version with IFC 100 converter: WATERFLUX 3100 W
	In field (F), wall (W) or rack (R) mount version with IFC 300 converter: WATERFLUX 3300 F, W or R
	In field (F) version with IFC 070 converter: WATERFLUX 3070 F (For detailed information refer to the documentation of the WATERFLUX 3070)
Nominal diameter	DN25...300 / 1...12"

Measuring accuracy

Reference conditions	Flow conditions similar to EN 29104
	Temperature: +10...30°C / +50...86°F
	Electrical conductivity: ≥ 300 µS / cm
Maximum measuring error	IFC 100: down to 0.3% of the measured value ± 0.5 mm/s
	IFC 300: down to 0.2% of the measured value ± 0.5 mm/s
	The maximum measuring error depends on the installation conditions.
	For detailed information refer to *Measurement accuracy* on page 16.
Repeatability	±0.1% (v >0.5m/s / 1.5 ft/s)
Calibration / Verification	**Standard:**
	Each meter is standard calibrated by a direct volume comparison.
	Option:
	Verification to Measurement Instrument Directive (MID), Annex MI-001. Standard: Verification at Ratio (Q3/Q1) = 80, Q3 ≥ 2 m/s Optional: Verification at Ratio (Q3/Q1) > 80 on request
	Only in combination with the IFC 300 signal converter
MID Annex MI-001 (Directive 2004/22/EC)	**EC-Type examination certificate to MID Annex MI-001**
	Only in combination with the IFC 300 signal converter
	Diameter range: DN25...300
	Minimum straight inlet flow: 0 DN
	Minimum straight outlet flow: 0 DN
	Forward and reverse (bi-directional) flow
	Orientation: any
	Ratio (Q3/Q1) = 400
	Liquid temperature range: +0.1°C / 50°C
	Maximum operating pressure: ≤ DN200: 16 bar, ≥ DN250: 10 bar
	For detailed information refer to *Legal metrology* on page 13.

Operating conditions

Temperature	
Process temperature	-5...+70°C / +23...+158°F
Ambient temperature	**Standard** (with aluminium converter housing):
	-40...+65°C / -40...+149°F
	Protect electronics against self-heating at ambient temperatures above 55°C
	Option (with stainless steel converter housing):
	-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	**Standard:**
	DN250...300: PN 10
	DN25...200: PN 16
	Option:
	DN250...300: PN 16
ASME B16.5	1...12": 150 lb RF
JIS	DN25...300 / 1...12": 10 K
Vacuum load	0 mbar / 0 psi absolute
Pressure loss	For detailed information refer to *Pressure loss* on page 20.
Chemical properties	
Physical condition	Water: drinking water, raw water, irrigation water. For salt water please contact the factory.
Electrical conductivity	≥ 20 µS/cm

Installation conditions

Installation	Assure that the flow sensor is always fully filled.
	For detailed information refer to *Installation* on page 21.
Flow direction	Forward and reverse
	Arrow on flow sensor indicates forward flow direction.
Inlet run	≥ 0 DN
	For detailed information refer to *Measurement accuracy* on page 16.
Outlet run	≥ 0 DN
	For detailed information refer to *Measurement accuracy* on page 16.
Dimensions and weights	For detailed information refer to *Dimensions and weights* on page 18.

Materials

Sensor housing	Sheet steel
Measuring tube	DN25...200: metallic alloy
	DN250...300: stainless steel
Flanges	Steel 1.0460 / 1.0038 (RSt37-2) (Wetted parts nickel plated)
Liner	Rilsan®
Protective coating	On exterior of the meter: flanges, housing, signal converter (compact version)
	Standard: polyurethane coating
	Option: subsoil coating
Connection box	Only for remote versions
	Standard: stainless steel
Measuring electrodes	Standard: stainless steel 1.4301 / AISI 304
	Option: Hastelloy® C
Reference electrode	Standard: stainless steel 1.4301 / AISI 304
	Option: Hastelloy® C
Grounding rings	Grounding rings can be omitted when the reference electrode is used.

Process connections

Flange	
EN 1092-1	**Standard:**
	DN250...300: PN 10
	DN25...200: PN 16
	Option:
	DN250...300: PN 16
ASME	1...12": 150 lb RF
JIS	DN25...300: 10 K
AS 4087 Class 14 AS 2129 Table D & E	DN25...300: on request
	For detailed information of nominal flange pressure and nominal diameter refer to *Dimensions and weights* on page 18.
Other connections	
Thread	DN25: G1" thread connection on request
	DN40: G1.5" & G2" thread connection on request
Other	Weld-on, clamp, oval flanges: on request

Electrical connections

	For full details, including power supply and power consumption etc., see technical datasheet of the relevant converter.
Signal cable (remote versions only)	
Type A (DS)	**In combination with the IFC 100 and the IFC 300 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)	**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).
	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 technical datasheet of the relevant converter.

Approvals and certificates

CE	
	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 : 2001
Other approvals and standards	
Custody transfer	Only in combination with the IFC 300 signal converter.
	MID Annex MI-001 type examination certificate
	Conformity with ISO 4064 and EN 14154
	Innerstaatliche Bauartzulassung als Kältezähler (For Germany and Switzerland)
Drinking water approvals	ACS, DVGW W270, NSF / ANSI Standard 61, TZW, WRAS
Protection category acc. to IEC 529 / EN 60529	**Standard:**
	IP66 / 67 (NEMA 4/4X/6)
	Option:
	IP68 factory (NEMA 6P)
	IP68 field (NEMA 6P)
	IP68 is only available for separate design
Shock test	IEC 68-2-27
Vibration test	IEC 68-2-64

2.2 Legal metrology

*MID Annex MI-001 is **only** available in combination with the IFC 300 signal converter!*

2.2.1 MID Annex MI-001

All new designs of water meters that are to be used for legal purposes in Europe require certification under the Measurement Instrument Directive (MID) 2004/22/EC.
Annex MI-001 of the MID applies to water meters intended for the measurement of volume of clean, cold or heated water in residential, commercial, and light industrial use. An EC-type examination certificate is valid in all countries of the European Union.

The WATERFLUX 3000 has an EC-type examination certificate and can be verified to the MID Annex MI-001 for water meters with diameter DN25...DN300. The conformity assessment procedure followed for the WATERFLUX 3000 is Module B (Type Examination) and Module D (Quality Assurance of the Production Process).

The maximum permissible error on volumes delivered between Q2 (transitional) flow rate and Q4 (overload) flow rate is ±2%.
The maximum permissible error on volumes delivered between Q1 (minimum) flow rate and Q2 (transitional) flow rate is ±5%.

Q1 = Q3 / R

Q2 = Q1 * 1.6

Q3 = Q1 * R

Q4 = Q3 * 1.25

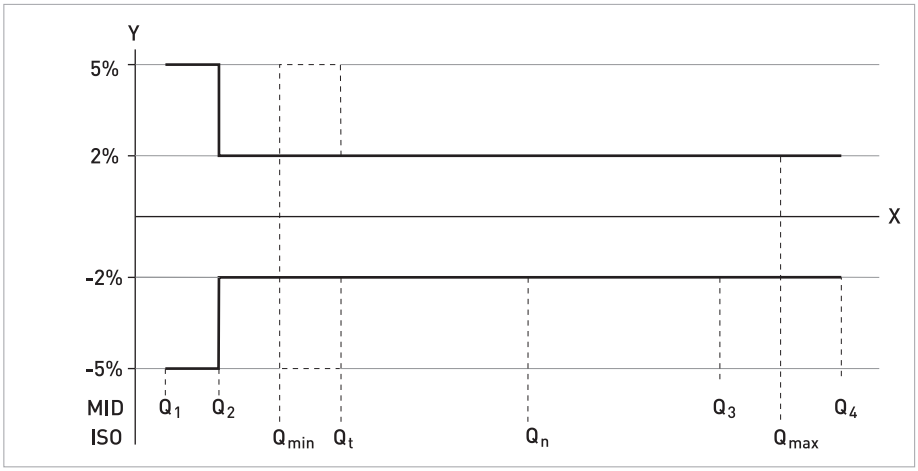


Figure 2-1: ISO flow rates added to figure as comparison towards MID
X: Flow rate
Y [%]: Maximum measuring error

MI-001 certified flow characteristics

DN	Span (R) Q3 / Q1	Flow rate [m^3/h]			
		Minimum Q1	Transitional Q2	Permanent Q3	Overload Q4
25	400	0.025	0.040	10	12.5
25	400	0.040	0.064	16	20.0
40	400	0.063	0.100	25	31.3
40	400	0.100	0.160	40	50.0
50	400	0.100	0.160	40	50.0
50	400	0.158	0.252	63	78.8
65	400	0.158	0.252	63	78.8
65	400	0.250	0.400	100	125.0
80	400	0.250	0.400	100	125.0
80	400	0.400	0.640	160	200.0
100	400	0.400	0.640	160	200.0
100	400	0.625	1.000	250	312.5
125	400	0.625	1.000	250	312.5
125	400	1.000	1.600	400	500.0
150	400	1.000	1.600	400	500.0
150	400	1.575	2.520	630	787.5
200	400	1.575	2.520	630	787.5
200	315	2.540	4.060	800	1000.0
250	400	2.500	4.000	1000	1250.0
300	400	4.000	6.400	1600	2000.0

Verification to MI-001, standard at the following values for R, Q1, Q2 and Q3.
Verification at other values for R and Q3 available on request.

Verification to MI-001

DN	Span (R)	Flow rate [m^3/h]		
		Q1	Q2	Q3
25	80	0.050	0.080	4
32	80	0.125	0.200	10
40	80	0.125	0.200	10
50	80	0.200	0.320	16
65	80	0.313	0.500	25
80	80	0.500	0.800	40
100	80	0.788	1.260	63
125	80	1.250	2.000	100
150	80	2.000	3.200	160
200	80	3.125	5.000	250
250	80	5.000	8.000	400
300	80	7.875	12.600	630

2.3 Measurement 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 water meter calibration certificate.

Reference conditions

- Medium: water
- Temperature: +10...30°C / +50...86°F
- Operating pressure: 1 bar / 14.5 psig

2.3.1 WATERFLUX 3100 and 3300 with straight inlet and outlet sections

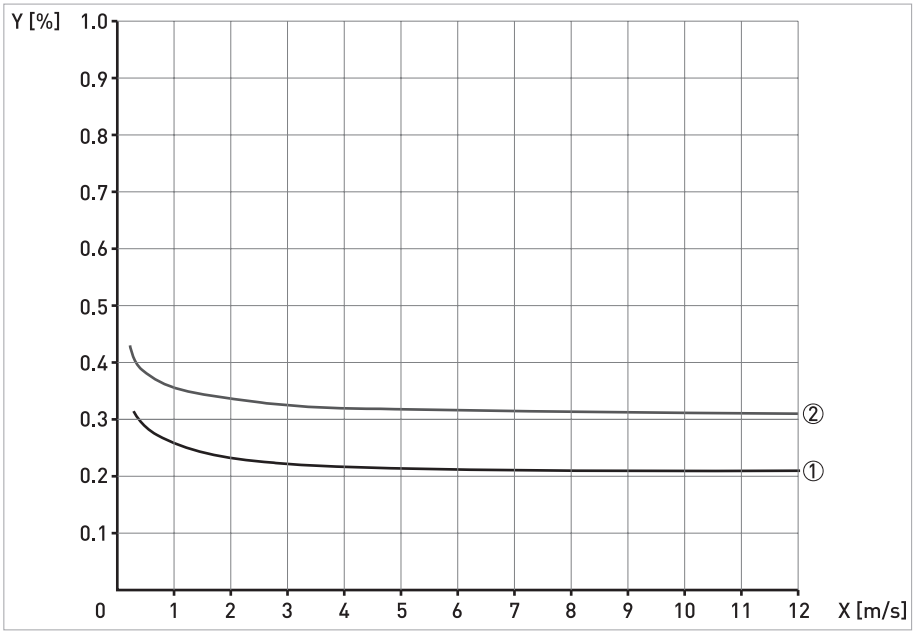


Figure 2-2: Flow velocity vs. accuracy
X [m/s]: flow velocity
Y [%]: deviation from the actual measured value

In combination with the IFC 100	Inlet	Outlet	Accuracy	Curve
DN25...300 / 1...12"	3 DN	1 DN	0.3% of mv +0.5 mm/s	②

In combination with the IFC 300	Inlet	Outlet	Accuracy	Curve
DN25...300 / 1...12"	3 DN	1 DN	0.2% of mv +0.5 mm/s	①

2.3.2 WATERFLUX 3100 and 3300 without straight inlet and outlet sections

Disturbed flow profiles, such as those that occur behind elbows, tee pieces, reducers or valves installed in front of a flowmeter, affect the measuring performance. Therefore it is usually recommended to fit a straight inlet length in front of and straight outlet length behind a flowmeter.

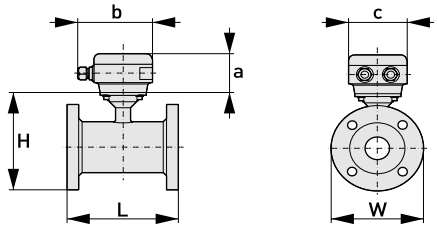
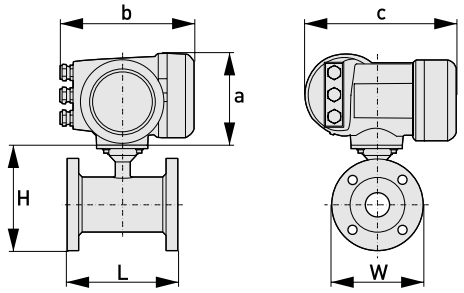
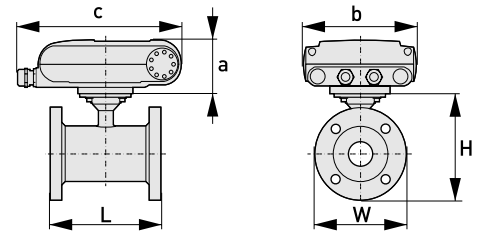
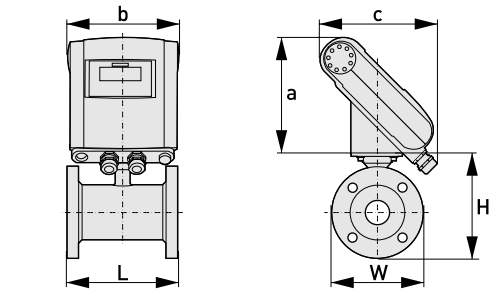
As a result of the unique WATERFLUX flow sensor design, whereby the mean flow velocity and flow profile are optimised within the rectangular and reduced cross section, the additional uncertainty for upstream disturbances are drastically reduced. Therefore the requirements for straight length and in front of and behind a meter are reduced.

The NMi has performed tests with various flow and swirl disturbers according to ISO 4064 and EN 14154. Based on these results the WATERFLUX 3000 has received a

EC-type certificate according MID Annex MI-001

- In combination with the IFC 300 signal converter
- Diameter range DN25...300
- Minimum straight inlet and outlet pipe length of 0 DN
- Bi-directional flow

2.4 Dimensions and weights

Remote version		a = 77 mm / 3.1" b = 139 mm / 5.5" ① c = 106 mm / 4.2" Total height = H + a
Compact version with IFC 300		a = 155 mm / 6.1" b = 230 mm / 9.1" ① c = 260 mm / 10.2" Total height = H + a
Compact version with IFC 100 (0°)		a = 82 mm / 3.2" b = 161 mm / 6.3" c = 257 mm / 10.1" ① Total height = H + a
Compact version with IFC 100 (45°)		a = 186 mm / 7.3" b = 161 mm / 6.3" c = 184 mm / 2.7" ① Total height = H + a

① The value may vary depending on the used cable glands

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

EN 1092-1

Nominal size DN [mm]	Dimensions [mm]			Approx. weight [kg]
	L	H	W	
25	150	150.5	115	5
40	150	165.5	150	5.7
50	200	186	165	13
65	200	200	185	11
80	200	209	200	17
100	250	237	220	17
125	250	266	250	21
150	300	300	285	29
200	350	361	340	36
250	400	408	395	50
300	500	458	445	60

ASME B16.5 / 150 lb

Nominal size [inches]	Dimensions [inches]			Approx. weight [lb]
	L	H	W	
1	5.91	5.83	4.33	18
1½	5.91	6	4.92	21
2	7.87	7.05	5.98	34
3	7.87	8.03	7.50	42
4	9.84	9.49	9.00	56
5	9.84	10.55	10.00	65
6	11.81	11.69	11.00	80
8	13.78	14.25	13.50	100
10	15.75	16.30	16.00	148
12	19.69	18.78	19.00	212

2.5 Pressure loss

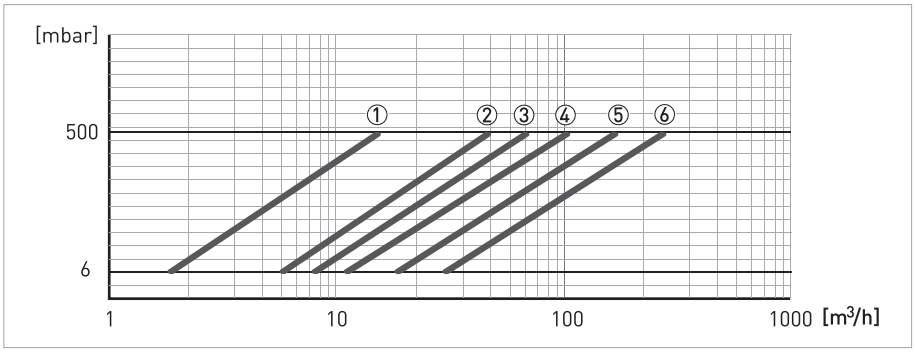


Figure 2-3: Pressure loss between 1 m/s and 9 m/s for DN25...100

① DN25
② DN40
③ DN50
④ DN65
⑤ DN80
⑥ DN100

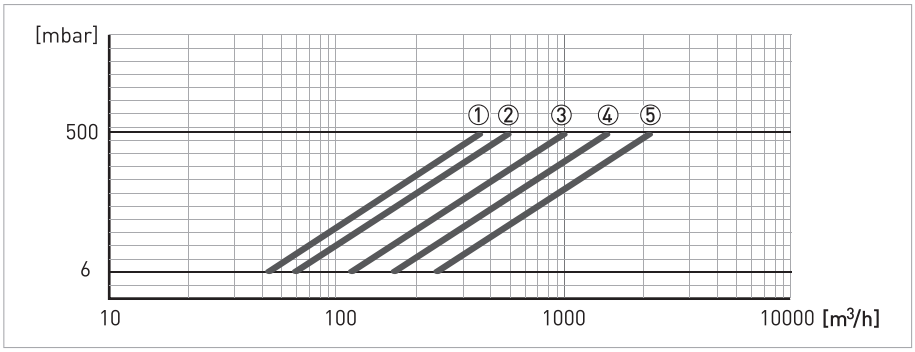


Figure 2-4: Pressure loss between 1 m/s and 9 m/s for DN125...300

① DN125
② DN150
③ DN200
④ DN250
⑤ DN300

3.1 Notes on installation

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

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

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Intended use

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

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

The **WATERFLUX 3000** is designed exclusively to measure the flow of drinking water, raw water and irrigation water.

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

3.3 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

3.4 Installation conditions

3.4.1 General requirements

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.*

3.4.2 Inlet and outlet

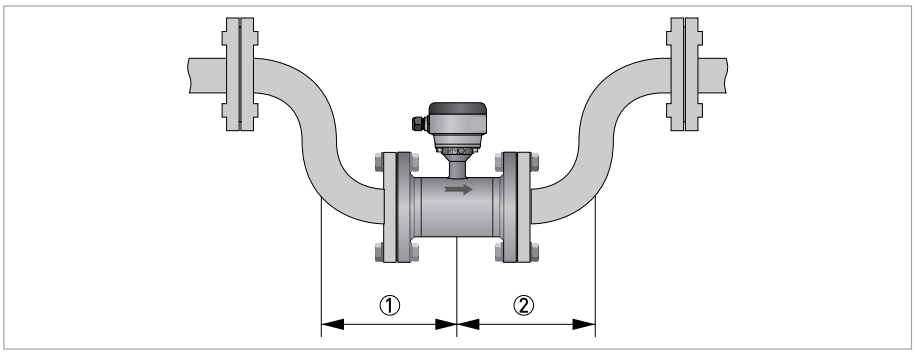


Figure 3-1: Recommended inlet and outlet

① ≥ 0 DN
② ≥ 0 DN

3.4.3 Mounting position

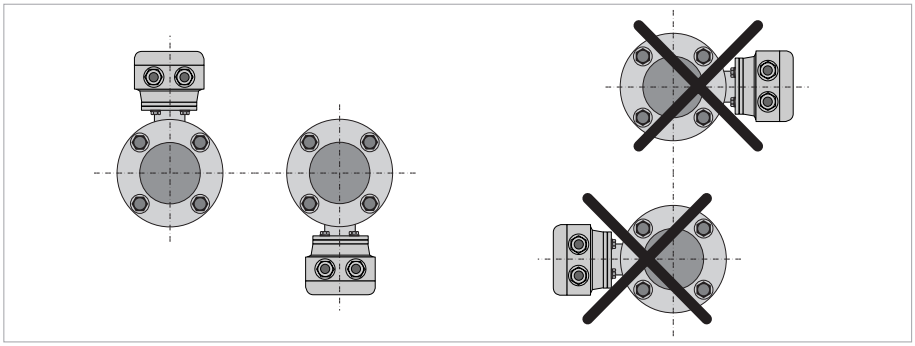


Figure 3-2: Mounting position

3.4.4 Flange deviation

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

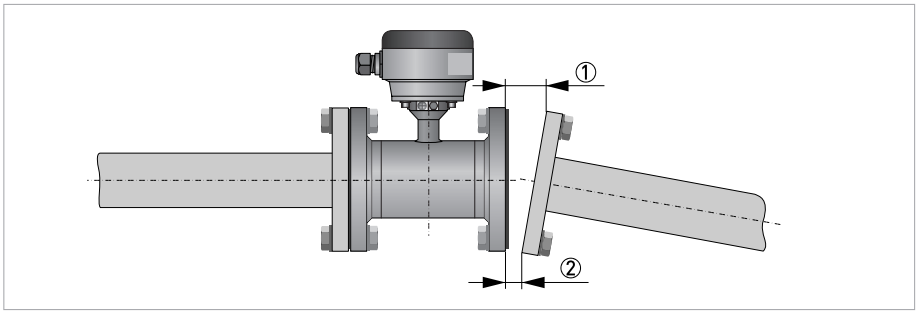


Figure 3-3: Flange deviation

① L_{max}
② L_{min}

3.4.5 T-section

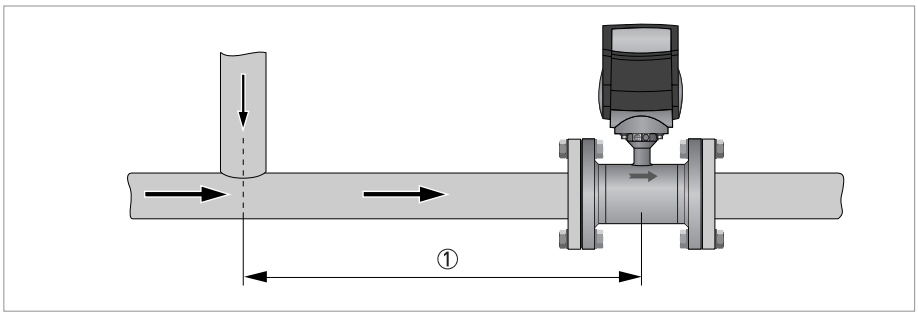


Figure 3-4: Distance behind a T-section

① ≥ 0 DN

3.4.6 Vibration

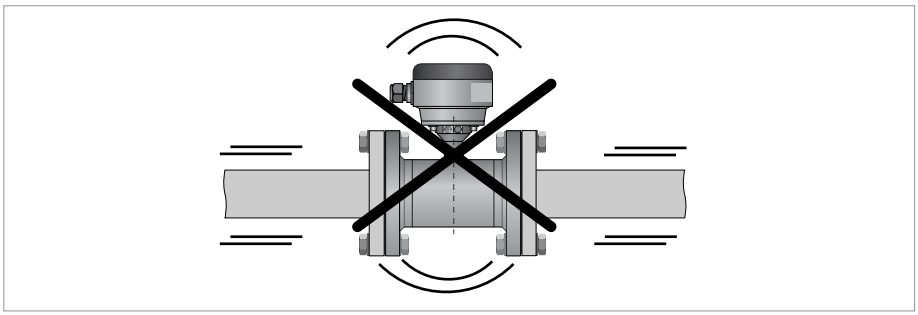


Figure 3-5: Avoid vibrations

3.4.7 Magnetic field

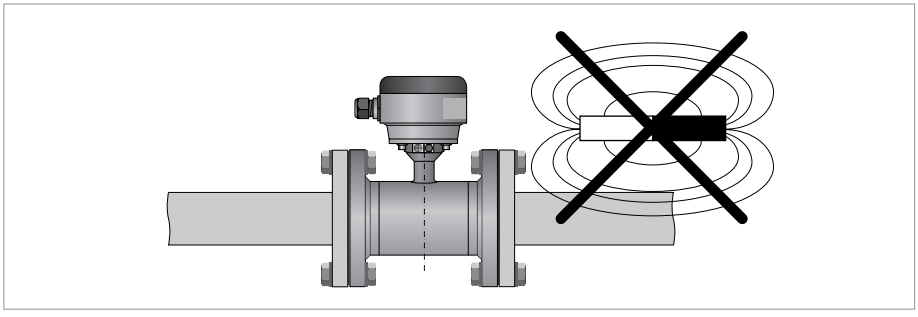


Figure 3-6: Avoid magnetic fields

3.4.8 Open discharge

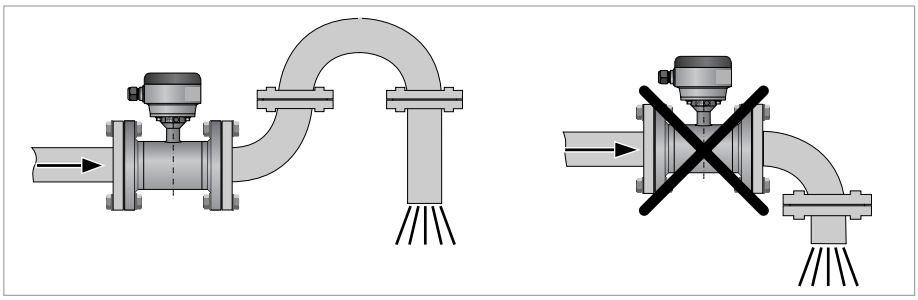


Figure 3-7: Installation in front of an open discharge

3.4.9 Bends

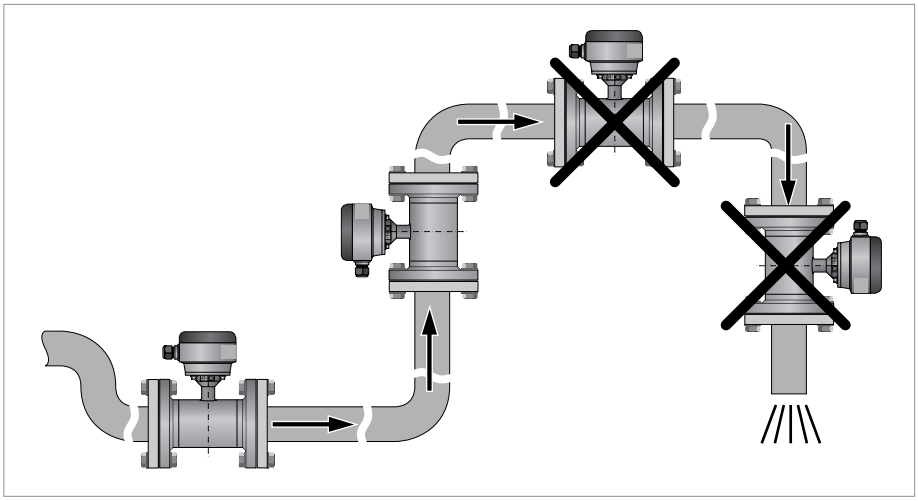


Figure 3-8: Installation in bending pipes

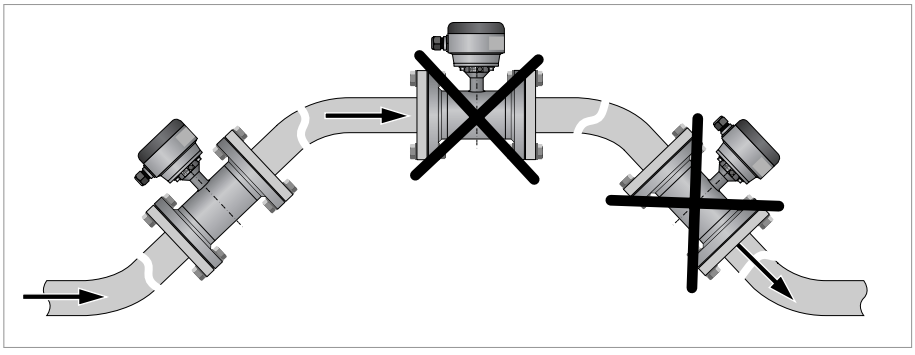


Figure 3-9: Installation in bending pipes

3.4.10 Control valve

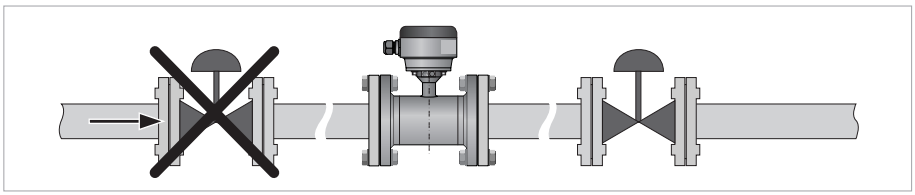


Figure 3-10: Installation in front of a control valve

3.4.11 Air venting

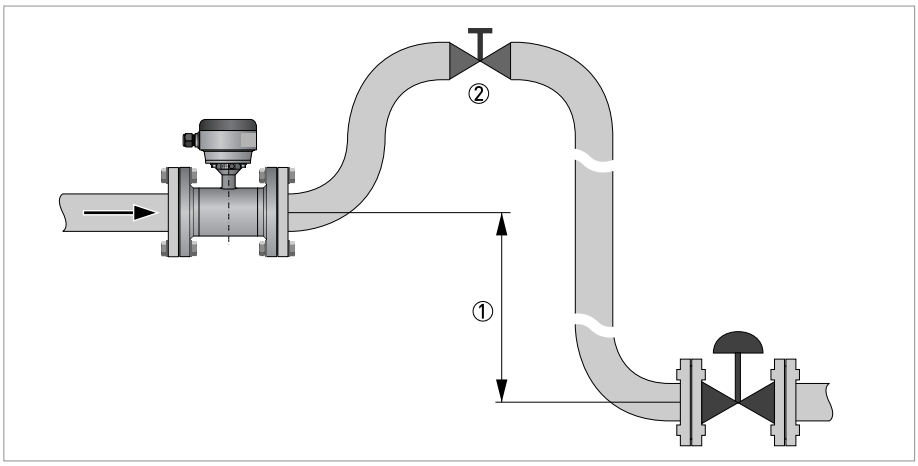


Figure 3-11: Air venting

① ≥ 5 m
② Air ventilation point

3.4.12 Pump

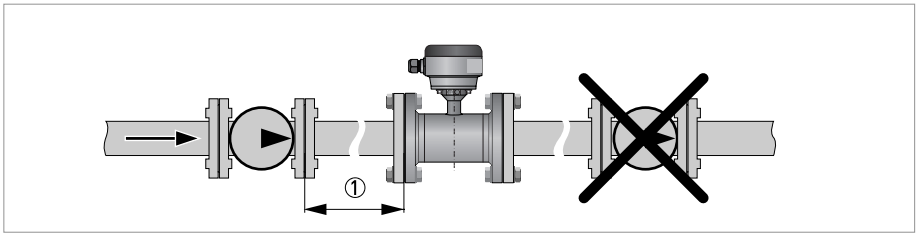


Figure 3-12: Installation behind a pump

① ≥ 3 DN

3.5 Mounting

3.5.1 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.

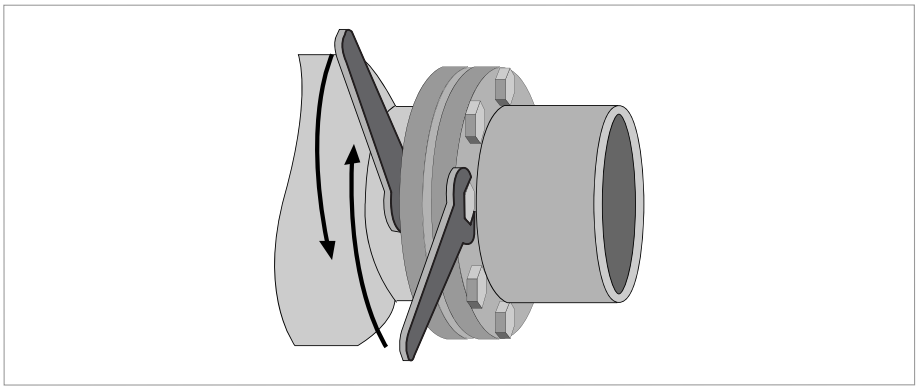


Figure 3-13: Tightening of bolts

Tightening of bolts

- Always tighten the bolts uniformely 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.

Nominal size DN [mm]	Pressure rating	Bolts	Max. torque [Nm] ①
25	PN 16	4 x M 12	12
40	PN 16	4 × M 16	30
50	PN 16	4 × M 16	36
65	PN 16	4 × M 16	50
80	PN 16	8 × M 16	30
100	PN 16	8 × M 16	32
125	PN 16	8 × M 16	40
150	PN10	8 x M20	55
150	PN 16	8 × M 20	55
200	PN 10	8 × M 20	85
200	PN 16	12 x M20	57
250	PN 10	12 x M 20	80
250	PN 16	12 x M 24	100
300	PN 10	12 x M 20	95
300	PN 16	12 x M 24	136

① The torque values also depend on variables (temperature, bolt material, gasket material, lubricants, etc.) outside the control of the manufacturer. Therefore these values should be regarded as indicative only.

Nominal size [inches]	Flange class [lb]	Bolts	Max. torque [lbs.ft] ①
1	150	4 x 1/2"	4
1½	150	4 x 1/2"	11
2	150	4 × 5/8"	18
2.5	150	4 x 5/8"	27
3	150	4 × 5/8"	33
4	150	8 × 5/8"	22
5	150	8 × 3/4"	33
6	150	8 × 3/4"	48
8	150	8 × 3/4"	66
10	150	12 x 7/8"	74
12	150	12 x 7/8"	106

① The torque values also depend on variables (temperature, bolt material, gasket material, lubricants, etc.) outside the control of themanufacturer. Therefore these values should be regarded as indicative only.

4.1 Safety instructions

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

Observe the national regulations for electrical installations!

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

4.2 Grounding

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

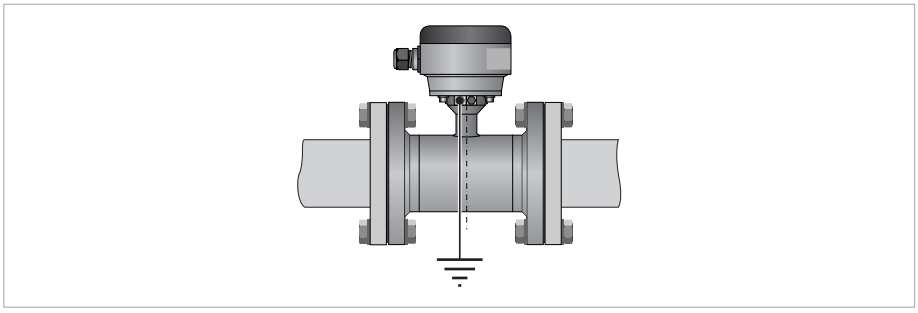


Figure 4-1: Grounding

Grounding without grounding rings. The flow sensor is equipped with a reference electrode.

4.3 Connection diagrams

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

KROHNE product overview

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

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