



OPTISONIC 3400 Quick Start

Robust, ultrasonic flowmeter for District Heating

ER 3.0.1_

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Warnings and symbols used**DANGER!**

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

**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.

**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.

Safety instructions for the operator**CAUTION!**

Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.

**LEGAL NOTICE!**

The responsibility as to the suitability and intended use of this device rests solely with the user. The supplier assumes no responsibility in the event of improper use by the customer. Improper installation and operation may lead to loss of warranty. In addition, the "Terms and Conditions of Sale" apply which form the basis of the purchase contract.

**INFORMATION!**

- Further information can be found on the supplied CD-ROM in the manual, on the data sheet, in special manuals, certificates and on the manufacturer's website.
- If you need to return the device to the manufacturer or supplier, please fill out the form contained on the CD-ROM and send it with the device. Unfortunately, the manufacturer cannot repair or inspect the device without the completed form.

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 field device will arrive in two cartons. One carton contains the converter and one carton contains the sensor.

**INFORMATION!**

Make sure to combine the sensor and the converter correctly, so they match by the devices serial number.

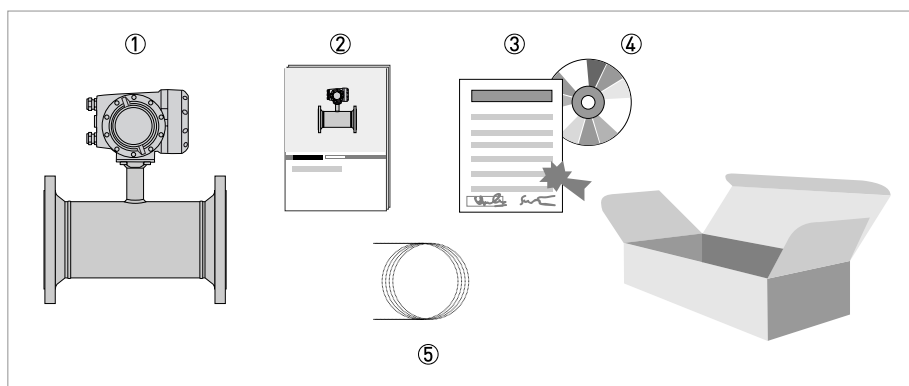


Figure 2-1: Scope of delivery

- ① Ordered flowmeter
- ② Product documentation
- ③ Factory calibration certificate
- ④ CD-ROM with product documentation in available languages
- 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

This ultrasonic flowmeter is designed for the continuous measurement of actual volume flow, mass flow, flow speed, velocity of sound, gain, SNR and diagnosis value.

Exclusively for bi-directional measuring of conductive and / or non-conductive fluids in closed, completely filled pipeline circuits.

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!

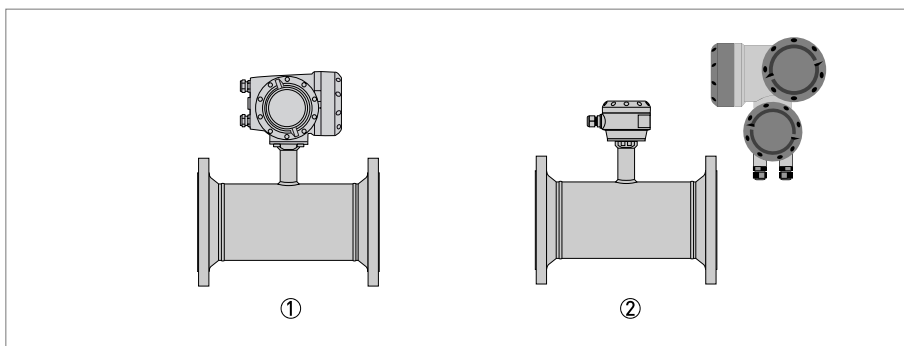
Product specific information and extensive product specification is available using PICK, the Product Information Center KROHNE web-tool.

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



The 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 signal cable)



- ① Compact version
② Remote version

2.3 Nameplates



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.

2.3.1 Example of nameplate for the compact version

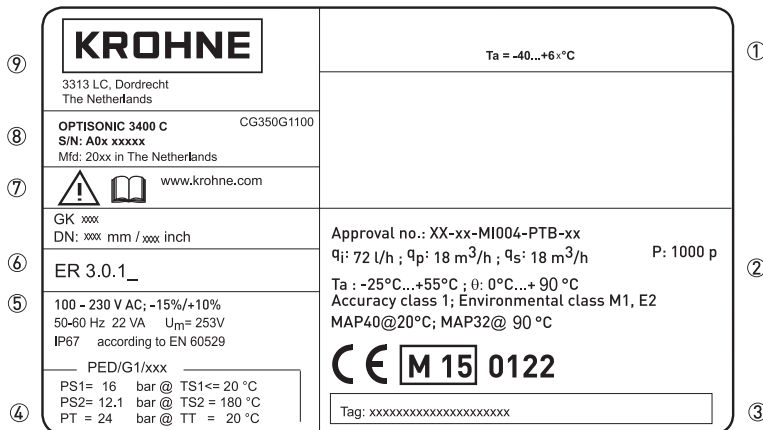
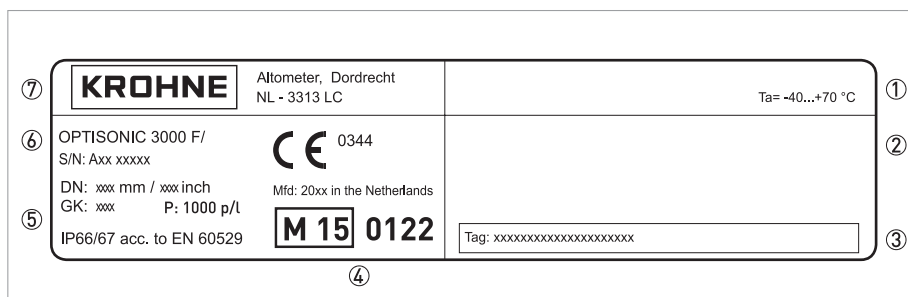


Figure 2-2: Example of nameplate for the compact version

- ① Ambient temperature
- ② MI004 approval number and specific data
- ③ Tag number and CE sign with number(s) of notified body / bodies
- ④ PED data, Category I / II / III or SEP
- ⑤ Mains supply data
- ⑥ Electronic revision number
- ⑦ Manufacturer website / GK & size info
- ⑧ Type designation of the flowmeter
- ⑨ Name and address of the manufacturer

2.3.2 Nameplate for the measuring sensor (field version)

Examples for measuring sensor versions in Standard MI-004 version.



1. Ambient temperature
2. MI-004 approval number and certified data
3. Tag number
4. CE sign & manufacturer and MI004 notified body data
5. Protection class, size and GK information
6. Type designation of the flowmeter
7. Name and address of the manufacturer

2.3.3 Examples of nameplates on the signal converter (field version)

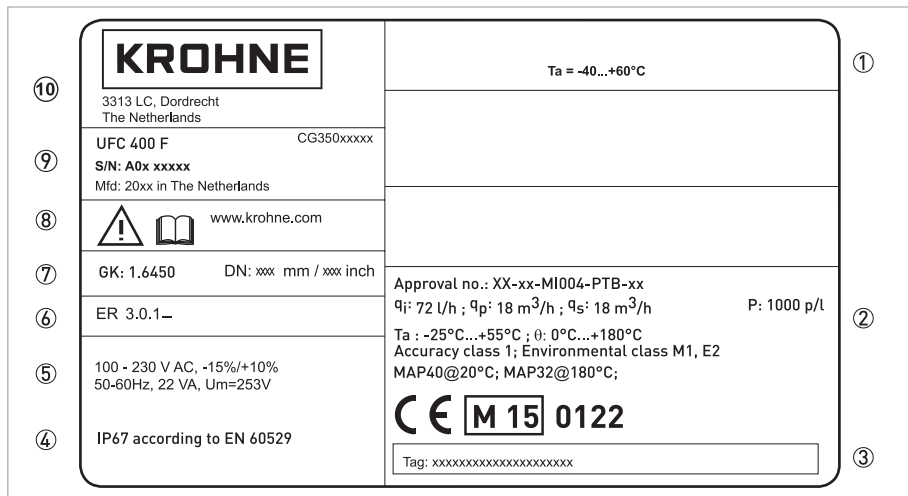


Figure 2-3: Examples of nameplates on the signal converter (field version)

- ① Ambient temperature
- ② MI004 approval number and certified data
- ③ Tag number
- ④ Protection class
- ⑤ Mains supply data
- ⑥ Electronics revision number
- ⑦ Calibration, size and GK data
- ⑧ Manufacturer website
- ⑨ Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
- ⑩ Name and address of the manufacturer

Electrical connection data of inputs/outputs (example of basic version)

① ② ③ ④ ⑤	POWER		PE (FE)	CG 35xxxxx	S/N A13xxxxx	KROHNE
			L(L+) N(L-)	A = Active P = Passive NC = Not connected		
	INPUT / OUTPUT	D - D	P	PULSE OUT / STATUS OUT I _{max} = 100 mA@f<= 10 Hz; = 20 mA@f<= 12 kHz V _o = 1.5 V @ 10 mA; U _{max} = 32 VDC		
		C - C	P	STATUS OUT I _{max} = 100 mA; V _{max} = 32 VDC		
		B - B	P	STATUS OUT / CONTROL IN I _{max} = 100 mA V _{on} > 19 VDC, V _{off} < 2.5 VDC; V _{max} = 32 VDC		
		A+ A- A	A or P	CURRENT OUT (HART) Active (Terminals A & A+); R _{Lmax} = 1 kohm Passive (Terminals A & A-); V _{max} = 32 VDC		

- ① Power supply (AC: L and N, DC: L+ and L-, PE for ≥ 24V AC, FE for ≤ 24 VAC and DC)
- ② Connection data of connection terminal D/D-
- ③ Connection data of connection terminal C/C-
- ④ Connection data of connection terminal B/B-
- ⑤ Connection data of connection terminal A/A-, A+ only operable in basic version

- A = active mode; the signal converter supplies the power for connection of the subsequent devices
- P = passive mode; external power supply required for operation of the subsequent devices
- N/C = connection terminals not connected

2.4 Storage

- Store the device in a dry, dust-free location.
- Avoid continuous direct sunlight.
- Store the device in its original packaging.
- Storage temperature: -50...+70°C / -58...+158°F

2.5 Transport

Signal converter

- Do not lift the signal converter by the cable glands.

Measuring sensor

- Do not lift the measuring sensor by the connection box.
- Use hoisting belts only.
- To transport flange devices, use lifting straps. Wrap these around both process connections.

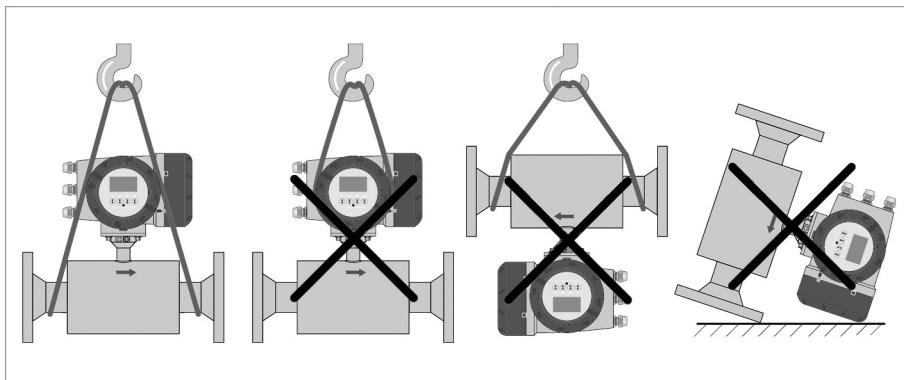


Figure 2-4: Transport

2.6 Pre-installation requirements

**INFORMATION!**

To assure a quick, safe and uncomplicated installation, we kindly request you to make provisions as stated below.

Make sure that you have all necessary tools available:

- Allen key (4 mm)
- Small screwdriver
- Wrench for cable glands
- Wrench for pipe mounting bracket (remote version only) see; on page 16
- Torque wrench for installing flowmeter in pipeline

2.7 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 68-2-6.*

2.7.1 Vibration

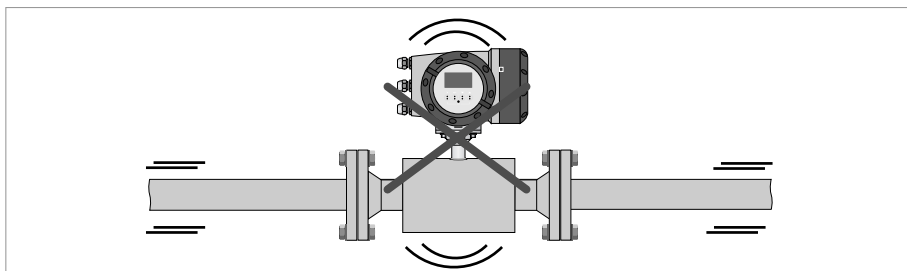


Figure 2-5: Avoid vibrations

**INFORMATION!**

In case of expected vibrations, please install a field version.

2.8 Installation conditions

2.8.1 Inlet and outlet

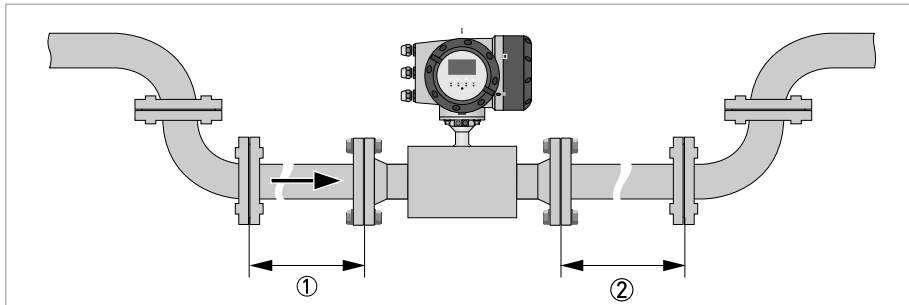


Figure 2-6: Recommended inlet and outlet

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

2.8.2 Bends in 2 or 3 dimensions

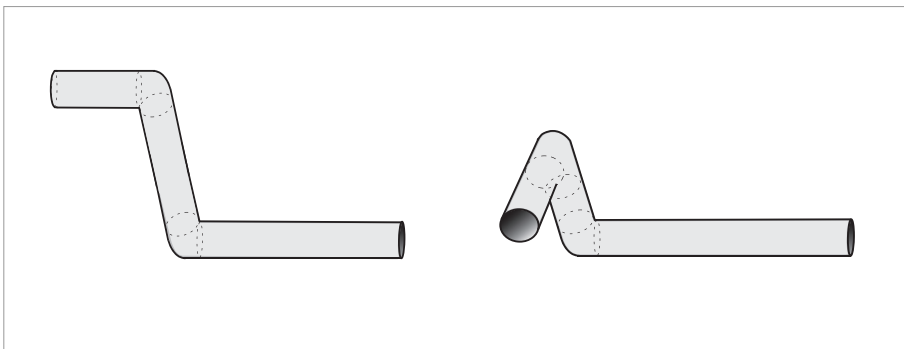


Figure 2-7: Inlet when using 2 and/or 3 dimensional bends in front of the flowmeter

Inlet length: using bends in 2 dimensions: ≥ 10 DN; when having bends in 3 dimensions: ≥ 15 DN

2.8.3 T-section

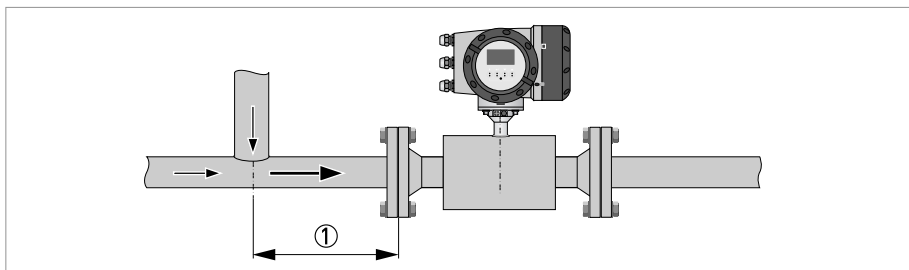


Figure 2-8: Distance behind a T-section

- ① ≥ 10 DN

2.9 Bends

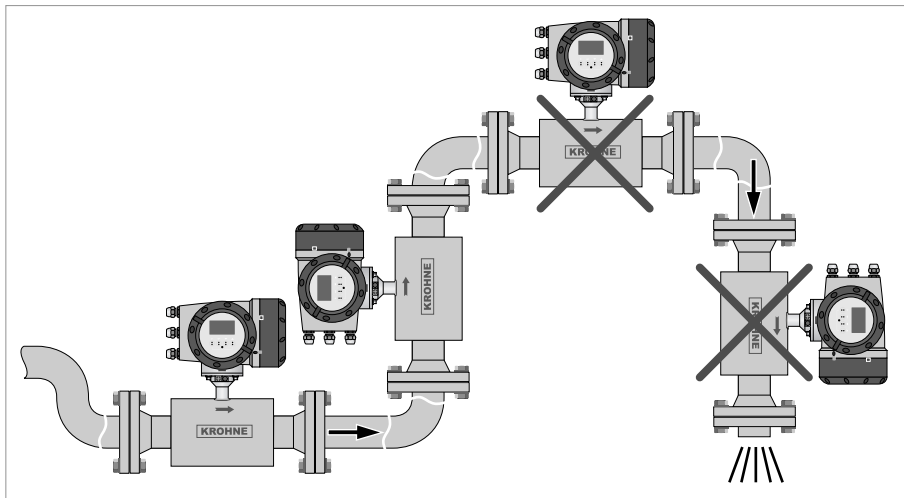


Figure 2-9: Installation in bending pipes

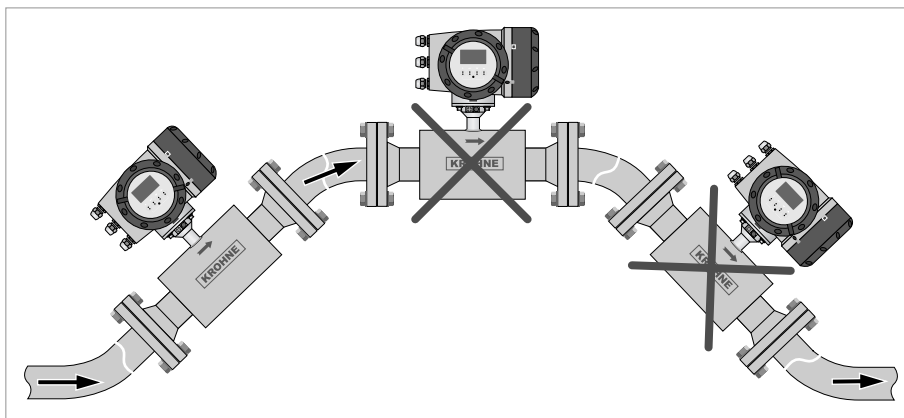


Figure 2-10: Installation in bending pipes

2.10 Open feed or discharge

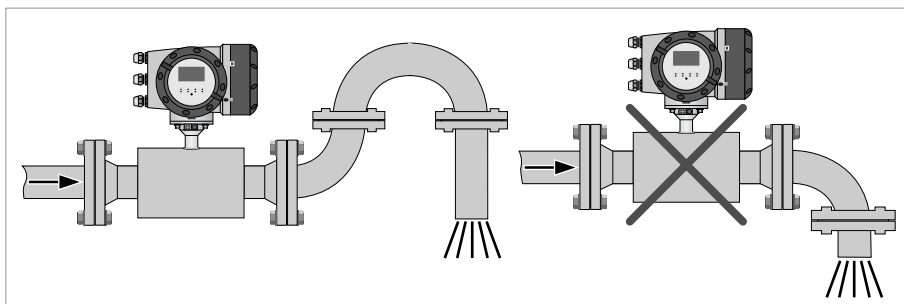


Figure 2-11: Open discharge

Install meter on a lowered section of the pipe to ensure a full pipe condition through the meter.

2.11 Position of pump

**CAUTION!**

Never install flowmeter at a pump suction side in order to avoid cavitation or flashing in the flowmeter.

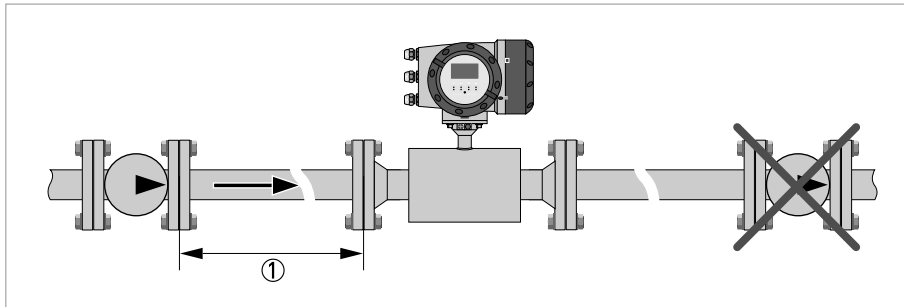


Figure 2-12: Position of pump

① ≥ 15 DN

2.12 Control valve

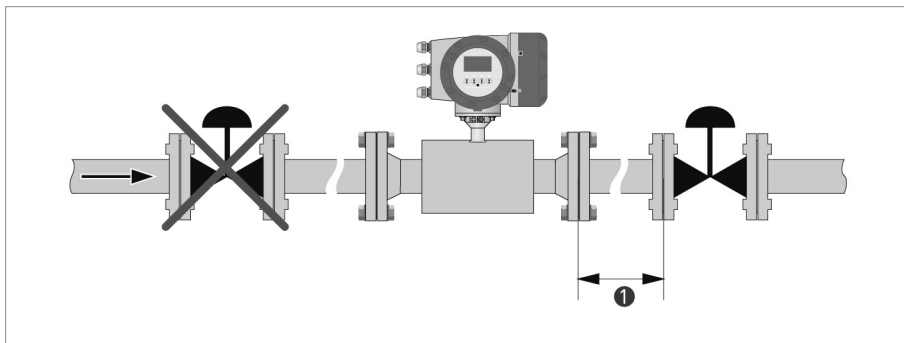


Figure 2-13: Installation in front of a control valve

① ≥ 20 DN

2.13 Down going pipeline over 5 m / 16 ft length

Install air vent downstream of the flowmeter to prevent vacuum. Although this will not harm the meter, it may cause gases to come out of solution (cavitate) and interfere with proper measurements.

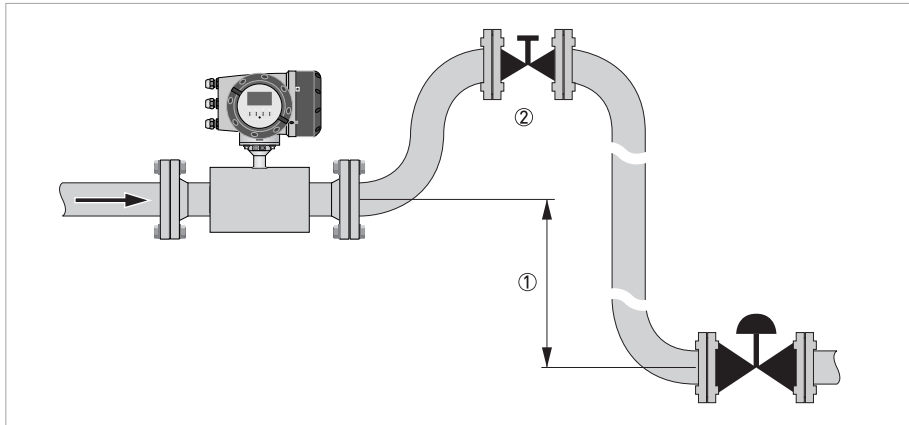


Figure 2-14: Down going pipeline over 5 m / 16 ft length

- ① ≥ 5 m / 16 ft
- ② Install air vent

2.14 Insulation

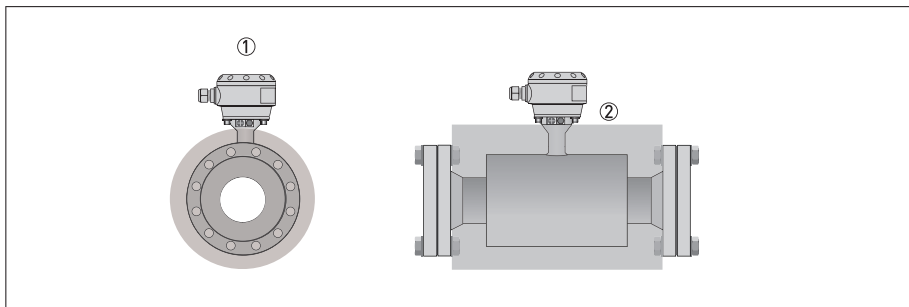


Figure 2-15: Insulation

- ① Connection box
- ② Insulation area



WARNING!

*The flow sensor can be insulated completely, except for the connection box.
(Ex: maximum temperature, refer to Ex supplement)*

For devices used in hazardous area, additional maximum temperature and insulation precautions apply. Please refer to the Ex documentation!

2.15 Mounting

2.16 Rotation of the compact converter housing



CAUTION!

Installing certified devices for hazardous areas

- DO NOT change the position of the converter housing of compact versions
- When not following this warning, there is a very high risk of damaging the internal cables of the device.

Installing devices for non-hazardous areas

Rotating the converter more than 90° relative to the sensor, is not recommended by the manufacturer.

2.17 Flange deviation



CAUTION!

Max. permissible misalignment of pipe flange faces: M_{max} 0.5 degree, according ASME B16.5 Individual flanges. See Appendix 12 ; Flange face alignment of the General Piping Requirements DEP 31.38.01.11-GEN

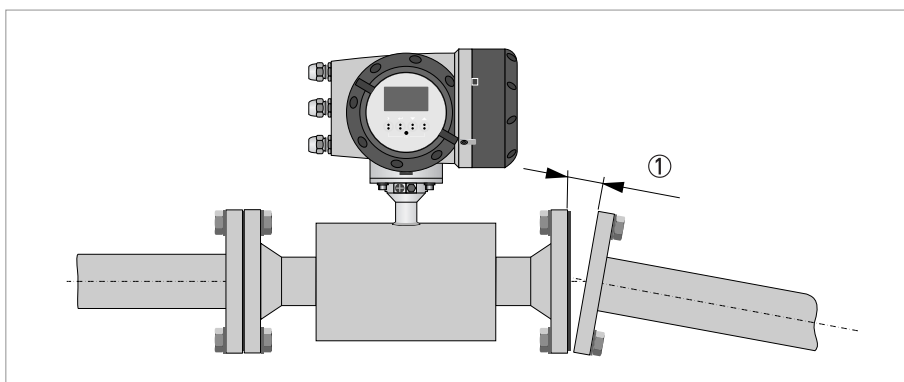


Figure 2-16: Flange deviation

① M_{max}

2.18 Mounting position

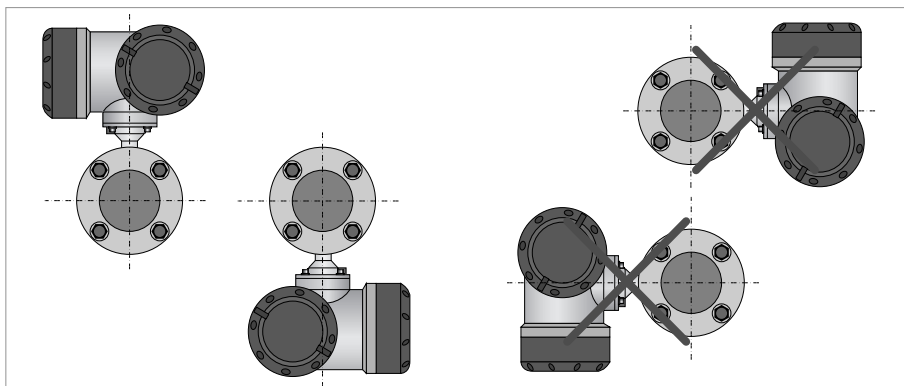


Figure 2-17: Horizontal and vertical mounting

2.19 Mounting the field housing, remote version



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.

2.19.1 Pipe mounting

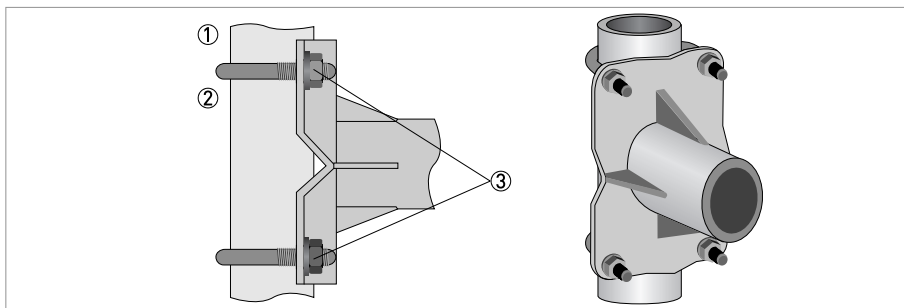


Figure 2-18: Pipe mounting of the field housing



- ① Fix the signal converter to the pipe.
- ② Fasten the signal converter using standard U-bolts and washers.
- ③ Tighten the nuts.

2.19.2 Turning the display of the field housing version

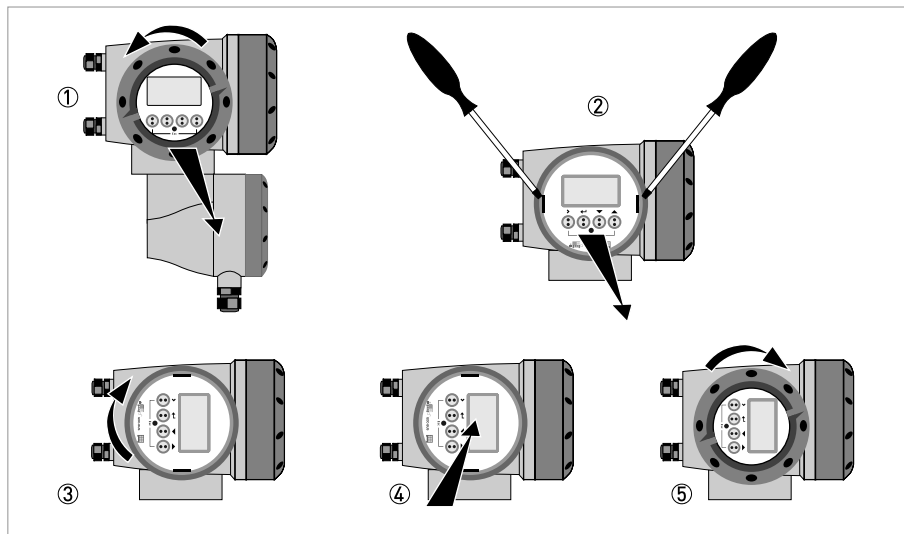


Figure 2-19: Turning the display of the field housing version



The display of the field housing version can be turned in 90° increments

- ① Unscrew the cover from the display and operation control unit.
- ② Using a suitable tool, pull out the two metal puller devices to the left and right of the display.
- ③ Pull out the display between the two metal puller devices and rotate it to the required position.
- ④ Slide the display and then the metal puller devices back into the housing.
- ⑤ Re-fit the cover and tighten it by hand.



CAUTION!

The ribbon cable of the display must not be folded or twisted repeatedly.



INFORMATION!

Each time a housing cover is opened, the thread should be cleaned and greased. Use only resin-free and acid-free grease.

Ensure that the housing gasket is properly fitted, clean and undamaged.

3.1 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.

3.2 Signal cable (remote versions only)

The flow sensor is connected to the signal converter via one signal cable, with 2, 4 or 6 (labeled) inner coax cables for the connection of maximal three acoustic paths.

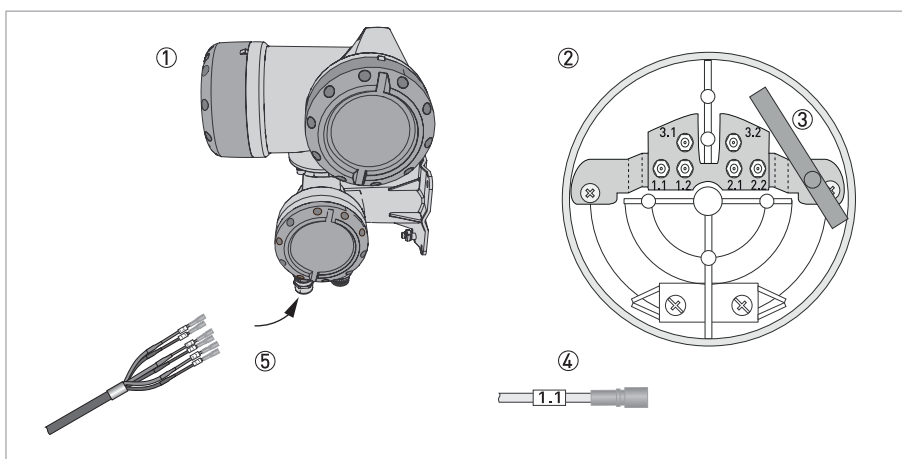


Figure 3-1: Construction of field version

- ① Signal converter
- ② Open connection box
- ③ Tool for releasing connectors
- ④ Marking on cable
- ⑤ Insert cable(s) into terminal compartment

**CAUTION!**

To ensure smooth functioning, always use the signal cable(s) included in the delivery.

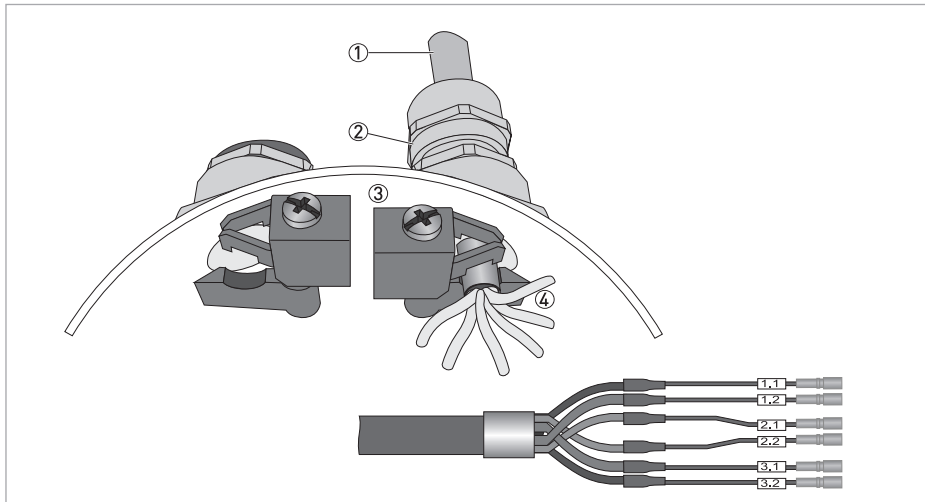


Figure 3-2: Clamp the cables on the shielding bush

- ① Cables
- ② Cable glands
- ③ Grounding clamps
- ④ Cable with metal shielding bush

**INFORMATION!**

Connect the cable on connector with similar numeral marking

3.3 Power supply

**WARNING!**

When this device is intended for permanent connection to the mains.

It is required (for example for service) to mount an external switch or circuit breaker near the device for disconnection from the mains. It shall be easily reachable by the operator and marked as the disconnecting the device for this equipment.

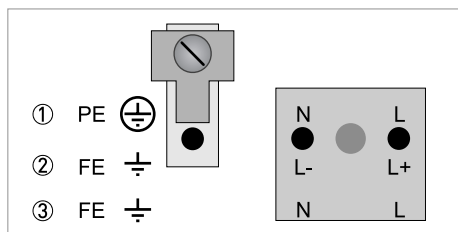
The switch or circuit breaker and wiring has to be suitable for the application and shall also be in accordance with the local (safety) requirements of the (building) installation [e.g. IEC 60947-1 / -3]

**INFORMATION!**

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

**INFORMATION!**

The power terminals in the terminal compartments are equipped with additional hinged lids to prevent accidental contact.



- ① 100...230 VAC (-15% / +10%), 22 VA
- ② 24 VDC (-55% / +30%) 12 W
- ③ 24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%), 22 VA or 12 W



DANGER!

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

100...230 VAC (tolerance range: -15% / +10%)

- Note the power supply voltage and frequency (50...60 Hz) on the nameplate.
- The protective ground terminal **PE** of the power supply must be connected to the separate U-clamp terminal in the terminal compartment of the signal converter



INFORMATION!

240 VAC+5% is included in the tolerance range.

3.4 Laying electrical cables correctly

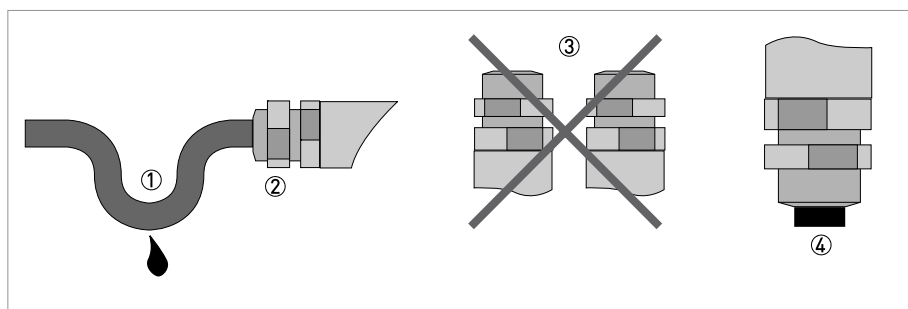


Figure 3-3: Protect housing from dust and water



- ① Lay the cable in a loop just before the housing.
- ② Tighten the screw connection of the cable entry securely.
- ③ Never mount the housing with the cable entries facing upwards.
- ④ Seal cable entries that are not needed with a plug.

3.5 Inputs and outputs, overview

3.5.1 Combinations of the inputs/outputs (I/Os)

This signal converter is available with various input/output combinations.

Basic version

- Has 1 current output, 1 pulse output and 2 status outputs / limit switches.
- The pulse output can be set as status output/limit switch and one of the status outputs as a control input.

Ex option

- For hazardous areas, all of the input/output variants for the housing designs C and F can be delivered with terminal compartment in Ex d (pressure-resistant casing) or Ex e (increased safety).
- For connection and operation of Ex devices, note the supplementary instructions.

3.5.2 Description of the CG-number



Figure 3-4: Marking (CG number) of the electronics module and input/output variants

- ① ID number:5
- ② ID number: 0 = standard
- ③ Power supply option
- ④ Display (language versions)
- ⑤ Input/output version (I/O)
- ⑥ 1st optional module for connection terminal A
- ⑦ 2nd optional module for connection terminal B

The last 3 digits of the CG number (⑤, ⑥ and ⑦) indicate the assignment of the terminal connections. Please refer to the following examples.

Description of abbreviations and CG identifier for possible optional modules on terminals A and B

Abbreviation	Identifier for CG No.	Description
I _a	A	Active current output
I _p	B	Passive current output
P _a / S _a	C	Active pulse output, frequency output, status output or limit switch (changeable)
P _p / S _p	E	Passive pulse output, frequency output, status output or limit switch (changeable)
C _a	G	Active control input
C _p	K	Passive control input
-	8	No additional module installed
-	0	No further module possible

3.5.3 Fixed, non-alterable input/output versions

This signal converter is available with various input/output combinations.

- The grey boxes in the tables denote unassigned or unused connection terminals.
- In the table, only the final digits of the CG no. are depicted.
- Connection terminal A+ is only operable in the basic input/output version.

CG-No.	Connection terminals								
	A+	A	A-	B	B-	C	C-	D	D-

Basic in-/output (I/O) (Standard)

1 0 0		I _p + HART® passive ①	S _p / C _p passive ②	S _p passive	P _p / S _p passive ②
	I _a + HART® active ①				

① Function changed by reconnecting

② Changeable

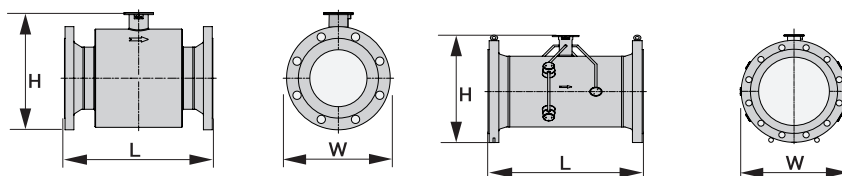
4.1 Dimensions and weights

Remote version		$a = 88 \text{ mm} / 3.5''$
		$b = 139 \text{ mm} / 5.5''$ ①
		$c = 106 \text{ mm} / 4.2''$
		Total height = $H + a$ ②
Compact version		$a = 155 \text{ mm} / 6.1''$
		$b = 230 \text{ mm} / 9.1''$ ①
		$c = 260 \text{ mm} / 10.2''$
		Total height = $H + a$ ②

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

② The value depends on version

4.2 Standard flow sensor



The following dimensions are applicable for the OPTISONIC 3400 in compact and remote versions.

EN1092-1; Standard variant - PN40

Nominal size	Dimensions [mm], CS = carbon steel / SS = stainless steel / Di = inner diameter					Approx. weight [kg]	
DN	L	H	W	Di CS	Di SS	CS	SS
25	250	155	115	27	27	8	8
32	260	156	140	35	35	9	10
40	270	173	150	39	41	11	14
50	300	193	165	53	53	14	17
65	300	203	185	63	63	18	19
80	300	238	200	78	81	17	18
100	350	268	235	102	104	24	24
125	350	297	270	127	130	30	29
150	400	326	300	154	158	37	37
200	400	427	375	207	207	63	63
250	500	492	450	260	260	100	100
300	500	547	515	308	308	140	140



INFORMATION!

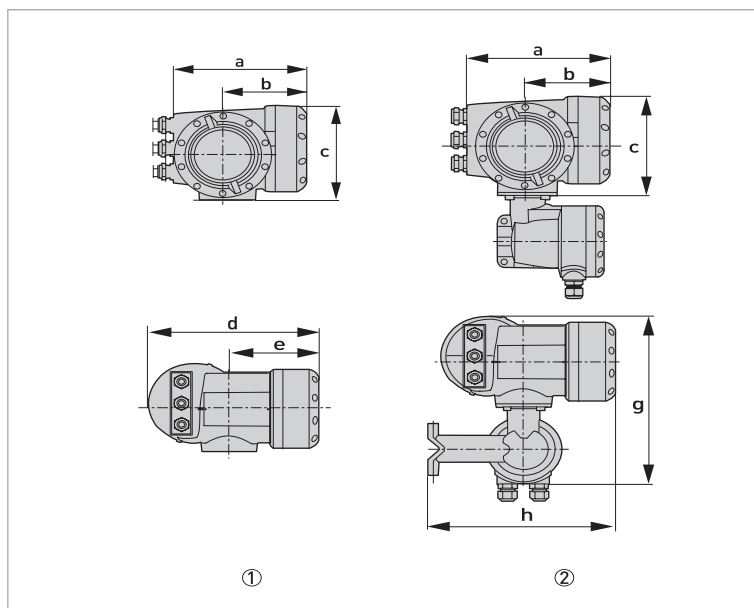
Other pressure classes like PN25, PN16, PN10 or ASME 150, 300 lb are also MI-004 certified. Dimensions and weights are available on request.



INFORMATION!

Mounting length of larger diameters; on request.

4.3 Signal converter housing



① Compact housing (C)

② Field housing (F)

Dimensions and weights in mm and kg

Version	Dimensions [mm]							Weight [kg]
	a	b	c	d	e	g	h	
C	202	120	155	260	137	-	-	4.2
F	202	120	155	-	-	295.8	277	5.7

Dimensions and weights in inch and lb

Version	Dimensions [inch]							Weight [lb]
	a	b	c	d	e	g	h	
C	7.75	4.75	6.10	10.20	5.40	-	-	9.30
F	7.75	4.75	6.10	-	-	11.60	10.90	12.60







KROHNE – Process instrumentation and measurement solutions

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

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