



OPTISONIC 3400 Quick Start

Multi purpose, all-round, ultrasonic flowmeter for liquids in all industrial processes

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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.

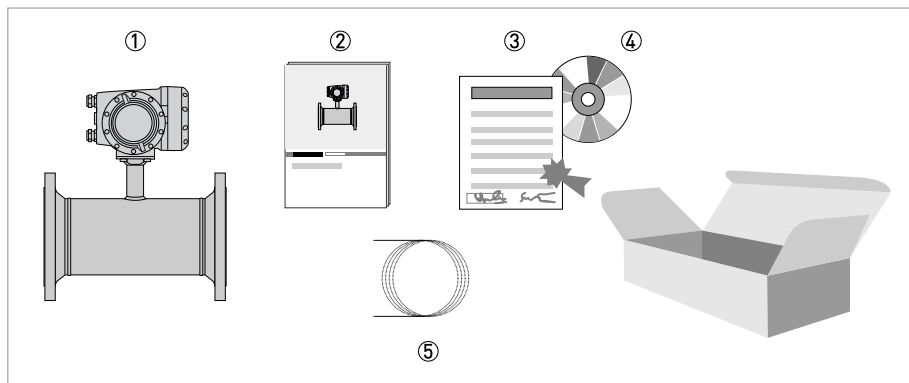


Figure 2-1: Scope of delivery - compact version

- 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

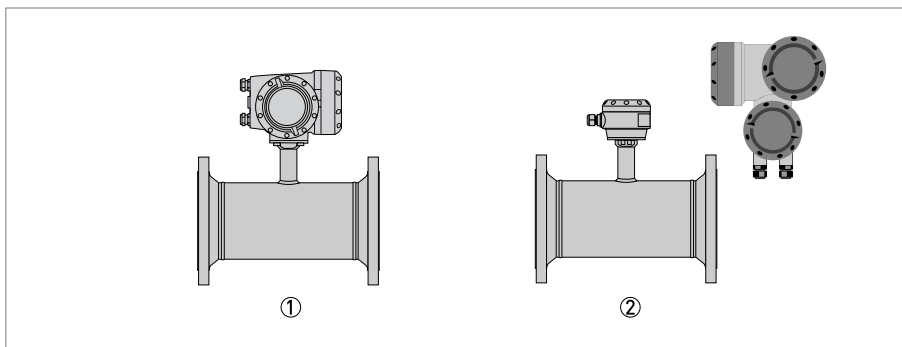
This ultrasonic flowmeter is designed for the continuous measurement of actual volume flow, mass flow, flow speed, velocity of sound, gain, SNR and diagnosis value.

Exclusively for measuring 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.

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

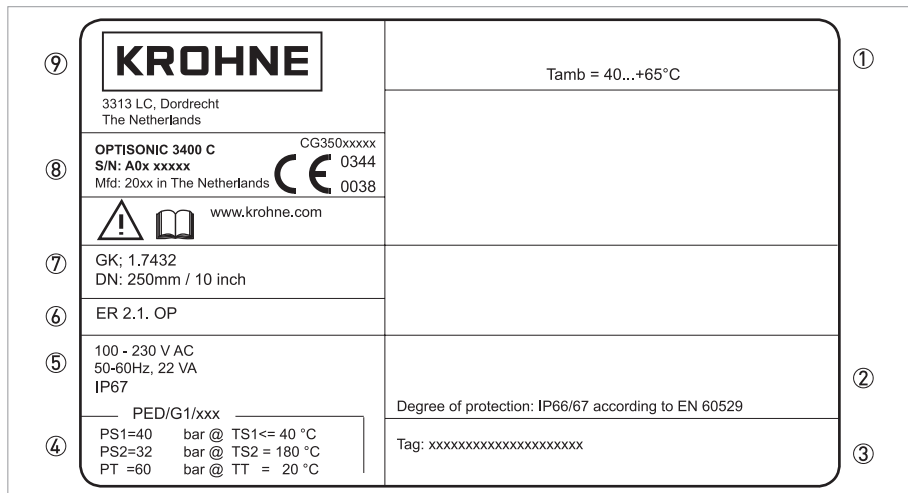
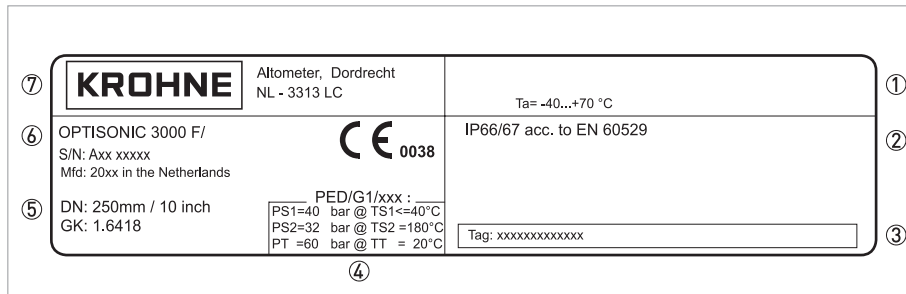


Figure 2-2: Example of nameplate for the compact version

- ① Ambient temperature
- ② Protection class
- ③ Tag number
- ④ PED data, type I / II / III or SEP
- ⑤ Mains supply data
- ⑥ Electronic revision number
- ⑦ Calibration data
- ⑧ Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
- ⑨ Name and address of the manufacturer

2.3.2 Nameplate for the measuring sensor (field version)

Examples for measuring sensor versions in Standard version.



1. Ambient temperature
2. Protection class
3. Tag number
4. PED data, type I / II / II or SEP
5. Calibration data
6. Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
7. Name and address of the manufacturer

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

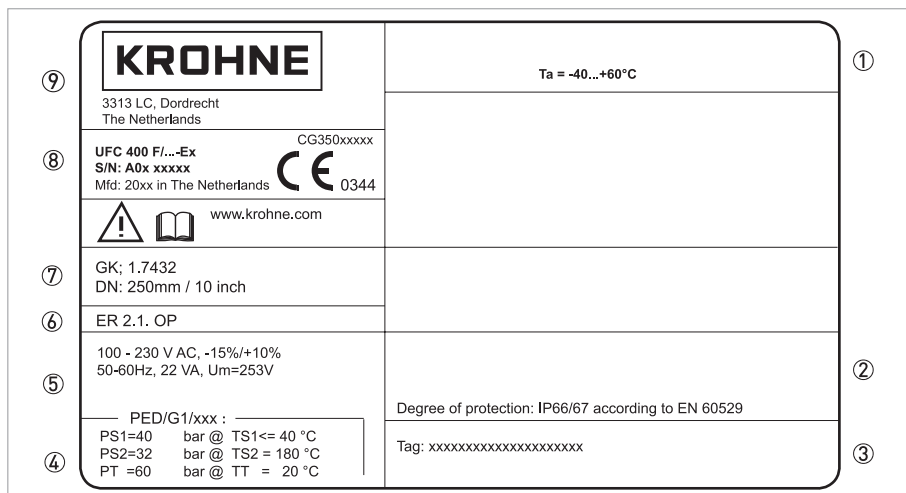






Figure 2-3: Examples of nameplates on the signal converter (field version)

- ① Ambient temperature
- ② Protection class
- ③ Tag number
- ④ PED data, type I / II / II or SEP
- ⑤ Mains supply data
- ⑥ Electronics revision numbers
- ⑦ Calibration data
- ⑧ Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
- ⑨ Name and address of the manufacturer

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

①	POWER 		CG 35xxxxx S/N A13xxxx	
	PE (FE)		 	
②	L(L+) N(L-)		A = Active P = Passive NC = Not connected	
	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	
③	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	
⑤	A +	A	CURRENT OUT (HART)	
	A -	or	Active (Terminals A & A+); R _{Lmax} = 1 kohm	
	A	P	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.

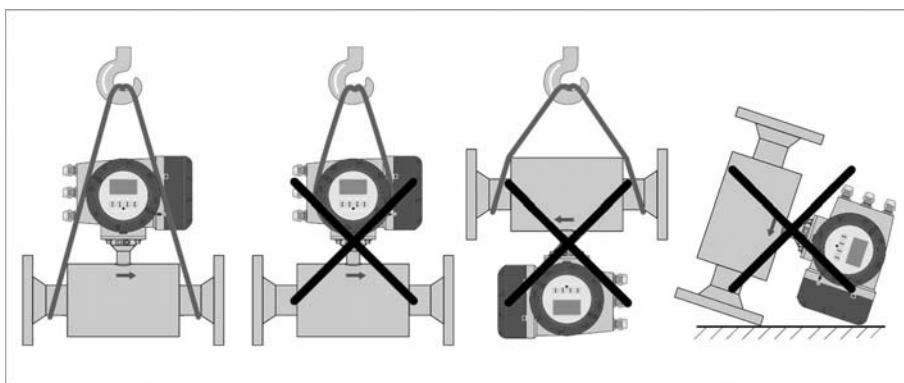


Figure 2-4: Transport

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 17
- 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

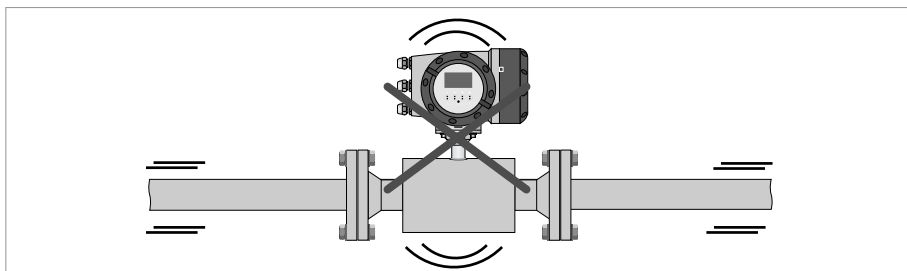


Figure 2-5: Avoid vibrations



INFORMATION!

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

2.8 Installation conditions

2.8.1 Inlet and outlet

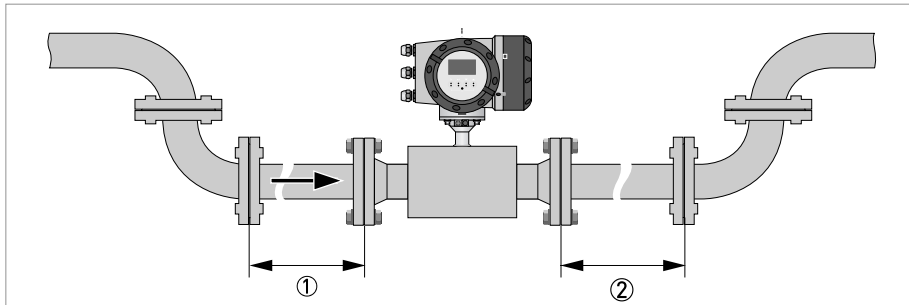


Figure 2-6: Recommended inlet and outlet

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

2.8.2 Bends in 2 or 3 dimensions

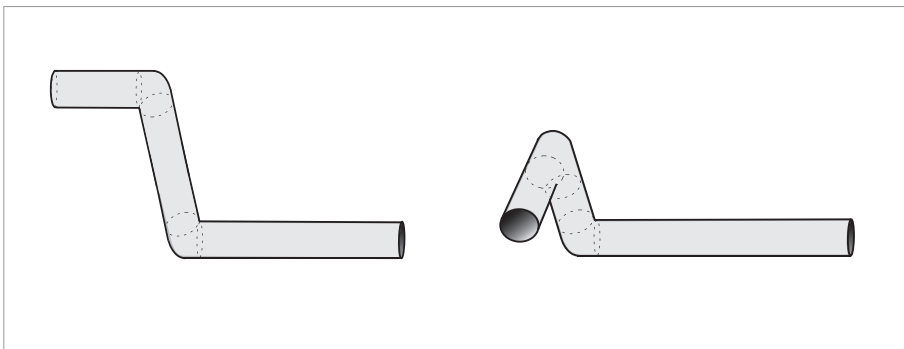


Figure 2-7: 2 and 3 dimensional bends, in front of flowmeter

- ① Bends in 2 dimensions: ≥ 5 DN; bends in 3 dimensions: ≥ 10 DN

2.8.3 T-section

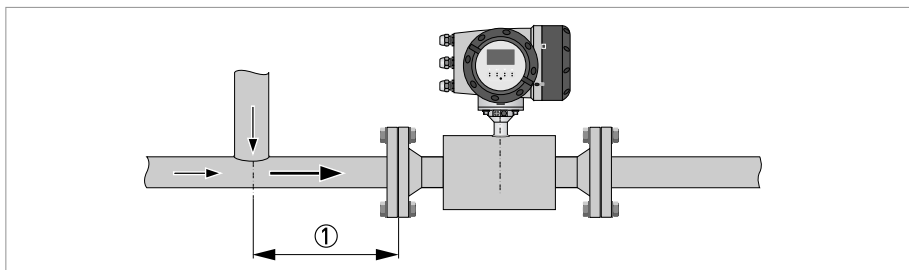


Figure 2-8: Distance behind a T-section

- ① ≥ 5 DN

2.9 Bends

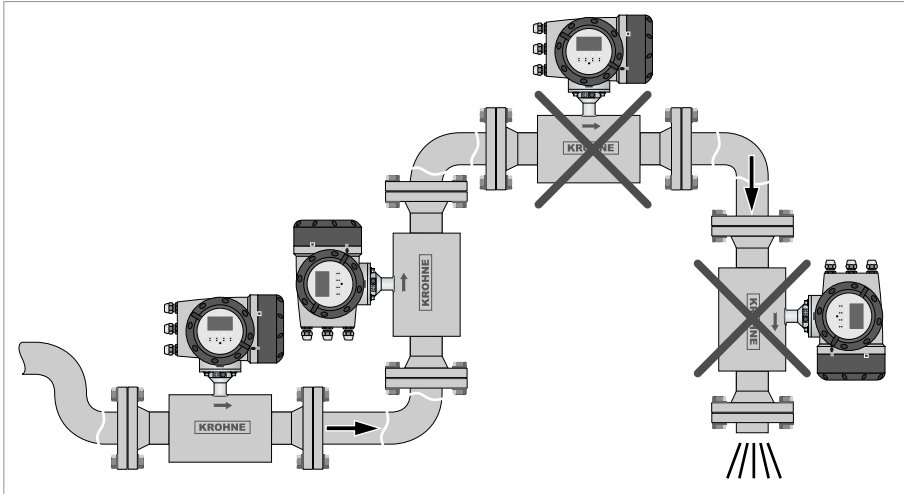


Figure 2-9: Installation in bending pipes

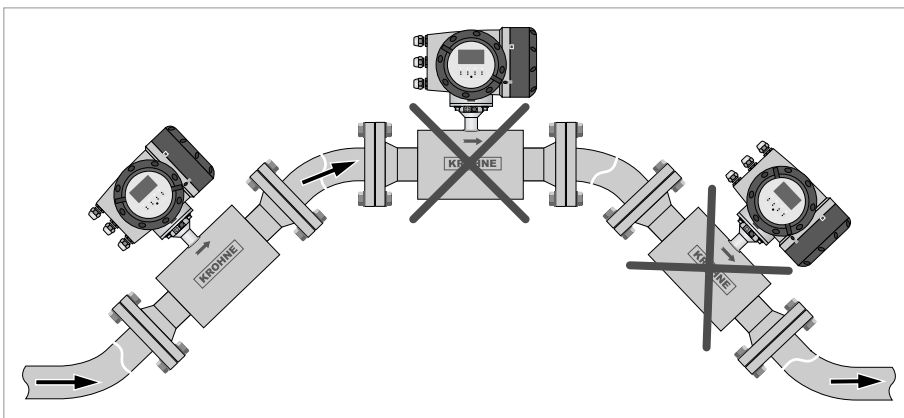


Figure 2-10: Installation in bending pipes

2.10 Open feed or discharge

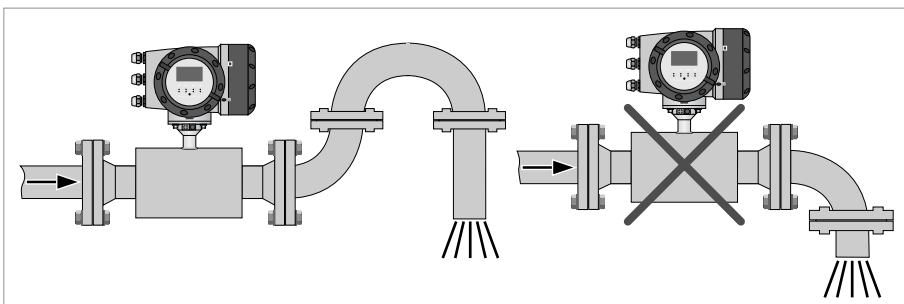


Figure 2-11: Open discharge

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.

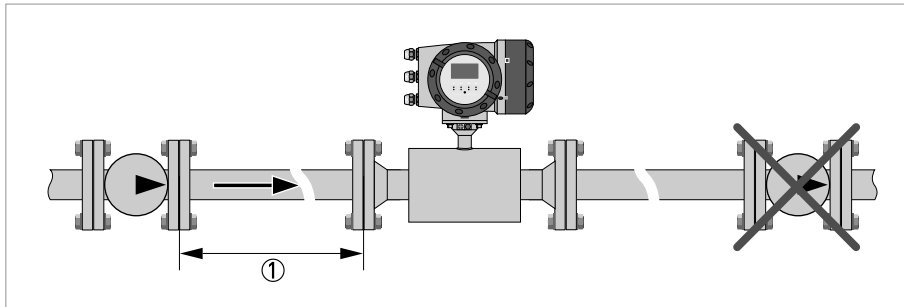


Figure 2-12: Position of pump

① ≥ 15 DN

2.12 Control valve

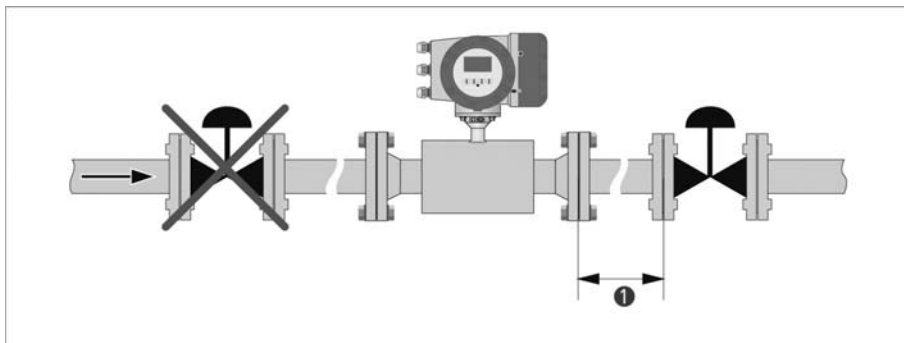


Figure 2-13: Installation in front of a control valve

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.

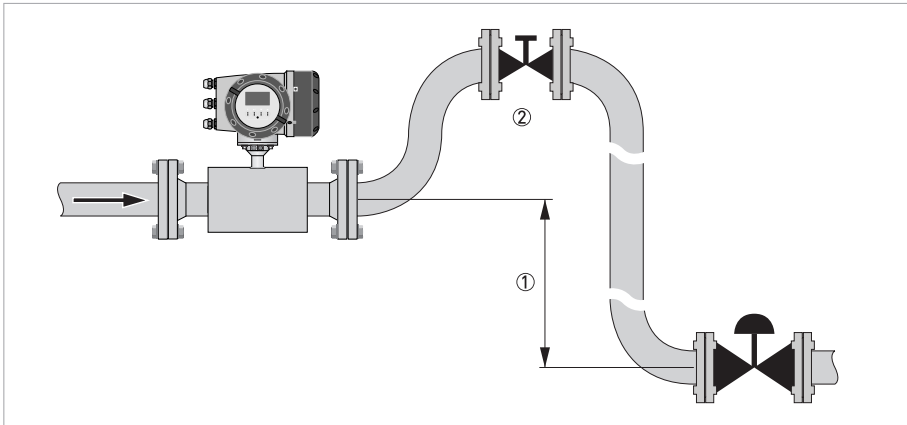


Figure 2-14: Down going pipeline over 5 m / 16 ft length

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

2.14 Insulation

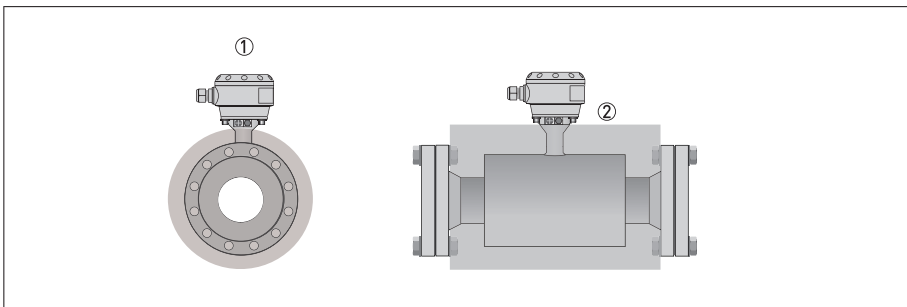


Figure 2-15: Insulation

- 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 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

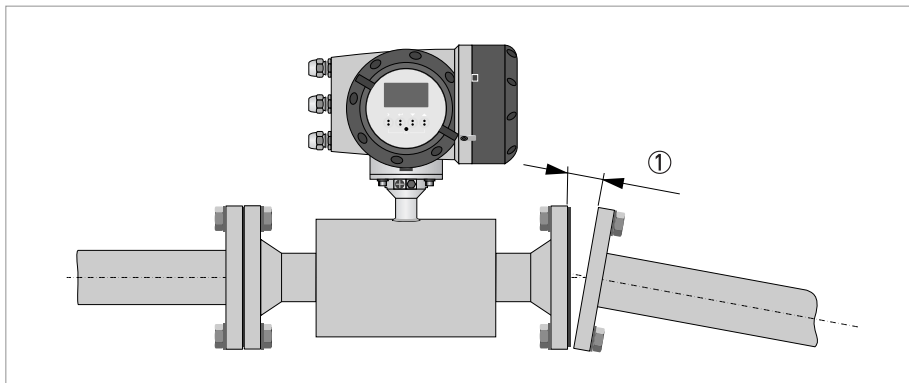


Figure 2-16: Flange deviation

① M_{max}

2.17 Mounting position

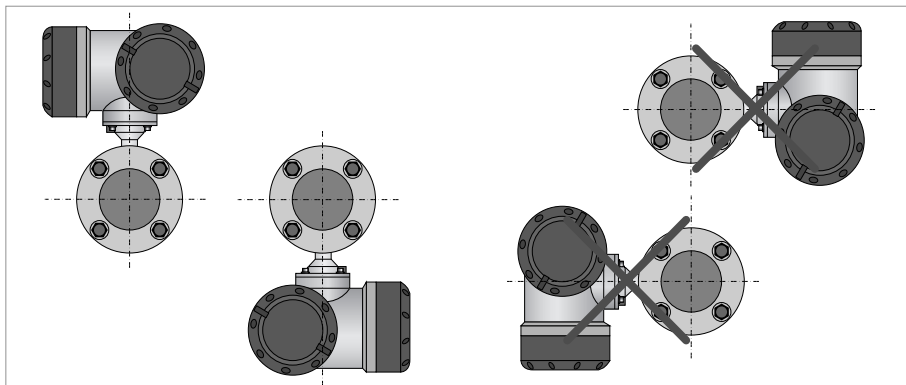


Figure 2-17: Horizontal and vertical mounting

2.18 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.

2.18.1 Pipe mounting

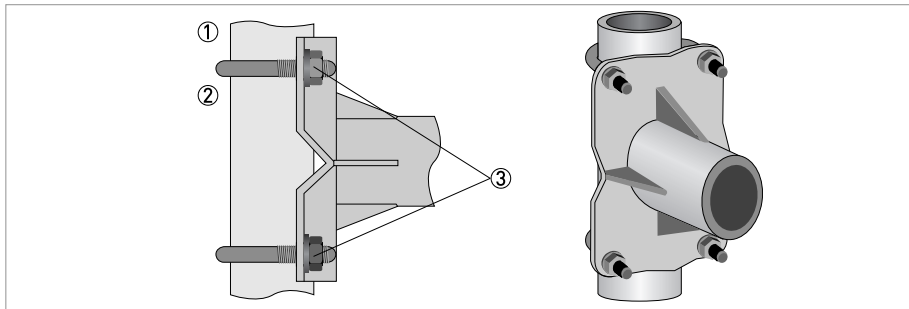


Figure 2-18: Pipe mounting of the field housing



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

2.18.2 Turning the display of the field housing version

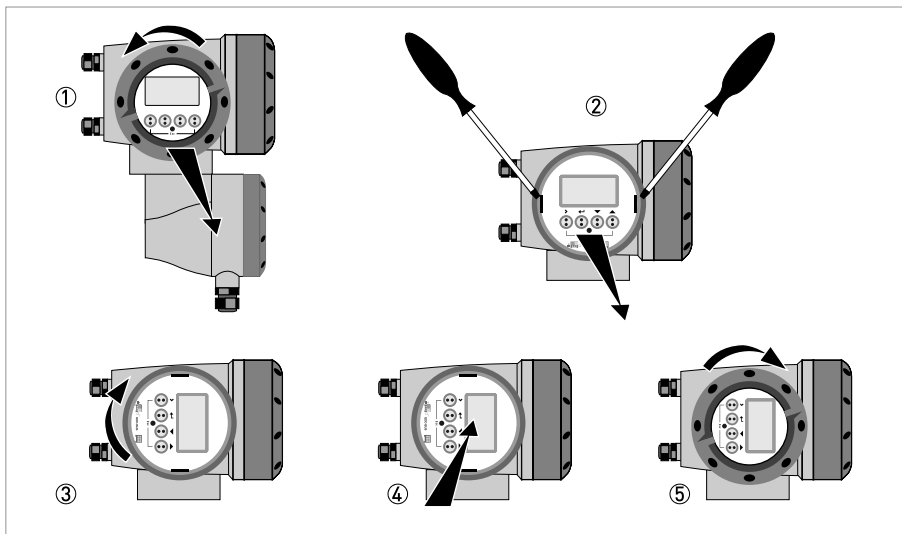


Figure 2-19: Turning the display of the field housing version



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 6 (labeled) inner coax cables for the connection of three acoustic paths.

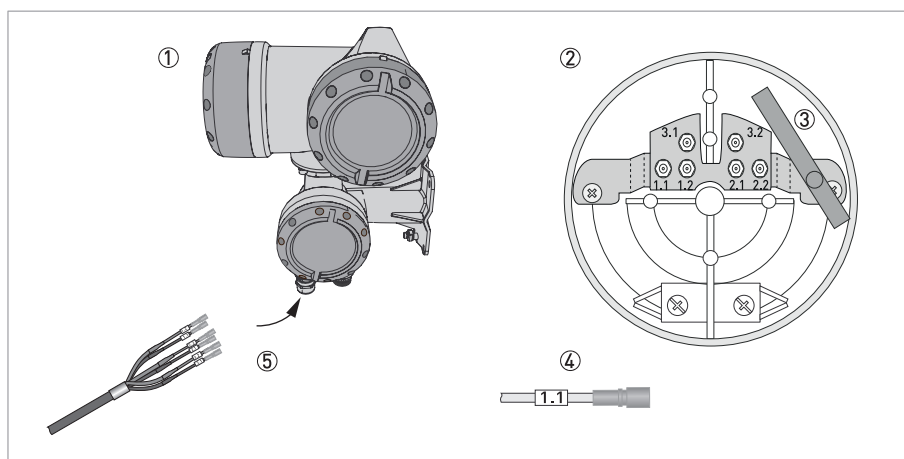


Figure 3-1: Construction of field version

- 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.

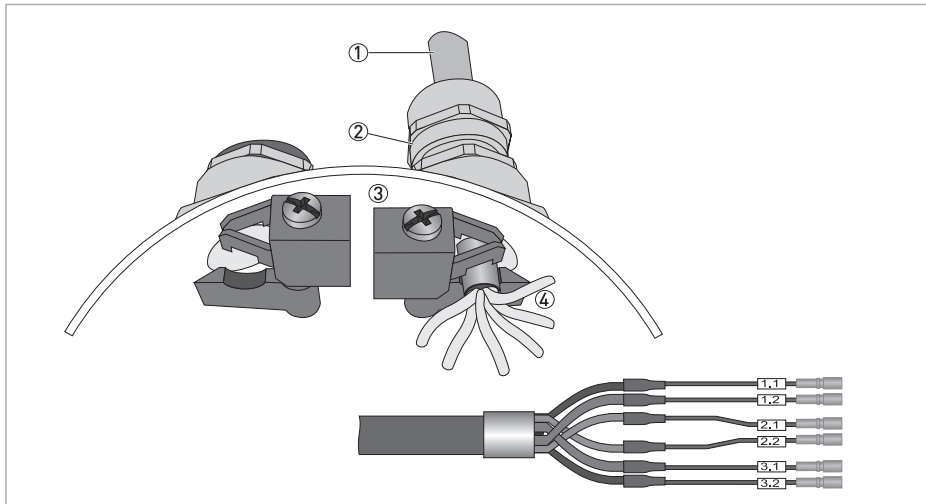


Figure 3-2: Clamp the cables on the shielding bush

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

Electrical connection - Standard version

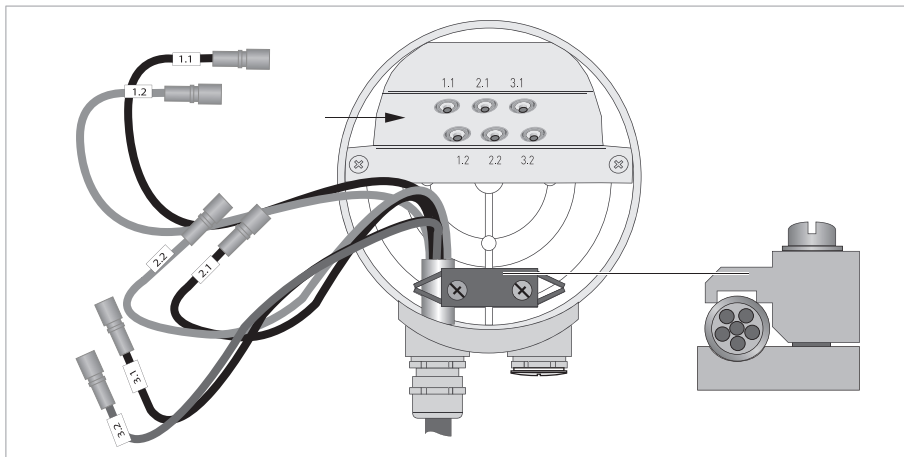


Figure 3-3: Connect the cables in the connection box of the flow sensor

Connection of flow sensor type Cryogenic and XXT

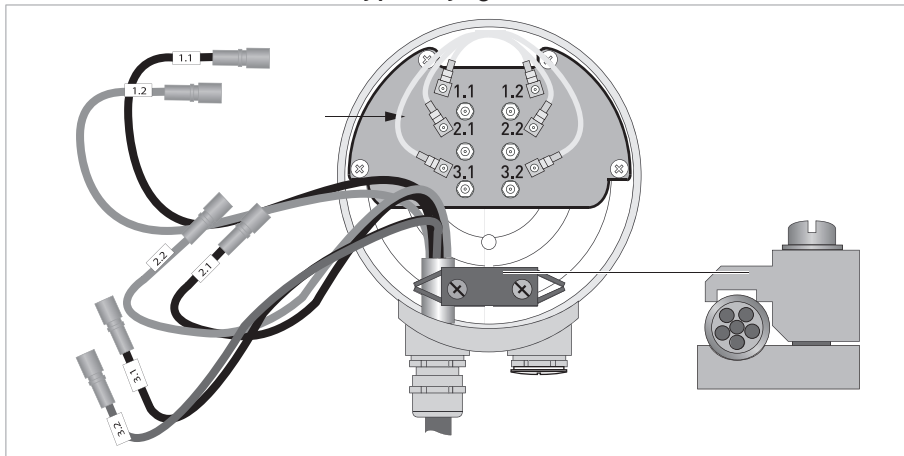


Figure 3-4: Connect the cables in the connection box of the flow sensor



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)



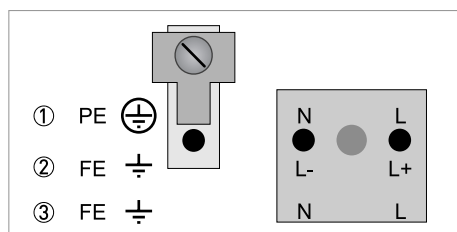
DANGER!

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.

24 VDC (tolerance range: -55% / +30%)**24 VAC/DC (tolerance ranges: AC: -15% / +10%; DC: -25% / +30%)**

- Note the data on the nameplate!
- For measurement process reasons, a functional ground **FE** must be connected to the separate U-clamp terminal in the terminal compartment of the signal converter.
- When connecting to functional extra-low voltages, provide a facility for protective separation (PELV) (acc. to VDE 0100 / VDE 0106 and/or IEC 364 / IEC 536 or relevant national regulations).

**INFORMATION!**

For 24 VDC, 12 VDC-10% is included in the tolerance range.

3.4 Laying electrical cables correctly

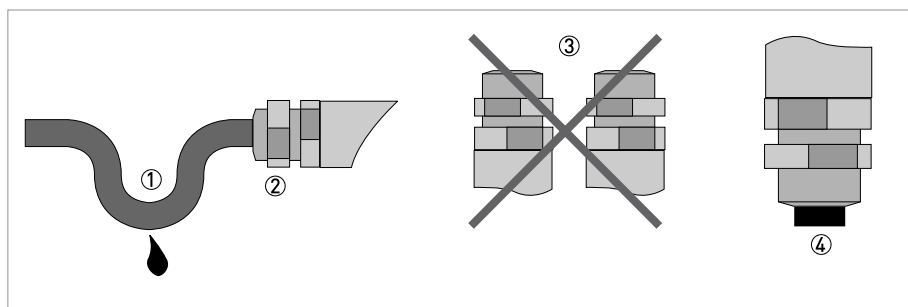


Figure 3-5: Protect housing from dust and water



- 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 i version

- Depending on the task, the device can be configured with various output modules.
- Current outputs can be active or passive.
- Optionally available also with Foundation Fieldbus and Profibus PA

Modular version

- Depending on the task, the device can be configured with various output modules.

Bus systems

- The device allows intrinsically safe and non intrinsically safe bus interfaces in combination with additional modules.
- For connection and operation of bus systems, please note the separate documentation.

Ex option

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

3.5.2 Description of the CG number



Figure 3-6: 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.

Examples for CG number

CG 350 x1 100	100...230 VAC & standard display; basic I/O: I _a or I _p & S _p /C _p & S _p & P _p /S _p
CG 350 x1 7FK	100...230 VAC & standard display; modular I/O: I _a & P _N /S _N and optional module P _N /S _N & C _N
CG 350 x1 4EB	24 VDC & standard display; modular I/O: I _a & P _a /S _a and optional module P _p /S _p & I _p

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)
P _N / S _N	F	Passive pulse output, frequency output, status output or limit switch acc. to NAMUR (changeable)
C _a	G	Active control input
C _p	K	Passive control input
C _N	H	Active control input to NAMUR Signal converter monitors cable breaks and short circuits acc. to EN 60947-5-6. Errors indicated on LC display. Error messages possible via status output.
-	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		$I_p + \text{HART}^{\text{®}}$ passive ①	S_p / C_p passive ②	S_p passive	P_p / S_p passive ②
	$I_a + \text{HART}^{\text{®}}$ active ①				

Ex-i in-/outputs (Option)

2 0 0				$I_a + \text{HART}^{\text{®}}$ active	P_N / S_N NAMUR ②
3 0 0				$I_p + \text{HART}^{\text{®}}$ passive	P_N / S_N NAMUR ②
2 1 0		I_a active	P_N / S_N NAMUR C_p passive ②	$I_a + \text{HART}^{\text{®}}$ active	P_N / S_N NAMUR ②
3 1 0		I_a active	P_N / S_N NAMUR C_p passive ②	$I_p + \text{HART}^{\text{®}}$ passive	P_N / S_N NAMUR ②
2 2 0		I_p passive	P_N / S_N NAMUR C_p passive ②	$I_a + \text{HART}^{\text{®}}$ active	P_N / S_N NAMUR ②
3 2 0		I_p passive	P_N / S_N NAMUR C_p passive ②	$I_p + \text{HART}^{\text{®}}$ passive	P_N / S_N NAMUR ②

① Function changed by reconnecting

② Changeable

3.5.4 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.
- Term. = (connection) terminal

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

Modular IOs (option)

4 __		max. 2 optional modules for term. A + B	I _a + HART [®] active	P _a / S _a active ①
8 __		max. 2 optional modules for term. A + B	I _p + HART [®] passive	P _a / S _a active ①
6 __		max. 2 optional modules for term. A + B	I _a + HART [®] active	P _p / S _p passive ①
B __		max. 2 optional modules for term. A + B	I _p + HART [®] passive	P _p / S _p passive ①
7 __		max. 2 optional modules for term. A + B	I _a + HART [®] active	P _N / S _N NAMUR ①
C __		max. 2 optional modules for term. A + B	I _p + HART [®] passive	P _N / S _N NAMUR ①

PROFIBUS PA/DP

D __		max. 2 optional modules for term. A + B	PA+ (2)	PA- (2)	PA+ (1)	PA- (1)
F __		max. 2 optional modules for term. A + B	PA+ (2)	PA- (2)	PA+ (1)	PA- (1)

FOUNDATION Fieldbus (option)

E __		max. 2 optional modules for term. A + B	V/D+ (2)	V/D- (2)	V/D+ (1)	V/D- (1)
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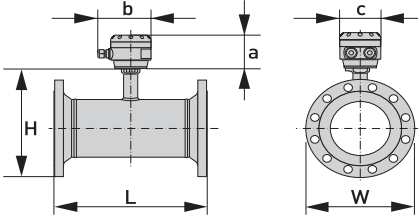
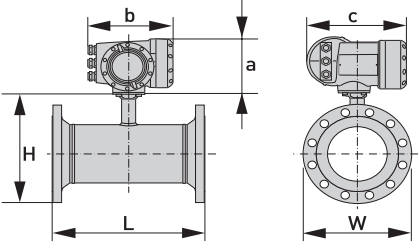
Modbus (option)

G __ ②		max. 2 optional modules for term. A + B		Commo n	Sign. B (D1)	Sign. A (D0)
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① changeable

② not activated bus terminator

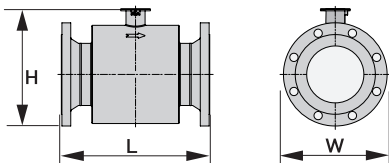
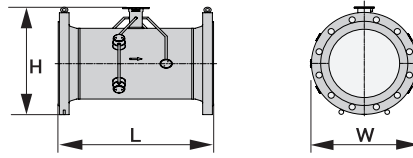
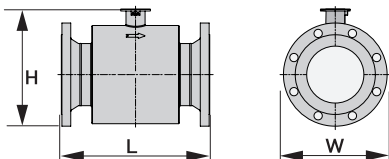
4.1 Dimensions and weights

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 ②</p>
Compact version		<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 ②</p>

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

② The value depends on version

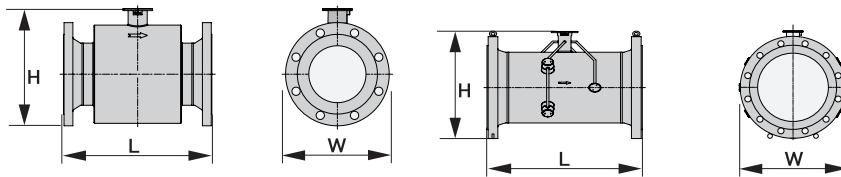
4.2 Variants

Standard version and Extended temperature - High Viscosity - Cryogenic versions; ≤ DN300 / 12"		<p>DIN: L= 250...500 mm / 9.8"...19.7"</p> <p>ANSI: L= 250...500 mm / 9.8"...19.7"</p> <p>* for Cryo - HV - XXT versions; ANSI: L= 250...550 mm / 9.8"...21.7"</p>
Standard version; ≥ DN350 / 14"		<p>DIN: L= 500...600 mm / 19.7"...23.6"</p> <p>ANSI: L= 700...800 mm / 27.6"...31.5"</p>
Extended temperature - High Viscosity - Cryogenic version; ≥ DN350 / 14"		<p>DIN: L= 500...750 mm / 19.7"...29.5"</p> <p>ANSI: L= 700...850 mm / 27.6"...33.5"</p>

For all dimensions and options; see tables on next pages (tables not final)

Note; the cCSA versions (DN25...65 / 1...2.5") are manufactured with a heavy duty neck (SS) which is 3.6 mm / 0.14 inch higher.

4.3 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],					Approx weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
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

EN1092-1; Standard variant - PN25

Nominal size	Dimensions [mm]					Approximate weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
100	350	268	235	102	104	24	23
125	350	297	270	127	130	30	29
150	400	326	300	154	158	37	37
200	400	419	360	207	207	61	61
250	450	479	425	255	255	80	80
300	500	532	485	305	305	102	102
350	500	539	555	330	330	126	126
400	600	596	620	379	379	172	167
450	700	654	670	441	441	199	199
500	700	707	730	488	488	252	252
600	800	817	845	588	588	335	355

EN1092-1; Standard variant - PN16

Nominal size	Dimensions [mm]					Approximate weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
100	350	261	220	102	104	20	19
125	350	287	250	127	130	20	20
150	350	319	285	154	158	30	29
200	400	409	340	207	207	51	47
250	400	469	405	255	255	64	64
300	500	520	460	305	305	84	84

EN1092-1; Standard variant - PN10

Nominal size	Dimensions [mm]					Approximate weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
200	400	409	340	207	207	48	48
250	400	464	395	255	255	55	55
300	500	512	445	305	305	71	71
350	500	517	505	341	341	69	69
400	600	572	565	388	388	90	90
450	600	623	615	441	441	97	101
500	600	674	670	487	487	118	118
600	600	779	780	585	585	157	157

ASME 150 lb Standard variant

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
1	9,8	250	6,0	152	4,3	108	1,1	27	20	9	22	10
1¼	10,2	260	6,3	161	4,6	117	1,4	35	22	10	22	10
1½	10,6	270	6,9	174	5,0	127	1,5 ①	39 ①	26	12	26	12
2	11,8	300	7,4	187	6,0	152	2,1	53	33	15	35	16
2½	11,8	300	8,7	221	7,0	178	2,5	63	42	19	44	20
3	13,8	350	9,2	233	7,5	191	3,1	78	44	20	44	20
4	13,8	350	10,4	265	9,0	229	4,0	102	57	26	60	27
5	13,8	350	11,4	289	10,0	254	5,0	128	71	32	73	33
6	15,7	400	12,4	316	11,0	279	6,1	154	88	40	90	41
8	15,7	400	16,1	408	13,5	343	8,0	203	110	50	108	49
10	19,7	500	18,5	470	16,0	406	10,0	255	161	73	150	68
12	19,7	500	20,9	531	19,0	483	12,0	305	214	97	209	95
14	27,6	700	20,9	531	21,0	533	13,3	337	260	118	249	113
16	31,5	800	23,2	589	23,5	597	15,3	388	342	155	315	143
18	31,5	800	25,0	635	25,0	635	17,2	438	406	184	348	158
20	31,5	800	27,2	692	27,5	699	19,3	489	489	222	448	203
24	31,5	800	31,5	801	32,0	813	23,0 ①	584 ①	761	345	591	268
28	35,4	900	35,8	909	36,5	927	27,1 ①	687 ①	1052	477	-	-
32	39,4	1000	40,4	1027	41,8	1061	30,8 ①	783 ①	1598	725	-	-
36	43,3	1100	39,5	1004	46,0	1168	34,8 ①	884 ①	2006	910	-	-
40	47,2	1200	48,9	1243	50,8	1289	38,6 ①	980 ①	2621	1189	-	-

① Inner Diameter SS differs from CS, consult KROHNE for more information

ASME 300 lb Standard variant

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
1	9,8	250	6,3	160	4,9	124	1,1	27	22	10	24	11
1¼	10,2	260	6,6	169	5,3	133	1,4	35	22	10	22	10
1½	10,6	270	6,9	175	6,1	155	1,6	41	31	14	31	14
2	11,8	300	7,6	194	6,5	165	2,1	53	35	16	37	17
2½	11,8	300	9,0	227	7,5	191	2,5	63	44	20	44	20
3	13,8	350	9,6	243	8,3	210	3,1	78	53	24	55	25
4	15,7	400	10,9	278	10,0	254	4,0	102	79	36	82	37
5	15,7	400	11,9	301	11,0	279	5,0	128	97	44	99	45
6	17,7	450	13,2	335	12,5	318	6,1	154	128	58	130	59
8	17,7	450	16,8	427	15,0	381	8,0	203	190	86	179	81
10	19,7	500	19,2	489	17,5	445	9.7 ①	248 ①	280	127	256	116
12	23,6	600	21,4	544	20,5	521	11.8 ①	299 ①	421	191	388	176
14	27,6	700	22,0	560	23,0	584	13.1 ①	333 ①	489	222	467	212
16	31,5	800	24,3	617	25,5	648	15,0	381	688	312	642	291
18	31,5	800	26,5	674	28,0	711	16,5 ①	419 ①	882	400	811	368
20	31,5	800	28,8	731	30,5	775	18,4 ①	467 ①	1065	483	955	433
24	31,5	800	33,5	852	36,0	914	22,1 ①	560 ①	1537	697	1413	641

① Inner Diameter SS differs from CS, consult KROHNE for more information

ASME 600 lb Standard variant

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
1	10,6	270	6,3	160	4,9	124	1,1	27	24	11	24	11
1¼	10,6	270	6,6	169	5,3	133	1,4	35	24	11	24	11
1½	11,4	290	7,4	189	6,1	155	1,5 ①	39 ①	33	15	33	15
2	13,0	330	7,6	194	6,5	165	2,1	53	40	18	40	18
2½	13,0	330	9,0	227	7,5	191	2,5	63	51	23	51	23
3	15,7	400	9,6	243	8,3	210	2,9	74	62	28	64	29
4	15,7	400	11,3	287	10,8	273	3,6 ①	92 ①	110	50	108	49
5	19,7	500	12,9	327	13,0	330	4,8	122	172	78	174	79
6	19,7	500	13,9	354	14,0	356	5,5 ①	140 ①	223	101	216	98
8	19,7	500	17,6	446	16,5	419	7,6	194	298	135	302	137
10	23,6	600	20,5	521	20,0	508	9,6	243	527	239	487	221
12	23,6	600	23,0	583	22,0	559	11,4	289	628	285	586	266
14	27,6	700	22,4	569	23,8	603	12,1 ①	308 ①	767	348	714	324
16	31,5	800	25,0	636	27,0	686	13,9 ①	354 ①	1093	496	1010	458
18	31,5	800	27,2	690	29,3	743	15,7 ①	398 ①	1338	607	1210	549
20	35,4	900	29,5	750	32,0	813	17,4 ①	443 ①	1757	797	1601	726
24	35,4	900	34,0	865	37,0	940	20,9 ①	532 ①	2480	1125	2238	1015

① Inner Diameter SS differs from CS, consult KROHNE for more information

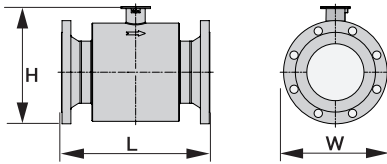
ASME 900 lb Standard variant

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
1	11,8	300	7,2	183	5,9	149	1,1	27	②	②	24	11
1½	11,8	300	7,8	198	7,0	178	1,6	41	②	②	33	15
2	14,6	370	9,0	230	8,5	216	2,1	53	②	②	64	29
3	17,7	450	10,7	271	9,5	241	2,6 ①	67 ①	93	42	95	43
4	17,7	450	12,1	309	11,5	292	3,4 ①	87 ①	143	65	137	62
6	23,6	600	14,9	379	15,0	381	5,2 ①	132 ①	309	140	306	139
8	31,5	800	19,3	490	18,5	470	7,0 ①	178 ①	562	255	540	245
10	31,5	800	22,6	574	21,5	546	9,1 ①	230 ①	772	350	750	340
12	35,4	900	24,6	625	24,0	610	10,8 ①	273 ①	1080	490	1025	465
14	35,4	900	23,2	589	25,2	641	11,8 ①	300 ①	1213	550	1146	520
16	39,4	1000	25,4	646	27,7	705	13,6 ①	344 ①	1565	710	1433	650
18	39,4	1000	28,0	712	31,0	787	15,3 ①	387 ①	2050	930	1940	880
20	43,3	1100	30,4	773	33,8	857	17,0 ①	432 ①	2624	1190	2535	1150
24	51,2	1300	36,1	916	41,0	1041	20,4 ①	518 ①	4718	2140	4475	2030

① Inner Diameter SS differs from CS

② Consult KROHNE for more information

4.4 Variant flow sensor; XXT - High Viscosity and Cryogenic (SS) versions.



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

EN1092-1; Extended temperature - High Viscosity and Cryogenic (SS) version - PN40

Nominal size	Dimensions [mm]					Approx weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
25	250	155	115	27	27	8	8
32	260	156	140	35	35	10	10
40	270	173	150	39	41	11	13
50	300	193	165	53	53	15	16
65	300	203	185	63	63	19	19
80	350	238	200	81	81	17	18
100	350	268	235	104	104	24	23
125	350	297	270	130	130	30	29
150	400	326	300	158	158	37	36
200	500	427	375	207	207	69	69
250	550	492	450	260	260	101	101
300	550	547	515	308	308	137	137

EN1092-1; Extended temperature - High Viscosity and Cryogenic (SS) version - PN25

Nominal size	Dimensions [mm]					Approximate weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
100	350	268	235	104	104	29	29
125	350	297	270	130	130	29	29
150	400	326	300	158	158	38	38
200	500	419	360	207	207	61	61
250	550	479	425	260	259	82	82
300	550	532	485	308	308	108	108
350	600	594	555	338	338	148	148
400	650	652	620	389	389	186	186
450	700	702	670	439	439	223	223
500	750	752	730	488	488	290	290
600	800	857	845	586	586	362	362

EN1092-1; Extended temperature - High Viscosity and Cryogenic (SS) version - PN16

Nominal size	Dimensions [mm]					Approximate weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
100	350	261	220	104	104	23	23
125	350	287	250	130	130	29	29
150	350	319	285	158	158	38	38
200	450	409	340	207	207	49	49
250	500	469	405	260	260	67	68
300	500	520	460	310	310	82	82

EN1092-1; Extended temperature - High Viscosity and Cryogenic (SS) version - PN10

Nominal size	Dimensions [mm]					Approximate weight [kg]	
	DN	L	H	W	Di CS	Di SS	CS
200	450	409	340	207	207	50	50
250	500	512	445	260	260	66	66
300	500	512	445	310	310	75	75
350	500	559	505	342	342	91	91
400	600	594	565	393	393	114	114
450	600	674	615	443	443	130	130
500	650	722	670	494	494	151	151
600	700	824	780	594	594	195	195
700	750	929	895	694	③	280	③
800	900	1039	1015	794	③	380	③
900	900	1137	1115	889	③	469	③
1000	1000	1247	1230	991	③	595	③

③ TBD - Consult KROHNE for more information

ASME 150 lb - Extended temperature - High Viscosity and Cryogenic versions

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
1	9,8	250	6,0	152	4,3	108	1,1	27	20	9	20	9
1¼	10,2	260	6,3	161	4,6	117	1,4	35	24	11	22	10
1½	10,6	270	6,9	174	5,0	127	1,6	41	26	12	24	11
2	11,8	300	7,4	187	6,0	152	2,1	53	33	15	33	15
2½	11,8	300	8,7	221	7,0	178	2,5	63	42	19	42	19
3	13,8	350	9,2	233	7,5	191	3,1	78	44	20	44	20
4	13,8	350	10,4	265	9,0	229	4,0	102	57	26	57	26
5	13,8	350	11,4	289	10,0	254	5,0	128	71	32	71	32
6	15,7	400	12,4	316	11,0	279	6,1	154	88	40	88	40
8	17,7	450	16,1	408	13,5	343	8,0	203	119	54	115	52
10	21,7	550	18,5	470	16,0	406	10,0	255	168	76	159	72
12	21,7	550	20,9	531	19,0	483	12,0	305	216	99	216	99
14	27,6	700	20,9	531	21,0	533	13,3	337	311	141	298	135
16	31,5	800	23,2	589	23,5	597	15,3	388	399	181	373	169
18	31,5	800	25,0	635	25,0	635	17,2	438	470	213	414	188
20	31,5	800	27,2	692	27,5	699	19,3	489	560	254	518	235
24	33,5	850	31,5	801	32,0	813	23,3	591	869	394	692	314
28	35,4	900	37,2	945	36,5	927	27,1 ①	687 ①	1052	527	-	-
32	37,4	950	41,8	1062	41,8	1061	30,8 ①	783 ①	1598	769	-	-
36	41,3	1050	45,8	1163	46,0	1168	34,8 ①	884 ①	2006	963	-	-
40	43,3	1100	50,2	1276	50,8	1289	38,6 ①	980 ①	2621	1225	-	-

① Inner Diameter SS differs from CS, consult KROHNE for more information

ASME 300 lb - Extended temperature - High Viscosity and Cryogenic versions.

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
1	9,8	250	6,3	160	4,9	124	1,1	27	22	10	22	10
1¼	10,2	260	6,6	169	5,3	133	1,4	35	24	11	22	10
1½	10,6	270	6,9	175	6,1	155	1,6	41	31	14	29	13
2	11,8	300	7,6	194	6,5	165	2,1	53	35	16	35	16
2½	11,8	300	9,0	227	7,5	191	2,5	63	44	20	44	20
3	13,8	350	9,6	243	8,3	210	3,1	78	53	24	53	24
4	15,7	400	10,9	278	10,0	254	4,0	102	79	36	79	36
5	15,7	400	11,9	301	11,0	279	5,0	128	97	44	97	44
6	17,7	450	13,2	335	12,5	318	6,1	154	128	58	128	58
8	19,7	500	16,8	427	15,0	381	8,0 ①	203 ①	203	92	187	85
10	21,7	550	19,2	489	17,5	445	9,7 ①	248 ①	288	135	265	120
12	23,6	600	21,4	544	20,5	521	11,8 ①	299 ①	428	194	392	178
14	27,6	700	24,0	609	23,0	584	13,1 ①	333 ①	536	243	518	235
16	31,5	800	26,2	665	25,5	648	15,0	381	699	317	697	316
18	31,5	800	28,4	722	28,0	711	16,5 ①	419 ①	941	427	871	395
20	31,5	800	30,5	774	30,5	775	18,4 ①	467 ①	1131	513	1023	464
24	33,5	850	34,8	884	36,0	914	22,1 ①	560 ①	1658	752	1530	694

① Inner Diameter SS differs from CS, consult KROHNE for more information

ASME 600 lb - Extended temperature - High Viscosity and Cryogenic versions.

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
1	10,6	270	6,3	160	4,9	124	1,1	27	24	11	24	11
1¼	10,6	270	6,6	169	5,3	133	1,4	35	24	11	24	11
1½	11,4	290	7,4	189	6,1	155	1,5 ①	39 ①	33	15	33	15
2	13,0	330	7,6	194	6,5	165	2,1	53	40	18	40	18
2½	13,0	330	9,0	227	7,5	191	2,5	63	51	23	51	23
3	15,7	400	9,6	243	8,3	210	2,9	74	62	28	62	28
4	15,7	400	11,3	287	10,8	273	3,6 ①	92 ①	110	50	108	49
5	19,7	500	12,9	327	13,0	330	4,8	122	172	78	172	78
6	19,7	500	13,9	354	14,0	356	5,5 ①	140 ①	223	101	216	98
8	21,7	550	17,6	446	16,5	419	7,6	194	320	145	313	142
10	25,6	650	20,5	521	20,0	508	9,3 ①	236 ①	536	243	503	228
12	27,6	700	23,0	583	22,0	559	11,1 ①	281 ①	679	308	631	286
14	29,5	750	24,3	618	23,8	603	12,1 ①	308 ①	842	382	789	358
16	31,5	800	26,9	684	27,0	686	13,9 ①	354 ①	1155	524	1074	487
18	33,5	850	29,1	738	29,3	743	15,7 ①	398 ①	1442	654	1307	593
20	35,4	900	31,2	793	32,0	813	17,4 ①	443 ①	1832	831	1682	763
24	37,4	950	35,3	896	37,0	940	20,9 ①	532 ①	2630	1193	2383	1081

① Inner Diameter SS differs from, consult KROHNE for more information

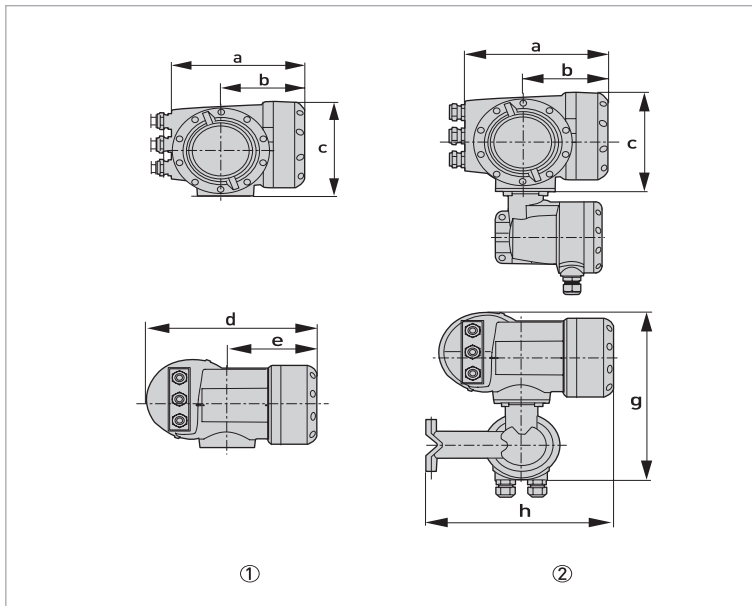
ASME 900 lb - Extended temperature, High Viscosity and *Cryogenic versions.

Nom. size	Dimensions						Inner diameter [Di]		Approximate weight			
	L		H		W		CS / SS ①		CS		SS	
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]	[lb]	[kg]
3	17,7	450	10,7	271	9,5	241	2,6 ①	67 ①	93	42	93	42
4	17,7	450	12,1	309	11,5	292	3,4 ①	87 ①	143	65	141	64
6	23,6	600	14,9	379	15,0	381	5,2 ①	132 ①	309	140	304	138
8	31,5	800	18,6	472	18,5	470	7,0 ①	178 ①	540	245	503	228
10	31,5	800	21,6	550	21,5	546	8,5 ①	216 ①	809	367	756	343
12	35,4	900	24,0	609	24,0	610	10,1 ①	257 ①	1129	512	994	451
14	35,4	900	25,1	637	25,2	641	11,2 ①	284 ①	1303	591	1162	527
16	39,4	1000	27,3	694	27,7	705	13,1 ①	333 ①	1627	738	1517	688
18	39,4	1000	29,9	760	31,0	787	14,9 ①	378 ①	2112	958	2022	917
20	39,4	1000	32,6	828	33,8	857	16,5 ①	419 ①	2599	1179	2399	1088
24	51,2	1300	37,6	955	41,0	1041	19,9 ①	505 ①	4830	2191	4482	2033

① Inner Diameter SS differs from CS, consult KROHNE for more information

*Cryogenic and XXT versions not available for 8"..."24"

4.5 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 product overview

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

Head Office KROHNE Messtechnik GmbH
Ludwig-Krohne-Str. 5
47058 Duisburg (Germany)
Tel.: +49 203 301 0
Fax: +49 203 301 103 89
info@krohne.com

The current list of all KROHNE contacts and addresses can be found at:
www.krohne.com

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