



## OPTISONIC 7300 Technical Datasheet

### Ultrasonic process gas flowmeter

- Large dynamic range (100:1), no pressure loss
- Measures starting from ambient pressure
- Accurate bi-directional measurement, independent of gas composition



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## 1.1 Ultrasonic gas flowmeter for process gases

The **OPTISONIC 7300** offers accurate process gas flow measurement by applying differential transit time technology.

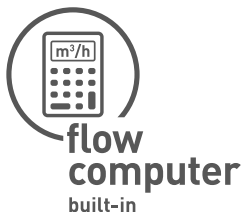
Unlike traditional gas flow technologies, the OPTISONIC 7300 measures with the same accuracy over a large flow range (100:1), independent of gas composition. For example the flowmeter can measure at ambient conditions regardless of the diameter.

Due to the full bore meter body, without any moving parts, the OPTISONIC 7300 does not provide any pressure loss and does not show any drift over time.

The OPTISONIC 7300 consists of an OPTISONIC 7000 flow sensor and a smart GFC 300 signal converter with integrated calculation to standard or normal flow conditions. The flowmeter can be supplied as compact or remote version.



- ① Compact version
- ② Remote flow sensor
- ③ Field signal converter



### Flow computer built-in

Many KROHNE flowmeters have a built-in flow computer that compensates for the effects of pressure and temperature on the flow measurement or to convert to standard volume. The OPTISONIC 7300/8300 have analogue input for P & T sensors, the OPTISWIRL 4200 has both integrated. This saves both cost and installation efforts for an external flow computer.

**Highlights**

- Excellent long term stability, no drift over time
- Large flow range (100:1)
- Integrated calculation to standard – or normal flow conditions, using pressure – and temperature measurement
- Independent of gas composition and changing gas conditions
- Maintenance free full bore flow sensor

**Industries**

- Oil & Gas
  - Natural gas production
  - Natural gas transport, storage and distribution
- Chemical plants
  - Process gases
  - Inert gases
  - Fuel/waste gases
- Petrochemical plants and refineries
  - Atmospheric distillation units
  - Gas processing units
- Energy and power plants
  - Natural gas fired plants

**Applications**

- Non-custody transfer natural gas measurement (in production, transport and distribution)
- Natural gas measurement for industrial consumption
- Hydrocarbon gases
- Hydrogen and hydrogen mixtures
- Inert industrial gases
- Fuel/waste gas
- Compressed air
- Low pressure steam

## 1.2 Options and variants



The **OPTISONIC 7300** is a single (2" / DN50 and 3" / DN80) or dual path (≥ 4" / DN150) ultrasonic gas flowmeter designed to measure a large range of gases and gas mixtures.

The usage of patented transducer technology and the availability of multiple transducer types ensures suitability for almost any gas.

The used materials comply to the requirements of the oil and gas industry i.e. NACE MR 175/103.

- Available as compact or remote version
- Standard pressure ratings up to ASME B16.5: 900 lb RF / EN 1092-1: PN 40.  
Higher pressure ratings (up to 2500 lb / PN 400) on request.
- Aluminium or stainless steel GFC 300 signal converter – compact or remote
- Dry or air calibration

### GFC 300 signal converter – compact or remote

- Display with 4 optical buttons
- I/O configurations available
- One universal software for all applications
- Monitoring Tool connection



### Online retractable transducers.

By using a retractor the transducers can be exchanged under pressure.

### Redundant design

Fitting of multiple flowsensors in one spoolpiece.

### Process connections

Buttweld, hub or API flange connections are available on request.



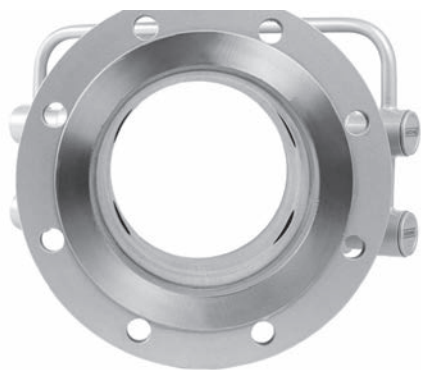
### 1.3 Features



#### **Transducer design**

With the patented design of the transducers, the OPTISONIC 7300 offers a superior application range. This design allows for a larger flow [-30...30 m/s / -100...100 ft/s] and diameter range [2" / DN50 up to 40" / DN1000].

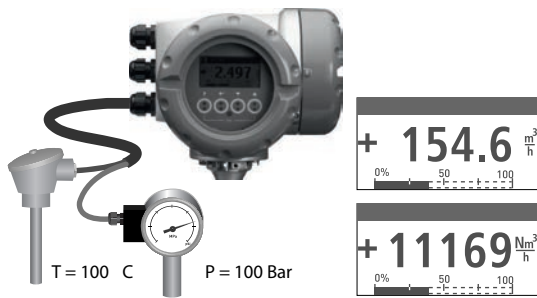
In addition the flow measurements are independent of pressure and temperature and gas composition.



#### **Full bore unobstructed flow sensor**

The OPTISONIC 7300 combines the advantages of ultrasonic flow measurement (free of maintenance, no recalibrations, free of obstructions and no moving parts) with a design that is dedicated for the process industry.

For applications in the process industry this combination offers the optimum value in both operational as in investment costs.



### Integrated calculation to standard or normal flow conditions

Gas flow is typically measured in standard units.

The GFC 300 signal converter can be equipped with two current inputs for pressure and temperature measurement.

If these inputs are used, the GFC 300 signal converter calculates volume flow to standard or normal flow conditions.

### Diagnostics

Because of the differential transit time technology, diagnostic information is available for free.

Diagnostic information provides information about the health of the instrument and can be utilised to verify/validate its measurement performance.

Also it provides insight about what is happening in the process e.g. pollution in the gas or changes in the gas composition.



### Features on request

- Retractable transducers
- Redundant design
- High pressure design

## 1.4 Measuring principle

- Like canoes crossing a river, acoustic signals are transmitted and received along a diagonal measuring path.
- A sound wave going downstream with the flow travels faster than a sound wave going upstream against the flow.
- The difference in-transit time is directly proportional to the mean flow velocity of the medium.

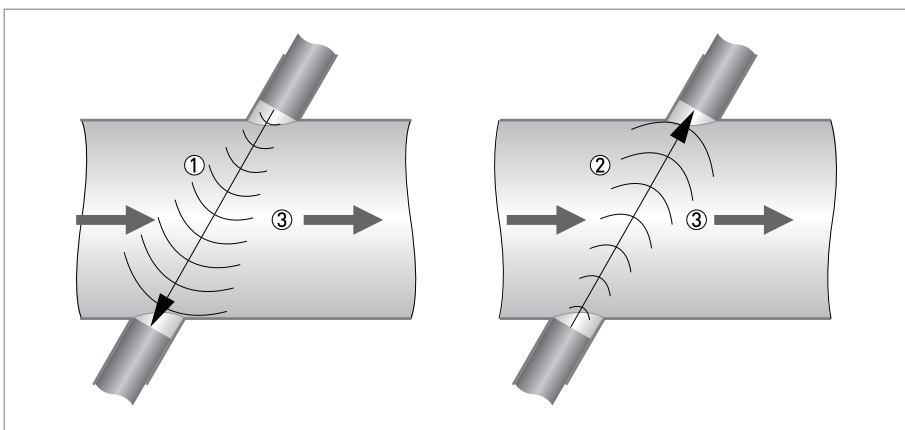


Figure 1-1: Measuring principle

- ① Sound wave against the flow direction
- ② Sound wave with the flow direction
- ③ Flow direction



## 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 sales office.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).*

### Measuring system

Measuring principle	Ultrasonic transit time
Application range	Flow measurement of process gases
<b>Measured value</b>	
Primary measured value	Transit time
Secondary measured values	Volume flow, corrected volume flow, mass flow, molar mass, flow speed, flow direction, velocity of sound, gain, signal to noise ratio, reliability of flow measurement, totalised volume or mass, methane fraction.

### Design

Features	1 or 2 parallel acoustic path(s), fully welded flow sensor with O-ring fitted transducers.
Modular construction	The measuring system consists of a flow sensor and a signal converter.
Compact version	OPTISONIC 7300 C
Remote version	OPTISONIC 7000 F flow sensor with GFC 300 signal converter
Nominal diameter	1 path: DN50...80 / 2...3"
	2 paths: DN100...600 / 4...24"
	Larger diameters on request.
Measuring range	0.3... 30 m/s / 1... 100 ft/s (bi-directional)
<b>Signal converter</b>	
Outputs / inputs	Current output (including HART®), pulse output, frequency output and/or status output, limit switch and/or control input, current inputs (depending on the I/O version)
Counters	2 internal counters with a max. of 8 counter places (e.g. for counting volume and/or mass units).
Self diagnostics	Integrated verification, diagnostic functions: flowmeter, process, measured values, bargraph, device configuration, etc.
Communication interfaces	HART® 5, Foundation Fieldbus, Modbus RS 485

Display and user interface	
Graphic display	LC display, backlit white.
	Size: 128 x 64 pixels, corresponds to 59 x 31 mm = 2.32" x 1.22"
	Display can be rotated in 90° increments.
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Operating elements	4 optical buttons for operator control of the signal converter without opening the housing.
	Infrared interface for reading and writing all parameters with IR interface (option) without opening the housing.
Remote control	PACTware™ (including Device Type Manager (DTM))
	HART® Hand Held Communicator from Emerson Process
	AMS® from Emerson Process
	PDM® from Siemens
	All DTMs and drivers are available free of charge from the manufacturer's website.
Display functions	
Operating menu	Setting the parameters using 2 measured value pages, 1 status page, 1 graphics page (measured values and graphics are freely adjustable)
Language of display texts	English, French, German, Russian
Measurement functions	<b>Units:</b> Metric, British and US units selectable as desired from lists for volume/mass flow and counting, velocity, temperature
	<b>Measured values:</b> volume flow, corrected volume flow, mass flow, flow speed, velocity of sound, gain, signal to noise ratio, flow direction, diagnostics

### Measuring accuracy

Dry calibration (standard)	DN100...600 / 4...24": < ± 2% of actual measured flow rate, for 1...30 m/s (3...100 ft/s) < ± 20 mm/s for 0.3...1 m/s (1...3 ft/s)
	DN50...80 / 2...3": < ± 3% of actual measured flow rate, for 1...30 m/s (3...100 ft/s) < ± 30 mm/s for 0.3...1 m/s (1...3 ft/s)
Air calibration (option)	
Reference conditions	Medium: Air
	Temperature: +20°C / +68°F
	Pressure: 1 bara / 14.5 psia
	Reynold > 10000
Inlet section: 20 DN (for ≤ DN80 / 3"); 10 DN ( for ≥ DN100 / 4")	
Maximum measuring error	DN100...600 / 4...24": < ± 1% of actual measured flow rate, for 1...30 m/s (3...100 ft/s) < ± 10 mm/s for 0.3...1 m/s (1...3 ft/s)
	DN50...80 / 2...3": < ± 1.5% of actual measured flow rate, for 1...30 m/s (3...100 ft/s) < ± 15 mm/s for 0.3...1 m/s (1...3 ft/s)
Repeatability	1 path: ± 0.3%; 2 paths: ± 0.2%

## Operating conditions

Temperature	
Process temperature	Compact version: -40...+125°C / -40...+257°F -40...+180°C / -40...+356°F, max. ambient temperature: 40°C / 104°F
	Remote version: -40...+180°C / -40...+356°F, for Ex versions max. ambient temperature may be derated, see Ex manual for details
Carbon steel flanges according to EN 1092-1, min. process temperature: -10°C / +14°F	
Carbon steel flanges according to ASME, min. process temperature: -29°C / -20°F	
FFKM transducer O-rings, min. process temperature: -20°C / -4°F	
Ambient temperature	Flow sensor: -40...+70°C / -40...+158°F
	Converter with aluminum housing: -40...+65°C / -40...+149°F
	Converter with a stainless steel housing: -40...+60°C / -40...+131°F
	Ambient temperatures below -25°C / -13°F may affect the readability of the display.
Protect the signal converter from external heat sources such as direct sunlight, as higher temperatures reduce the life cycle of all electronic components.	
Storage temperature	-50...+70°C / -58...+158°F
Pressure	
All sensor designs at full rating according to below flange standards for standard materials.	
Max. pressure limited by transducer	Titanium G7.01: 150 barg / 2175 psia
	Titanium G7.04: 100 barg / 1465 psia
	Duplex/composite G6.01: 431 barg / 6266 psia
	Duplex/composite G6.02: 270 barg / 3930 psia
	Inconel 625, grade 1 G11.04: 75 barg / 1102 psia
EN 1092-1	DN50...80: PN 40
	DN100...150: PN 16
	DN200...600: PN 10
	Larger diameters and higher pressures on request (up to DN1000: PN 420).
ASME B16.5	2...24": 150 lb RF
	2...24": 300 lb RF
	2...24": 600 lb RF
	2...14": 900 lb RF
	Larger diameters and higher pressure ratings on request (up to 40": 2500 lb).
Properties of medium (other properties on request)	
Physical condition	Process gas, single phase
Density	Standard: 10...45 g/mol / 1...150 kg/m <sup>3</sup> / 0.062...9.36 lb/ft <sup>3</sup>
	<b>Extended</b> (may impose limitations on other specifications): 2...80 g/mol / 0.2...250 kg/m <sup>3</sup> / 0.012...15.6 lb/ft <sup>3</sup>

**Installation conditions**

Installation	For detailed information refer to <i>Installation</i> on page 28.
Inlet section (minimum)	DN50...80 / 2...3", 1 path: 20 DN (straight inlet)
	DN100...600 / 4...24", 2 paths: 10 DN (straight inlet)
	Larger in and outlet section will improve the stability of the measurement.
Outlet section	Minimal 3 DN (straight outlet)
Dimensions and weight	For detailed information refer to <i>Dimensions and weight</i> on page 21.

**Materials**

<b>Flow sensor</b>	
Flanges (wetted)	Standard: carbon steel ASTM A105 N
	Option: stainless steel AISI 316 L, carbon steel A350 LF2
	Other materials on request.
Measuring tube (wetted)	Standard: carbon steel ASTM A106 Gr. B or equivalent
	Option: stainless steel AISI 316 L, carbon steel A333 Gr. 6
	Other materials on request.
Sensor conduits	Stainless steel AISI 316 L / 1.4404
Sensor neck	Stainless steel AISI 316 / 1.4408
Transducer nozzles (wetted)	Stainless steel AISI 316 L / 1.4404
Transducer holders (wetted), incl. caps	Stainless steel AISI 316 L / 1.4404
Transducers (wetted)	Standard: titanium grade 29
	Option: Inconel 625 / Duplex composiet
Transducer O-rings (wetted)	Standard: FKM / FPM
	Option: FFKM / Aflas
Connection box (remote version only)	Standard: die-cast aluminium, standard coated (stainless steel for Ex version)
	Option: stainless steel AISI 316 / 1.4408
Coating (flow sensor)	Standard coating
	Option: Offshore coating
NACE conformity	For standard range, all wetted materials are conform NACE MR0175.
<b>Signal converter</b>	
Housing	Compact version: housing in aluminium or stainless steel 316 / 1.4408
	Remote version: housing in aluminium or stainless steel 316 / 1.4408
	Console: stainless steel 316 / 1.4408
Coating (converter housing)	Standard coating

### Electrical connections

General	Electrical connection is carried out in conformity with the VDE 0100 directive "Regulations for electrical power installations with line voltages up to 1000 V" or equivalent national specifications.
Power supply	Standard: 100...230 VAC (-15% / +10%), 50/60 Hz
	Option: 24 VDC (-55% / +30%) 24 VAC/DC (AC: -15% / +10%; DC: -25% / +30%)
Power consumption	AC: 22 VA
	DC: 12 W
Signal cable (remote version only)	Shielded cable with 2 triax cores, 1 cable per path: Ø 10.6 mm / 0.4"
	Class 1 Div1/2: single coax cables for fitting in conduit (2 per acoustic path)
	5 m / 16 ft
	Option: 10...30 m / 33...98 ft
Cable entries	Standard: M20 x 1.5
	Option: adapters for 1/2 NPT, PF 1/2 adapter

Inputs and outputs

General	All in-and outputs are galvanically isolated from each other and from all other circuits.		
	All operating data and output values can be adjusted.		
Description of used abbreviations	$V_{ext}$ = external voltage; $R_L$ = load + resistance; $V_0$ = terminal voltage; $I_{nom}$ = nominal current  Safety limit values (Ex i): $V_i$ = max. input voltage; $I_i$ = max. input current; $P_i$ = max. input power rating; $C_i$ = max. input capacity; $L_i$ = max. input inductivity		
<b>Current output</b>			
Output data	Measurement of volume flow, corr. volume flow, mass flow, molar mass, flow speed, velocity of sound, gain, diagnostics 1, 2, 3, HART® communication.		
Temperature coefficient	Typically $\pm 30$ ppm/K		
Settings	<b>Without HART®</b>		
	Q = 0%: 0...15 mA		
	Q = 100%: 10...20 mA		
	Error identification: 3...22 mA		
	<b>With HART®</b>		
	Q = 0%: 4...15 mA		
	Q = 100%: 10...20 mA		
	Error identification: 3.5...22 mA		
Operating data	<b>Basic I/Os</b>	<b>Modular I/Os</b>	<b>Ex i I/Os</b>
Active	$V_{int, nom} = 24$ VDC  $I \leq 22$ mA  $R_L \leq 1$ k $\Omega$		$V_{int, nom} = 20$ VDC  $I \leq 22$ mA  $R_L \leq 450$ $\Omega$  $V_0 = 21$ V $I_0 = 90$ mA $P_0 = 0.5$ W $C_0 = 90$ nF / $L_0 = 2$ mH $C_0 = 110$ nF / $L_0 = 0.5$ mH Linear characteristics
	Passive	$V_{ext} \leq 32$ VDC  $I \leq 22$ mA  $V_0 \geq 1.8$ V  $R_L \leq (V_{ext} - V_0) / I_{max}$	

<b>HART®</b>			
Description	HART® protocol via active and passive current output		
	HART® version: 5		
	Universal HART® parameter: completely integrated		
Load	≥ 230 Ω at HART® test point; Note maximum load for current output!		
Multi-Drop operation	Yes, current output = 4 mA		
	Multi-Drop address adjustable in operation menu 1...15		
Device drivers	Available for FC 375/475, AMS, PDM, FDT/DTM		
<b>Pulse output or frequency output</b>			
Output data	Volume flow, corr. volume flow, mass flow		
Function	Adjustable as pulse or frequency output		
Pulse rate/frequency	Adjustable final value: 0.01...10000 pulse/s or Hz		
Settings	Pulses per volume or mass unit or max. frequency for 100% flow		
	Pulse width: setting automatic, symmetric or fixed (0.05...2000 ms)		
Operating data	<b>Basic I/Os</b>	<b>Modular I/Os</b>	<b>Ex i I/Os</b>
Active	-	$V_{nom} = 24 \text{ VDC}$ $f_{max}$ in operating menu set to $f_{max} \leq 100 \text{ Hz}$ : $I \leq 20 \text{ mA}$  open: $I \leq 0.05 \text{ mA}$  closed: $V_{0, nom} = 24 \text{ V}$ at $I = 20 \text{ mA}$	-
		$f_{max}$ in operating menu set to $100 \text{ Hz} < f_{max} \leq 10 \text{ kHz}$ : $I \leq 20 \text{ mA}$  open: $I \leq 0.05 \text{ mA}$  closed: $V_{0, nom} = 22.5 \text{ V}$ at $I = 1 \text{ mA}$ $V_{0, nom} = 21.5 \text{ V}$ at $I = 10 \text{ mA}$ $V_{0, nom} = 19 \text{ V}$ at $I = 20 \text{ mA}$	

Passive	$V_{ext} \leq 32 \text{ VDC}$		-
	$f_{max}$ in operating menu set to $f_{max} \leq 100 \text{ Hz}$ : $I \leq 100 \text{ mA}$  $R_{L, max} = 47 \text{ k}\Omega$ $R_{L, min} = (V_{ext} - V_0) / I_{max}$  open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$  closed: $V_{0, max} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $V_{0, max} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$		
	$f_{max}$ in operating menu set to $100 \text{ Hz} < f_{max} \leq 10 \text{ kHz}$ : $I \leq 20 \text{ mA}$  $R_{L, max} = 47 \text{ k}\Omega$ $R_{L, min} = (V_{ext} - V_0) / I_{max}$  open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$  closed: $V_{0, max} = 1.5 \text{ V}$ at $I \leq 1 \text{ mA}$ $V_{0, max} = 2.5 \text{ V}$ at $I \leq 10 \text{ mA}$ $V_{0, max} = 5.0 \text{ V}$ at $I \leq 20 \text{ mA}$		
NAMUR	-	Passive to EN 60947-5-6	Passive to EN 60947-5-6
		open: $I_{nom} = 0.6 \text{ mA}$  closed: $I_{nom} = 3.8 \text{ mA}$	open: $I_{nom} = 0.43 \text{ mA}$  closed: $I_{nom} = 4.5 \text{ mA}$  $V_i = 30 \text{ V}$ $I_j = 100 \text{ mA}$ $P_j = 1 \text{ W}$ $C_j = 10 \text{ nF}$ $L_j \sim 0 \text{ mH}$



<b>Status output / limit switch</b>			
Function and settings	Adjustable as automatic measuring range conversion, display of flow direction, overflow, error, switching point		
	Valve control with activated dosing function		
Operating data	Basic I/Os	Modular I/Os	Ex i I/Os
Active	-	$V_{int} = 24 \text{ VDC}$ $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $V_{0, nom} = 24 \text{ V}$ at $I = 20 \text{ mA}$	-
Passive	$V_{ext} \leq 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ $R_{L, max} = 47 \text{ k}\Omega$ $R_{L, min} = (V_{ext} - V_0) / I_{max}$ open: $I \leq 0.05 \text{ mA}$ at $V_{ext} = 32 \text{ VDC}$ closed: $V_{0, max} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $V_{0, max} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$	$V_{ext} = 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ $R_{L, max} = 47 \text{ k}\Omega$ $R_{L, min} = (V_{ext} - V_0) / I_{max}$ open: $I \leq 0.05 \text{ mA}$ at $V_{ext} = 32 \text{ VDC}$ closed: $V_{0, max} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $V_{0, max} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$	-
NAMUR	-	Passive to EN 60947-5-6 open: $I_{nom} = 0.6 \text{ mA}$ closed: $I_{nom} = 3.8 \text{ mA}$	Passive to EN 60947-5-6 open: $I_{nom} = 0.43 \text{ mA}$ closed: $I_{nom} = 4.5 \text{ mA}$ $V_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i = 0 \text{ mH}$

Control input			
Function	Hold value of the outputs (e.g. for cleaning work), set value of the outputs to "zero", counter and error reset, stop counter, range conversion, zero calibration		
	Start of dosing when dosing function is activated.		
Operating data	Basic I/Os	Modular I/Os	Ex i I/Os
Active	-	$V_{int} = 24 \text{ VDC}$ Ext. contact open: $V_{0, nom} = 22 \text{ V}$ Ext. contact closed: $I_{nom} = 4 \text{ mA}$ Contact closed (on): $V_0 \geq 12 \text{ V}$ at $I_{nom} = 1.9 \text{ mA}$ Contact open (off): $V_0 \leq 10 \text{ V}$ at $I_{nom} = 1.9 \text{ mA}$	-
Passive	$8 \text{ V} \leq V_{ext} \leq 32 \text{ VDC}$ $I_{max} = 6.5 \text{ mA}$ at $V_{ext} \leq 24 \text{ VDC}$ $I_{max} = 8.2 \text{ mA}$ at $V_{ext} \leq 32 \text{ VDC}$ Contact closed (on): $V_0 \geq 8 \text{ V}$ at $I_{nom} = 2.8 \text{ mA}$ Contact open (off): $V_0 \leq 2.5 \text{ V}$ at $I_{nom} = 0.4 \text{ mA}$	$3 \text{ V} \leq V_{ext} \leq 32 \text{ VDC}$ $I_{max} = 9.5 \text{ mA}$ at $V_{ext} \leq 24 \text{ V}$ $I_{max} = 9.5 \text{ mA}$ at $V_{ext} \leq 32 \text{ V}$ Contact closed (on): $V_0 \geq 3 \text{ V}$ at $I_{nom} = 1.9 \text{ mA}$ Contact open (off): $V_0 \leq 2.5 \text{ V}$ at $I_{nom} = 1.9 \text{ mA}$	$V_{ext} \leq 32 \text{ VDC}$ $I \leq 6 \text{ mA}$ at $V_{ext} = 24 \text{ V}$ $I \leq 6.6 \text{ mA}$ at $V_{ext} = 32 \text{ V}$ On: $V_0 \geq 5.5 \text{ V}$ at $I \geq 4 \text{ mA}$ Off: $V_0 \leq 3.5 \text{ V}$ at $I \leq 0.5 \text{ mA}$ $V_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i = 0 \text{ mH}$
NAMUR	-	Active to EN 60947-5-6 Terminals open: $V_{0, nom} = 8.7 \text{ V}$ Contact closed (on): $V_{0, nom} = 6.3 \text{ V}$ at $I_{nom} > 1.9 \text{ mA}$ Contact open (off): $V_{0, nom} = 6.3 \text{ V}$ at $I_{nom} < 1.9 \text{ mA}$ Detection for open terminals: $V_0 \geq 8.1 \text{ V}$ at $I \leq 0.1 \text{ mA}$ Detection of cable short circuit: $V_0 \leq 1.2 \text{ V}$ at $I \geq 6.7 \text{ mA}$	-

Current input (Modular I/O)			
Function	A connected external sensor delivers the values (temperature, pressure or current) to the current input.		
Operating data	Basic I/Os	Modular I/Os	Ex i I/Os
Active	-	$V_{int, nom} = 24 \text{ VDC}$ $I \leq 22 \text{ mA}$ $I_{max} \leq 26 \text{ mA}$ (electronically limited) $V_{0, min} = 19 \text{ V at } I \leq 22 \text{ mA}$  No HART®	$V_{int} = 20 \text{ VDC}$ $I \leq 22 \text{ mA}$ $V_{0, min} = 14 \text{ V at } I \leq 22 \text{ mA}$ No HART®
			$V_0 = 24.1 \text{ V}$ $I_0 = 99 \text{ mA}$ $P_0 = 0.6 \text{ W}$ $C_0 = 75 \text{ nF} / L_0 = 0.5 \text{ mH}$ No HART®
Passive	-	$V_{ext} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $I_{max} \leq 26 \text{ mA}$ (electronically limited) $V_{0, max} = 5 \text{ V at } I \leq 22 \text{ mA}$  No HART®	$V_{ext} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $V_{0, max} = 4 \text{ V at } I \leq 22 \text{ mA}$ No HART®
			$V_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i = 0 \text{ mH}$  No HART®
Current input (Ex i I/O)			
Function	A connected external sensor delivers the values (temperature, pressure or current) to the current input.		
Operating data	Basic I/Os	Modular I/Os	Ex i I/Os
Active	-	-	$V_{int} = 20 \text{ VDC}$ $I \leq 22 \text{ mA}$ $V_{0, min} = 14 \text{ V at } I \leq 22 \text{ mA}$ No HART®
			$V_0 = 24.1 \text{ V}$ $I_0 = 99 \text{ mA}$ $P_0 = 0.6 \text{ W}$ $C_0 = 45 \text{ nF} / 110 \text{ nF}$ $L_0 = 2.0 \text{ mH} / 0.2 \text{ mH}$ No HART®

FOUNDATION Fieldbus	
Description	Galvanically isolated according to IEC 61158
	Current consumption: 10.5 mA
	Permissible bus voltage: 9...32 V; in Ex application: 9...24 V
	Bus interface with integrated reverse polarity protection
	Link Master function (LM) supported
	Tested with Interoperable Test Kit (ITK) version 5.2
Function blocks	6 x analogue input (AI), 2 x integrator, 1 x PID, 1 x arithmetic
Output data	Volume flow, corr. volume flow, mass flow, molar mass, enthalpy flow, spec. enthalpy, density, flow speed, process temperature, process pressure, electronic temperature, velocity of sound (av.), gain (av.), SNR (av.), velocity of sound 1-3, gain 1-3, SNR 1-3
Modbus	
Description	Modbus RTU, Master / Slave, RS485
Address range	1...247
Supported function codes	01, 03, 04, 05, 08, 16, 43
Supported Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud

## Approvals and certificates

### CE

This device fulfils the statutory requirements of the relevant directives. The manufacturer certifies successful testing of the product by applying the conformity mark on the device.	
	For more information on the directives, standards and the approved certifications, please refer to the declaration of conformity supplied with the device or downloadable from the manufacturer's website.
Hazardous areas	
Non-Ex	Standard
Ex zone 1 - 2	For detailed information, please refer to the relevant Ex documentation.
	According to European directive 2014/34/EU / UK-Regulation 2016 No. 1107
IECEX	OPTISONIC 7300 C: IECEx KIWA 18.0004X
	OPTISONIC 7000 F: IECEx KIWA 18.0004X and GFC 300 F: IECEx KIWA 17.0001X
ATEX	OPTISONIC 7300 C: KIWA 18ATEX0005X
	OPTISONIC 7000 F: KIWA 18ATEX0005X and GFC 300 F: KIWA 17ATEX0002X
Class 1, Division 1/2	cQPSus LR 1338-6R1 / LR 1338-11
NEPSI	OPTISONIC 7300 C: GYJ181424X
	OPTISONIC 7000 F / GFC 300: GYJ181425X
Other standards and approvals	
Ingress protection according to IEC 60529	<b>Signal converter</b>
	Compact version (C): IP66/67, NEMA 4X/6
	Field version (F): IP66/67, NEMA 4X/6
	<b>All flow sensors</b>
	IP66/67, NEMA 4/4X/6
NAMUR	NE 21, NE 43, NE 53, NE 80
Shock resistance	IEC 60068-2-27
	f = 20...2000 Hz, rms = 30g, t = 18min
Vibration resistance	IEC 60068-2-64; 1g up to 2000 Hz
	IEC 60721; 10g

## 2.2 Dimensions and weight

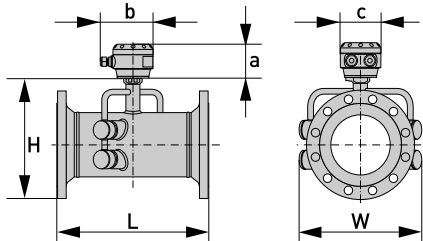
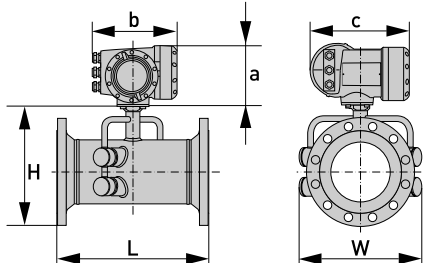
Remote version		<p>a = 88 mm / 3.5"</p> <p>b = 139 mm / 5.5" ①</p> <p>c = 106 mm / 4.2"</p>
Compact version		<p>a = 155 mm / 6.1"</p> <p>b = 230 mm / 9.1" ①</p> <p>c = 260 mm / 10.2"</p> <p>Total height = H + a</p>

Table 2-1: Dimension and weight

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

2.2.1 Flow sensor in carbon steel

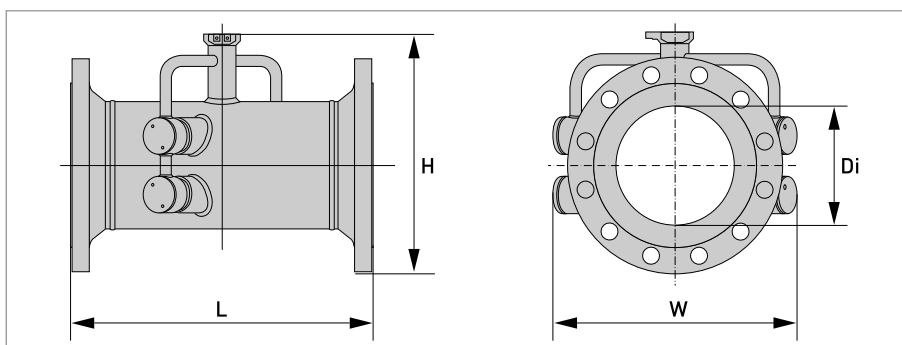


Figure 2-1: Dimensions of flow sensor

EN 1092-1

Nominal size		Dimensions [mm]				Approx. weight [kg]
DN	PN [bar]	L	H	W	Di ①	
200	PN 10	460	368	429	207	46
250	PN 10	530	423	474	261	66
300	PN 10	580	473	517	310	81
350	PN 10	610	519	542	341	109
400	PN 10	640	575	583	392	141
450	PN 10	620	625	623	442	170
500	PN 10	670	678	670	493	202
600	PN 10	790	784	780	593	278

Table 2-2: Dimensions and weight in mm and kg

① Di = inner diameter at flange face. Inner tube diameter may be smaller.

PN 16

Nominal size		Dimensions [mm]				Approx. weight [kg]
DN	PN [bar]	L	H	W	Di ①	
100	PN 16	490	254	337	107	24
125	PN 16	520	283	359	133	32
150	PN 16	540	315	387	159	35

Table 2-3: Dimensions and weight in mm and kg

① Di = inner diameter at flange face. Inner tube diameter may be smaller.

## PN 40

Nominal size		Dimensions [mm]				Approx. weight [kg]
DN	PN [bar]	L	H	W	Di <sup>①</sup>	
50	PN 40	320	196	300	54.5	11
65	PN 40	350	216	313	70.3	14
80	PN 40	480	230	324	82.5	19

Table 2-4: Dimensions and weight in mm and kg

① Di = inner diameter at flange face. Inner tube diameter may be smaller.

## ASME 150 lb

Nominal size	Dimensions								Approx. weight	
	L		H		W		Di <sup>①</sup>			
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]
2"	14.2	360	7.5	190	11.8	300	2.1	53	22	10
2½"	15.0	380	8.3	210	12.2	310	2.5	63	33	15
3"	20.5	520	8.9	226	12.8	324	3.1	78	44	20
4"	21.7	550	10.1	258	13.3	337	4.0	102	64	29
5"	23.2	590	11.2	285	14.1	364	5.1	128	84	38
6"	24.4	620	12.2	312	15.2	387	6.1	154	90	41
8"	21.2	540	14.5	369	16.9	429	8.1	206	130	59
10"	24.0	610	16.9	428	18.7	474	10.3	260	185	84
12"	26.4	670	19.4	492	20.4	512	12.2	311	266	121
14"	28.7	730	21.0	534	21.3	540	13.4	340	352	160
16"	30.3	770	23.3	591	23.5	597	15.4	391	462	210
18"	30.7	780	25.0	635	25.0	635	17.5	441	570	259
20"	32.7	830	27.3	693	27.5	699	19.3	489	607	304
24"	35.8	910	31.5	801	32.0	813	23.3	591	904	411

Table 2-5: Dimensions and weight in inch / mm and lb / kg

① Di = inner diameter at flange face. Inner tube diameter may be smaller.

ASME 300 lb

Nominal size	Dimensions								Approx. weight	
	L		H		W		Di ①			
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]
2"	15.0	380	7.7	196	11.8	300	2.1	53	27	12
2.5"	15.4	390	8.5	217	12.2	310	2.5	63	38	17
3"	21.3	540	9.3	235	12.8	324	3.1	78	53	24
4"	22.4	570	10.7	271	13.3	337	4.0	102	86	39
5"	24.0	610	11.7	298	14.1	364	5.1	128	115	52
6"	25.2	640	13.0	331	15.0	387	6.1	154	146	66
8"	22.0	560	15.3	388	16.6	429	8.0	203	207	94
10"	25.2	640	17.6	448	18.3	474	10.0	255	309	140
12"	28.0	710	20.1	511	20.5	521	11.9	303	452	205
14"	29.9	760	22.0	559	23.0	584	13.1	333	609	276
16"	31.9	810	24.3	616	25.5	648	15.0	381	785	356
18"	33.1	840	26.5	673	28.0	711	16.9	428	926	420
20"	36.6	930	28.8	731	30.5	775	18.8	478	1237	561
24"	38.2	970	33.5	851	36.0	914	22.6	575	1715	778

Table 2-6: Dimensions and weight in inch / mm and lb / kg

① Di = inner diameter at flange face. Inner tube diameter may be smaller.

ASME 600 lb

Nominal size	Dimensions								Approx. weight	
	L		H		W		Di ①			
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]
2"	15.7	400	7.7	196	11.5	300	1.9	49	33	15
2.5"	16.1	410	8.5	217	12.0	310	2.3	59	44	20
3"	22.0	560	9.3	235	12.5	324	2.9	74	66	30
4"	24.4	620	11.1	281	13.1	337	3.8	97	119	54
5"	26.0	660	12.7	323	14.1	359	4.8	122	183	83
6"	27.2	690	13.8	350	15.0	374	5.8	146	223	101
8"	24.4	620	16.1	408	16.5	421	7.6	194	333	151
10"	27.2	690	18.3	479	20.0	508	9.6	243	531	241
12"	28.3	720	20.9	530	22.0	559	11.4	289	655	297
14"	29.9	760	22.4	568	23.7	603	12.5	317	798	362
16"	32.7	830	25.0	635	27.0	686	14.3	364	1105	501
18"	34.6	880	27.1	689	29.3	743	16.1	409	1389	630
20"	35.4	900	29.5	750	32.0	813	17.9	456	1695	769
24"	38.2	970	34.0	864	37.0	640	21.6	548	2438	1106

Table 2-7: Dimensions and weight in inch / mm and lb / kg

① Di = inner diameter at flange face. Inner tube diameter may be smaller.



## ASME 900 lb

Nominal size	Dimensions								Approx. weight	
	L		H		W		Di <sup>①</sup>			
	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[lb]	[kg]
2"	17.7	450	8.7	222	11.5	300	1.7	43	64	29
2.5"	18.1	460	9.6	244	12.0	310	2.3	59	86	39
3"	23.6	600	9.9	251	12.5	324	2.6	67	119	54
4"	26.8	640	11.4	290	13.0	337	3.4	87	157	71
5"	26.8	680	12.6	333	13.7	359	4.6	116	240	109
6"	28.7	730	14.3	363	15.0	381	5.5	140	335	152
8"	26.8	680	17.0	433	18.5	470	7.2	183	545	247
10"	29.9	760	19.6	498	21.5	546	9.1	230	838	380
12"	31.9	810	21.9	556	24.0	610	10.7	273	1168	530
14"	33.9	860	23.1	588	25.2	641	11.8	300	1382	627

Table 2-8: Dimensions and weight in inch / mm and lb / kg

① Di = inner diameter at flange face. Inner tube diameter may be smaller.

2.2.2 Signal converter housing

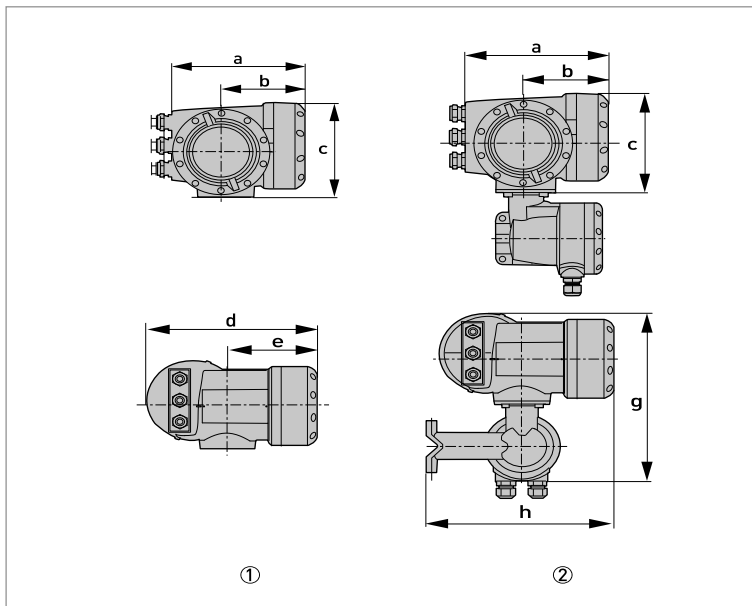


Figure 2-2: Dimensions of signal converter housing

- ① Compact version (C)
- ② Field housing (F) - remote version

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

Table 2-9: Dimensions and weight in mm and kg

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

Table 2-10: Dimensions and weight in inch and lb

*The weight of a field stainless steel converter housing is 14 kg / 30.9 lb*

### 2.2.3 Mounting plate of field housing

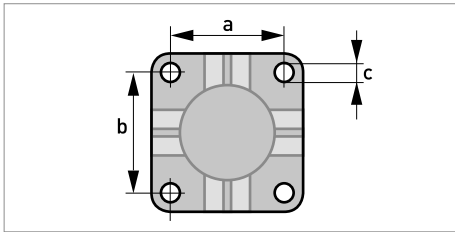


Figure 2-3: Dimensions for mounting plate of field housing

	[mm]	[inch]
a	72	2.8
b	72	2.8
c	Ø9	Ø0.4

Table 2-11: Dimensions in mm and inch

### 3.1 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 **OPTISONIC 7300** is designed exclusively for bi-directional measurement of process gases in closed completely filled pipeline circuits. Excess of contaminations (moisture, particles, 2 phases) disturb the acoustic signal and must be avoided.

The overall functionality of the gas flowmeter is the continuous measurement of actual volume flow, corrected volume flow, mass flow, molar mass, flow speed, velocity of sound, gain, SNR and diagnosis value.

### 3.2 General notes on installation

*Inspect the packaging 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.*

### 3.3 General requirements

*The following precautions must be taken to ensure a reliable installation.*

- *Make sure that there is adequate space on the sides.*
- *Protect the signal converter from direct sunlight and install a sunshade 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 vibrations and mechanical shocks. The measuring devices are tested for a vibration/shock level as described in the chapter "Technical data".*

#### 3.3.1 Vibration

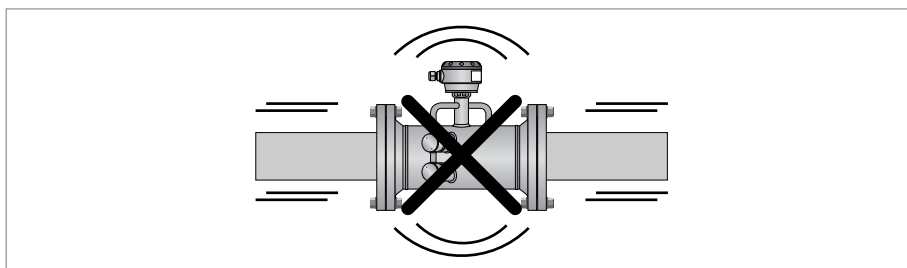


Figure 3-1: Prevent intense vibrations

*In case of too many vibrations, please install supports on both sides of the flowmeter to minimize movement.*

### 3.4 Installation requirements for the flow sensor

To secure the optimum functioning of the flowmeter, please note the following observations.

The OPTISONIC 7300 is designed for the measurement dry gas flow. Excess of liquids may disturb the acoustic signals and should thus be avoided.

The following guidelines should be observed in case occasional small amounts of liquids are to be expected:

- Install the flow sensor in a horizontal position in a slightly descending line.
- Orientate the flow sensor such that the path of the acoustic signal is in the horizontal plane.

For exchanging the transducers, please keep a free space of 1 m / 39" around the transducer.

### 3.5 Installation conditions

#### 3.5.1 Inlet and outlet

##### 1 path flowmeter

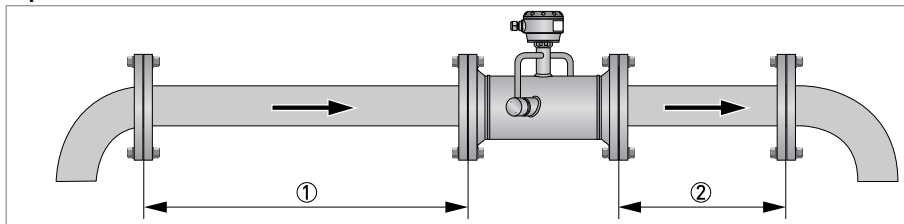


Figure 3-2: Recommended inlet and outlet for  $\leq$  DN80 / 3"

- ① Refer to chapter "Bends in 2 or 3 dimensions"  
 ②  $\geq$  3 DN

##### 2 path flowmeter

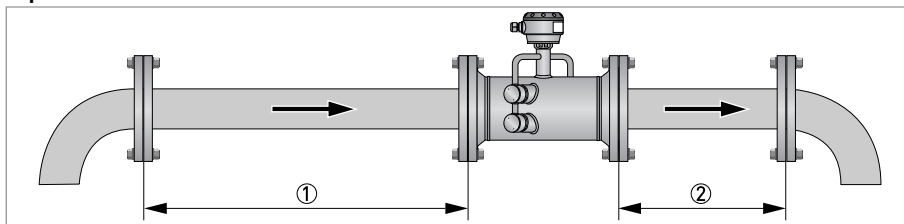


Figure 3-3: Recommended inlet and outlet for  $\geq$  DN100 / 4"

- ① Refer to chapter "Bends in 2 or 3 dimensions"  
 ②  $\geq$  3 DN

3.5.2 Bends in 2 or 3 dimensions

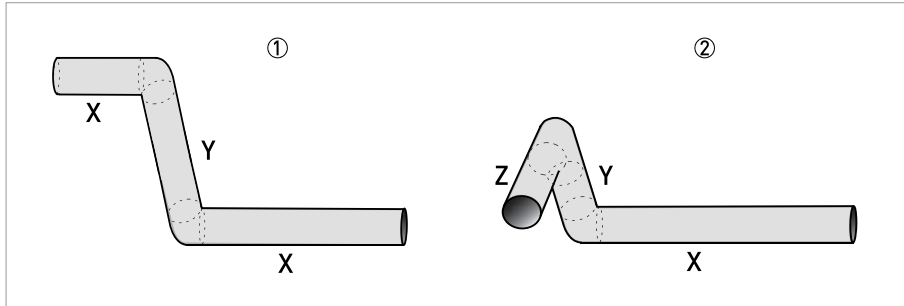


Figure 3-5: 2 and/or 3 dimensional bends upstream of the flowmeter

- ① 2 dimensions = X/Y
- ② 3 dimensions = X/Y/Z

Inlet length:

for 2 path using bends in 2 dimensions:  $\geq 10$  DN; when having bends in 3 dimensions:  $\geq 15$  DN

for 1 path using bends in 2 dimensions:  $\geq 20$  DN; when having bends in 3 dimensions:  $\geq 25$  DN



**INFORMATION!**

2 dimensional bends occur in a vertical **or** horizontal plane (X/Y) only, while 3 dimensional bends occur in both vertical **and** horizontal plane (X/Y/Z).

3.5.3 T-section

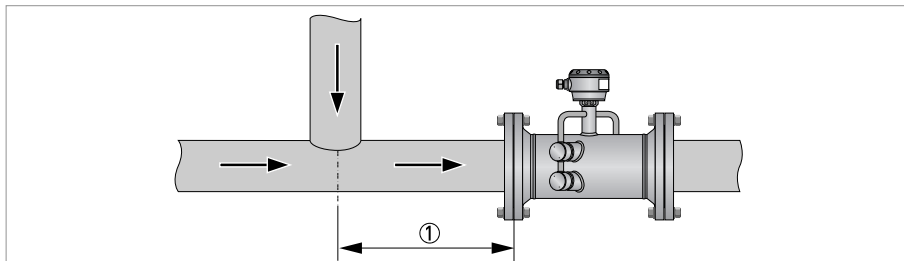


Figure 3-4: Distance behind a T-section

- ① 2 path  $\geq 10$  DN, 1 path  $\geq 20$  DN

### 3.5.4 Control valve

*When a restriction (valve or reducer) is installed in the same pipeline with the flowmeter and noise is expected, please contact the manufacturer.*

To prevent flow disturbances in the flowmeter a control valve is installed downstream of the flowmeter.

If a control valve is installed upstream of the flowmeter position, an extended straight inlet pipe (up to 50 DN) is recommended, depending on the process and control valve type.

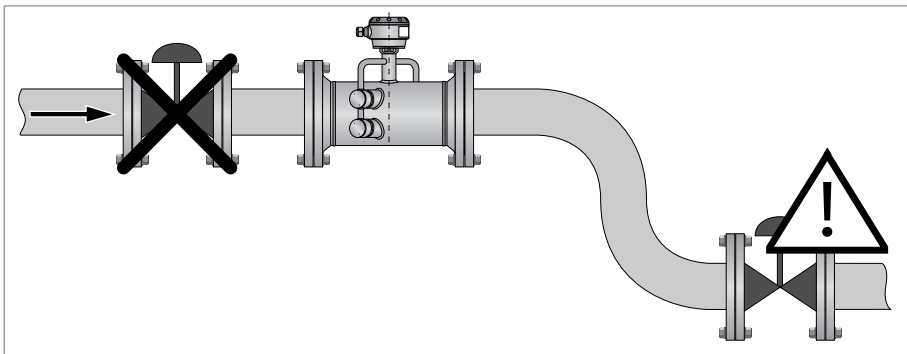


Figure 3-5: Installation of the flowmeter and a valve/reducer in the same pipeline

### 3.5.5 Flange deviation

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

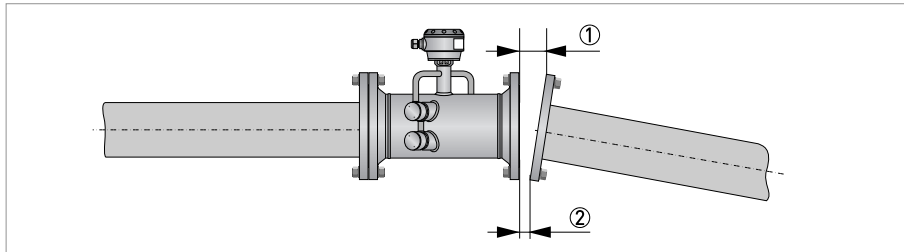


Figure 3-6: Flange deviation

- ①  $L_{max}$
- ②  $L_{min}$

### 3.5.6 Installation position

- Horizontal: install the flow sensor in a horizontal position in case of the presence of liquids.
- Vertically

$$+15^\circ < \alpha < -15^\circ$$

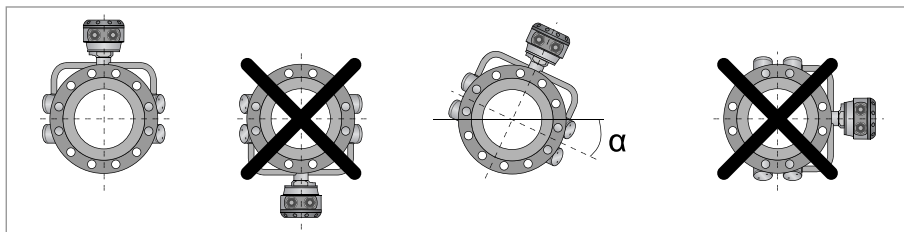


Figure 3-7: Installation position

- Horizontal or vertical: allowed installation position in case of dry gas.

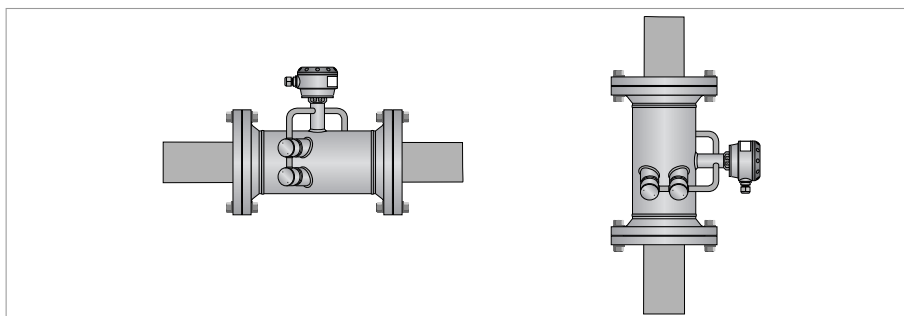


Figure 3-8: Horizontal and vertical installation

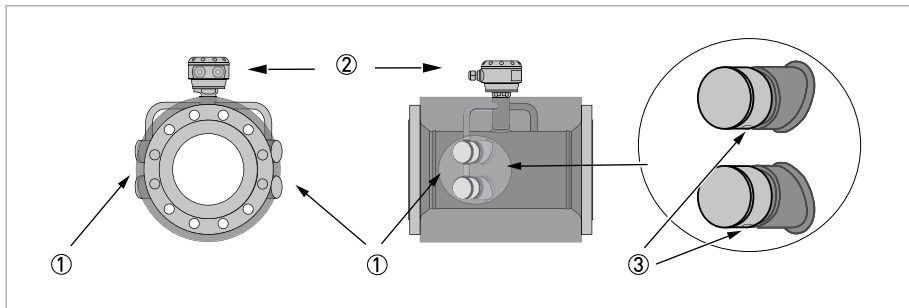


### 3.5.7 Thermal insulation

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

*Always leave vent holes ③ free!*

*The flow sensor can be insulated completely, except for the transducers ① and the connection box ② to allow cooling by free air convection.*



**Figure 3-9: Leave vent holes free**

- ① Transducers
- ② Connection box
- ③ Vent holes

## 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!*

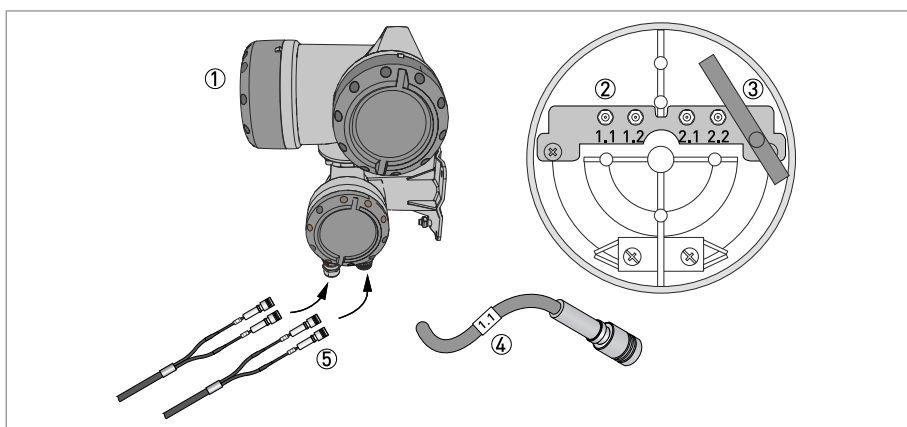
*For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.*

*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 Connection of signal cable to signal converter (remote version only)

The flow sensor is connected to the signal converter via one or two signal cables, with 2 inner Triax cables for the connection of one or two acoustic path(s). A flow sensor with one acoustic path has one cable. A flow sensor with two acoustic paths has two cables.



**Figure 4-1: Connection of signal cable to signal converter**

- ① Signal converter
- ② Open connection box
- ③ Tool for releasing connectors
- ④ Marking on cable
- ⑤ Insert cable [1 path flowmeter] or cables [2 path flowmeter] through cable glands

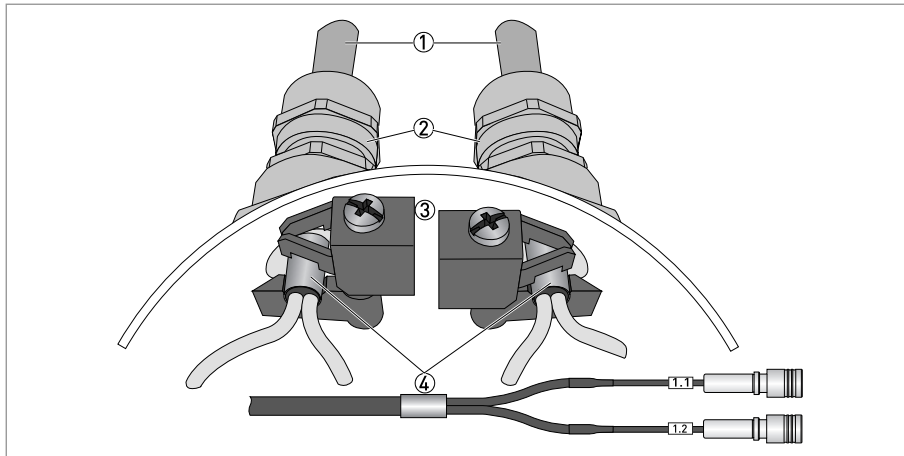


Figure 4-2: Clamp the cables on the shielding bush

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

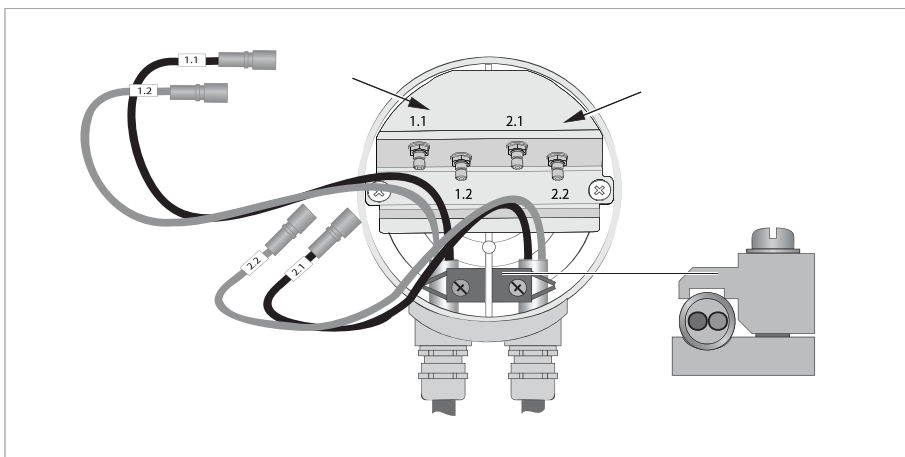


Figure 4-3: Connect the cables in the connection box of the sensor

*Connect the cable on connector with similar numeral marking*

### 4.3 Power supply connection

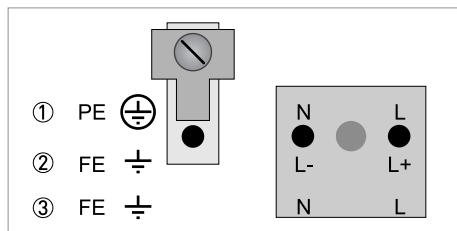
*For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.*

*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)*

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



**Figure 4-4: Power supply connection**

- 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

#### Grounding of remote version

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

For EMC reasons, connect the converter housing to a sufficiently low impedance grounding. If necessary, the external U-clamp (size M5) of the converter housing can be used for this purpose.

**100...230 VAC (tolerance range for 100 VAC: -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

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

**24 VDC (tolerance range: -55% / +30%)****24 VAC/DC (tolerance range: 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) (according to VDE 0100 / VDE 0106 and/or IEC 60364 / IEC 61140 or relevant national regulations)

## 4.4 Input and outputs, overview

### 4.4.1 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 input and output modules.
- Current outputs can be active or passive.
- Current inputs are active.
- Optionally available with Foundation Fieldbus.

#### Modular version

- Depending on the task, the device can be configured with various input and output modules.
- Current inputs and outputs can be active or passive.
- Optionally available with Foundation Fieldbus or RS 485 Modbus.

#### 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 supplementary documentation.

#### Ex option

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

#### 4.4.2 Description of the CG number

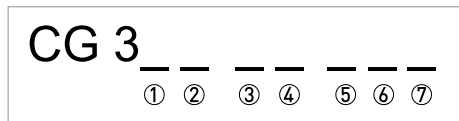


Figure 4-5: Marking (CG number) of the electronics module and input/output variants

- ① ID number: 6
- 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 see the following examples.

#### Examples for CG number

CG 360 11 100	100...230 VAC & standard display; basic I/O: $I_a$ or $I_p$ & $S_p/C_p$ & $S_p$ & $P_p/S_p$
CG 360 11 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 360 81 4EB	24 VDC & standard display; modular I/O: $I_a$ & $P_a/S_a$ and optional module $P_p/S_p$ & $I_p$

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 according 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 according to EN 60947-5-6. Errors indicated on LC display. Error messages possible via status output.
$II n_a$	P	Active current input (for Modular I/O)
$II n_p$	R	Passive current input (for Modular I/O)
$2 \times II n_a$	5	Two active current inputs (for Ex i I/O)
-	8	No additional module installed
-	0	No further module possible

Table 4-1: Description of abbreviations and CG identifier for possible optional modules on terminals A and B

### 4.4.3 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 I/Os (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 I/Os (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
2 3 0		$I I n_a$ active	$P_N / S_N$ NAMUR $C_p$ passive ②	$I_a + \text{HART}^{\text{®}}$ active	$P_N / S_N$ NAMUR ②
3 3 0		$I I n_a$ active	$P_N / S_N$ NAMUR $C_p$ passive ②	$I_p + \text{HART}^{\text{®}}$ passive	$P_N / S_N$ NAMUR ②
2 4 0		$I I n_p$ passive	$P_N / S_N$ NAMUR $C_p$ passive ②	$I_a + \text{HART}^{\text{®}}$ active	$P_N / S_N$ NAMUR ②
3 4 0		$I I n_p$ passive	$P_N / S_N$ NAMUR $C_p$ passive ②	$I_p + \text{HART}^{\text{®}}$ passive	$P_N / S_N$ NAMUR ②
2 5 0		$I I n_a$ active	$I I n_a$ active		

① Function changed by reconnecting

② Changeable



#### 4.4.4 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 <sub>a</sub> + HART® active	P <sub>a</sub> / S <sub>a</sub> active ①
8 __		max. 2 optional modules for term. A + B	I <sub>p</sub> + HART® passive	P <sub>a</sub> / S <sub>a</sub> active ①
6 __		max. 2 optional modules for term. A + B	I <sub>a</sub> + HART® active	P <sub>p</sub> / S <sub>p</sub> passive ①
B __		max. 2 optional modules for term. A + B	I <sub>p</sub> + HART® passive	P <sub>p</sub> / S <sub>p</sub> passive ①
7 __		max. 2 optional modules for term. A + B	I <sub>a</sub> + HART® active	P <sub>N</sub> / S <sub>N</sub> NAMUR ①
C __		max. 2 optional modules for term. A + B	I <sub>p</sub> + HART® passive	P <sub>N</sub> / S <sub>N</sub> NAMUR 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		Common	Sign. B (D1)	Sign. A (D0)
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① Changeable

② Not activated bus terminator

Please fill in this form and fax or email it to your local representative.  
Please include a sketch of the pipe layout as well, including the X, Y, Z dimensions.

**Customer information:**

Date:	
Submitted by:	
Company:	
Address:	
Telephone:	
Fax:	
E-mail:	

**Flow application data:**

Reference information (name, tag etc):	
New application Existing application, currently using:	
Measurement objective:	
<b>Flow application data / Medium</b>	
Gas type / composition:	
CO <sub>2</sub> content:	
CH <sub>4</sub> content:	
H <sub>2</sub> S content:	
Moisture content:	
Density or molecular weight:	
Velocity of sound:	
<b>Flow rate</b>	
Normal:	
Minimum:	
Maximum:	
<b>Temperature</b>	
Normal:	
Minimum:	
Maximum:	
<b>Pressure</b>	
Normal:	
Minimum:	
Maximum:	

**Piping details**

Nominal pipe size:	
Inner / outer diameter:	
Wall thickness / schedule:	
Pipe material:	
Straight inlet / outlet section (DN):	
Upstream situation (elbows, valves, pumps):	
Type of valve or reducer:	
Pressure drop over the valve or reducer:	
Position of the valve or reducer compared to flowmeter:	
Flow orientation (vertical up / horizontal / vertical down / other):	

**Environment details**

Corrosive atmosphere:	
Sea water:	
High humidity (% R.H.)	
Nuclear (radiation):	
Hazardous area:	
Additional details:	

**Hardware requirements:**

Accuracy requested (percentage of rate):	
Power supply (voltage, AC/DC):	
Analogue output (4..20 mA)	
Pulse (specify minimum pulse width, pulse value):	
Digital protocol:	
Options:	
Remote mounted signal converter:	
Specify cable length:	
Accessories:	

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